North Pacific Fishery Management Council

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INITIAL REVIEW DRAFT

Environmental Assessment / Regulatory Impact Review for Proposed Regulatory Amendment to

Adjust the Partial Coverage Observer Fee

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Abstract: This Environmental Assessment/Regulatory Impact Review analyzes proposed management measures that would apply exclusively to the Gulf of Alaska (GOA), Bering Sea and Aleutian Islands (BSAI) groundfish and Pacific halibut (*Hippoglossus stenolepsis*) fisheries. The measures under consideration include adjusting the observer fee that supports deployment of observers and electronic monitoring in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the GOA and BSAI. Under any alternative, the scope of this analysis is limited to changes in the observer fee percentage. The purpose of this action is to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring and fund deployment of electronic monitoring systems.

List of Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
AAC	Alaska Administrative Code
ABC	acceptable biological catch
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COAR	Commercial Operators Annual Report
Council	North Pacific Fishery Management Council
CP	catcher/processor
CV	catcher vessel
DPS	distinct population segment
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	endangered species unit
FMA	Fisheries Monitoring and Analysis
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRFA	Final Regulatory Flexibility Analysis
ft	foot or feet
GOA	Gulf of Alaska
IRFA	Initial Regulatory Flexibility Analysis
IPA	Incentive Plan Agreement
JAM	jeopardy or adverse modification
lb(s)	pound(s)
LEI	long-term effect index
LLP	license limitation program
LOA	length overall
m	meter or meters
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MSST	minimum stock size threshold
t	tonne, or metric ton
NAICS	North American Industry Classification System
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fishery Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPPSD	North Pacific Pelagic Seabird Database
Observer Program	North Pacific Groundfish and Halibut Observer Program
OMB	Office of Management and Budget
PBR	potential biological removal
PSC	prohibited species catch
PPA	Preliminary preferred alternative
PRA	Paperwork Reduction Act
PSEIS	Programmatic Supplemental Environmental Impact Statement
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future action
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SBA	Small Business Act
Secretary	Secretary of Commerce
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
SRKW	Southern Resident killer whales
TAC	total allowable catch
U.S.	United States
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system

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Executive Summary

This document analyzes a proposed regulatory amendment to adjust the observer fee that supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the Gulf of Alaska (GOA) and the Bering Sea and Aleutian Islands (BSAI). In October 2017, the Council initiated this analysis of a potential adjustment to the observer fee. The observer fee supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the GOA and BSAI. This analysis examines potential costs and benefits of raising the observer fee or leaving it at 1.25 percent of ex-vessel values. The alternatives under consideration vary as to whether the observer fee would be levied equally on fishing vessels in the partial coverage category of the North Pacific Observer Program, or whether a fee adjustment would be differentially applied by gear sector. Under any alternative, the scope of this analysis is limited to changes in the observer fee percentage. The deployment of observers and electronic monitoring would continue to be implemented using the current, statistically-reliable, random sampling model as established in the existing annual process for review and planning process.

Data collected by well-trained, independent observers and EM are a cornerstone of management in the Federal fisheries off Alaska. These data are needed by the Council and NMFS to comply with the Magnuson-Stevens Act, the Marine Mammal Protection Act, the Endangered Species Act, and other applicable Federal laws and treaties. Data collected by observers and EM contribute to best available scientific information used to manage fisheries in the North Pacific. Information collected by observers and EM provides a reliable and verifiable method for NMFS to gain information about fish and shellfish intercepted by commercial fisheries, as well as data concerning seabird and marine mammal interactions with commercial vessels. Observers record total catch; composition of catch; species weights, size, and sex; information on bycatch and protected species interactions; and, collect tissue samples.

Current EM systems on fixed-gear vessels record catch events and shore-based EM reviewers enumerate total catch and composition of catch, including bycatch. Managers use observer and EM data in the catch accounting process, to manage groundfish catch and bycatch limits established in regulation and to document fishery interactions with protected resources. Managers also use these catch accounting data to inform the development of management measures that minimize bycatch and reduce fishery interactions with protected resources. Scientists use observer and EM-collected data for stock assessments and marine ecosystem research. Much of this information is expeditiously available (e.g., daily or at the end of a trip, depending on the type of vessel) to ensure effective management.

Starting in 2013, a fee system replaced a pay-as-you-go method in the partial coverage category, where vessel owners directly paid for their observer, as needed to meet regulatory coverage requirements. The fee is to be used to pay the combined costs of stationing observers, or EM equipment, on board fishing vessels and U.S. fish processors and inputting collected data. Through the fees, owners and operators compensate the Federal Government for the costs associated with managing fishery resources.

In 2016-2017, NMFS announced that Federal funding would not be forthcoming for funding at-sea observer coverage, as had occurred during the initial years of implementing the restructured Observer Program, which occurred in 2013. As a result, the 2017 coverage rates were based almost exclusively on monies from the observer fee. While monitoring was still governed by the scientific sampling plan, which accommodates varying levels of coverage, the Council expressed dissatisfaction with deployment selection rates, which were the lowest since 2013. The Council tasked NMFS and the Council's Fishery Monitoring Advisory Committee (FMAC; formerly the Observer Advisory Committee) to consider options to increase partial coverage selection rates, as an alternative to adjusting the observer fee. A paper was prepared by a subgroup of the FMAC during the summer of 2017, which evaluated whether there are short-term options that can be addressed through changes to the Annual Deployment Plan or the Catch Accounting System, and longer-term solutions that may involve regulatory change. The FMAC recommended the Council pursue these short-term options, and only raise the fee as a last resort.

In October 2017, however, the Council opted to initiate this analysis to consider raising the fee. The Council heard from staff that as a best case, initiating an analysis to adjust the fee in October 2017 would not result in changes to fee collection rates (and potentially increased selection rates) until 2021 at the earliest, and it was also reiterated from NMFS that the Council could not rely on continued supplemental Federal funding, despite a one-time allocation that was received for 2018-2019. The Council requested that staff address FMAC recommendations in the analysis to the extent possible, which include developing reference points to inform the scale of measures needed for improving selection rates and continuing to evaluate the effect of integrating electronic monitoring within the partial coverage program.

At the February 2018 Council meeting, the Council adopted a purpose and need statement, and a set of alternatives for analysis. The proposed action alternatives would change the observer coverage fee requirements for vessels in the partial coverage category in GOA and BSAI fisheries. To allow for timely Council consideration of funding needs, the analysis has a narrow scope, focusing on two action alternatives for raising the observer fee in addition to the no-action alternative.

Throughout this analysis, the term 'fishery' is used interchangeably with the terms 'gear' or 'gear type'. In the Magnuson-Stevens Act, Section 313, the fee authority, allows that fees may vary by fishery. Fishery is defined in the Magnuson-Stevens Act as "one or more stocks of fish that can be treated as a unit for purposes of conservation and management and that are identified on the basis of geographic, scientific, technical, recreational, or economic characteristics, or method of catch; or any fishing for such stocks." Alternative 3 of this analysis considers adjusting fee levels by fishery, with further refinement based on the 'method of catch' distinction. 'Method of catch' in this case refers to different types of gear. This analysis does not define an exhaustive list of possible 'methods of catch'. For purposes of this analysis 'method of catch' corresponds to 'fishery,' which in turn corresponds to four gear types in the partial coverage category of the Observer Program: hook-and-line, jig, trawl, and pot.

Purpose and Need

The Council initiated this action in October 2017, and adopted the following purpose and need statement in February 2018:

> *The North Pacific Observer Program (Observer Program) is widely recognized as successful and essential for the management of the North Pacific groundfish and halibut fisheries. The funding and annual planning and review process for monitoring vessels and processors in the partial coverage category are designed to implement a scientifically reliable sampling plan to collect data necessary to manage the commercial groundfish and halibut fisheries. This system distributes the cost of observer coverage across participants in the partial coverage category and provides annual flexibility to evaluate the performance of and improve the sampling plan, in consultation with the Council. Through this process, monitoring selection rates are adjusted*

annually according to the available budget. In addition, the monitoring selection rates may be adjusted in response to fishery management objectives, as funding allows.

The annual process of establishing observer coverage and EM selection rates in the partial coverage category using the Observer Program Annual Report and Draft Annual Deployment Plan is a well-designed, flexible, and legally defensible process. This annual process produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage and can allow for annual consideration of policy-driven monitoring objectives identified through the Council process.

To continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems, additional funding for monitoring in the partial coverage category may be necessary.

Alternatives

The National Environmental Policy Act (NEPA) and the Regulatory Flexibility Act (RFA) are the primary laws directing the preparation of this document for a regulatory amendment. NEPA requires a description of the purpose and need for the proposed action, as well as a description of alternative actions that may address the problem. The specific contents required to satisfy NEPA are integrated throughout the document, which incorporates additional information to more rigorously capture the impacts of the proposed action. The action alternatives were both designed to accomplish the stated purpose and need for the action (see Section 1.1), which is to maintain current levels of observer coverage, fund deployment of electronic monitoring systems, and continue to improve the partial coverage Observer Program.

The Council adopted the following alternatives for analysis in February 2018.

Alternative 1: Status quo. Observer fee of 1.25 percent applies equally to all landings in the partial coverage category.

Alternative 2: Increase the observer fee up to 2 percent (analyze a range), to apply equally to all landings in the partial coverage category.

Alternative 3: Maintain the 1.25 percent observer fee applying equally to all landings in the partial coverage category, and additionally, raise the fee up to 2 percent (analyze a range) by fishery sector (longline, pot, jig, trawl).

Environmental Assessment

The Council and NMFS developed the restructured Observer Program to address longstanding concerns about statistical bias of observer-collected data and cost inequality among fishery participants with the prior Observer Program's deployment and funding structure. Since implementation in 2013, observer deployment has been evaluated regularly. These analyses include the Final Supplemental Environmental Analysis for Restructuring the Program for Observer Procurement and deployment in the North Pacific (SEA, NMFS 2015), annual analysis associated with each Annual Deployment Plan (NMFS 2013-2019), and annually with a report that evaluates the performance of the program under each Annual Deployment Plan (NMFS Annual Reports; 2013-2017).

The sections of this analysis are complimentary and when viewed as such show considerable uncertainty in projecting revenue, which translates into uncertainty in gaps and the money available to meet the hurdle thresholds and allow for optimization. The restructured program made substantial improvements to the representativeness (quality and utility) of the data from that proportion of the fishing population that was contained in the sample. An important problem prior to restructuring was that certain large fisheries

were not required to take observers and thus samples that represented that unique type of fishing could not be obtained.

On an annual basis, NMFS develops an Annual Deployment Plan that describes how NMFS intends to assign at-sea and shoreside fishery observers and electronic monitoring to vessels and processing plants engaged in halibut and groundfish fishing operations in the North Pacific. Each Annual Deployment Plan describes three elements of the sampling design for at-sea deployment of observers and EM in the partial coverage category: 1) the selection method (e.g. vessel or trip) to accomplish random sampling; 2) division of the population of partial coverage trips into selection pools or strata (stratification scheme); and 3) the allocation of deployment trips among strata (allocation strategy). A strength of the ADP process is that strata definitions, risk thresholds, hurdle levels, and optimization can be revisited as needed. Although stability is an important component for the observer program, fisheries change over time and new information can change priorities and scientific understanding. As has occurred in the past (e.g., Table 4), the observer sampling program will likely continue to evolve; however, the current allocation approach of hurdle plus opimization allows some stability in terms of meeting sample collection priorities, while also allowing for specific policy objectives.

The Observer Program improves the utility of observer data by improving the ability of NMFS to deploy observers when and where necessary to improve the quality of observer data and allow for the deployment of observers and the collection of data on vessels that were not covered under the previous program (less than 60 ft LOA groundfish vessels and halibut vessels).

The Observer Program does not increase fishing activity or change the measures currently in place to protect the physical and biological environment. Overall fishing effort, including the spatial and temporal distribution of fishing effort, in the groundfish and halibut fisheries is not expected to change under the alternatives. None of the alternatives affect how, where, or when fishing is conducted. None of the alternatives considered in this analysis would change the management of the fisheries, the location of the fisheries or fishing effort, nor the process used to establish total allocable catches. The action alternatives differ in whether an increase in the fee percentage is assessed equally across all gear sectors or differentially by gear: trawl, H&L, pot, and jig. The changes considered in this action would not cause adverse impacts to the physical or biological environment. Therefore, all potential impacts analyzed in this EA are assumed to be beneficial. No potential impacts on habitat or the ecosystem have been identified.

Regulatory Impact Review

The Regulatory Impact Review (RIR)[1] in Chapter 5 of this analysis examines the benefits and costs of a proposed regulatory amendment to adjust the partial coverage observer fee as part of the North Pacific Fishery Management Council (Council)'s fisheries research plan for monitoring in the partial coverage groundfish and halibut fisheries of the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI). The Council's fisheries research plan is implemented by the Fisheries Monitoring and Analysis Division (FMA) at the National Marine Fisheries Service (NMFS)'s Alaska Fisheries Science Center (AFSC), and its purpose is to collect data necessary for the conservation, management, and scientific understanding of the groundfish and halibut fisheries off Alaska. The observer fee supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the GOA and BSAI.

[1] If the RIR/IRFA is a stand-alone document because the action qualifies for a CE, add this footnote:
"The proposed action has no potential to effect individually or cumulatively on the human environment. The only effects of the action are economic, as analyzed in this RIR/IRFA. As such, it is categorically excluded from the need to prepare an Environmental Assessment."

The RIR considers the expected impacts of maintaining the existing the observer fee, as well as potential impacts of a fee adjustment on vessels, processors (and registered buyers) in the partial coverage category of the Observer Program. The alternatives under consideration vary as to whether the observer fee would be levied equally on fishing vessels in the partial coverage category of the North Pacific Observer Program, or whether a fee adjustment would be differentially applied by gear sector. Under any alternative, the scope of this analysis is limited to changes in the observer fee percentage. The alternatives considered in this analysis would not change the current annual planning process for the deployment of observers and electronic monitoring in the partial coverage category through the Annual Deployment Plan (ADP) process.

To the extent possible this analysis examines changes to the observer fee, holding all else equal. Decisions about deployment will remain part of the ADP process conducted by FMA. The analysis accepts deployment methods in the current ADP as a given constraint and does not produce a recommendation for NMFS concerning deployment. The analysis also accepts current methods for calculating standard prices.

Comparison of Alternatives for Decision Making

This analysis considers raising the partial coverage observer fee to continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems.

Two action alternatives are meant to address this. Alternative 2 would raise the fee to some amount, equally across all fisheries (i.e., gear types). Alternative 3 would raise the fee amount differentially across the fisheries (i.e., gear types) based on fairness. The no action alternative, Alternative 1, would maintain the current level of the fee.

Given trends of decreasing TACs in some fisheries (i.e., Pacific cod and halibut) and uncertainties related to future abundance, effort, and prices, any of the alternatives could result in some phenomenon of accruing lower revenues from the fee than was possible in years past. Analysts have described this phenomenon as "running up the down escalator".

There are many unknowns in this analysis, including future fixed gear EM costs, the potential for EM to be implemented on pollock trawl catcher vessels, and potential contracting changes that could emerge from ongoing cost/coverage efficiencies work by the FMAC partial coverage Subgroup. Additionally, there are a number of potential changes that may occur in the Observer Program in the near future. For example, in December 2018 the Council reviewed an update about observer coverage on vessels delivering to tenders, and decided no change was needed to existing prioritization of analytical projects. Therefore, the Council plans to consider changing the way observer coverage is deployed on vessels delivering to tenders after this fee analysis will have been completed. NMFS is also in the process of finalizing a new observer contract, which may result in changes to existing cost curves (i.e., the marginal cost of an additional observer-day).

Although there is evidence that certain levels of observer coverage reduce the likelihood of undesirable data gaps, there is no simple definition of what a minimum level of observer or EM coverage should be. NMFS has found from studies in Alaska and elsewhere that even at low deployment rates, statistically reliable estimates can be made for nearly all fishing operations. NMFS does not provide a "hard line" or baseline that indicates a single rate that results in the whole observer data collection program failing to collect reliable information. There is not a specific amount of coverage at which NMFS is unable to manage the groundfish fisheries in the BSAI or GOA; rather there are levels of observer coverage at which NMFS may not have data in specific strata or fisheries.

Data quality is a continuum, and a single threshold is not appropriate, nor desired, for such a complicated and diverse program. Instead, the Annual Deployment Plan process provides a risk assessment and information to guide policy decisions about where to reduce the risk of no coverage, rather than a single defining rate where data becomes unreliable (which would only be relative to a specific sampling objective and measure). The flexibility afforded NMFS and the Council through the Annual Deployment Plan process allows the Observer Program to adapt, as new scientific information is available, and to inform future changes in estimation methods that will result in better use of observer data under existing funding levels.

The Council has consistently supported gathering enough data to ensure that certain policy objectives are accomplished. Eight specific policy objectives for the Observer Program previously identified by the Council include:

- Minimizing a "monitoring effect" so data from observed vessels are representative of unobserved vessels
- Improving discard estimates for fishery species, including minimizing variability and reducing gaps in coverage in all strata/reporting areas
- Priority for monitoring PSC
- Detecting species decline or rare events
- Design the program with flexibility to respond to evolving data and management needs in individual fisheries
- Provide for equitable distribution of the burdens of monitoring among fishery participants
- Design the program, to the extent practical, so that the requirement for monitoring does not impact operational choices of vessel operators
- Foster and maintain positive public perception/stakeholder support

Alternative 1 would maintain the current fee level. Under Alternative 1, financial impacts on vessels and processors would be minimized, but this alternative could result in decreasing fee revenues for the partial coverage category or the ability to purchase fewer observer days in the near future. Alternative 2 would increase the fee, impacting vessels and processors, while increasing the relative amount of fee revenue available to the partial coverage category of the Observer Program. Alternative 3 would increase the differentially across fisheries (gear types), taking into account stability and value of each fishery over time, as well as relative coverage needs. Choosing Alternative 3 would constitute a policy shift by the Council to redefine the meaning of equitability as regards the observer fee.

Within the partial coverage category, the higher revenue-producing fisheries (i.e., hook-and-line and pot) have contributed more to fee revenues since 2013, while the relatively lower producing fisheries (i.e., trawl and jig) have been contributing less. Effort and participation in the trawl fisheries are relatively stable over time, while jig is unstable and smaller in scale. There is an ongoing shift taking place between hook-and-line and pot, with decreased effort in hook-and-line compensated by increased effort in pot).

Given the lack of anticipated significant environmental impacts related to this decision (see Chapter 4), the Council might choose to make determinations about the fee at Initial Review based on their own policy goals. The first step in this decision process could be for the Council to consider whether the current system of equal fees across the board is or is not equitable.

1 Introduction

This document analyzes a proposed regulatory amendment to adjust the observer fee that supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the Gulf of Alaska (GOA) and the Bering Sea and Aleutian Islands (BSAI). In October 2017, the Council initiated this analysis of a potential adjustment to the observer fee. The observer fee supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the GOA and BSAI. This analysis examines potential costs and benefits of raising the observer fee or leaving it at 1.25 percent of ex-vessel values. The alternatives under consideration vary as to whether the observer fee would be levied equally on fishing vessels in the partial coverage category of the North Pacific Observer Program, or whether a fee adjustment would be differentially applied by gear sector. Under any alternative, the scope of this analysis is limited to changes in the observer fee percentage. The deployment of observers and electronic monitoring would continue to be implemented using the current, statistically-reliable, random sampling model as established in the existing annual process for review and planning process.

This document is an Environmental Assessment/Regulatory Impact Review (EA/RIR). An EA provides assessments of the environmental impacts of an action and its reasonable alternatives. The RIR is an assessment of the economic benefits and costs of the action alternatives, their distribution, and impacts on directly regulated small entities. This EA/RIR addresses the statutory requirements of the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the National Environmental Policy Act, and Presidential Executive Order 12866. An EA/RIR is a standard document produced by the North Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS) Alaska Region to provide the analytical background for decision-making.

1.1 Purpose and Need

The Council initiated this action in October 2017, and adopted the following purpose and need statement in February 2018 (see Appendix A. Council Motions related to the Fee Analysis, 2017-2018):

> The North Pacific Observer Program (Observer Program) is widely recognized as successful and essential for the management of the North Pacific groundfish and halibut fisheries. The funding and annual planning and review process for monitoring vessels and processors in the partial coverage category are designed to implement a scientifically reliable sampling plan to collect data necessary to manage the commercial groundfish and halibut fisheries. This system distributes the cost of observer coverage across participants in the partial coverage category and provides annual flexibility to evaluate the performance of and improve the sampling plan, in consultation with the Council. Through this process, monitoring selection rates are adjusted annually according to the available budget. In addition, the monitoring selection rates may be adjusted in response to fishery management objectives, as funding allows.
>
> The annual process of establishing observer coverage and EM selection rates in the partial coverage category using the Observer Program Annual Report and Draft Annual Deployment Plan is a well-designed, flexible, and legally defensible process. This annual process produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage and can allow for annual consideration of policy-driven monitoring objectives identified through the Council process.
>
> To continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems, additional funding for monitoring in the partial coverage category may be necessary.

1.2 History of this Action

In 2016-2017, NMFS announced that Federal funding would not be forthcoming for funding at-sea observer coverage, as had occurred during the initial years of implementing the restructured Observer Program, which occurred in 2013. As a result, the 2017 coverage rates were based almost exclusively on monies from the observer fee. While monitoring was still governed by the scientific sampling plan, which accommodates varying levels of coverage, the Council expressed dissatisfaction with deployment selection rates, which were the lowest since 2013. The Council tasked NMFS and the Council's Fishery Monitoring Advisory Committee (FMAC; formerly, the Observer Advisory Committee) to consider options to increase partial coverage selection rates, as an alternative to adjusting the observer fee. A paper was prepared by a subgroup of the FMAC during the summer of 2017, which evaluated whether there are short-term options that can be addressed through changes to the Annual Deployment Plan or the Catch Accounting System, and longer-term solutions that may involve regulatory change. The FMAC recommended the Council pursue these short-term options, and only raise the fee as a last resort.

However, the Council heard from staff that as a best case, initiating an analysis to adjust the fee in October 2017 would not result in changes to fee collection rates (and potentially increased selection rates) until 2021 at the earliest, and it was also reiterated from NMFS that the Council could not rely on continued supplemental Federal funding, despite a one-time allocation that was received for 2018-2019. Therefore, in October 2017, the Council opted to initiate this analysis to consider raising the fee. The Council requested that staff address FMAC recommendations in the analysis to the extent possible, which include developing reference points to inform the scale of measures needed for improving selection rates and continuing to evaluate the effect of integrating electronic monitoring within the partial coverage program.

At the February 2018 Council meeting, the Council adopted a purpose and need statement, and a set of alternatives for analysis. The proposed action alternatives would change the observer coverage fee requirements for vessels in the partial coverage category in GOA and BSAI fisheries. To allow for timely Council consideration of funding needs, the analysis has a narrow scope, focusing on two action alternatives for raising the observer fee in addition to the no-action alternative.

1.3 Description of Management Area

The proposed action affects the fee percentage assessed on landings made by vessels not in the full coverage category of the North Pacific Observer Program. This includes landings made by trawl and fixed gear groundfish and halibut catcher vessels and some small catcher/processors throughout the BSAI and GOA groundfish management areas, and throughout the Alaska halibut management areas (Figure 1).

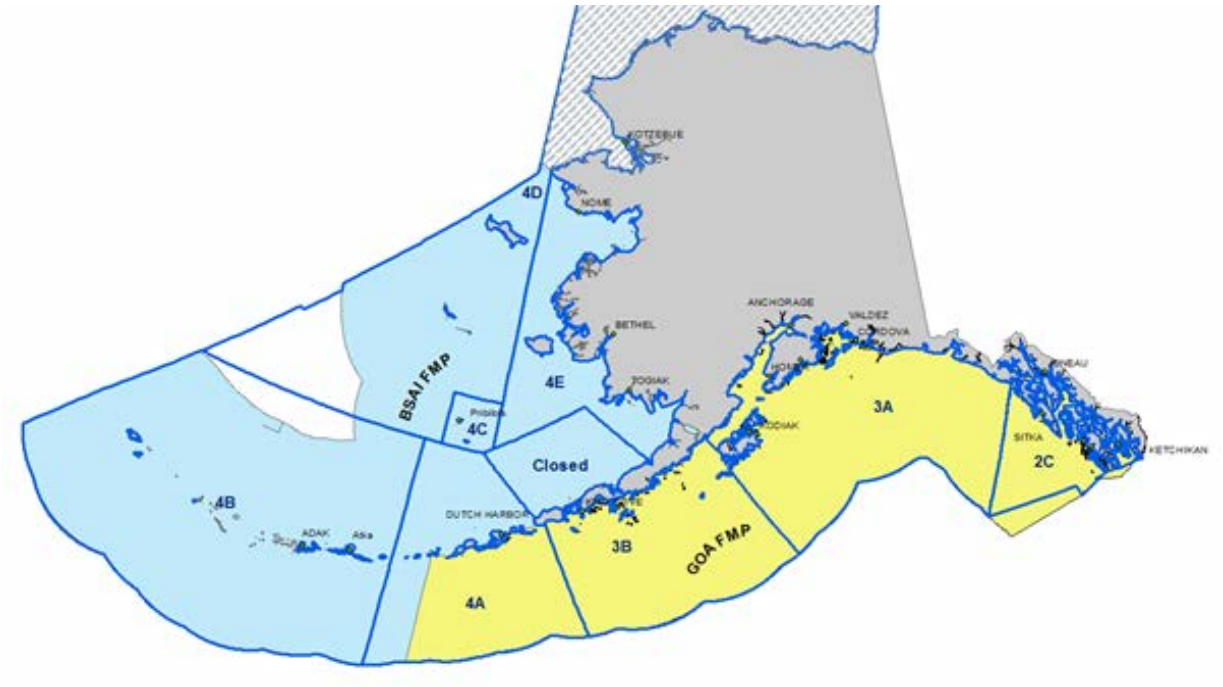


Figure 1 **Regulatory and reporting areas in the BSAI and GOA. Light blue = BSAI Groundfish FMP area, Yellow = GOA Groundfish FMP area, Blue lines delineate IPHC halibut management areas (2C, 3A-B, 4A-E).**

2 Description of Alternatives

The National Environmental Policy Act (NEPA) and the Regulatory Flexibility Act (RFA) are the primary laws directing the preparation of this document for a regulatory amendment. NEPA requires a description of the purpose and need for the proposed action, as well as a description of alternative actions that may address the problem. The specific contents required to satisfy NEPA are integrated throughout the document, which incorporates additional information to more rigorously capture the impacts of the proposed action. The action alternatives were both designed to accomplish the stated purpose and need for the action (see Section 1.1), which is to maintain current levels of observer coverage, fund deployment of electronic monitoring systems, and continue to improve the partial coverage Observer Program.

The Council adopted the following alternatives for analysis in February 2018.

> Alternative 1: Status quo. Observer fee of 1.25 percent applies equally to all landings in the partial coverage category.
>
> Alternative 2: Increase the observer fee up to 2 percent (analyze a range), to apply equally to all landings in the partial coverage category.
>
> Alternative 3: Maintain the 1.25 percent observer fee applying equally to all landings in the partial coverage category, and additionally, raise the fee up to 2 percent (analyze a range) by fishery sector (longline, pot, jig, trawl).

2.1 Alternative 1, No Action

Alternative 1 is a status quo alternative. Status quo refers to the current, restructured Observer Program that has been in place since 2013. Under Alternative 1, a fee equal to 1.25 percent of the ex-vessel value is assessed on the landings of groundfish and halibut subject to the fee. This fee would continue to be levied equally across all landings by vessels in the partial coverage category.

Ex-vessel value would continue to be determined by multiplying the standard price for groundfish for each species or species group, gear category (trawl and non-trawl categories), and port combination by the round weight equivalent for each species or species group. Ex-vessel value for halibut would continue to be determined by multiplying the standard price for halibut for each port by the headed and gutted weight equivalent of the landings. NMFS reviews each landing report and determines whether the reported landing is subject to the observer fee and, if so, which groundfish species in the landing are subject to the observer fee. All IFQ or CDQ halibut are included in the observer fee calculation. For any landed groundfish or halibut subject to the observer fee, NMFS applies the appropriate standard ex-vessel prices for the species, gear type, and port, and calculates the observer fee associated with the landing. The fee is levied on the processors and registered buyers who are expected to split the fee with catcher vessel owners. Under Alternative 1, NMFS would continue to bill processors and registered buyers annually for fees reported on landings in the prior calendar year. NMFS would continue to calculate and publish standard ex-vessel prices for groundfish and halibut species subject to the observer fee, as described in the notice published annually in December (82 FR 60704, December 22, 2017).

Alternative 1 would maintain a consistent and equal financial burden on the fishing fleet (across sectors) based on a consistent percentage fee over time. Consistency in the fee rate may come at the cost of decreased consistency and/or decreased overall magnitude of Observer Program revenues.

2.2 Alternative 2, Adjust the Fee Equally Among Sectors

Under Alternative 2, the observer fee percentage would be increased from the current 1.25 percent, up to potentially the statutory maximum of 2 percent of the ex-vessel value of the landed groundfish and halibut

subject to observer fees. Section 313(d) of the Magnuson-Stevens Act authorizes implementation of a system of fees, based on the gross ex-vessel value of retained groundfish and halibut. This observer fee may not exceed 2 percent of the unprocessed ex-vessel value of fish or shellfish landings and is assessed on all landings subject to observer fees.

This alternative would increase the percent of fees collected from fishermen and processors or registered buyers in the partial coverage category. More specifically, this alternative would increase the percent of fees collected from landings made by vessels not in the full coverage category of the Observer Program, and subject to regulations at §679.55.

Alternative 2 is designed to address the Council's purpose and need, the intent of which is to increase fees such that revenue is available to fund observer coverage at levels which continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems. Under Alternative 2, the same fee percentage would be applied to all fishing sectors in the partial coverage fisheries. This alternative would thus maintain an existing equal distribution of the fee burden across fishing sectors.

Under Alternative 2, the observer fee would continue to be calculated using the same methods as Alternative 1, with the exception that the 1.25 percent fee percentage would be increased, as recommended by the Council. No changes would be made to the method for calculating total ex-vessel value, including annual calculation of standard prices. NMFS would continue to bill processors and registered buyers annually for the fees reported in the previous calendar year.

Alternative 2 would require an amendment to Federal regulations at §679.55(f). This section would be modified to specify the fee percentage as recommended by the Council.

2.3 Alternative 3, Adjust the Fee Variably Among Sectors

Under Alternative 3, all vessels and processors or registered buyers in the partial coverage category would continue to pay at least a 1.25 percent observer fee, as under the status quo. The Council could, however, choose to adjust the observer fee for any fishery sector (vessels using hook-and-line, pot, jig, or trawl gear) above 1.25 percent and up to 2 percent. The fee percentage for each fishery sector could each be set at different percentages. The fee percentage collected from each sector would contribute to the overall fee revenues collected across sectors and would not necessarily be applied exclusively to deploying observers or EM aboard vessels from that sector. Standard prices would continue to be calculated as they are under status quo and published annually in the Federal Register.

In the Magnuson-Stevens Act, Section 313, the fee authority, allows that fees may vary by fishery. Fishery is defined in the Magnuson-Stevens Act as "one or more stocks of fish that can be treated as a unit for purposes of conservation and management and that are identified on the basis of geographic, scientific, technical, recreational, or economic characteristics, or method of catch; or any fishing for such stocks." Alternative 3 of this analysis considers adjusting fee levels by fishery, with further refinement based on the 'method of catch' distinction. 'Method of catch' in this case refers to different types of gear. This analysis does not define an exhaustive list of possible 'methods of catch'. For purposes of this analysis 'method of catch' corresponds to 'fishery,' which in turn corresponds to four gear types in the partial coverage category of the Observer Program: hook-and-line, jig, trawl, and pot.

Alternative 3 emerged from discussions at the FMAC, as a way of considering an option to increase observer fee revenues while distributing costs differently across fisheries. The Council and NMFS have prioritized observer coverage deployment on PSC-limited trawl vessels over that of deployment on hook-and-line, pot, or jig vessels primarily due to interest in prioritizing coverage on vessels that are limited by PSC. However, due to lower average ex-vessel values, the trawl sector pays proportionately less into the overall program than other fishery sectors. Furthermore, PSC catch by trawl vessels imposes costs on

other sectors, leading to the potential that an equal fee percent is not necessarily equitable. Recognizing that this fee analysis will proceed in considering how to increase observer coverage fees to meet needs of NMFS, the FMAC recommended that all sectors should pay a base amount of a 1.25 percent fee, and additional fees could be levied by gear sector to better align fee revenues with consistent deployment priorities.

Since the Observer Program was restructured in 2013, the Council and NMFS have consistently prioritized higher deployment rates on PSC-limited trawl vessels in the partial coverage category. Since 2017, this prioritization has been carried out using a baseline 15 percent hurdle approach (further explained in Section 4.1.2). Under Alternative 3, the costs of increased coverage on vessels limited by PSC (e.g., coverage above the baseline hurdle) could be internalized by those imposing the costs (i.e., the PSC-limited trawl fleet).

The intent of the Council under Alternative 3—as with Alternative 2—would be to increase fees such that revenue is available to fund observer coverage at levels to continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems. Distinct from Alternatives 1 or 2, Alternative 3 would shift the distribution of costs across fishery sectors, based on some metric determined by the Council (possibly based on PSC-limited fisheries), while maintaining flexibility to deploy observer and EM coverage as needed within the partial coverage category. Alternative 3 would provide the opportunity for the Council to consider whether differing fee percentages by fishery might yield more *equitable* distribution of the costs across fishery sectors rather than equal fee percentage for all fishery sectors.

The Council's intent under Alternative 3 would *not* be to ensure that every sector pay its own coverage needs, which might require formulaic changes to the program. Under Alternative 3, the 1.25 percent base fee would be assessed on all landings subject to the observer fee and specific gear sectors may be assessed additional fee percentages. Under this Alternative, the observer fee would continue to be calculated using the same methods as Alternative 1, with the exception that the 1.25 percent fee percentage would be increased for one or more fishery sector(s) (hook-and-line, pot, jig, or trawl gear) as recommended by the Council. No changes would be made to the method for calculating total ex-vessel value, including annual calculation of standard prices. NMFS currently calculates standard prices for trawl and non-trawl gear groups and would continue to use this method for calculating standard prices under Alternative 3. NMFS would continue to bill processors and registered buyers annually for the fees reported in the previous calendar year.

Alternative 3 would require a regulatory amendment at §679.55(f). This section would be modified to specify a fee percentage for each fishery sector as recommended by the Council.

2.4 Comparison of Alternatives

Alternatives 2 and 3, the action alternatives, include changes to the observer fee percentage (Table 1). Under the action alternatives, there would be no change to the rules that determine which vessels are in the partial coverage category versus the full coverage category or which landings are subject to observer fees. There would also be no change to the annual process of establishing observer or EM selection rates in the partial coverage category, through the Annual Deployment Plan. NMFS would continue to consult with the Council to review the annual performance of observer deployment with the Annual Report and development of the Annual Deployment Plan. The action alternatives would not change the process for deploying observers nor the vessel responsibilities relative to carrying an observer or an EM system. No changes to observer data entry equipment or transmission requirements are proposed under any of the alternatives.

Table 1 Summary of alternatives and expected results.

	Alternative 1	Alternative 2	Alternative 3
	Status quo. No action.	Increase the observer fee equally to all landings subject to observer fees	Maintain the 1.25% fee equally for all landings, and consider adjusting the fee up to 2% for individual gear sectors
Fee percentage	1.25%	1.25 – 2.0 %	HAL: 1.25% - 2% Pot: 1.25% - 2% Trawl: 1.25% - 2% Jig: 1.25% - 2%
Standard Price Calculation	Standard prices are calculated for trawl and non-trawl gear sector by port or port groupings	Status Quo	Status Quo
Determination of observer and EM Deployment	Determined each year by NMFS in consultation with the Council in the Annual Deployment Plan	Status Quo	Status Quo
Review of Observer and EM deployment	Evaluated annually in the Observer Program Annual Report	Status Quo	Status Quo

2.5 Alternatives Considered but not Analyzed Further

In 2017, the FMAC drafted and the Council considered a variety of ideas for increasing coverage rates that were not included in this analysis of partial coverage observer fee percentages. The Council determined that considering the option addressed in this analysis—raising the observer fee—was the best one to move forward at that time.[2] Other alternatives considered but not moved forward in 2017 are listed below:

Federal Funding: More money to fund the partial coverage contract is the most direct way to increase selection rates. When additional Federal funding is successfully solicited, the increase in observer coverage rates is proportional to the amount of additional funding received. NMFS provided some level of supplement to the observer fee each of the first four years of the restructured program, until NMFS headquarters decided that the cost of at-sea observer coverage for Federal fisheries off Alaska should be entirely borne by industry. This decision resulted in the low 2017 coverage levels that precipitated the FMAC's current work. There is no certainty this option will be a long-term solution. Monies must be solicited by the Council and/or the Alaska Region in each budget cycle, with no guarantee of success.

[2] At their October 2017 meeting, the Council heard from the NMFS Assistant Administrator (Chris Oliver) that they would be receiving a one-time allocation of Federal funding to support the program for 2018-2019, but not to count on any more money forthcoming. The Council also heard from staff that as a best case, initiating an analysis to raise the fee in October 2017 would not result in increased selection rates until 2021 at the earliest. As a result, the Council opted to initiate an analysis to consider increasing the observer fee, with the first steps of the analytical process to be specific requests from the FMAC with respect to developing observer coverage reference points, and optimizing the balance of vessels using EM, those in the observer pools, and those in zero selection. While recognizing that the immediate next steps require agency staff work, the Council requested that the FMAC subgroup continue to engage and interact with staff on developing these steps.

Additional federal funding would increase observer coverage rates which would improve the quantity of data collected and reduce uncertainty in management decisions. Increasing observer coverage rates could impact vessel owner/operators' decisions on whether to be in the observer pool or EM pool. Ideally, prior to NMFS finalizing decisions regarding allocation of limited funding for each of the NMFS's observer programs, a full priority based resources (PBR) evaluation would be undertaken. That way, specific objectives could be compared across regions, and a more optimal and transparent allocation of National Observer Program funds would be achieved.

Zero selection: Under this option, the Council considered methods to change which vessels are in the zero selection pool. Currently, vessels are placed in zero selection primarily on the basis of vessel size and gear – hook- and-line and pot vessels 40 ft and over (and all trawl) are included in the sampling frame. Changing the definition of zero selection would not require a change in the regulations, as the criteria for who is in zero selection are contained in the Annual Deployment Plan. To move any of the zero coverage options forward, the Council would need to consider the potential for efficiency gain from redefining zero selection criteria.

EM optimization: The Council considered whether it is possible to improve coverage rates by optimizing monitoring between vessels that participate in the EM selection pool and those that take observers. As with the zero selection option, this would not require a change in the regulations, but could be accomplished through encouraging vessels that make the EM program cost effective to opt into the EM selection pool, ideally freeing up funding for observers. It was determined that EM optimization is likely to be an iterative process taking 2-3 years, as vessels were incentivized to opt into EM and current EM vessels are returned to the observer selection pool. The first step to move this option forward is to prepare the methodology for splitting the fee, on which an optimization discussion will build. Staff are already tasked to develop this methodology, and an initial step is included in Appendix B of the 2018 Annual Deployment Plan (NMFS 2017b). Once the cost models are understood, the Council and the agency could evaluate different scenarios for cost optimization between EM and observers.

Monitoring cooperatives: The Council also considered the feasibility and utility of establishing cooperatives as a mechanism to reduce monitoring costs and, in turn, increase monitoring rates in the partial coverage category. Cooperatives could form by port location, gear type, fishery, monitoring method (observers/EM), or combinations thereof (e.g., port/gear). In general, cooperatives with a larger vessel membership are expected to find more opportunities for cost trimming and minimizing the total number of cooperatives reduces the aggregate expense of co-op management labor. However, it is not assumed that existing groups, in aggregate, represent every vessel that operates in the partial coverage category. If cooperative participation is mandatory, industry groups might need to extend their representation or the work of their staff if that staff assumes the role of a cooperative manager. If participation is voluntary and cooperatives coalesce around existing groups, the Council or NMFS might need to oversee that independent vessels do not fail to opt in because they were not already associated with a group that has management capacity.

Voucher Program: One option to optimize coverage rates by creating efficiencies is to use the 1.25 percent landings fee to reimburse vessels for coverage at a set daily amount rather than using the fees to fund a Federal contract with an observer provider company, as is currently the case. Under this "voucher" approach, a vessel owner would be responsible for securing an observer to monitor his/her trip when selected in ODDS. The provider would charge a market rate that encompasses the daily rate to cover that vessel's trip, as well as associated variable costs (travel and board). If the market rate exceeds the fixed daily rate dollar value ascribed to the voucher, the vessel owner selected for coverage would pay the difference directly to the provider. However, a voucher system appears to be a tool for sea-day cost predictability and cost control, rather than cost reduction. The Observer Program might be assured that variable cost overruns (travel/board) will not cut into the number of sea-days required to achieve a random monitoring sample for catch accounting.

The effectiveness of vouchers as a tool to incentivize cost savings would seem to rely on competition between multiple observer providers, so that providers share that incentive and are not merely the recipients of uncapped payments "over and above" the voucher amount. NMFS FMA cannot manage multiple separate contracts with different providers, but the current Statement of Work for the Federal contract does not preclude more than one provider from working together. Whether such an arrangement is likely to emerge remains to be seen. Any further steps toward developing and analyzing a voucher system will require buy-in, cooperation, and some amount of transparency from observer providers to help staff and NMFS understand sea-day price factors and how they vary by location or from one year to the next.

Contract changes: The intention, under this option, was for the Council to scope out whether there are changes to the partial coverage contract that could be incorporated by NOAA's Acquisition and Grants Office (AGO) on the Statement of Work for the rebidding of the contract. The focus was to see whether it is possible to build efficiencies into the contract that would reduce the program-level daily cost for observer days. The contract as currently structured includes a fixed daily cost for an observer sea day and reimburses actual travel costs for transporting observers to and from deployments.

Modify deployment design to increase efficiency: It would be possible for NMFS staff to evaluate alternative sampling designs in the context of improving cost efficiencies (e.g., lower travel costs). This analysis would involve the same AFSC and AKRO staff that work on many of the other projects and priorities discussed in this paper including: the Annual Report, Annual Deployment Plan, catch accounting methodologies, and allocation of fee budget between EM and observers. If the Council requested an additional project to evaluate alternative sampling designs, the project would need to be prioritized relative to other items on the list of analytical projects. After discussion in September 2017, the Council did not request work on sampling designs for the time being.

Analytical considerations removed from the analysis: in February of 2018, it was noted that the earliest time that an increase in revenue could affect monitoring was in 2021. Under this timeframe, the regulatory amendment to adjust the fee would need to be implemented by January 2020, which means that the Council would need to take final action at the latest in early 2019. In order to keep to this timeline, the Council determined it was not possible to address all of the FMAC's requests within the fee analysis. Due to temporal and staffing capacity constraints, the following considerations were removed from this analysis, to be evaluated as independent projects when staff become available:

- Determining what coverage is needed to evaluate the observer effect at the post-stratified gear/target fishery level (recognizing that some trawl target fisheries will need to be grouped for this analysis).

- For zero selection, include consideration of further platooning of the hook and line fleet by effort, periodic expanded sampling plans (e.g., planning for more intensive selection rates every 4-5 years for a particular sector), and inclusion of vessels under 40 ft in a redefined zero selection pool.

- For EM optimization, consider how to design incentives to induce the most cost-effective vessels to participate in the EM pool.

3 Monitoring Objectives

In the most general terms, the action alternatives considered in this analysis are intended to improve the Observer Program by increasing financial stability, which in turn would also enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems. The alternatives considered provide a range of potential fee revenue scenarios (bookends) and different methods of levying fees. The action alternatives being considered vary as to whether a fee adjustment would be levied equally on fishing vessels in the partial coverage category of the North Pacific Observer Program (Alternative 2), or whether a fee adjustment would be differentially applied by gear sector (Alternative 3).

Under any alternative, the scope of this analysis is limited to a change in the fee percentage; the deployment of observers and electronic monitoring will continue to be implemented using statistically reliable deployment methods, through the Annual Deployment Plan process. At the same time, available fee revenue and decisions about deployment of observers and EM are closely linked through factors that influence the available fee revenue for observer and EM deployment. For example, stock declines have the potential to negatively impact observer fee revenues, which could in turn result in decreased capacity to purchase days of observer or EM coverage in the future.

NMFS and the Council make decisions about the Observer Program (deployment, fee amounts, etc.) based on a combination statistical sampling needs and policy objectives. This chapter provides background on sampling needs (Section 3.3) and policy objectives (Section 3.4) for monitoring, which are met through the deployment of observers and EM systems. Content from this chapter is used in later sections of this document as a basis for assessing how to determine what, if any, fee adjustment may be appropriate to address the Council's purpose and need statement for this action (see Section 1.1).

3.1 Background

Data collected by well-trained, independent observers and EM are a cornerstone of management in the Federal fisheries off Alaska. These data are needed by the Council and NMFS to comply with the Magnuson-Stevens Act, the Marine Mammal Protection Act, the Endangered Species Act, and other applicable Federal laws and treaties. Data collected by observers and EM contribute to best available scientific information used to manage fisheries in the North Pacific. Information collected by observers and EM provides a reliable and verifiable method for NMFS to gain information about fish and shellfish intercepted by commercial fisheries, as well as data concerning seabird and marine mammal interactions with commercial vessels. Observers record total catch; composition of catch; species weights, size, and sex; information on bycatch and protected species interactions; and, collect tissue samples. Current EM systems on fixed-gear vessels record catch events and shore-based EM reviewers enumerate total catch and composition of catch, including bycatch. Managers use observer and EM data in the catch accounting process, to manage groundfish catch and bycatch limits established in regulation and to document fishery interactions with protected resources. Managers also use these catch accounting data to inform the development of management measures that minimize bycatch and reduce fishery interactions with protected resources. Scientists use observer and EM-collected data for stock assessments and marine ecosystem research. Much of this information is expeditiously available (e.g., daily or at the end of a trip, depending on the type of vessel) to ensure effective management.

All groundfish and halibut vessels and processors operating in Federal fisheries off Alaska may be required to accommodate NMFS-certified observers or an EM system, to verify catch composition and quantity, including catch discarded at sea, and to collect biological information on marine resources. Vessels and processors are included in either a full or partial coverage category, based on the vessel type and target fishery in which they are participating: in the full observer coverage category, vessels and processors have at least one observer present for all fishing activity; in the partial observer coverage

category, NMFS determines when and where observer coverage or EM is needed. Those in the full observer coverage category are required to obtain observer coverage by contracting directly with NMFS-permitted observer providers to meet coverage requirements in regulation. Those in the partial coverage category must pay a fee based on a proportion of the ex-vessel value of their landed catch and are required to carry an observer or EM system as determined by NMFS through an Annual Deployment Plan. The partial observer coverage category includes:

a) Catcher vessels designated on a Federal Fisheries Permit when directed fishing for groundfish in federally managed or parallel fisheries, except those in the full coverage category.

b) Catcher vessels when fishing for halibut individual fishing quota (IFQ) or sablefish IFQ.

c) Catcher vessels when fishing for halibut CDQ, fixed gear sablefish CDQ, or groundfish CDQ using pot or jig gear; or catcher vessels less than or equal to 46 ft LOA using hook-and-line gear fishing for groundfish.

d) Catcher/processors that meet criteria that allows assignment to the partial coverage category.

e) Shoreside or stationary floating processors, except those in the full coverage category.

The Observer Program uses established sampling methods to collect reliable data by stationing observers or EM systems on a statistically reliable sample of fishing vessels in the partial coverage category. The sampling plan for vessels and processors in the partial coverage category is described each year in the Annual Deployment Plan, developed by NMFS in consultation with the Council. Some vessels and processors may be in full coverage for part of the year and partial coverage at other times of the year, depending on the observer coverage requirements for specific fisheries.

The Observer Program provides a regulatory framework for NMFS-certified observers or approved EM devices to obtain information necessary to conserve and manage groundfish and halibut fisheries in the GOA and the BSAI management areas. Section 313 of the Magnuson-Stevens Act (16 U.S.C. 1862) authorizes the Council, in consultation with NMFS, to prepare a fishery research plan that includes stationing observers to collect data necessary for the conservation, management, and scientific understanding of the fisheries under the Council's jurisdiction. Section 313(d) of the Magnuson-Stevens Act authorized creation of the North Pacific Fishery Observer Fund within the U.S. Treasury. Funds for deploying observers on vessels in the partial coverage category are provided through a system of fees based on the gross ex-vessel value of retained groundfish and halibut. The fee system used in the restructured Observer Program follows Magnuson-Stevens Act requirements in 16 U.S.C. 1862(a)(2) and (b)(2). The observer fee may not exceed 2 percent of the unprocessed ex-vessel value of fish or shellfish landings subject to the Observer Program and is assessed on all landings by vessels that are not otherwise participating in a full coverage fishery.

Starting in 2013, the fee system replaced a pay-as-you-go method in the partial coverage category, where vessel owners directly paid for their observer, as needed to meet regulatory coverage requirements. The fee is to be used to pay the combined costs of stationing observers, or EM equipment, on board fishing vessels and U.S. fish processors and inputting collected data. Through the fees, owners and operators compensate the Federal Government for the costs associated with managing fishery resources.

The observer fee is assessed on all landings accrued against a Federal total allowable catch (TAC) for groundfish or a commercial halibut quota made by vessels that are subject to Federal regulations and not included in the full coverage category. Therefore, a fee is only assessed on landings of groundfish from vessels designated on a Federal Fisheries Permit or from vessels landing IFQ or CDQ halibut or IFQ sablefish. For vessels subject to the observer fee, only landings accrued against a Federal TAC or IFQ allocation are included in the fee assessment.

The observer fee system distributes the cost of observer coverage across participants in the partial coverage category and provides annual flexibility to evaluate the performance of and improve upon the sampling plan, in consultation with the Council. The funding, annual planning, and review process for monitoring vessels and processors in the partial coverage category of the Observer Program are designed to implement a scientifically reliable sampling plan to collect data necessary to manage the commercial groundfish and halibut fisheries. Through this process, monitoring selection rates are adjusted annually according to the available budget. In addition, the monitoring selection rates may be adjusted in response to fishery management objectives, as funding allows.

The fee-based system was designed to fairly and equitably distribute the cost of observer coverage among all vessels and processors in the partial coverage category and provides a consistent source of revenue directly linked to the value of the fishery. Currently, NMFS collects a 1.25 percent fee based on the ex-vessel value of groundfish and halibut in fisheries subject to the fee. The intent of the North Pacific Fishery Management Council and NMFS is for vessel owners to split the fee liability 50:50 with the processor or registered buyer. While vessels and processors are responsible for their portion of the fee, the owner of a shoreside processor or a stationary floating processor and the registered buyer are responsible for collecting the fee, including the vessel's portion of the fee, and remitting the full fee liability to NMFS. During the restructuring process, the Council identified that there would be a need to reevaluate the observer fee percentage after the first few years of the restructured Observer Program with actual information about program revenues, costs, and achieved coverage levels.

3.2 Observer Program Amendments

3.2.1 Observer Program Restructure

In 2013, the restructured Observer Program was implemented for vessels subject to partial coverage. The restructured Observer Program replaced the previous industry-financed pay-as-you go service delivery model for the Observer Program in place from the 1990s through the end of 2012. Restructuring addressed problems with the earlier service delivery model, including the following key concerns:

- The inability for NMFS to determine when and where observers should be deployed. Vessels and processors in less than full coverage (i.e., the 30 percent observer coverage category) could decide, within certain target fishery and time categories, when to carry observers. This resulted in sources of bias that jeopardized the statistical reliability of catch and bycatch data.
- Inadequate coverage levels established in regulation. The program design was driven by coverage levels based on vessel size, which did not include observer requirements for either the commercial halibut sector or the under 60 foot groundfish sector.
- Disproportionate cost issues among the various fishing fleets. Many smaller vessels had faced observer costs that were disproportionately high relative to their gross earnings, compared to larger offshore vessels operating in the BSAI, their under 60-foot counterparts, and their counterparts outside of Alaska.
- The difficulty to respond to evolving data and management needs in individual fisheries. Coverage levels and deployment patterns could not be effectively tailored to management needs or circumstances of individual fisheries or evolving fisheries management objectives.

Changing the service delivery model and including previously unobserved halibut and under 60 foot groundfish vessels in the partial coverage component of the Observer Program meant that the restructure reduced bias in observer data, facilitated collection of observer data in sectors that did not previously have coverage requirements, and allowed flexibility through the Annual Deployment Plan model, whereby fishery managers can tailor observer coverage in response to management needs and circumstances of

individual fisheries. The creation of a fee-based funding mechanism reflecting the value a vessel or processor extracts from the fishery has improved the equitability of cost distribution among fishery participants. NMFS contracts directly with observer providers for the partial coverage category and determines when and where observers are deployed based on a scientifically sound sampling design.

Landings by vessels in the partial coverage category are assessed a 1.25 percent fee which is paid to NMFS by processors and registered buyers and is used to fund the deployment of observers. A 1.25 percent fee was chosen during the restructure analysis based on the Council's interest in balancing need for revenue to support the Observer Program with need to minimize impacts on the industry sectors included in the restructured Program. As all sectors benefit from monitoring data that allows sustainable management of the fishery resource, the Council chose to apply the same fee percentage to all participants, to develop a fee program that is fair and equitable across all sectors in the BSAI and GOA groundfish and halibut fisheries.

The restructure of the Observer Program has provided a framework for NMFS and the Council to allocate observer effort towards its multiple objectives within an established budget. Under the restructured program, NMFS reports regularly to the Council through the Annual Report and Annual Deployment Plan processes, which have improved transparency with respect to the sample design and financial aspects of the program. NMFS and the Council have used the flexibility of the restructured process to make continuous improvements towards optimizing coverage across fisheries.

3.2.2 Electronic Monitoring Integration Analysis

Since 2013, the Council has been working to integrate an electronic monitoring (EM) option into the partial coverage component of the Observer Program. An EM system uses cameras, video storage devices, and associated sensors to record and monitor fishing activities, in lieu of having a observer onboard. EM systems collect at-sea data which allows shore-based EM reviewers to estimate discards of fish, including halibut, and mortality of seabirds. The Council-established EM Workgroup, which includes representatives from commercial fishing operations, agencies, and EM service providers, oversaw a program of EM cooperative research from 2014 through 2017. Beginning with the 2018 fishing year, the EM option was fully implemented in regulation, and fixed-gear vessels that are approved to participate in the EM selection pool, and which comply with EM deployment requirements, are not required to carry an observer.

The Council's primary objective in pursuing an EM option was to develop an alternate method of collecting catch and discard information to accommodate small fixed gear vessels that have trouble accommodating an observer onboard. This option was subsequently extended to other fixed gear vessels that prefer to utilize EM instead of observers. The Council also recognized that there may be other opportunities in the future to utilize EM as part of an optimized monitoring program, under the Annual Deployment Plan.

Developing the EM program required considerable investment and was funded through a combination of federal funding and funding from external sources such as the U.S. National Fish and Wildlife Foundation. Beginning in 2019, the costs of the fixed gear EM program must be covered through the observer fee system that also supports observer deployment in the partial coverage component of the Observer Program.

3.3 Sampling Needs

NMFS and the Council make decisions about the Observer Program (deployment, fee amounts, etc.) based on a combination statistical sampling needs and policy objectives. The following sections describe sample needs (Section 3.3) and policy objectives (Section 3.4).

One factor for the Council to consider in the decision about whether to recommend raising the observer fee is to identify the sampling needs for observer and EM data, and whether those needs are currently being met. There is no specific threshold of coverage below which NMFS cannot sustainably manage federal fisheries. However, there are levels of coverage below which there is an increased risk of non-representative data, or below which there may be gaps in the ability to obtain biological samples for stock assessments. At lower levels of coverage there is risk that observer data become less useful for achieving random, gear-specific, or area-specific, species-specific sampling. At lower levels of observer coverage, fishery managers may take more conservative or precautionary approaches towards management decisions.

The following section provides some discussion of what sampling needs are for managing fisheries and stock assessment and describe some of the previous and ongoing work to assess coverage needs. The impact analysis in Chapter 5 (Section 5.6, Section 5.9) consider how the alternatives under evaluation accommodate these needs.

3.3.1 Managing Fisheries – Target Species, Incidental Catch, and Bycatch

The Observer Program complies with the Magnuson-Stevens Act requirement that the program must be reasonably calculated to gather reliable data by stationing observers on all, or a statistically reliable sample, of fishing vessels and processors necessary for conservation, management, and scientific understanding of the fisheries covered by the fisheries research plan (16 U.S.C. 1862(b)(1)(A)). Prior to 2013, the Observer Program did not use well-established random sampling methods to deploy observers in fisheries subject to partial coverage. Instead, fishermen could choose when to take observers to fulfill their observer coverage requirement. The ad-hoc deployment method prevented representative sampling across fishing trips, resulting in a) sampling effort that did not correspond with fishing effort, and b) consistent problems with too little or too much coverage in fisheries in the 30 percent observer coverage category. Implementing a scientific sampling plan for deploying observers has been a major accomplishment of the restructured Observer Program.

Since observer data collected in the partial coverage category is extrapolated in the Catch Accounting System (CAS) to create estimates of catch for groundfish fishing operations, it is important that NMFS collect observer data from a representative sample of fishing operations. Collecting a representative sample means that information from a subset of fishing operations is collected to estimate characteristics of all federal groundfish and halibut fishing operations off Alaska. The purpose of random sampling is to obtain data that represents characteristics of a population for which inferences are needed. The group of units for which inferences are needed is called the target population. In the Observer Program, the target population is all federal groundfish and halibut fishing operations off Alaska. At-sea data collected by observers from a randomly-selected subset of all fishing operations (called a sampling frame) are used to make inferences about the target population of all trips that comprise all federal groundfish and halibut fisheries.

Inferences about unsampled events (e.g., discard on unobserved trips) in the target population are made using available sampling information, the quality of which depends on how “representative” the sampling frame is of the target population and the estimation processes used in the inference. Sample units collected using stratified random sampling can also be grouped after the sample has been collected. This procedure is called post-stratification, which results in ‘post-strata.’ Post-strata boundaries are defined using information that is known after a sample unit has been selected. The quality of estimates depends on the observed fishing activity (selected from the sample frame) having the same distributional characteristics as the target population. Hence, differences in the characteristics of the units within the sampling frame versus units outside the sampling frame and within the target population can be a source of bias in the inferences.

Under the previous program, the lack of a random sampling of trips prevented rigorous statistical inferences about unsampled trips. This problem was compounded by concerns about the representativeness of the sampled events relative to the sample frame and target population. An important improvement under the restructured Observer Program is better alignment of the sampling frame with the target frame. The restructured rule authorized observers to be placed on all halibut vessels and vessels under 60 feet LOA. The improved sample frame reduced the number of trips that had no probability of coverage by 41 percent and 35 percent for 2013 and 2014, respectively. Following the trend in trips, the number of vessels included in the sampling frame has also increased when compared to the previous program.

The restructured Observer Program has improved catch estimates through improved sampling methods. The Observer Program now collects data on previously unobserved portions of the fishing fleet (halibut individual fishing quota (IFQ) vessels and vessels between 60 feet and 40 feet LOA). The restructure also decreased bias caused by self-selection of observed trips allowed under the program between 1990 and 2013.

The expanded sampling frame created by the restructured Observer Program has further resulted in better spatial distribution of sampling relative to the overall fishery footprint. The spatial distribution of observer coverage under the new program includes areas not previously covered. The largest improvement during the first years of the restructured program (2013, 2014, and 2015) occurred in southeastern Alaska (reporting Area 659), which had no coverage from 2009 through 2012.

The Supplement to the Environmental Assessment for restructuring the Observer Program (NMFS 2015) described in detail the increased reliability in observer information resulting from implementing the restructured program. Although there were higher than anticipated costs in the first few years of the restructured program, the improvements have resulted in improved information for the management and conservation of the North Pacific fisheries. The inclusion of previously unobserved small vessels and halibut vessels under the restructured Observer Program improved the representativeness of data compared to the previous program, even at very low deployment rates in the small vessel sampling frame (given the rate prior to restructuring was 0 percent). The spatial distribution of observer coverage since 2013 includes areas not previously covered, particularly nearshore areas.

NMFS has found from studies in Alaska and elsewhere that even at low deployment rates, statistically reliable estimates can be made for nearly all fishing operations. NMFS does not provide a “hard line” or baseline that indicates a single rate that results in the whole observer data collection program not being able to collect reliable information. There is not a specific amount of coverage at which NMFS is unable to manage the groundfish fisheries in the BSAI or GOA; rather there are levels of observer coverage at which NMFS may not have data in specific strata or fisheries. Data quality is a continuum, and a single threshold is not appropriate, nor desired, for such a complicated and diverse program. Instead, the Annual Deployment Plan process provides a risk assessment and information to guide policy decisions about where to reduce risk of no coverage, rather than a single defining rate where data becomes unreliable (which would only be relative to a specific sampling objective and measure). The flexibility afforded to NMFS and the Council through the Annual Deployment Plan process allows the Observer Program to adapt, as new scientific information is available, and to inform future changes in estimation methods that will result in better use of observer data under existing funding levels.

3.3.2 Stock Assessment Data Needs

While fishing morality information is often the focus of observer data, and is used in stock assessments, observers also collect a plethora of biological information on target and bycatch species. Observers collect sex, length, and weight information from prioritized species, and collect biological samples such as otoliths, scales, fin rays, or other tissues for age and genetic determinations. Observers also complete trophic interaction collections, periodic maturity studies, and carry out dozens of specialized projects

designed by NOAA researchers, academics, and fishing industry partners. This information is used in stock assessments to model the age structure of the species, predator-prey interactions, and temporal, geographic, or depth-related differences in the distribution, for example by age or sex. Biological samples also provide important data for developing ecosystem models that show food web interactions.

There are many factors that go into biological sampling needs, including: increased understanding of target and non-target species; how many stock assessment models currently use biological samples; and, how many may need biological samples in the future. There is no direct translation between a percentage of observer coverage and a threshold number of biological samples. While some sample collection could be conducted dockside with landed species, other information must be collected at sea. This is obvious for discarded species, but also, for example, maturity and trophic interaction information (including stomach contents) that cannot be successfully collected dockside, after biological tissue has deteriorated.

Growing EM data collections provide mortality information, but when EM replaces fishery observers, associated biological data collections are also lost. So, while current observer coverage levels have always been adequate to provide for stock assessment needs, very low coverage compounded by increases in EM concentrated in specific geographic regions or fisheries could cause a loss of these data inadvertently.

3.4 Policy Objectives for Observers and EM

Sections 3.1 and 3.2 described the factors that contribute to identifying sampling needs for the users of Observer Program data. In Section 3.3 it was stated that there is no specific threshold of coverage below which NMFS cannot sustainably manage federal fisheries. However, there are levels of coverage below which there is an increased risk of non-representative data, or below which there may be gaps in the ability to obtain biological samples for stock assessments. At lower levels of coverage there is risk that observer data become less useful for achieving random, gear-specific, or area-specific, species-specific sampling. At lower levels of observer coverage, fishery managers may take more conservative or precautionary approaches towards management decisions.

In addition to meeting sampling goals, the Council will also consider its policy objectives for deployment and data collection when assessing whether to recommend raising the observer fee. Decisions about how to distribute observer coverage are not based solely on statistically reliable sampling requirements of the Magnuson-Stevens Act. NMFS and the Council balance a diverse set of sampling and policy-based objectives for deployment and data collection, while drawing from a single funding source. NMFS allocates deployment among sampling strata through the Annual Deployment Plan process, while policy choices of the Council may influence the stratification scheme (e.g., small/large vessel strata, gear-specific strata). The Council's policy objectives for data collection, such as PSC accounting, are complementary to but different from goals of attempting to achieve random samples and representative data of fishing trip behavior. Meeting both sampling objectives and policy objectives sometimes requires tradeoffs, but NMFS generally strives to achieve sampling goals of obtaining statistically representative data of fishing trips while meeting Council policy goals.

For example, for 2018 and 2019, NMFS implemented an observer deployment allocation strategy of 15 percent plus increases, called 'optimization,' based on discarded groundfish and halibut and Chinook (two PSC species). A minimum level of sampling is precautionary with respect to avoiding bias and providing data across all gear types. The 15 percent plus optimization allocation strategy provided a balance between minimizing variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce gaps in observer coverage in the partial coverage category. This is an example of balancing a diverse set of sampling and policy goals in one deployment strategy.

The 15% threshold was established based on statistical analyses done in the Supplement to the Environmental Assessment for restructuring the Observer Program (NMFS 2015) and Annual Deployment Plans. These analyses showed that gaps in coverage became more prominent at around a

15% coverage level. Coverage below this level increases the risk of not having federal area-specific data (NMFS 2015). NMFS would still be able to produce estimates of catch and manage fisheries at levels below 15%; however, the threshold level represents an approximate point that at-or-above which estimates of higher quality could be made since the chance of not sampling important spatial components was explicitly considered in deployment.

The section that follows describes some of the key policy objectives that the Council has previously identified and describes risk tolerance and the potential effect of EM optimization on determining the need for an adjustment to the observer fee.

3.4.1 Policy Objectives for the Observer Program

The Council and NMFS have identified that it is critical to conservation and management objectives that the management of the Alaska fisheries be supported by reliable and scientifically valid observer and EM information. NMFS strives to collect high quality and unbiased observer and EM data for the benefit of stewardship objectives. Although there is evidence that certain levels of observer coverage reduce the likelihood of undesirable data gaps from forming, there is no simple definition of what a minimum level of observer or EM coverage should be. The Council has supported gathering enough data to ensure that certain policy goals are accomplished. The following subsections provide some discussion of additional policy objectives that the Council has identified, at different points in time, relevant to observer data. To the extent possible, this analysis will discuss the impacts of the alternatives, in later sections, with respect to the eight policy objectives identified below. Eight specific policy objectives for the Observer Program include:

1. Minimizing a "monitoring effect" so data from observed vessels are representative of unobserved vessels
2. Improving discard estimates for fishery species, including minimizing variability and reducing gaps in coverage in all strata/reporting areas
3. Priority for monitoring PSC
4. Detecting species decline or rare events
5. Design the program with flexibility to respond to evolving data and management needs in individual fisheries
6. Provide for equitable distribution of the burdens of monitoring among fishery participants
7. Design the program, to the extent practical, so that the requirement for monitoring does not impact operational choices of vessel operators
8. Foster and maintain positive public perception/stakeholder support

Minimizing a "monitoring effect" so data from observed vessels are representative of unobserved vessels

The random sampling established under the restructured Observer Program eliminated much of the bias that existed under the previous program. The goal of sampling under the restructured program was to randomize the deployment of observers into fisheries to collect representative data used to estimate catch and bycatch, assess stock status, and determine biological parameters used in ecosystem modeling efforts and salmon stock-of-origin analyses (NMFS 2015). Random sampling results in better spatial and temporal distribution of observer coverage across all fisheries.

At the same time, Alaska groundfish fisheries have limits on the amount of bycatch allowed to be caught, particularly for halibut, salmon, crab, and herring (PSC species). Since bycatch accounting relies on at-sea

data collection from observers, incentives exist to fish differently when an observer is on board a vessel than when a vessel is unobserved (i.e., to fish in areas where bycatch is expected to be lower). A well-known issue with at-sea data collection resulting from these incentives is the potential for an observer-effect. This occurs when the vessel fishes differently when an observer or EM system is on board. Each Annual Report investigates differences between the sampled population, the sample frame, and the target population to investigate potential observer effects.

For several years, the Council has discussed the potential for an observer effect among vessels delivering to a tender. While this has not always been the case, in 2016 an observer effect of differing trip lengths was found within trips that delivered to tenders in the trawl stratum. Whether this observer effect was due to intentional manipulation of trips (facilitated by the flexibility in ODDS and the current trip definitions) or by vessel operator behavior in the trawl pollock partial coverage fleet, the structure of the data (observed trips and trips with VMS are shortened since all unobserved non-VMS deliveries to a tender are lumped into the same trip), or simply low sample size is unknown. In 2017, currently the most recent year for which data is available, there were no metrics with low enough p-values to examine whether observed trips were similar to unobserved trips in the POT or TRW Tender strata (2017 Annual Report, page 52).

The observer-effect phenomenon is closely related to the policy goal for accurate PSC accounting, and for equitability among participants in bearing the burdens of monitoring. The observer-effect also impacts representative sampling goals of NMFS. Therefore, minimizing or eliminating the potential for an observer-effect is both a sampling goal and a policy goal. Maintaining or expanding coverage would be expected to minimize the potential for an observer-effect to go unnoticed, while decreasing coverage would be expected to have no effect or a negative impact on the potential for an observer-effect to go unnoticed. Expanding coverage would likely require increased capacity, in the form of more observer days or broader EM implementation, both of which cost money.

Improving discard estimates for fishery species, including minimizing variability and reducing gaps in coverage in all strata/reporting areas

Without estimates of discarded catch in a given fishery, managers are compelled to manage using more precautionary approaches for data-limited fisheries. If observer data are not available at the reporting area level, then estimation of discarded catch still occurs at the FMP area level. If observer data were not available at the FMP area level, however, then estimates of discarded catch would not be made. The Council has consistently placed a priority on the NMFS analysis of estimation methods for variance of catch and bycatch (NPFMC 2018). Mitigating risks of gaps in the observer data in a specific fishery or reporting area will require consistent and reliable random sampling across fleets.

Priority for monitoring PSC

While NMFS does not identify a specific level below which observer data cease to be statistically reliable (NMFS 2015), the Council has communicated for several years through feedback to NMFS on the draft Annual Deployment Plans that it has a low risk tolerance for PSC limited fisheries. In fact, documenting bycatch and PSC limited catches in domestic fisheries has been a key policy goal since the 1980s:

> *The SSC prefers the alternatives that use observers because of the desire to monitor bycatch and prohibited species catches…* (SSC minutes May 1985).

Under the restructured Observer Program, all catcher/processors and motherships were placed in the full coverage category, in part due to the need for independent estimates of PSC and other discards from these vessels. In addition, all catcher vessels were placed in full coverage when they participate in catch share programs with transferable PSC limits. Several characteristics of transferable PSC limits work together to create a level of incentive to misreport that NMFS and the Council felt justified full coverage. First and foremost, PSC limits can prevent the full harvest of a target fishery allocation if the PSC limit is reached before the target fishery catch is fully harvested. This creates an incentive to misreport the PSC and the

discard of any other species that might limit the catch of the target species. These incentives to misreport exist with both transferable PSC limits under catch share programs and with non-transferable PSC limits in limited access fisheries. However, under catch share programs, the responsibility for not exceeding target species and PSC limit allocations rests with the individual vessel or entity receiving the allocation.

In general, although NMFS retains the ability to close fisheries to prevent overfishing, NMFS does not actively manage catch share programs by issuing fishery closures once NMFS data indicates that a catch or PSC limit allocated to an entity will be reached. Vessels fishing for entities with transferable PSC limits under a catch share program can continue to fish until the entity's allocation of target species or PSC is reached. The ability to work together to manage entity-level allocations is what creates many of the important benefits of a catch share program. However, this ability also creates an increased incentive to misreport PSC or the catch of other limiting species. This incentive does not exist at such a high level in limited access fisheries more actively managed by NMFS. Transferable PSC limits also provide the potential for individual vessels and entities to benefit by transferring PSC not needed to support their target species allocations for additional compensation. These incentives together created the justification for full coverage for catcher vessels with transferable PSC limit allocations under a catch share program, while catcher vessels operating in limited access fisheries with non-transferable PSC limits were placed in partial coverage.

Beginning in 2013, the Council has requested that NMFS maintain higher observer coverage rates for all trawl vessels and fixed gear vessels over 57.5' to expand coverage on PSC limited fisheries, and in 2017 the Council endorsed using the full optimization allocation strategy that maximizes precision for halibut PSC.

Detecting species decline or rare events

The Supplemental EA analysis (NMFS 2015) found that the yearly fluctuation in observer coverage rates has consequences for NMFS's ability to estimate catch in the groundfish and halibut fisheries. An important consequence of changing deployment rates is whether the post-strata within the catch accounting system can still be reliably filled with observer information and the degree to which estimates of discarded catch are available to inform fishery management decisions. Discard rates for a NMFS reporting area may differ from the FMP-wide discard rate if the fishery species composition/discard composition varies geographically.

In 2017, the Council learned that Gulf of Alaska Pacific cod had undergone a considerable decline in abundance. The Council hosted an Ecosystem Workshop in February 2018, which brought together the Council, SSC, and AP for a day to focus on ecosystem issues in the BSAI and GOA Regions. A prominent theme of the Workshop was the need to lower the risk that rare events or species declines like the cod scenario in 2017 might be missed. Maintaining the Observer Program with consistent, reliable observer and EM coverage across all Federal fisheries is consistent with the policy goal to lower the risk of missing a species decline or rare event. One potential strategy to increase confidence that species declines will be noticed might be to steadily increase overall observer coverage rates while minimizing yearly fluctuations or instability in coverage across all sectors.

Design the program with flexibility to respond to evolving data and management needs in individual fisheries

One of the advantages of restructuring the Observer Program was the implementation of the Annual Deployment Plan process, which allows the Council and NMFS to consider, on an annual basis, the appropriate stratification scheme and allocation strategy for observers in partial coverage, within the available budget. The Council highlighted the importance of this feature when recommending that EM be integrated as an option in the Observer Program.

The ability to change the deployment strategy from year to year, however, also creates a lack of stability making it difficult to evaluate which adjustment to the program created which result. NMFS has

previously recommended to the Council that the deployment strategy remain stable for at least a two-year period in order to allow for evaluation and optimization.

Provide for equitable distribution of the burdens of monitoring among fishery participants

One of the keystones of restructuring the Observer Program was to address the issue of equitability with respect to paying the cost of observer coverage, through implementation of the fee system based on ex-vessel value. One of the drivers for the Council's prioritization of an EM option for fixed gear vessels was to address the disproportionate burden experienced by small vessels when required to accommodate an observer onboard, which could come at the expense of leaving a crewmember behind. In this analysis, Alternative 3 provides an opportunity for the Council to consider whether differing fee percentages by fishery might yield more *equitable* distribution of the fee costs across fishery sectors (by gear type) rather than the equal fee percentage approach for all fishery sectors taken in Alternatives 1 and 2.

Design the program, to the extent practical, so that the requirement for monitoring does not impact operational choices of vessel operators

The design of the Observer Program is intended to provide that, to the extent practical, the presence of the observer onboard does not affect a vessel operator's choices about carrying out their fishing operation (their operational choices). This principle was prioritized by the Council in developing a fixed gear EM approach using EM for catch estimation, in that while there are some additional responsibilities for vessel operators to install and maintain the EM system, once it is installed the vessel is largely able to continue its normal fishing practice, and does not have significant additional duties for data collection (e.g., such as maintaining a detailed logbook that would be audited through EM).

Foster and maintain positive public perception/stakeholder support

Fostering and maintaining positive perceptions and general stakeholder support for the Observer Program is an important policy goal for the Council. Positive stakeholder perceptions are closely related to the several previous objectives, such as the equitable distribution of costs and logistical burdens. This objective also requires stakeholder buy-in about the value of Observer Program, and its appropriate management and use by the agency.

Between 2014 and 2015, selection rates were increased from 15 percent to 24 percent in the large vessel sector. This increase in at-sea days supported higher deployment rates on the trawl fleet, which helped ensure continued stakeholder support for and confidence in the new program, especially in the first few years after the restructure. NMFS is interested in maintaining observer coverage in the future at these higher selection rates, to continue to get high quality data and maintain stakeholder confidence in estimates of bycatch.

EM development fulfills a mixture of sampling objectives and policy objectives by expanding coverage, while alleviating some logistical issues for vessels that may have a hard time accommodating observers. But increasing coverage rates on vessels carrying EM systems has fulfilled a secondary goal of EM development. The primary driver of implementing a broad EM program has been the policy objective to maintain stakeholder support by offering alternative monitoring options for fixed gear vessels.

3.5 Risk Tolerance

The Supplemental EA gap analysis (Section 4.2.2 of the EA) provided a discussion of the risk of not having observer data in a specific fishery to estimate discards. Without estimates of discarded catch in a given fishery, managers are compelled to manage using more precautionary approaches for data-limited fisheries. If observer data are not available at the reporting area level, then estimation of discarded catch still occurs at the FMP area level. If observer data were not available at the FMP area level, however, then

estimates of discarded catch are not generated in the Catch Accounting System. The Council has consistently placed a priority on the NMFS analysis of estimation methods for variance of catch and bycatch.

The Council requested NMFS develop estimation methods for variance as a mechanism to consider whether existing variance is within the Council's risk tolerance. NMFS's work to address variance as a factor in Annual Deployment Plan optimization (tech memo forthcoming) is one example of a response to the need to mitigate risk. Mitigating risks of gaps in the observer data in a specific fishery or reporting area is, to some extent, dependent on stable and reliable random sampling across fleets.

3.6 Factors Affecting Coverage Rates

Observer coverage rates are impacted by targets, as well as by available funding. Targets depend on whether a hurdle approach is utilized (i.e., whether there is a minimum level of coverage sought across all gear types, as further described in Section 4.1.2), how optimization metrics are calculated (e.g., whether certain PSC species are prioritized for coverage), and whether there are differing or similar goals for observer deployment and electronic monitoring (EM; e.g., 30 percent sampling rates in EM as opposed to the 15 percent hurdle for observers). The hurdle approach and optimization are described below in Section 4.1.2. EM costs are described in Section 3.3.4, below. Available funding for purchasing coverage are primarily determined by fee revenues, costs, and fishing trip lengths. The following three subsections describe these factoring affecting available resources.

3.6.1.1 Fee Revenues

The process used by NMFS to calculate and collect ex-vessel value fee liabilities was designed based on experience with other fee collection programs authorized by the Magnuson-Stevens Act and administered by NMFS while taking into consideration aspects unique to the Section 313 authority, the universe of entities included in the fee system, and stated Congressional intent; and incorporating the best information available to determine the ex-vessel value of the fisheries (see Appendix B of this document). For example, the process proposed to partition the ex-vessel value-based fee liability among individual entities (i.e., using standard, average prices proportional to the amount of the resource they harvest or process) is consistent with the approach taken to implement ex-vessel value-based cost recovery fees for crab and halibut/sablefish IFQ.

Available revenue from fees each year is affected by standard prices and fishing effort. Standard prices (Section 4.2.1) determine a common price per pound of fish landed for all species subject to the observer fee. Fishing effort is impacted by annual total allowable catch quotas (TACs) and is measured in terms of the number of trips taken in each gear type. Effort impacts how many total pounds of fish are landed, as well as how many total trips are taken and how long those trips are.

3.6.1.2 Costs

Cost per observer day and EM costs (see Section 3.6.2 for EM cost description) impact how much coverage a given amount of revenue can purchase. This changes from year-to-year. Cost per observer sea-day is dependent on a variety of things, which were most recently summarized in Appendix E of the 2019 Annual Deployment Plan (see Appendix C. Factors That Impact Cost per Observer Sea-dayof this document).

3.6.1.3 Trip Length

Each deployment strata have different average trip lengths, as a factor of differing gear types resulting in differing fishing practices. Table 2 shows an example of differing numbers of trips and numbers of trip days, by gear strata, for 2016.

Table 2 Example of trips and trip days, by strata. Source: 2016 Observer Program Annual Report.

2016	Number of trips	Number of trip days	Days/trip
Trawl	2,518	7,192	2.86
Hook and Line	2,274	13,493	5.93
Pot	1,158	4,622	3.99
Total	5,950	25,307	4.25

3.6.2 Funding the Fixed-gear EM Program

The first step to understanding the effect of supporting the fixed gear EM program through the observer fee is to better understand EM costs. NMFS intends to present an EM cost evaluation as part of the draft 2020 Annual Deployment Plan, as this will be the first year that the Annual Deployment Plan contemplates allocating funding among EM and observer strata.

While the initial cost of installing equipment on EM vessels is relatively high, vessels that remain in the program (stratum) are expected to produce data for multiple years at lower ongoing monitoring costs (primarily maintenance, licensing, and data review). The intention is for EM to be able to achieve a higher selection rate for less cost than the current cost per observer day, even when considering the cost of video data review. This is a major difference between EM and observer monitoring, where the daily cost of observing vessels is fairly stable but relies on a great deal of human capital and frequent travel. Under an optimized EM/observer program it may be possible to achieve the monitoring goals by reducing the average daily cost of monitoring for the program as a whole.

At the same time, existing research suggests that if not used often an EM system is not necessarily more accurate or more affordable than an observer. A large proportion of small boats (such as those in the fixed gear sector) are not ideally suited for making EM economically efficient, because they may not carry out enough fishing trips each year to make up for the initial investment 'sunk' costs of EM system installation. There is some evidence to suggest that data is often of lower quality on a vessel's first trip of the year. Furthermore, the voluntary aspect of the current EM program has the potential to introduce a relatively high level of risk in terms of cost and cost savings to the overall Observer Program. If vessels carry EM in one year, but not the next, sunk costs of system installation could be lost. In addition, the future service model for EM is moving from a grant process to a Federal contract beginning in mid-2019, the implications of which remain uncertain.

Understanding the cost of the fixed-gear EM program in a given future year, and thus the proportion of total partial coverage observer funds required, is a foundational step in analyzing how changing the fee percentage might impact programmatic monitoring objectives. Even if the maximum number of EM vessels remains capped (currently 165), the program's cost will vary annually. The analysis that supported EM Integration identified EM cost-drivers and how each is expected to behave over time or with more/fewer vessels in the EM fleet due to attrition or changes to the Annual Deployment Plan. However, once the EM program is fully transitioned to observer fee funding, analysis of annual program demands and apportionment of the total funding pool between EM and observer coverage will be determined through the Annual Deployment Plan process. A model will be developed specific to the Annual Deployment Plan process in the future but will not be available on the timeline of the fee analysis at hand. The eventual cost modeling approach for the Annual Deployment Plan will have the benefit of additional observation of the EM stratum at its current operational scale in terms of maturity, providers, vessels, and service locations. Moreover, modeling approaches associated with the Annual Deployment Plan allocation of observer resources are also likely to change over time with changes in information needs and analytical improvements.

To satisfy the needs of this fee analysis, staff relied on a simplified approach to near-term EM cost estimation based on current and past years of program spending relative to the number of vessels served and the nature of the spending (e.g., start-up costs vs. ongoing operational costs). Staff made informed

adjustments that reflect the maturation of the program (e.g., physical capital already acquired). This approach results in a coarse estimate – expressed as a range – that reasonably gauges the program's true revenue-demand. Offering a more detailed model at this time would be speculative given the rapid development of the EM stratum and uncertainties surrounding the future of Federal contracts, data storage, and video review. More importantly, a detailed model developed by staff would be front-running the approach yet to be developed for the Annual Deployment Plan, which is ultimately the model that matters from an operational standpoint over the medium- to long-term with regard to annual apportionment and deployment decisions. Attempting to preconceive that model without FMA involvement at this time would also result in two similar but different models in the public sphere at the time when the fee analysis is in the public/secretarial review stage and while FMA is fully incorporating EM costs into its Draft 2020 Annual Deployment Plan. Finally, a coarse estimate for a semi-mature EM fleet of ~165 fixed gear vessels – again, expressed as a range – befits the Council's decision-making scale where the body is attempting to address particular monitoring objectives with a fairly blunt tool (percent fee increase), and doing so in the context of an ever-changing landscape of observer sea-day costs, EM fleet enrollment, et cetera.

NOTE: EM program expansion in partial coverage trawl does not play a role in this analysis. Potential impacts from the forthcoming (National) EM Cost Allocation Procedural Directive will not be addressed in this analysis because they cannot be predicted at this time. See Section 4.2.2.7 for more details.

3.6.3 Coverage Levels Achieved Since 2013

Federal funding supported deployment of observers in 2013 while the 1.25 percent observer fee was assessed in that initial year of the restructured Observer Program. NMFS continued to provide some supplementary funding to support at-sea deployment in each of the first four years of the restructured program. The justification for this was both to ensure stability of coverage during the initial years of the program, as ex-vessel values fluctuated and costs exceeded expectations, and also to accommodate the timing of the fee collection and distribution process, whereby the previous year's fees may not be available in some years until May, and even then may not be available in full. In 2016, NMFS headquarters informed the Council that future Federal funding would not be guaranteed for supporting at-sea observer coverage in the future, as the cost of at-sea observer coverage should be entirely borne by industry. As a result, 2017 coverage levels were based almost exclusively on the observer fee, and the resulting low levels of coverage led the Council to initiate this analysis. In June 2017, the Council requested and subsequently received a further $1+ million allocation from NMFS, to stabilize coverage rates for 2018 and 2019 while the Council develops this analysis.

Table 3 uses fee and Federal funding data from the 2016 Annual Report and the 2018 Annual Deployment Plan to identify how many days could have been afforded in each of the previous years, if relying exclusively on the observer fee. Table 3 also identifies approximately how many observer days have been purchased with supplementary Federal funding and reports the actual coverage days that were used (or predicted) in each year, along with the actual coverage levels that were achieved (or predicted) using those observer days. The observer fee's purchasing power has varied between 3,200 and 3,800 observer days since 2013. If the partial coverage category were entirely industry-funded, the Council would likely only be able to afford coverage at selection rates slightly greater than 2017, which realized approximately 3,050 observer days at coverage rates of 4 percent for pot gear vessels, 11 percent for longline vessels, and 18 percent for trawl vessels. The additional NMFS funding, which allowed the Council to purchase between 800 and 2,100 days per year, has substantially increased the selection rate. Although NMFS has developed an annual process that produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage, the 2015 Supplemental EA found that spatial and temporal bias in the observer data was much reduced when selection rates were increased to 15 percent and above.

Preliminary work by NMFS staff to establish estimates of variance for the 2015 observer data was encouraging. Objectives for precision were met in almost all of the important fishery and gear strata. The Council is interested in maintaining observer coverage in the future at selection rates of 15 percent and above, in order to continue to get high quality data from observer coverage and maintain stakeholder confidence in estimates of bycatch.

Table 3 Coverage resulting from the observer fee plus Federal funding, 2013-2018. EM values not included.

Year	Total deployment of at-sea observer days in partial coverage	Observer fees received during calendar year (assessed from previous year's landings) in $ millions	Industry/Federal breakout		What coverage levels have we achieved in the partial coverage fleet with these observer days?		
			How many days could we have afforded with the previous year's industry fee	Days purchased with supplementary Federal funding during calendar year	Pot/longline vessels 40-57.5 ft LOA		All trawl vessels, and pot/longline >57.5 ft LOA
2013	3,533	n/a	0	6,450*	11%		15%
2014	4,573	$4.25	3,800	1,675	16%±		15%
2015	5,318	$3.46	3,200	2,500	12%		24%
					Pot	Longline	Trawl
2016	4,677	$3.90	3,700	375	15%	15%	28%
2017	3,059	$3.77	3,600		Pot: 4% Tender pot: 4%	Longline: 11% Tender longline: 25%	Trawl: 18% Tender trawl: 14%
2018 *(predicted)*	4,394		3,375	1,900	Pot: 16% Tender pot: 17%	17%	Trawl: 20% Tender trawl: 17%

3.7 Summary of Monitoring Objectives

This chapter summarized monitoring objectives related to the Observer Program as relates to the fee system in the partial coverage category, to provide a lens for the Council to consider how to evaluate the alternatives. The chapter identified both baseline coverage needs and policy objectives that emerge during the Council process. The remainder of this analysis evaluates the potential for each alternative to meet (or fail to meet) sampling needs and policy objectives.

4 Environmental Assessment

There are four required components for an environmental assessment. The need for the proposal is described in Section 1.1, and the alternatives in Section 2. This Section addresses the probable environmental impacts of the proposed action and alternatives. A list of agencies and persons consulted is included in Section 7.

This section evaluates the direct, indirect, and cumulative impacts of the alternatives and options on the various resource components. The socio-economic impacts of this action are described in detail in the Regulatory Impact Review (RIR) portion of this analysis (Section 5).

Recent and relevant information, necessary to understand the affected environment for each resource component, is summarized in the relevant section. For each resource component, the analysis identifies the potential impacts of each alternative, and uses criteria to evaluate the significance of these impacts. If significant impacts are likely to occur, preparation of an EIS is required. Although an EA should evaluate economic and socioeconomic impacts that are interrelated with natural and physical environmental effects, economic and social impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14).

An environmental assessment must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA define cumulative effects as:

> "the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the CEQ guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful.

4.1 Background

In 2013, National Marine Fisheries Service (NMFS) restructured the North Pacific Groundfish and Halibut Observer Program (Observer Program) to implement a rigorous scientific method for deploying observers onto more vessels in the Federal fisheries and a fee system to pay for observers deployed on those vessels in the partial observer coverage category (an observer is on board on selected fishing trips). The restructured Observer Program places all vessels and processors in the groundfish and halibut fisheries off Alaska into one of two categories: (1) the full coverage category, where observers are on board for every fishing trip and the vessels and processors obtain those observers by contracting directly with observer providers, and (2) the partial coverage category, where NMFS has the flexibility to deploy observers based on methods described in an Annual Deployment Plan. Funds for deploying observers in the partial coverage category are provided through a system of fees based on the ex-vessel value of retained groundfish and halibut landings from vessels in the partial coverage category. The restructured Observer Program also increased the number of vessels with full observer coverage to include nearly all catcher/processors, all motherships, and any catcher vessels participating in a catch share program with a transferrable prohibited species catch (PSC) limit.

The North Pacific Fishery Management Council (Council) and NMFS developed the restructured Observer Program to address longstanding concerns about statistical bias of observer-collected data and cost inequality among fishery participants with the prior Observer Program's deployment and funding structure. The Observer Program was restructured with Amendment 86 to the Fishery Management Plan for Groundfish of the Bering Sea/Aleutian Islands Management Area (BSAI groundfish FMP), Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA groundfish FMP) (collectively, Amendments 86/76), and the implementing final rule (77 FR 70062, November 21, 2012).

Since implementation in 2013, observer deployment has been evaluated regularly. These analyses include the Final Supplemental Environmental Analysis for Restructuring the Program for Observer Procurement and deployment in the North Pacific (SEA, NMFS 2015), annual analysis associated with each Annual Deployment Plan (NMFS 2013-2019), and annually with a report that evaluates the performance of the program under each Annual Deployment Plan (NMFS Annual Reports; 2013-2017). The SEA was a supplement to the environmental analysis conducted under Amendments 76/86 and evaluated impacts on sampling and changes to deployment rates related to potential changes in revenue associated with the 1.25% fee percentage. Analysis associated with the Annual Deployment Plans and Annual Reports evaluated potential outcomes based on revenue available for a given year, and subsequent issues associated with data representativeness as it relates to annual deployment.

4.1.1 SEA Analysis Overview

The SEA supplemented the 2011 Environmental Assessment for Restructuring the Program for Observer Procurement and Deployment in the North Pacific. In response to a Court Order, NMFS prepared the supplement to consider whether the restructured Observer Program would yield reliable, high quality data given likely variations in costs and revenues under the 1.25% fee. This supplement analyzed new information since the 2011 Environmental Assessment, including observer data, costs, and fee revenue from two complete years (2013 and 2014) under the new program. The impact analysis in the SEA supported the same conclusions as the 2011 EA/RIR/IRFA for Amendments 86/76. Specifically, the SEA demonstrated that restructuring resulted in improvements in the statistical reliability of data collected by the observer program (even at low rates of coverage). Statistical reliability was evaluated in terms of improvements made in sampling to better represent the underlying population (fishing events), and the degree to which data is available to inform fishery management decisions (i.e., estimate total catch).

The new program made substantial improvements to the representativeness (quality and utility) of the data from that proportion of the fishing population that was contained in the sample. An important problem prior to restructuring was that certain large fisheries were not required to take observers and thus samples that represented that unique type of fishing could not be obtained. The restructured program addressed this issue by enabling sampling on these vessels, resulting in more nearshore data and better representation of the fishing fleets in 2013 and 2014 (see Section 3.2.1 of the SEA). The improvements in data enabled catch estimation to occur where it had not been possible under the previous program. As a result, the new catch estimates provided important new information to stock assessment authors and inseason managers on sensitive species such as skates, sharks, and rockfish. The new program also moved away from self-selected observation to a randomized deployment, which was shown to improve the temporal representation of fishing and allowed an annual evaluation of deployment metrics in the Annual Report (see following sections).

The SEA also evaluated how data gaps could develop under various revenue scenarios and given that costs were much higher than anticipated under the Amendment 76/86 EA/RIR/IRFA. A simulation of deployment and potential impacts on catch accounting was evaluated in the SEA. The SEA found substantial improvements in the representativeness of data under the restructured observer program. The analysis also found that the risk (at a 50% level) of not having enough observer data to generate estimates of discarded catch at reporting area and fishery target level greatly increased at deployment rates less than

15%. Even at low deployment rates (i.e., 5-10%), however, there was generally sufficient information to estimate discards at the FMP-area level, with some estimation gaps persisting because fishery targets were composed largely of vessels in the "zero" coverage category, or the fishery target was relatively rare. The SEA made several important distinctions: 1) estimation and sampling strata can be changed based on scientific and policy decisions, thus issues like variability and data gaps are tied to those decisions and not necessarily solely dependent on observer coverage levels; 2) risk tolerance for data gaps is both a scientific and policy decision since it reflects both the risk of obtaining an unrepresentative sample (scientific) and the risk of not meeting a policy objective (e.g., coverage on fisheries that have high discard); and 3) the definition of the sampling frame relative to the population is critical for obtaining representative samples.

The SEA also describes the Annual Deployment Plan and Annual Report processes as an ongoing evaluation of the reliability of the information collected through the restructured Observer Program. This iterative process is adaptive to the dynamic nature of fishery data collection since by using a process of evaluation, public and Council review, Council recommendations on sampling plan adjustments and adjustments to deployment by NMFS can be incorporated into the Annual Deployment Plan. Importantly, the Annual Deployment Plan enables changes to be implemented to address identified sampling issues. For example, the 2015 Annual Deployment Plan expanded on the gap analysis that was conducted in the SEA and provided a risk assessment of data being available for every NMFS/area/gear combination to help guide policy decisions about deployment rates (e.g., Figure B-2 in the 2015 Annual Deployment Plan). Neither the analysis in the Annual Deployment Plan nor the SEA provide a "hard line" or a single deployment rate that results in the overall observer data collection program not being able to collect reliable information. Instead, these analyses in combination with the Annual Deployment Plan process provide a risk assessment and information to guide policy decisions about where to reduce risk of no coverage rather than a single defining rate where data becomes unreliable (which would only be relative to a single specific sampling objective and measure)

4.1.2 Annual Deployment Plans

On an annual basis, NMFS develops an Annual Deployment Plan that describes how NMFS intends to assign at-sea and shoreside fishery observers and electronic monitoring to vessels and processing plants engaged in halibut and groundfish fishing operations in the North Pacific. Each Annual Deployment Plan describes three elements of the sampling design for at-sea deployment of observers and EM in the partial coverage category: 1) the selection method (e.g. vessel or trip) to accomplish random sampling; 2) division of the population of partial coverage trips into selection pools or strata (stratification scheme); and 3) the allocation of deployment trips among strata (allocation strategy). Sampling strata and the allocation strategy have both evolved since the first Annual Deployment Plan was finalized in 2012. Changes to the sampling design (sampling strata and selection method) have largely been driven by evaluations presented in the Annual Reports (e.g., the 2015 Annual Report recommended gear-specific strata) and recommendations by the Statistical and Science Committee of the Council; whereas, changes to the allocation strategies have been a combination of evaluation in the Annual Deployment Plans and the Annual Report (NMFS 2017a), with scientific input from the SSC and policy input from the Council.[3] The selection method and definition of the sampling strata for each year are summarized in Table 4, the details of which are included each respective Annual Deployment Plan. Some of the significant changes include changing the selection unit from vessels to trips (Annual Deployment Plan 2015), defining sampling strata by gear rather than by vessel size (Annual Deployment Plans 2016 through 2019), and implementing regulations for the EM strata (Annual Deployment Plans 2018 and 2019).

The allocation strategy has also evolved since 2013 from a constant rate within a couple large strata (Annual Deployment Plans 2013 and 2014) to an allocation based on variability in retained and discarded

[3] Annual Deployment Plans and Annual Reports for each year since 2013 are available at: https://alaskafisheries.noaa.gov/fisheries/observer-program.

catch (Annual Deployment Plans 2016 and 2017), to a "hurdle" approach (Annual Deployment Plans 2018 and 2019).

The 'hurdle' observer allocation strategy uses a 2-step process. First, the allocation meets a base level of coverage that is equally allocated among sampling strata; second, once the base level of coverage is accomplished, the remaining sea days are allocated among strata by optimizing precision and cost. The hurdle approach balances the tradeoff between collection of samples across most area and gear combinations, with other policy decisions that focus on specific management needs. In establishing the hurdle, NMFS used a risk threshold to evaluate the probability of having at least three trips observed within a gear type for each NMFS area in a year. This threshold provides a reference point to evaluate whether a gear/reporting area has at least a 50% probability of containing at least 3 observed trips in a year. A risk threshold is consistent with the threshold used in the SEA, but could obviously be adjusted should risk tolerance change in the future. The three-trip threshold represented a minimum number of trips required for generating variance estimate by area and is precautionary with respect to reducing spatial bias by setting a reasonable chance of getting data across all gear types and areas. In setting the probability of observing 3 trips at 50%, NMFS also recognized that not all areas will achieve coverage; some areas have few trips and are unlikely to contain any observed trips (NMFS 2018[b], Appendix D). A consequence of not having data from observed trips in these smaller areas is that catch estimates must rely on data from outside of the area and estimates of variance will not be reliably produced.

In the second step of the hurdle allocation approach, once the minimum threshold is met, the remaining sea days are allocated using an algorithm that maximizes precision for chosen metrics (such as total trip discards) for the least cost. When budget allows, this enables policy decisions to be incorporated into the allocation strategy. Policy direction from the Council and fishery management priorities determine which metrics are included in the optimization algorithm each year. For example, the 2019 draft Annual Deployment Plan evaluated two sets of optimization metrics: 1) discards of groundfish, halibut PSC and Chinook salmon PSC; 2) discards of crab PSC in addition to discards of groundfish, halibut PSC, and Chinook salmon PSC. In their review of the draft Annual Deployment Plan in October, both the SSC and the Council recommended that the optimization be based on Chinook and halibut PSC, rather than optimization that included crab, reflecting a policy priority to optimize on certain PSC species. The final 2019 Annual Deployment Plan optimized trips above the hurdle based on the Council's recommendation, resulting in the higher relative weightings for sampling strata that are PSC constrained (of 0.70 for trawl and 0.27 for hook-and-line), compared to other strata (0.01 for pot and tender trawl, and <0.01 for tender pot; Table 4 in Annual Deployment Plan 2019). These weightings are used in the allocation strategy for sea days above the 15% hurdle and results in deployment rates that reflect the priorities associated with optimization metrics (e.g. trawl 24%; Table 4).

A strength of the Annual Deployment Plan process is that strata definitions, risk thresholds, hurdle levels, and optimization can be revisited as needed. Although stability is an important component for the observer program, fisheries change over time and new information can change priorities and scientific understanding. As has occurred in the past (e.g., Table 4), the observer sampling program will likely continue to evolve; however, the current allocation approach of hurdle plus opimization allows some stability in terms of meeting sample collection priorities, while also allowing for specific policy objectives.

Table 4 **Sampling strata and selection pools in the partial coverage category from 2013 to the present. The partial coverage selection rates set through the Annual Deployment Plan since 2013 are noted and the realized coverage rates evaluated in the Annual Report are noted in parenthesis. CP=catcher/processor; CV=catcher vessel; H&L= hook-and-line gear; LOA=vessel length overall.**

<table>
<tr><th rowspan="2">Year</th><th colspan="7">Partial coverage category</th></tr>
<tr><th colspan="5">Observer trip selection pool
Observer coverage required on all randomly selected trips</th><th>EM trip selection pool
EM required on randomly selected trips</th><th>Observer vessel selection pool</th><th>No selection pool Observer coverage not required</th></tr>
<tr><td>2019</td><td>Trawl: 24%</td><td>Trawl Tender: 27%</td><td>H&L: 17%</td><td>Pot: 16%</td><td>Tender Pot: 17%</td><td rowspan="2">Fixed gear EM trip selection pool: 30%</td><td rowspan="5">n/a</td><td rowspan="6">Vessels <40’ LOA and Jig gear</td></tr>
<tr><td>2018</td><td>Trawl: 20%</td><td>Trawl Tender: 17%</td><td>H&L: 17%</td><td>Pot: 16%</td><td>Tender Pot: 17%</td></tr>
<tr><td>2017</td><td>Trawl: 18% (20.7)</td><td>Trawl Tender: 14% (18.8)</td><td>H&L: 11% (12.0)</td><td>H&L Tender: 25% (0)</td><td>Pot: 4% (7.7)</td><td>Pot Tender: 4% (5.3)</td><td rowspan="5">n/a</td></tr>
<tr><td>2016</td><td colspan="2">Trawl: 28% (28.0)</td><td colspan="2">H&L: 15% (15.0)</td><td colspan="2">Pot: 15% (14.7)</td></tr>
<tr><td>2015</td><td colspan="2">Large Vessel: 24% (23.4)
Trawl CVs, Small CPs, H&L/Pot CVs ≥ 57.5’</td><td colspan="4">Small Vessel: 12% (11.2)
H&L/Pot CVs >40’ and <57.5’</td></tr>
<tr><td>2014</td><td colspan="6">All Trawl CVs and H&L/Pot vessels ≥ 57.5’: 16% (15.1)</td><td>H&L/Pot CVs >40’ and <57.5’: 12% (15.6)</td></tr>
<tr><td>2013</td><td colspan="6">All Trawl CVs and H&L/Pot vessels ≥ 57.5’: 14.5% (14.8)</td><td>H&L/Pot CVs >40’ and <57.5’: 11% (10.6)</td><td colspan="2">Vessels <40’ LOA and Jig gear</td></tr>
</table>

4.2 Revenue and Gap Analysis

This analysis builds on the work done in previous analyses discussed in Section 4.1, particularly the gap analysis done in the SEA and the sample allocation described in the Annual Deployment Plans (Section 4.1.2). The previous analyses evaluated allocation of samples based on a fixed fee percentage (1.25%), with the SEA considering how variability in revenue and costs could create estimate gaps and the Annual Deployment Plans considering projected revenue and costs within the context of an upcoming deployment. The SEA analysis included simulations using estimation strata that closely match the groundfish estimation methods in the catch accounting system and deployment rates that were based on the Annual Deployment Plan sampling strata at the time of analysis (small and large vessel strata). Deployment rates were also independent from changes in costs per day, but both per day cost and potential fee revenue were put in context with the consequences of changes in deployment rates and catch accounting post-strata. The Annual Deployment Plans evaluated gaps on a much courser scale than the SEA, with the analytic focus on defining the probability of obtaining at least 3 observed trips in a gear/area combination for an entire year and based on a known budget.

The analysis presented in this section of this Analysis bridges the SEA and past Annual Deployment Plan analyses in several important ways:

- The Annual Deployment Plans have consistently evaluated gaps at the year/reporting area/sampling strata level. This analysis expands on this definition by using major trip targets and within-year periods to relate gaps in data as they relate to both fishing activity and inseason monitoring activity.

- The 2017 Annual Deployment Plan (current sampling strata and allocation strategy) is used in the simulation; a 15% hurdle is included and the deployment allocations above the hurdle represent current optimization priorities made by NMFS with Council input.

- Cost per observer sea-day is modeled and incorporated into the simulation, reflecting past contract performance where increases in revenue and total sea-days result in lower per sea-day costs.

- Potential revenues are evaluated across a range of fee rates and include both ex-vessel price performance and volume, and an evaluation of historical revenue across a range of potential fee rates.

Alternatives should be evaluated in context with the potential fee revenues, costs, and impacts on gaps in information due to changing deployment rates. These components are described and evaluated in the following sections: Fee Revenue Analysis (Section 4.2.1), Evaluation of Gaps (Section 4.2.2), and Variance Scaling (Section 4.2.3). These sections complement one another, and the revenue and fee percentages calculated in Section 3.2.1 are directly comparable to the evaluation of gaps in Section 3.2.2 and discussion on variance scaling in Section 3.2.3. The Revenue Analysis section provides a description of the economic components associated with calculating the observer fees and provides a hindcast of actual revenues post-restructure and potential revenues for pre-restructure years. This forms the basis from which to compare the fee alternatives with potential impacts on coverage and information gaps. The range of revenues provided in Section 3.2.1 can be directly mapped to Section 3.2.2 by comparing Table 9 with the mean estimated revenues for a given fee percentage across all gears in Table 7.

A critical component not considered in the fee revenue breakout is the cost of EM, which will be subtracted from the total fee generated revenue and hence this analysis may contain overly-optimistic fee projections and associated at-sea observer coverage. The costs of a mature EM program are unknown at

this point (see Section 4.2.2.7 on EM) so to account for potential EM costs, Table 12 or Table 13 scale the realized fee percentage by the varying levels of EM costs. For example, if EM costs $500k, and $5.7M revenue is generated, then the effective fee percentage rate is 0.16% lower than shown in the gap analysis. So far EM costs have been supported by a combination of Federal funding and external grants. However, in the future, fee revenues may be used to fund EM systems.

Annually, NMFS uses revenues generated from the 1.25% fee to budget available observer days for the Annual Deployment Plan. In establishing sampling rates in the Annual Deployment Plan, NMFS must consider how to allocate fee revenue (and unspent revenue from previous years) across the calendar Annual Deployment Plan year. Fee revenue is not available for expenditure until the second half of the following year (usually in June) due to the federal budgeting cycle, thus NMFS must ensure funds are available to fund the first half of the year from the previous year's funding. In addition, NMFS can choose to spend revenue across multiple years, which helps smooth out fluctuations in revenue (including NMFS contributions) available for funding observer deployment.

4.2.1 Fee Revenue Analysis

This section explores a range of possible observer fee revenues for the partial coverage category by evaluating recent information on catch, ex-vessel standard prices, ex-vessel value, and a range of fee percentages, all of which contribute to observer fee revenues. Because there are only five complete years of information available under the restructured Observer Program, the range of possible observer fee revenues have been expanded and include data from 2009-2012. For these pre-restructure years, the data reflects information from what would have been the partial coverage category if the restructured Observer Program had been in place in its current form during that time. Expanding the years of available data in this manner is similar to the analysis discussed in Section 4.2 of the Supplemental Environmental Assessment (NMFS 2015) and allows for an examination of nine years of data.

Halibut, sablefish, Pacific cod, and Pollock accounted for 98.05% (on average) of the observer fees collected between 2013 and 2017. While a hallmark of the restructured Observer Program is that each participant pays an equal percentage of the value, they derive from the groundfish and halibut fisheries toward the cost of collecting observer data, the contribution from other groundfish species have been omitted from this analysis in order to simplify calculations for the historical data prior to the restructured Observer Program. The dataset for this analysis includes:

- 2009-2012: landings were identified, ex-vessel standard prices were calculated, and ex-vessel values were estimated for halibut, sablefish, Pacific cod, and Pollock that would have constituted the partial coverage category if the restructured Observer Program had been in place in its current structure during that time.

- 2013-2017: landings, standard prices, and the ex-vessel value of catch of halibut, sablefish, Pacific cod, and Pollock that fell under the partial coverage category.

4.2.1.1 Analytical Assumptions

The fee revenue analysis is based on several assumptions. The first assumption is that past scenarios are indicative of future reality. Just because the landings subject to observer fees in recent years are within a certain range does not guarantee that landings in the future will fall within that same range. Similarly, just because ex-vessel prices were within a certain range in the past does not mean they will continue to fall within that range in the future. The ex-vessel value of catch is expected to fluctuate, as are the catch quotas. As these are the foundation for the ex-vessel value upon which observer fees are based, this analysis assumes future fee revenues will be comparable to fee revenues generated in the recent past.

A second assumption in the fee revenue analysis is that no supplemental funds will be used to fund observer coverage. This analysis assumes observer coverage (EM and at-sea coverage) is based solely on

observer fee revenues and that any EM costs would be deducted from the fee budget prior to determining observer coverage selection rates.

A third assumption in the fee revenue analysis is that fee revenues are used within a single year. This analysis does not account for the possibility of unused fee proceeds being carried over from one year to the next. There may be years in which the amount of revenue from a preceding year exceeds the revenue needed for desired coverage levels in a subsequent year (i.e., because effort ends up being less than expected). Observer fee revenue can be rolled-over and be available for subsequent years.

4.2.1.2 Partial Coverage Landings

The first component in the calculation of observer fee revenues are landings. In general, the landings subject to observer fees includes halibut IFQ or CDQ, sablefish IFQ, fixed gear sablefish CDQ, and the landings of catcher vessels and some small catcher/processors that possess a Federal Fisheries Permit (FFP) and participate in federally managed or parallel groundfish fisheries, excluding non-sablefish CDQ groundfish, AFA Pollock, and the Central GOA Rockfish Program. This analysis applied the methods and rules for the restructured program back in time in order to analyze a broader set of years.

Figure 2 illustrates the amount of catch that was subject to observer fees between 2013 and 2017 and catch that, hypothetically, would have been subject to observer fees between 2009 and 2012 had the current program been in place at the time. Each panel in the figure corresponds to one of the four species that are the focus of this analysis. Halibut catch is summarized in headed and gutted weight equivalents and sablefish, Pacific cod, and Pollock are summarized in round weight equivalents. Over this time-period, halibut and sablefish have shown overall declines in catch volume. Halibut catch was at its highest in 2009 with 445.4 million pounds and at its lowest in 2014 with 163.8 million pounds. Sablefish catch has declined from 258.7 million pound in 2012 to 176.3 million pounds in 2016. Pacific cod has fluctuated from 1,324.1 million pounds in 2009 to 2,373.4 million pounds in 2012 and back to 1,506.5 million pounds in 2017. Pollock is the only species showing a steady increase in catch between 2009 through 2017 (813.0 million pounds in 2009 to 3,885.7 million pounds in 2017).

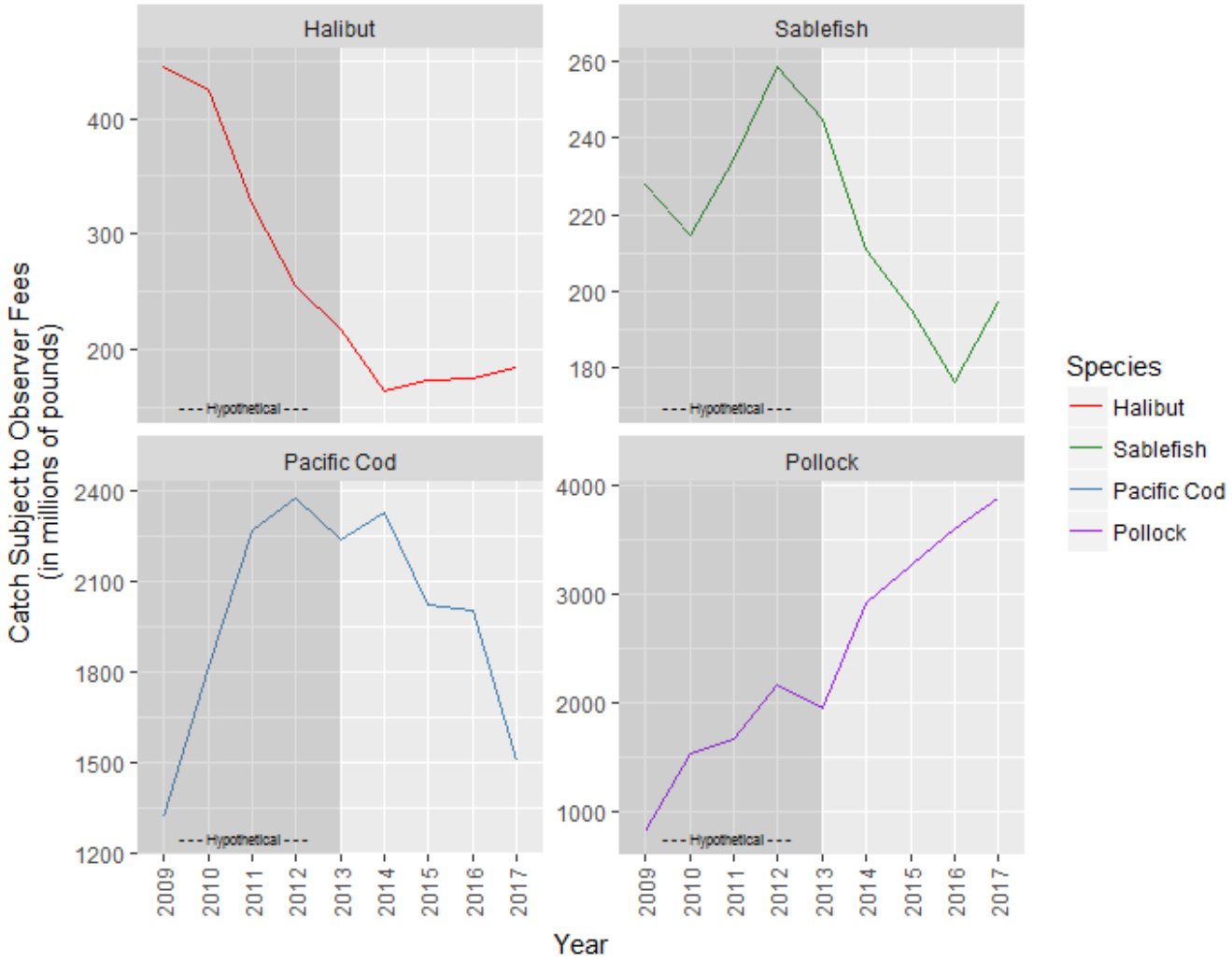


Figure 2 Hypothetical and Actual[1] Annual Catch of Halibut[2], Sablefish, Pacific Cod, and Pollock, Subject to Observer Fees, 2009 through 2017, in millions of pounds, by species.

Sources: NMFS Alaska Region Catch Accounting System (CAS) and Restricted Access Management (RAM) IFQ Landing Data
[1] Darker gray shading for 2009 through 2012 reflects the years prior to the Observer Program restructure, for which catch would, hypothetically, have been subject to observer fees. The actual catch subject to observer fees, 2013 through 2017, are also shown.
[2] Halibut catch is summarized in headed and gutted equivalents and sablefish, Pacific cod, and Pollock are summarized in round weight equivalents.

4.2.1.3 Standard Ex-Vessel Prices

A second component in the calculation of observer fee revenues are standard ex-vessel prices. There are two methods utilized for calculating the standard ex-vessel prices used for the observer program fee: 1) the groundfish method; and 2) the IFQ and CDQ method. Details of the methods to derive standard prices are outlined in the *Federal Register* notice where standard prices are published each year (83 FR 65146, December 18, 2018); here we summarize those methods. This analysis applied the methods and rules for the restructured program back in time in order to analyze a broader set of years.

Groundfish standard ex-vessel prices are calculated as an average of three years of volume and value information from the State of Alaska's Commercial Fishery Entry Commission's (CFEC) gross revenue data. Three years of data are used in order to lessen the impact of inter-annual fluctuations in ex-vessel revenue by the use of a rolling average ex-vessel price (NPFMC 2006). Because there is a time delay before groundfish price information is available for the calculation of the current year's standard ex-

vessel prices, the data used to generate standard ex-vessel prices are lagged by at least two years.[4] The standard price calculations result in a weighted average ex-vessel price per pound by species, port, and gear category. Three gear categories are used for the standard ex-vessel prices: pelagic trawl gear, non-pelagic trawl gear, and non-trawl gear (hook-and-line, pot, and jig). NMFS does not publish any price information that would permit the identification of an individual or business. If the calculated ex-vessel price for a species, port, and gear category combination is confidential, standard ex-vessel prices are calculated at an aggregated level. For example, aggregations may be by gear type (i.e., a combined non-pelagic and pelagic trawl price), for a geographic area instead of a port (i.e., the Central Gulf of Alaska instead of the port of Kodiak), or for a grouping of species instead of an individual species (i.e., GOA deep-water flatfish instead of Dover sole). Standard ex-vessel prices for Pacific cod, pollock, and trawl caught sablefish were calculated for 2009 through 2012 using the same method and confidentiality standards that were used to calculate standard groundfish prices under the restructured Observer Program for 2013 through 2017.

Standard ex-vessel prices for halibut IFQ or CDQ, sablefish IFQ, and sablefish accruing against the fixed gear sablefish CDQ reserve are based on a second method of standard ex-vessel price calculations. The IFQ and CDQ standard ex-vessel prices are based on the volume and value data collected on the IFQ Buyer Report from the previous year. The standard ex-vessel prices reflect a single annual average price per pound, by port. If the calculated ex-vessel price for a species and port combination is confidential, standard ex-vessel prices are calculated at an aggregated level, for example, for a geographic area instead of a port (i.e., the Central Gulf of Alaska instead of the port of Kodiak). Standard ex-vessel prices for halibut and fixed gear sablefish were calculated for 2009 through 2012 in a manner consistent with how standard IFQ and CDQ ex-vessel prices were calculated under the restructured Observer Program for 2013 through 2017.

The actual standard prices used to assess observer program fees between 2013 and 2017 and prices that would have been used between 2009 and 2012 had the current program been in place at that time were examined. Because of the manner in which standard ex-vessel prices are calculated, there are a range of prices for each species within a year. Figure 3 illustrates the weighted average standard ex-vessel price for each of the four species of interest by year. Prices were weighted by the amount of catch that would have that standard price applied to it in the calculation of observer fees. To help illustrate the variability of the prices, one weighted standard deviation is plotted above and below the weighted mean in Figure 3. The standard deviation was also weighted by the amount of catch that would have had each standard price applied to in in the calculation of observer fees. All of the prices have been adjusted for inflation using the using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018. Over the time-period examined, the average standard ex-vessel price for halibut has ranged from $3.68 in 2010 to $6.96 in 2012; sablefish from $2.99 in 2014 to $5.49 in 2012; Pacific cod from $0.29 in 2017 to $0.55 in 2010; and Pollock from $0.14 in 2017 to $0.20 in 2012.

[4] For example, the 2019 standard ex-vessel prices are based on 2015, 2016, and 2017 gross revenue data.

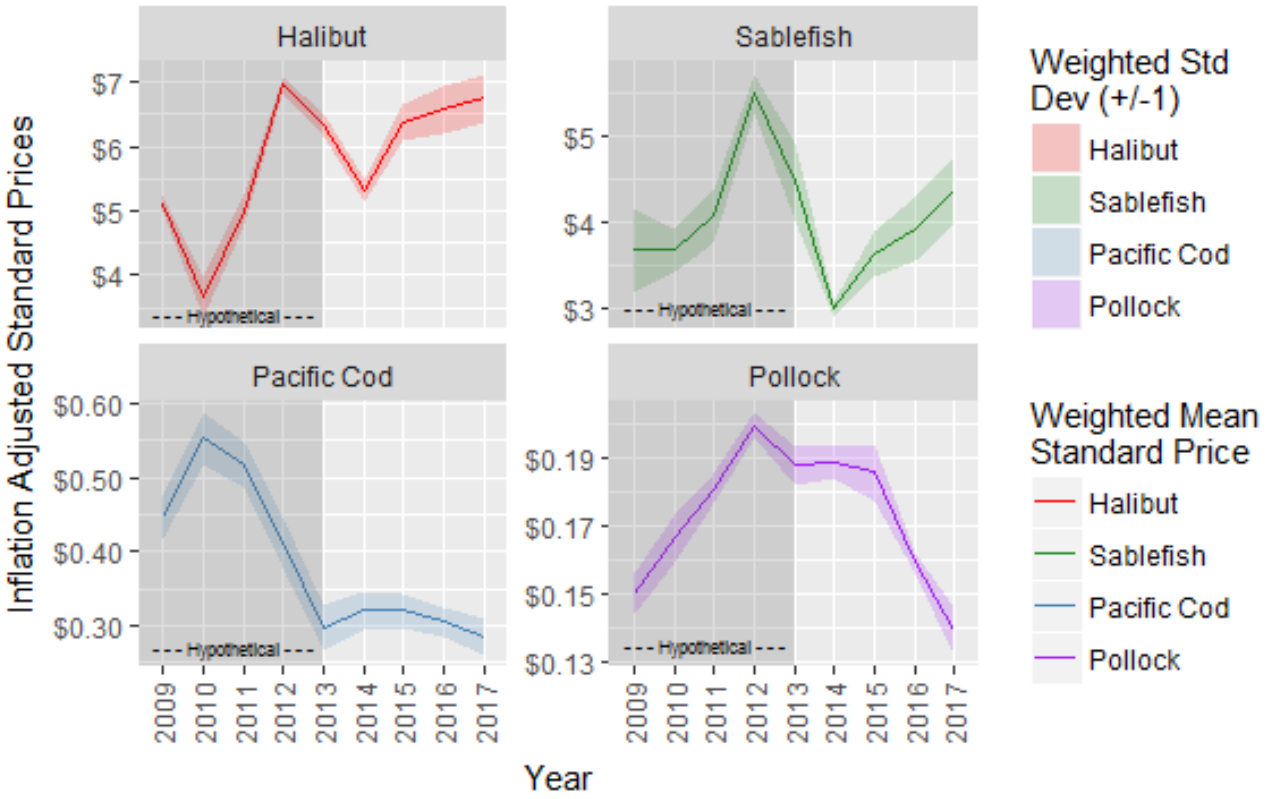


Figure 3 Hypothetical and Actual[1] Annual Observer Fee Standard Prices[2] for Halibut, Sablefish, Pacific Cod, and Pollock, 2009 through 2017, as the Inflation Adjusted Weighted Mean Standard Price[4] (Line) and Plus or Minus One Weighted Standard Deviation[3] (Color Shading).

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Darker gray shading for 2009 through 2012 reflects the years prior to the Observer Program restructure, for which hypothetical inflation adjusted standard prices have been calculated using the same methodology as under the restructured Observer Program, 2013 through 2017.

[2] Groundfish standard prices for each year reflect a 3-year rolling weighted average of lagged revenue data (i.e., a 2017 standard price is based on 2013, 2014, and 2015 data) and halibut and sablefish fixed gear standard prices reflect a weighted average of revenue data from a portion of the previous year and a portion of the year two years previous (i.e., a 2017 standard price is based on data submitted in a 2016 report, which covers October 2015 through September 2016). Standard prices are identified for each port, species, and gear (with gear as HAL/POT/JIG, NPT, or PTR), however each standard price may reflect an aggregate of revenue data from multiple ports or multiple gears in order to meet confidentiality standards.

[3] Mean standard prices and standard deviation calculations were weighted by the amount of catch subject to observer fees at each standard price.

[4] Standard prices were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

4.2.1.4 Partial Coverage Ex-Vessel Value

A third component in the calculation of observer fee revenues are ex-vessel values. Ex-vessel value is determined by multiplying the standard price for groundfish by the round weight equivalent for each year, species, gear, and port combination, and by multiplying the standard price for halibut by the headed and gutted weight equivalent for each year and port combination. The actual ex-vessel values that were the basis of observer program fees between 2013 and 2017 and ex-vessel values that would have been the basis of observer program fees between 2009 and 2012 had the current program been in place at that time were examined. Again, all of the ex-vessel values have been adjusted for inflation using the using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018.

Figure 4 illustrates the ex-vessel value for the four species of interest, combined, by year, in the top panel and the ex-vessel value for each of those species, individually, by year, in the bottom four panels. Over the time-period examined, the ex-vessel value of hypothetical and actual partial coverage landings ranged from $461.1 million dollars in 2012 to $279.5 million dollars in 2014. The highest overall ex-vessel value in 2012 coincides with the 2nd highest halibut ex-vessel value ($177.6 million), the 3rd highest Pacific cod ex-vessel value ($98.2 million), and highest sablefish ex-vessel value ($142.0 million) over this time-period. The lowest overall ex-vessel value in 2014 coincides with the lowest halibut ($87.0 million) and lowest sablefish ($63.1 million) ex-vessel values between 2009 and 2017. Since 2014, the ex-vessel values of halibut and sablefish partial coverage catch have increased slightly, but Pacific cod ex-vessel value continues to decline.

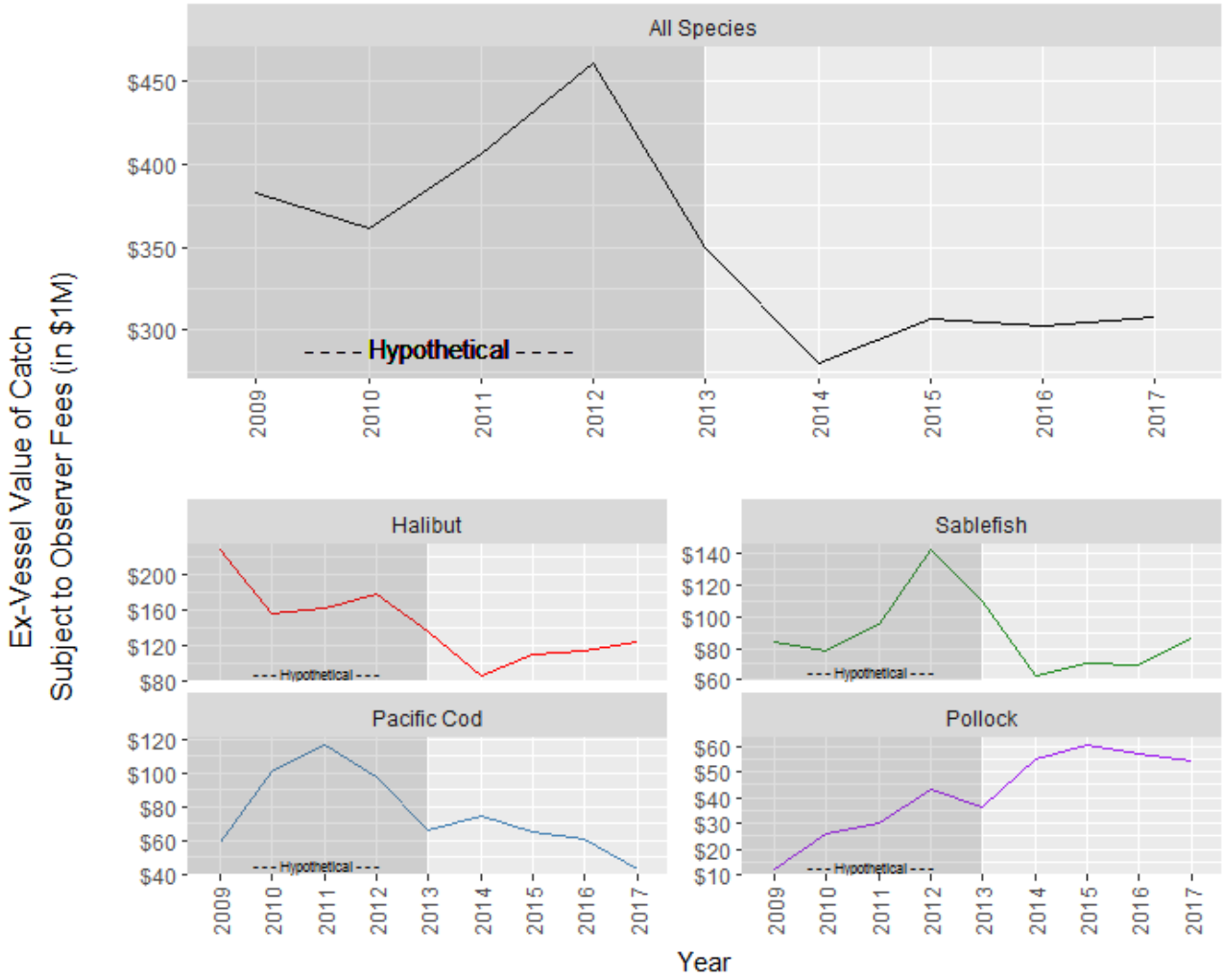


Figure 4 Hypothetical and Actual[1] Annual Ex-Vessel Values of All Species[2], Halibut, Sablefish, Pacific Cod, and Pollock Catch Subject to Observer Fees, 2009 through 2017, in Millions of Inflation Adjusted Dollars[3].

Sources: NMFS Alaska Region Catch Accounting System (CAS) and Restricted Access Management (RAM) IFQ Landing Data

[1] Darker gray shading for 2009 through 2012 reflects the years prior to the Observer Program restructure, for which ex-vessel values reflect catch that would, hypothetically, have been subject to observer fees. The actual ex-vessel value of catch subject to observer fees, 2013 through 2017, are also shown.

[2] The All Species ex-vessel values in this figure only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values of catch that, hypothetically, would have been subject to observer fees between 2009 and 2012. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

[3] Ex-vessel values were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

Figure 5 illustrates the ex-vessel value of catch subject to observer fees by the four different gear types, combined, by year, in the top panel and the ex-vessel value for each of those gear types, individually, by year, in the bottom four panels. Over the time-period examined, the ex-vessel value of hypothetical and actual partial coverage landings ranged from $461.1 million dollars in 2012 to $279.5 million dollars in 2014. The trend in ex-vessel value for all gear types combined over this time-period is driven largely by the ex-vessel value of hook and line catch, as is seen by the similarity in their plots. The highest overall ex-vessel value in 2012 and lowest overall ex-vessel value in 2014 coincide with the highest hook and line ex-vessel value in 2012 ($322.7 million) and lowest hook and line value in 2014 ($153.5 million). The largest ex-vessel values for the jig, pot, and trawl gears were $2.1 million, $65.5 million, and $92.0 million in 2011, 2011, and 2014, respectively. The smallest ex-vessel values for jig, pot, and trawl gears were $0.2 million, $27.2 million, and $39.6 million in 2017, 2009, and 2009, respectively.

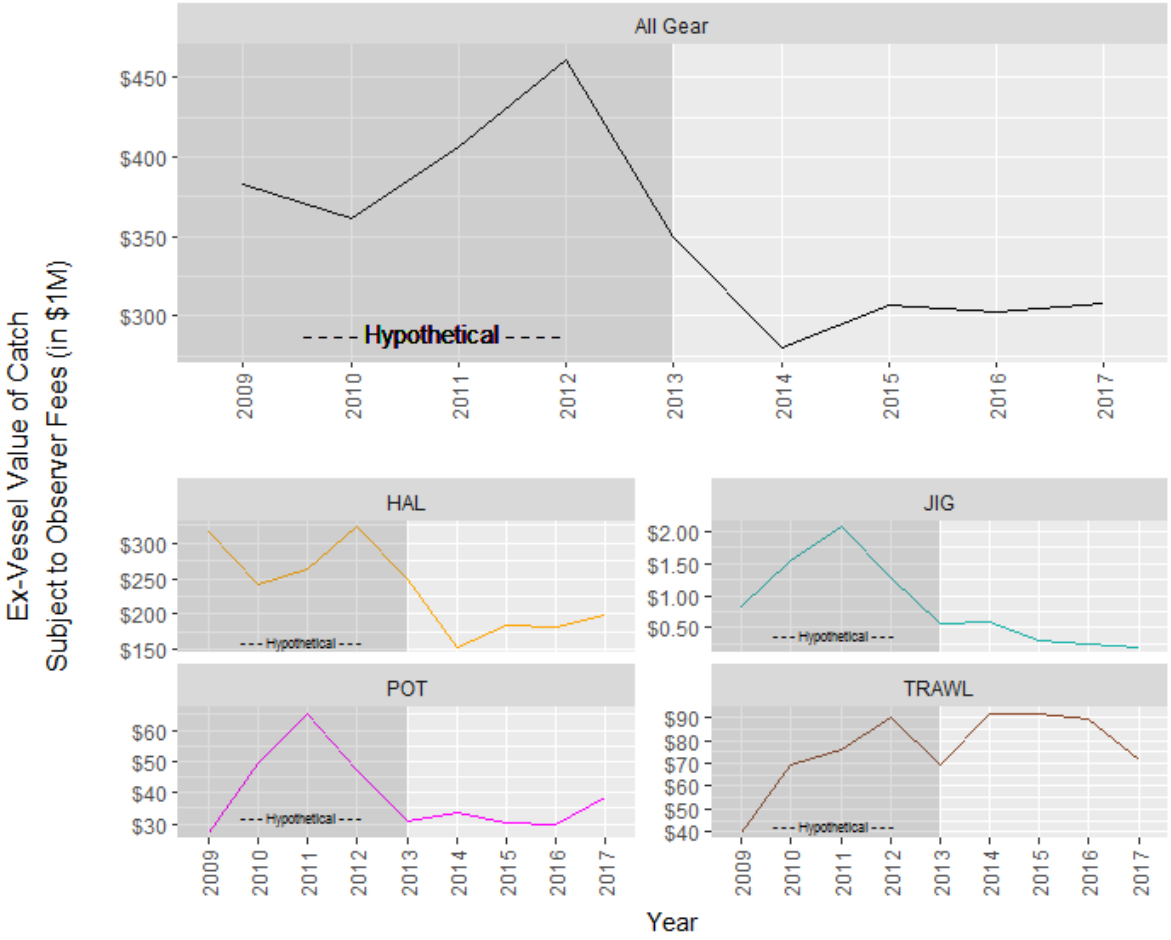


Figure 5 Hypothetical and Actual[1] Annual Ex-Vessel Values[2] for All Gear, Hook and Line (HAL), Jig, Pot, and Trawl Catch Subject to Observer Fees, 2009 through 2017, in Millions of Inflation Adjusted Dollars[3].

Sources: NMFS Alaska Region Catch Accounting System (CAS) and Restricted Access Management (RAM) IFQ Landing Data

[1] Darker gray shading for 2009 through 2012 reflects the years prior to the Observer Program restructure, for which ex-vessel values reflect catch that would, hypothetically, have been subject to observer fees. The actual ex-vessel value of catch subject to observer fees, 2013 through 2017, are also shown.

[2] The ex-vessel values in this figure only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values of catch that, hypothetically, would have been subject to observer fees between 2009 and 2012. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-

vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

[3] Ex-vessel values were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

Figure 6 illustrates the proportion of the ex-vessel value of catch subject to observer fees based on the gear type and species of the catch in each year between 2009 and 2017. Gear and species combinations that accounted for less than 1% of the ex-vessel value in a year were aggregated into the 'Other' category. In each year since 2009, hook and line halibut catch comprises the largest proportion of ex-vessel value subject to observer fees, ranging from 31.1 to 59.4%. Hook and line sablefish catch comprises the second largest proportion of ex-vessel value subject to observer fees in each year (20.8 to 30.2%). Prior to 2013, Pacific cod landings constituted a larger proportion of the ex-vessel value on trawl gear, but in 2013 and onward, Pollock landings do. Landings of Pacific cod or sablefish on pot gear have contributed between 6% to 15.3% and 1% to 4.6% annually, respectively.

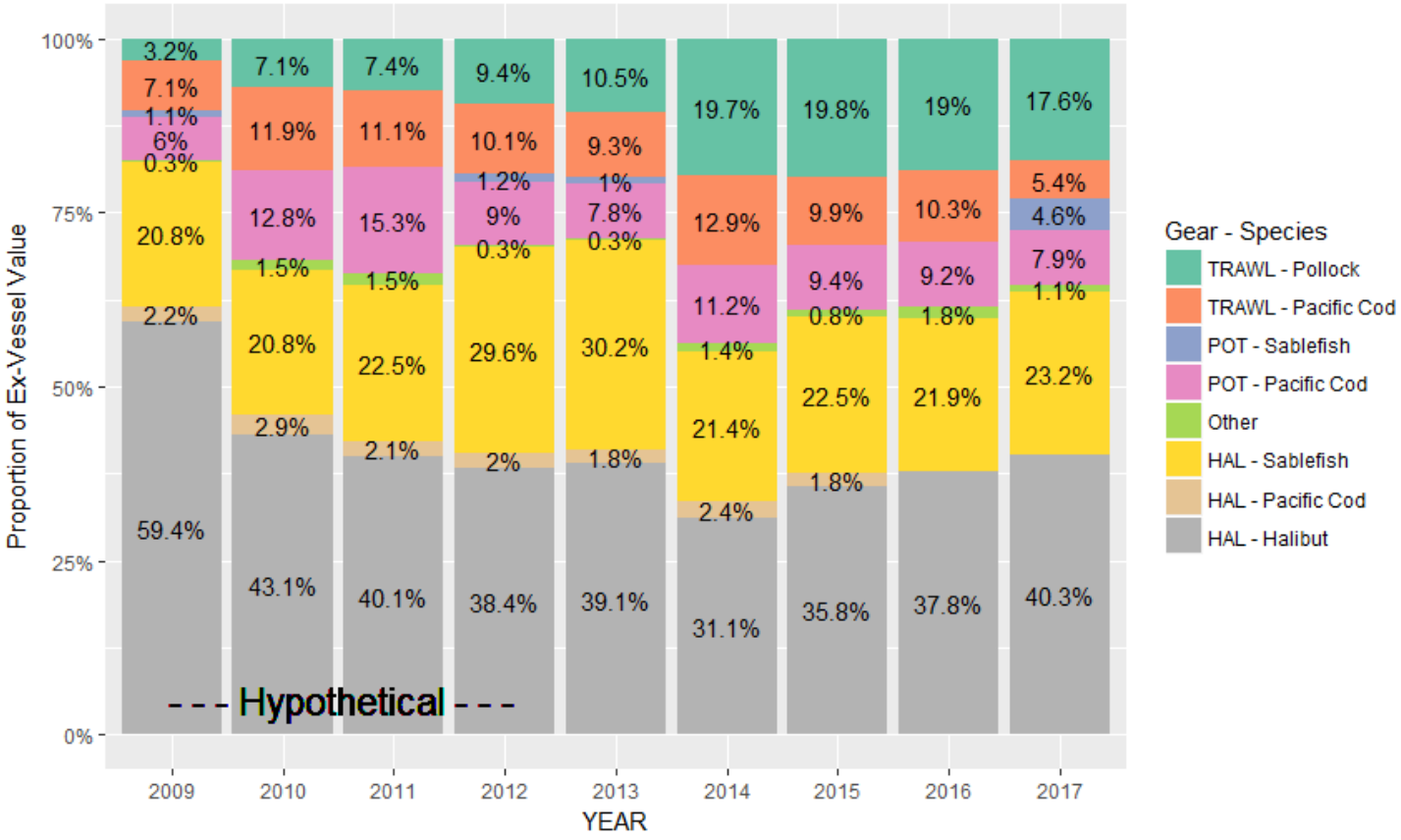


Figure 6 The Proportion of Hypothetical and Actual1 Annual Ex-Vessel Value of Catch Subject to Observer Fees[3], by Species and Gear Type[2], 2009 through 2017.

Sources: NMFS Alaska Region Catch Accounting System (CAS) and Restricted Access Management (RAM) IFQ Landing Data

[1] 2009 through 2012 reflects the years prior to the Observer Program restructure for which ex-vessel values reflect catch that would, hypothetically, have been subject to observer fees. The actual ex-vessel value of catch subject to observer fees, 2013 through 2017, are also shown.

[2] Gear and species combinations that account for less than 1% of the ex-vessel value in a year are aggregated into 'Other'.

[3] The ex-vessel values in this figure only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values of catch that, hypothetically, would have been subject to observer fees between 2009 and 2012. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

4.2.1.5 Partial Coverage Fee Percentages and Fee Revenues

The final component of observer fee revenues is the fee percentage. When the restructured observer program was implemented in 2013 the fee percentage was set at 1.25% of the ex-vessel value of catch subject to observer fees. This analysis evaluates a range of potential fee percentages above 1.25% to reflect the range of alternatives being considered under this action. The actual fee revenues that were generated between 2013 and 2017 under the restructured program and the hypothetical fee revenues between 2009 and 2012 that would have been generated had the current program been in place at that time, were examined. Table 5 and Table 6 indicate the fee revenues generated for the four species of interest in this analysis by gear type. These values are a product of the amount of catch subject to fees and the standard prices applied to them, resulting in ex-vessel values and applying a 1.25% observer fee. Fee revenues are listed in nominal dollars as well as the inflation adjusted amounts (Table 5 and Table 6).

Under section 313 of the Magnuson-Stevens Fishery Conservation Act, observer fees can be expressed as a percentage of ex-vessel value (not to exceed two percent) of the unprocessed ex-vessel value of the fish harvested. Table 7 identifies a range of possible observer fee revenues based on hypothetical and actual ex-vessel values between 2009 and 2017 and a range of observer fee percentages between the current 1.25% fee and the 2% maximum fee possible. For each gear type, the minimum, mean, and maximum annual inflation adjusted ex-vessel values between 2009 and 2017 were identified. The product of each of those values and each of the 0.05 fee percentage increments between 1.25 and 2.0 were calculated and listed in the table as possible fee revenues.

Table 7 can be used to determine a range of fee revenues based on recent ex-vessel values and varying the fee percentage or to determine a range of fee revenues at a particular fee percentage based on a range of underlying ex-vessel values. For example, the lowest ex-vessel value for catch subject to observer fees on hook and line gear was $153.5 million in 2014. At the 1.25% observer fee that equates to $1.92 million in fee revenues, at the 1.75% fee $2.69 million, and at the 2.0% fee $3.07 million. In another example, the lowest ex-vessel value for trawl gear between 2009 and 2017 was $39.6 million in 2009. At the 1.5% fee level, this would have resulted in $0.59 million in fee revenues. The mean ex-vessel value between 2009 and 2017 was $76.5 million and it would have resulted in $1.15 million in fee revenues at the 1.5% fee. The highest ex-vessel value between 2009 and 2017 for trawl gear was $92.0 million in 2014 and it would have resulted in $1.38 million in fee revenues at the 1.5% fee.

In order to calculate a range of fee revenues for all gears combined at each of the possible fee percentages, the lowest annual ex-vessel value in the last nine years was identified, the highest annual ex-vessel value in the last nine years was identified, and the average annual ex-vessel value across the last nine years was calculated. These ex-vessel values included all four gear types and the four species of interest. Each was multiplied by the fee percentages between 1.25% and 2.0%. The ‘All Gears’ summary does not estimate minimum fee revenues based on each gears’ worst annual ex-vessel value and it does not estimate the maximum fee revenues based on each gears’ best annual ex-vessel value, but rather, attempts to summarize fee revenues based on an overall low ex-vessel value year and on an overall high ex-vessel value year.

Table 7 can also be used to estimate fee revenues, based on the ex-vessel value in recent years, if fee percentages are applied differently based on gear type. For example, if fees were assigned as 1.25%, 2.0%, 1.75%, and 1.5% for hook and line, jig, pot, and trawl gears, respectively, the fee revenue would have been $4,778,130 based on the average ex-vessel value in recent years.

Extending the time-period analyzed for this analysis was done to provide more data for examination and a wider range of possible values. However, on average, annual ex-vessel values were higher for all of the gear types other than trawl prior to the Observer Program restructure in 2013 (see Figure 5). Therefore, many of the fee revenue estimates in Table 7 are based on high ex-vessel value years prior to 2013. To look at the information without these higher ex-vessel values, the data in Table 8 were generated in the

same way as Table 7, but they were based only on years under the current Observer Program, 2013 through 2017. This table contains higher minimum fee estimates for pot and trawl gears and lower maximum fee estimates for all gears but trawl. Fee revenue estimates based on mean annual ex-vessel values are also lower for all gear types but trawl.

4.2.1.6 Fee Percentages, Fee Revenues, and Funding Levels

As seen in previous sections, a range of fee revenues is possible for a particular ex-vessel value depending on the fee percentage applied. Based on the hypothetical ex-vessel values between 2009 and 2012 and the actual ex-vessel values between 2013 and 2017, fee revenues were calculated for each fee percentage in 0.05% increments between 1.25% and 2.0%. These fee revenues were compared to a range of theoretical funding levels for the observer program between $2.5 and $10 million. Figure 7 identifies the proportion of years between 2009 and 2017 where fee revenues fell below each funding level for a range of funding levels at each fee percentage. Not surprisingly, as the fee percentage rises, fewer recent years would have failed to meet funding levels. For example, at the 1.25% fee level, observer fee revenues in just over half of the years between 2009 and 2017 fell below $4.5 million (0.56 or 5 out of 9 years). At the 1.5% fee, just one out of nine years (11%) did and at 1.65% none of the recent years would have generated less than $4.5 million in observer fees. This figure also indicates that based on recent years, there are funding levels that are not obtainable ($9.5 million) even if the fee is raised to the cap (2.0%).

Figure 8 was constructed in a manner comparable to Figure 7, however it is based on only the five years under the current Observer Program, 2013 through 2017. Because it is based on years with lower ex-vessel values, the proportions are higher in most cells of corresponding fee percentage and funding level, and the funding level for each fee percentage at which the proportion reaches 1 (all years were below the funding level) is lower than in Figure 6.

Figure 7 and Figure 8 also show differences in variability due to the length of the time series considered, and the relative stability of the time series. For example, there is a larger range of potential revenue outcomes in Figure 7 versus Figure 8. The range of revenue can be evaluated by comparing a cell with a “0” value (always hit revenue goal) with a cell that contains a “1” (never hit the revenue goal). One reason for the narrow range during the restructure years is that there are simply fewer possible combinations of revenues for the 2013-2017 series (only 5 years considered), but also revenue was fairly low and stable during these years (see Figure 3 and Figure 5). The post-restructure period is relevant to determining the discussion of how well past performance is a predictor of future revenues. Given that the 5-year post-restructure period represents a period of relatively low revenue when compared to the relatively high revenue period preceding the implementation of the restructured program in 2013. Simply taking the average of the entire period without considering the recent low-revenue trend may mask risks associated with an enduring low revenue period. Thus, the post-restructure period may better reflect the risk of not meeting certain revenue goals given they exclude high revenue peaks observed during the 2000’s, and reflect a relatively stable low revenue period, and reflect current market conditions and catch levels, both of which are likely to persist in the near future.

Table 5 A Comparison of Hypothetical Observer Fee Revenues at the 1.25% Fee between 2009 and 2012 for Halibut, Sablefish, Pacific Cod, and Pollock as Nominal Dollars and Inflation Adjusted Dollars, by Gear Type and All Gears[1]

			Hook and Line		Jig		Pot		Trawl		All Gears	
Year	Fee Type[2]	Species	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]
2009	Hypothetical	Halibut	$2,442,888	$2,841,653	$6,510	$7,579					$2,449,397	$2,849,231
		Sablefish	$854,255	$993,864			$44,319	$51,544	$1,510	$1,755	$900,084	$1,047,163
		Pacific Cod	$91,018	$106,084	$2,327	$2,703	$247,449	$288,293	$292,522	$341,184	$633,315	$738,263
		Pollock	$275	$309	$21	$24	$18	$21	$131,661	$151,908	$131,976	$152,262
		All	**$3,388,436**	**$3,941,910**	**$8,858**	**$10,305**	**$291,786**	**$339,858**	**$425,692**	**$494,846**	**$4,114,772**	**$4,786,920**
2010	Hypothetical	Halibut	$1,702,307	$1,946,800	$6,652	$7,603					$1,708,959	$1,954,403
		Sablefish	$822,074	$939,347			$36,049	$41,199	$5,128	$5,848	$863,251	$986,394
		Pacific Cod	$113,867	$129,968	$10,403	$11,854	$509,070	$579,984	$467,904	$536,365	$1,101,244	$1,258,170
		Pollock	$222	$247	$5	$5	$16	$18	$281,216	$319,587	$281,459	$319,858
		All	**$2,638,471**	**$3,016,362**	**$17,060**	**$19,463**	**$545,134**	**$621,201**	**$754,248**	**$861,800**	**$3,954,914**	**$4,518,825**
2011	Hypothetical	Halibut	$1,837,256	$2,035,494	$7,566	$8,386					$1,844,822	$2,043,879
		Sablefish	$1,030,215	$1,141,625			$38,190	$42,334	$9,254	$10,241	$1,077,660	$1,194,200
		Pacific Cod	$98,902	$109,227	$15,821	$17,463	$702,610	$776,144	$506,867	$562,349	$1,324,200	$1,465,182
		Pollock	$138	$152	$18	$20	$11	$12	$335,785	$377,481	$335,952	$377,665
		All	**$2,966,512**	**$3,286,498**	**$23,406**	**$25,869**	**$740,811**	**$818,490**	**$851,905**	**$950,071**	**$4,582,633**	**$5,080,927**
2012	Hypothetical	Halibut	$2,041,881	$2,212,103	$7,386	$8,000					$2,049,267	$2,220,103
		Sablefish	$1,573,327	$1,704,959	$19	$21	$62,217	$67,382	$2,774	$3,003	$1,638,337	$1,775,364
		Pacific Cod	$107,755	$116,547	$7,529	$8,146	$478,225	$520,327	$539,088	$582,292	$1,132,597	$1,227,311
		Pollock	$311	$340	$26	$28	$24	$26	$486,812	$540,538	$487,173	$540,932
		All	**$3,723,275**	**$4,033,948**	**$14,959**	**$16,195**	**$540,466**	**$587,734**	**$1,028,674**	**$1,125,833**	**$5,307,374**	**$5,763,709**

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 fees. Between 2013 and 2017, other groundfish fees accounted for 1.95% of the fees, on average.

[2] Fee type indicates if fee revenues reflect actual fee revenues for the Observer Program or if they are hypothetical for the years preceding the restructured Observer Program, but were estimated using the same methodology.

[3] Fees were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

Table 6 A Comparison of Actual Observer Fee Revenues at the 1.25% Fee between 2013 and 2017 for Halibut, Sablefish, Pacific Cod, and Pollock, as Nominal Dollars and Inflation Adjusted Dollars, by Gear Type and All Gears[1]

			Hook and Line		Jig		Pot		Trawl		All Gears	
Year	Fee Type[2]	Species	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]	Nominal Fee	Inflation Adjusted[3]
		Halibut	$1,626,914	$1,708,465	$3,798	$3,988					$1,630,712	$1,712,452
		Sablefish	$1,257,740	$1,320,151			$43,559	$45,755	$3,561	$3,737	$1,304,860	$1,369,642
2013	Actual	Pacific Cod	$75,547	$80,153	$3,022	$3,166	$324,464	$340,967	$393,038	$407,842	$796,071	$832,128
		Pollock	$263	$287	$4	$4	$31	$34	$432,729	$457,056	$433,027	$457,382
		All	**$2,960,464**	**$3,109,056**	**$6,824**	**$7,157**	**$368,055**	**$386,756**	**$829,328**	**$868,635**	**$4,164,670**	**$4,371,604**
		Halibut	$1,050,014	$1,085,552	$1,298	$1,342					$1,051,312	$1,086,894
		Sablefish	$722,970	$748,048			$25,721	$26,614	$13,211	$13,650	$761,901	$788,311
2014	Actual	Pacific Cod	$82,571	$84,969	$5,967	$6,162	$378,683	$390,300	$434,814	$449,672	$902,034	$931,103
		Pollock	$400	$401	$24	$24	$113	$113	$650,363	$686,780	$650,901	$687,318
		All	**$1,855,955**	**$1,918,970**	**$7,289**	**$7,528**	**$404,517**	**$417,027**	**$1,098,387**	**$1,150,102**	**$3,366,149**	**$3,493,627**
		Halibut	$1,333,853	$1,372,143	$1,782	$1,833					$1,335,635	$1,373,976
		Sablefish	$839,257	$863,365			$14,584	$15,008	$9,761	$10,051	$863,601	$888,424
2015	Actual	Pacific Cod	$67,791	$69,785	$1,918	$1,975	$350,328	$361,101	$366,585	$379,059	$786,623	$811,920
		Pollock	$261	$261	$41	$41	$133	$133	$727,194	$759,618	$727,630	$760,053
		All	**$2,241,162**	**$2,305,554**	**$3,741**	**$3,850**	**$365,045**	**$376,242**	**$1,103,541**	**$1,148,728**	**$3,713,488**	**$3,834,373**
		Halibut	$1,394,656	$1,428,430	$1,350	$1,382					$1,396,006	$1,429,812
		Sablefish	$806,145	$825,744	$33	$33	$22,778	$23,314	$14,186	$14,549	$843,142	$863,640
2016	Actual	Pacific Cod	$27,309	$28,125	$1,475	$1,521	$335,526	$346,373	$375,736	$389,041	$740,046	$765,060
		Pollock	$154	$154	$79	$79	$73	$73	$715,495	$715,495	$715,801	$715,801
		All	**$2,228,264**	**$2,282,453**	**$2,936**	**$3,016**	**$358,377**	**$369,760**	**$1,105,417**	**$1,119,085**	**$3,694,995**	**$3,774,313**
		Halibut	$1,518,485	$1,548,043	$2,237	$2,281	$2,581	$2,630			$1,523,303	$1,552,954
		Sablefish	$874,246	$891,553			$171,667	$175,032	$8,415	$8,574	$1,054,328	$1,075,158
2017	Actual	Pacific Cod	$26,506	$27,327	$249	$258	$292,459	$302,580	$202,939	$207,750	$522,152	$537,915
		Pollock	$131	$131	$2	$2	$33	$33	$674,250	$674,250	$674,416	$674,416
		All	**$2,419,368**	**$2,467,054**	**$2,488**	**$2,541**	**$466,739**	**$480,274**	**$885,603**	**$890,574**	**$3,774,200**	**$3,840,443**

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 fees. Between 2013 and 2017, other groundfish fees accounted for 1.95% of the fees, on average.

[2] Fee type indicates if fee revenues reflect actual fee revenues for the Observer Program or if they are hypothetical for the years preceding the restructured Observer Program, but were estimated using the same methodology.

[3] Fees were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

Table 7 A Comparison of Possible Observer Fee Revenues at Different Fee Percentages, based on the Minimum, Mean, and Maximum Annual Ex-Vessel Value for Each Gear Type or All Gears between 2009 and 2017 for Halibut, Sablefish, Pacific Cod, and Pollock.

Fee %	Hook and Line			Jig			Pot			Trawl			All Gears		
	Min 2014	Mean	Max 2012	Min 2017	Mean	Max 2011	Min 2009	Mean	Max 2011	Min 2009	Mean	Max 2014	Min 2014	Mean	Max 2012
1.25	$1,918,970	$2,929,089	$4,033,948	$2,541	$10,658	$25,869	$339,858	$488,594	$818,490	$494,846	$956,630	$1,150,102	$3,493,627	$4,384,971	$5,763,709
1.3	$1,995,729	$3,046,253	$4,195,306	$2,643	$11,084	$26,904	$353,453	$508,137	$851,229	$514,640	$994,896	$1,196,106	$3,633,372	$4,560,370	$5,994,258
1.35	$2,072,487	$3,163,416	$4,356,663	$2,745	$11,511	$27,938	$367,047	$527,681	$883,969	$534,434	$1,033,161	$1,242,110	$3,773,117	$4,735,769	$6,224,806
1.4	$2,149,246	$3,280,580	$4,518,021	$2,846	$11,937	$28,973	$380,641	$547,225	$916,708	$554,228	$1,071,426	$1,288,114	$3,912,862	$4,911,168	$6,455,354
1.45	$2,226,005	$3,397,743	$4,679,379	$2,948	$12,363	$30,008	$394,236	$566,768	$949,448	$574,022	$1,109,691	$1,334,118	$4,052,607	$5,086,567	$6,685,903
1.5	$2,302,764	$3,514,907	$4,840,737	$3,049	$12,790	$31,043	$407,830	$586,312	$982,188	$593,816	$1,147,957	$1,380,122	$4,192,352	$5,261,966	$6,916,451
1.55	$2,379,522	$3,632,071	$5,002,095	$3,151	$13,216	$32,077	$421,424	$605,856	$1,014,927	$613,609	$1,186,222	$1,426,126	$4,332,097	$5,437,364	$7,146,999
1.6	$2,456,281	$3,749,234	$5,163,453	$3,253	$13,642	$33,112	$435,018	$625,400	$1,047,667	$633,403	$1,224,487	$1,472,130	$4,471,842	$5,612,763	$7,377,548
1.65	$2,533,040	$3,866,398	$5,324,811	$3,354	$14,069	$34,147	$448,613	$644,943	$1,080,406	$653,197	$1,262,752	$1,518,134	$4,611,588	$5,788,162	$7,608,096
1.7	$2,609,799	$3,983,561	$5,486,169	$3,456	$14,495	$35,182	$462,207	$664,487	$1,113,146	$672,991	$1,301,017	$1,564,138	$4,751,333	$5,963,561	$7,838,645
1.75	$2,686,558	$4,100,725	$5,647,527	$3,558	$14,921	$36,216	$475,801	$684,031	$1,145,886	$692,785	$1,339,283	$1,610,142	$4,891,078	$6,138,960	$8,069,193
1.8	$2,763,316	$4,217,888	$5,808,885	$3,659	$15,348	$37,251	$489,396	$703,575	$1,178,625	$712,579	$1,377,548	$1,656,146	$5,030,823	$6,314,359	$8,299,741
1.85	$2,840,075	$4,335,052	$5,970,243	$3,761	$15,774	$38,286	$502,990	$723,118	$1,211,365	$732,372	$1,415,813	$1,702,151	$5,170,568	$6,489,758	$8,530,290
1.9	$2,916,834	$4,452,216	$6,131,600	$3,863	$16,200	$39,321	$516,584	$742,662	$1,244,104	$752,166	$1,454,078	$1,748,155	$5,310,313	$6,665,156	$8,760,838
1.95	$2,993,593	$4,569,379	$6,292,958	$3,964	$16,627	$40,355	$530,179	$762,206	$1,276,844	$771,960	$1,492,343	$1,794,159	$5,450,058	$6,840,555	$8,991,386
2.0	$3,070,352	$4,686,543	$6,454,316	$4,066	$17,053	$41,390	$543,773	$781,750	$1,309,584	$791,754	$1,530,609	$1,840,163	$5,589,803	$7,015,954	$9,221,935

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values upon which hypothetical fees between 2009 and 2012 are based. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

[2] All fee revenues are shown in inflation adjusted dollars. Ex-vessel value and fee revenues were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[3] The year upon which each minimum and maximum fee revenue column is based are provided.

[4] The fee revenues for individual gear types at a particular fee percentage are not expected to add up to the fee revenue for all gears at that fee percentage. For example, the minimum ex-vessel value for hook and line, jig, pot, and trawl occurred in 2014, 2017, 2009, and 2009, respectively. As such, the gear specific minimum fee revenues at each fee percentage are based on those years. However, the minimum ex-vessel value for all gears combined was 2014, so the 2014 ex-vessel value is the basis for the minimum all gears fee revenues at each fee percentage.

Table 8 A Comparison of Possible Observer Fee Revenues at Different Fee Percentages, based on the Minimum, Mean, and Maximum Annual Ex-Vessel Value for Each Gear Type or All Gears between 2013 and 2017 for Halibut, Sablefish, Pacific Cod, and Pollock.

Fee %	Hook and Line			Jig			Pot			Trawl			All Gears		
	Min 2014	Mean	Max 2013	Min 2017	Mean	Max 2014	Min 2016	Mean	Max 2017	Min 2013	Mean	Max 2014	Min 2014	Mean	Max 2013
1.25	$1,918,970	$2,416,617	$3,109,056	$2,541	$4,818	$7,528	$369,760	$406,012	$480,274	$868,635	$1,035,425	$1,150,102	$3,493,627	$3,862,872	$4,371,604
1.3	$1,995,729	$2,513,282	$3,233,418	$2,643	$5,011	$7,829	$384,550	$422,252	$499,485	$903,380	$1,076,842	$1,196,106	$3,633,372	$4,017,387	$4,546,468
1.35	$2,072,487	$2,609,947	$3,357,780	$2,745	$5,204	$8,130	$399,340	$438,493	$518,696	$938,126	$1,118,259	$1,242,110	$3,773,117	$4,171,902	$4,721,333
1.4	$2,149,246	$2,706,611	$3,482,143	$2,846	$5,397	$8,431	$414,131	$454,733	$537,907	$972,871	$1,159,676	$1,288,114	$3,912,862	$4,326,417	$4,896,197
1.45	$2,226,005	$2,803,276	$3,606,505	$2,948	$5,589	$8,733	$428,921	$470,974	$557,118	$1,007,616	$1,201,093	$1,334,118	$4,052,607	$4,480,932	$5,071,061
1.5	$2,302,764	$2,899,941	$3,730,867	$3,049	$5,782	$9,034	$443,712	$487,214	$576,329	$1,042,362	$1,242,510	$1,380,122	$4,192,352	$4,635,447	$5,245,925
1.55	$2,379,522	$2,996,605	$3,855,229	$3,151	$5,975	$9,335	$458,502	$503,455	$595,540	$1,077,107	$1,283,927	$1,426,126	$4,332,097	$4,789,962	$5,420,789
1.6	$2,456,281	$3,093,270	$3,979,591	$3,253	$6,168	$9,636	$473,292	$519,695	$614,751	$1,111,853	$1,325,344	$1,472,130	$4,471,842	$4,944,476	$5,595,653
1.65	$2,533,040	$3,189,935	$4,103,954	$3,354	$6,360	$9,937	$488,083	$535,936	$633,962	$1,146,598	$1,366,761	$1,518,134	$4,611,588	$5,098,991	$5,770,518
1.7	$2,609,799	$3,286,599	$4,228,316	$3,456	$6,553	$10,238	$502,873	$552,176	$653,173	$1,181,343	$1,408,178	$1,564,138	$4,751,333	$5,253,506	$5,945,382
1.75	$2,686,558	$3,383,264	$4,352,678	$3,558	$6,746	$10,539	$517,664	$568,417	$672,384	$1,216,089	$1,449,595	$1,610,142	$4,891,078	$5,408,021	$6,120,246
1.8	$2,763,316	$3,479,929	$4,477,040	$3,659	$6,939	$10,840	$532,454	$584,657	$691,595	$1,250,834	$1,491,012	$1,656,146	$5,030,823	$5,562,536	$6,295,110
1.85	$2,840,075	$3,576,593	$4,601,403	$3,761	$7,131	$11,142	$547,244	$600,898	$710,806	$1,285,579	$1,532,429	$1,702,151	$5,170,568	$5,717,051	$6,469,974
1.9	$2,916,834	$3,673,258	$4,725,765	$3,863	$7,324	$11,443	$562,035	$617,138	$730,017	$1,320,325	$1,573,846	$1,748,155	$5,310,313	$5,871,566	$6,644,838
1.95	$2,993,593	$3,769,923	$4,850,127	$3,964	$7,517	$11,744	$576,825	$633,378	$749,228	$1,355,070	$1,615,263	$1,794,159	$5,450,058	$6,026,081	$6,819,703
2.0	$3,070,352	$3,866,587	$4,974,489	$4,066	$7,710	$12,045	$591,615	$649,619	$768,439	$1,389,816	$1,656,680	$1,840,163	$5,589,803	$6,180,596	$6,994,567

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees.

[2] All fee revenues are shown in inflation adjusted dollars. Ex-vessel value and fee revenues were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[3] The year upon which each minimum and maximum fee revenue column is based are provided.

[4] The fee revenues for individual gear types at a particular fee percentage are not expected to add up to the fee revenue for all gears at that fee percentage. For example, the minimum ex-vessel value for hook and line, jig, pot, and trawl occurred in 2014, 2017, 2016, and 2013, respectively. As such, the gear specific minimum fee revenues at each fee percentage are based on those years. However, the minimum ex-vessel value for all gears combined was 2014, so the 2014 ex-vessel value is the basis for the minimum all gears fee revenues at each fee percentage.

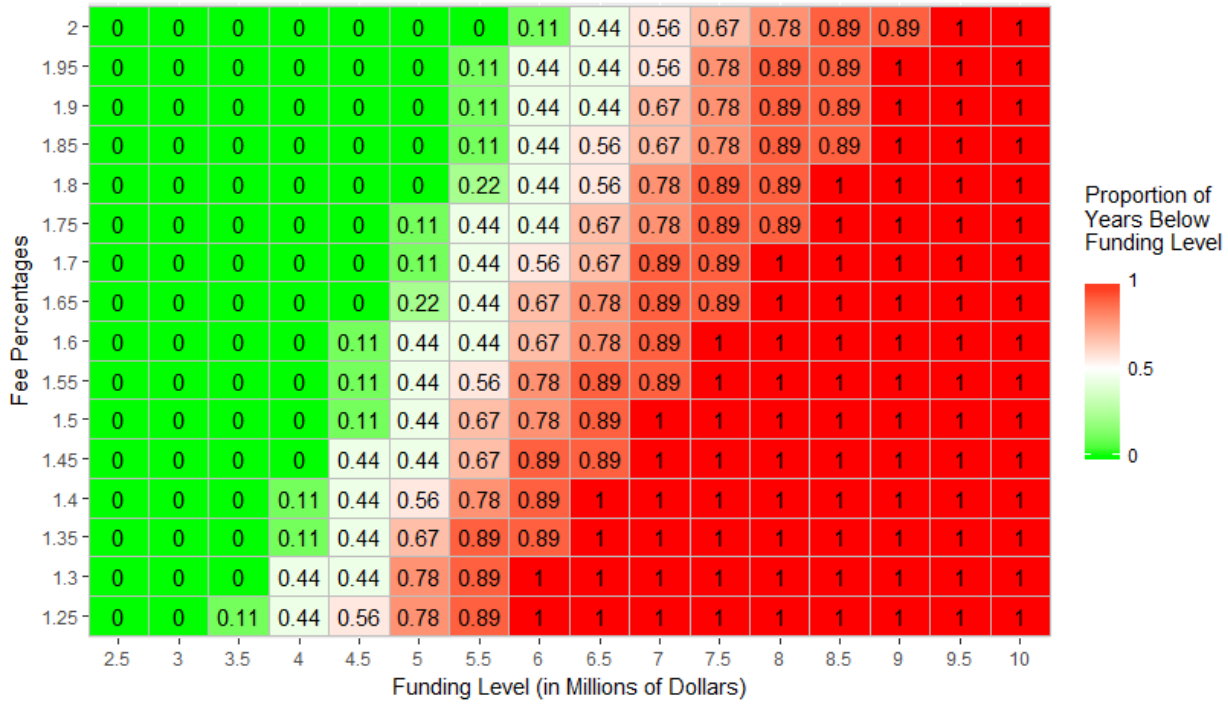


Figure 7 The Proportion of Years between 2009 and 2017 that Observer Fee Revenues Fell Below Various Funding Levels (in Millions of Dollars) based on Different Fee Percentages Applied to the Hypothetical or Actual Ex-Vessel Values of Halibut, Sablefish, Pacific Cod, and Pollock Catch.

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues compared to funding levels in this figure were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[2] This figure does not take into account funding sources aside from observer fee revenues.

[3] Proportions reflect the number of years out of nine, between 2009 and 2017, that hypothetical or actual observer fee revenues fell below a particular funding level.

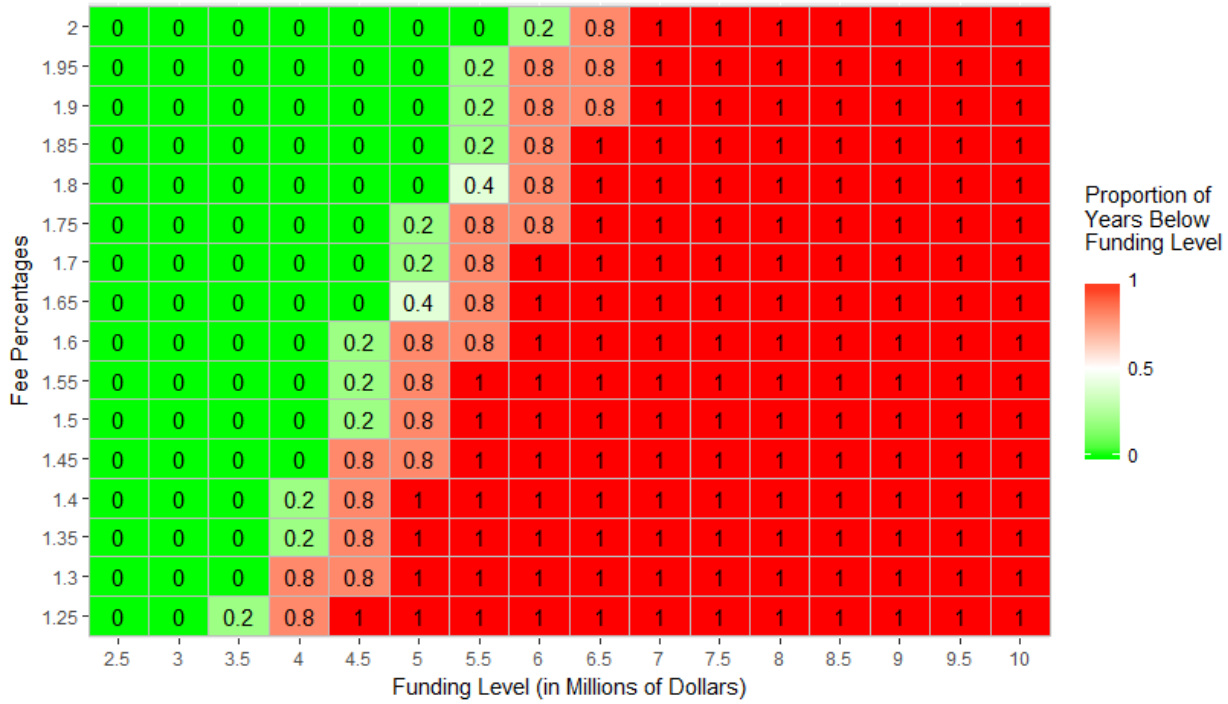


Figure 8 The Proportion of Years between 2013 and 2017 that Observer Fee Revenues Fell Below Various Funding Levels (in Millions of Dollars) based on Different Fee Percentages Applied to the Ex-Vessel Value of Halibut, Sablefish, Pacific Cod, and Pollock Catch.

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues compared to funding levels in this figure were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[2] This figure does not take into account funding sources aside from observer fee revenues.

[3] Proportions reflect the number of years out of five, between 2013 and 2017, that observer fee revenues fell below a particular funding level.

4.2.2 Gap Analysis

4.2.2.1 Introduction

One objective of the Observer Program is to monitor the breadth of fishing activities that occur in the federal waters (EEZ) off Alaska. In order to meet that goal, observer deployment rates should be high enough to result in data that is representative of fishing activities at the scales needed by our data users (stock assessors, in-season quota management, industry groups, and other scientists and researchers). As deployment rates increase, the probability of observed trips occurring in various subsets of fishing activity increases (e.g., defined by NMFS reporting areas or time period). The analyses presented in the 2015 SEA (NMFS, 2015) supported deployment rates of 15% of trips or more in order to minimize the probability of CAS post-strata having no data. In addition, the Observer Program Annual Report (NMFS 2018b) includes an evaluation of the adequacy of the deployment rate (sample size) relative to achieving spatial representation of observer data on an annual basis (i.e., defined by NMFS Reporting Area within each sampling stratum on an annual basis). It is important to note that the spatial resolution assessed in the annual report (annual, NMFS Area) is different from the much higher resolution used by CAS (i.e., weekly or three week periods, NMFS Areas, and target fisheries).

The current analysis evaluates the effect of funding on deployment rates and the resulting resolution of observer data. The scale of post-strata (scale of data resolution) used in this evaluation was intermediate in size between the high resolution post-strata used by CAS and the low resolution post-strata used in the

Observer Program Annual Report. In this evaluation, data gaps are defined to be post-strata (area and time blocks) without observer data. Using simulation and a data pooling routine that mimics the CAS, the prevalence of post-strata without data was evaluated for different levels of observer coverage; specifically the frequency of having no observer data within a post-strata and hence having no data for discard rate estimation for in-season management as well as having no biological data available for stock assessments. The results from the sampling simulation were also used to evaluate the extent to which observer deployments (collection of biological data) may be spatially representative of the effort within the EM and no-selection pools (i.e. similar gear, target, and NMFS Area) at varying funding levels.

4.2.2.2 Observer Fee Rates/Budget Scenarios

Based on the observer fee revenues presented (Section 4.2.1; Table 7 and Table 8), budget scenarios were developed using observer fee rates ranging between 0.75% and 2.25% of the ex-vessel value of catch (Table 9). This extended range of ex-vessel fee percentages was used to extend the range of funding scenarios available to the simulation routine. The revenues used in the budget scenarios below 1.25% were estimated by scaling the 2009-2017 average revenue of $4,384,971 relative to the current 1.25% observer fee rate. For example, the estimated revenue from an observer fee rate of 0.75% was $4,384,971* (0.75 / 1.25) = $2,630,983.00. Extending the budget below the 1.25% scenario was done to provide a range of potential revenue outcomes to account for uncertainty in revenue and EM costs. Finally, we highlight that Appendix D of this document contains a similar analysis as this section, except the mean revenues in that analysis are from the post restructure period (2013 through 2017).

This analysis assumed that all of the revenues were used to fund observer coverage and not EM deployments. EM costs would presumable being subtracted the total fee revenue, leaving the remainder available for at-sea deployment. The effective result, in terms of the gap analysis for at-sea coverage, is realized coverage at a lower fee level. Table 12 and Table 13 provide a lookup to help the reader understand how a given EM cost would adjust the effective at-sea deployment fee rate.

The cost per observer day is not constant between budget scenarios (Figure 9)-- the average cost per-observer-day decreases as more observer days are purchased using the estimated curve for 2017. The cost per-observer-day for each budget scenario is presented in Table 9. Note that meeting the 15% hurdle required a budget of $4,676,133.

Revenues generated from the 0.75% and 1.00% observer fee rates were not sufficient to afford all guaranteed days in the partial coverage observer provider's contract. In such scenarios, NFMS would still be responsible for acquiring the necessary funds to afford all guaranteed days. However, these simulations operated under the assumption that if all guaranteed days could not be afforded, only the days afforded were purchased. Therefore, the simulations do not reflect the contractual obligations that would be relevent in scenarios with insufficient funding levels.

4.2.2.3 Annual Deployment Plan Allocation

The 2019 Annual Deployment Plan allocation methodology was used to determine trip-selection rates for each sampling stratum in the observer pool and for each budget scenario. The 15% hurdle + optimization (based on discards, PSC chinook, and PSC halibut) allocation design was used when the budget was sufficient to provide deployment rates higher than the 15% base rate. If the budget was not sufficient to allow 15% deployment rates in each stratum, the sampling rate was held equal across strata at the maximum affordable rates. Since 2017 is the last full year for which fishing effort data is available, all analyses are based on 2017 effort. The strata-specific deployment rates within each budget scenario are presented in Table 9. The optimization weights are presented in Table 10.

4.2.2.4 Trip-selection Simulation and Gap Analyses

The 2017 distribution of fishing trips in the partial coverage pool, including those in the zero-coverage strata, were used in the simulations. The strata-specific deployment rates from each budget scenario were used to simulate trip selection. The number of both randomly selected trips (observed) and non-selected trips (unobserved) within each post-stratum were counted to determine the expected amount of data available and total amount of effort within the post-stratum. Each budget scenario was simulated 500 times.

Within each iteration of the simulation, all trips within the observer trip-selection and no-selection pool, and within each deployment strata (gear type for the no-selection pool), were assigned a trip target and NMFS Reporting Area (and FMP). Any trips that occurred in multiple NMFS were counted in each post-stratum. Trips could not be assigned to multiple sampling strata. Refer to Figure 18 for an illustrated walkthrough of the gap analysis routine.

Within the no-selection pool, trips were assigned to a sampling stratum based on the gear types fished (hook-and-line or pot) and did not include tendering activity. Trips within the no-selection pool that fished with hook-and-line or pot gear were compared only to trips selected for observer coverage within the non-tender strata with the same gear types. For example, a trip in the zero-selection pool that fished with pot gear were checked with selected trips in the observer pool that were within the POT strata but not the POT_TENDER strata. Jig gear trips were excluded from the analyses because CAS does not use observer data to estimate discard rates for these trips.

Four levels of post-stratification (data resolution) were used within each sampling stratum (defined by gear type for the zero selection pool) and each trip was assigned to a coverage level. Observed trips constituted the base coverage level (COVER). For these trips, trip-specific data can be used to estimate bycatch rates and other parameters for those trips.

Estimation of parameters for trips which were not observed relies on data from observed trips. Data from similar trips within a sampling stratum are grouped into post-stratum (e.g. trips within the same trip target and NMFS reporting area). To evaluate whether different coverage rates resulted in greater or fewer gaps in data, unobserved trips were assigned to three categories depending on the proximity in time and space to one or more observed trips.

The first category contains unobserved trips most similar to the observed trips that will provide data to the estimation process. Unobserved trips that shared NMFS Reporting Area, trip target, and had a trip start date that was within 15 days (30 day window) of a covered trip fell into the AREA coverage level. If an unobserved trip did not share NMFS Area with an observed trip, but did share FMP area, trip target, and had a start date within 45 days (90 day window) of an observed trip, it was assigned to the FMP coverage level. Lastly, if an unobserved trip could not be assigned to any of the above coverage levels, it was assigned to the full-year coverage level (YTD), indicating that any available observer data from the current year and within the sampling stratum and trip target would be used to estimate a bycatch rate for the unobserved trip (i.e., data from all observed trips that had occurred in the sampling stratum for the current year would be used).

The output of each iteration was the total number of trips within each data level for each strata/gear, trip target, and NMFS area. FMP-level totals were obtained by summing across all NMFS areas within each FMP. The final outputs represent the number of trips in a coverage level averaged over all 500 iterations of the simulation routine.

4.2.2.5 Results

Figure 10, Figure 11, Figure 12, and Figure 13 show the results of the gap analyses, specific to each strata/gear, FMP, and trip target. These plots combine the counts from both the observer trip and the no-

selection pools. In this way, data availability at differing temporal and spatial coverage levels (resolution) can be compared for differing observer fee rates. Within each plot, the x-axis represents the observer fee rate, ranging from 0.75% to 2.25%; for corresponding budget levels, see Table 9.

The top row of plots depicts the average number of trips (from the observer trip-selection pool and no-selection pool combined) within each coverage level (averaged over 500 iterations) that resulted from the deployment rates associated with the seven budget scenarios. The number of trips in COVER equals the number of observed trips within the sampling stratum and trip target while the number of trips within the AREA coverage levels is the number of unobserved trips that share (at least partially) the same NMFS Area, trip target, sampling stratum and occurred within 15 days of an observed trip. Similarly for the other two coverage categories, the number of trips assigned to the FMP and YTD levels are also presented. The total number of trips within the sampling stratum and trip target are also provided at the top of each plot.

In interpreting these plots, the COVER category (lowest category in the bar) is analogous to the amount of observer coverage, on average, in that trip target. The size of the AREA category shows the number of closely matched unobserved trips; trips that are close in time (30-day window) and space (same NMFS Area). Data from the COVER category trips is directly applicable to the trips in the AREA category. In estimation processes such as estimation of bycatch, discards, or length distributions, data from these COVER trips will be expanded to the unobserved AREA trips. Trips that fall into the other two categories are not as close in time or space to observed trips (COVER), although data from the observed trips will be expanded to those FMP or YTD trips. The larger the expansion to fewer similar trips, the greater the potential for imprecision and possible bias being introduced to the estimation process. Budget scenarios with more COVER and AREA trips represent data collection scenarios that yield higher quality data; the greater the proportion of trips in COVER and AREA, the higher the quality and utility of the data.

The next row of plots shows those proportions; the proportion of the total number of trips within each coverage category (COVER, AREA, FMP, and YTD) as the number of trips in each coverage level (color) divided by the total number of trips within the strata and targets. The proportion of trips at the Area level (blue) and FMP levels (green) will vary inversely to each other; if more trips are in the Area level, there are fewer in the FMP level. Hence, as the proportion of trips increases at one level (e.g. Area), it must similarly decrease in the others (e.g. FMP); all the proportions must add to one (the total). Again, the quality of higher resolution estimates will increase with increasing proportions of trips in the COVER and AREA categories. The points on the figures represent the proportions that resulted from each of the seven discrete scenarios. The lines represent extrapolations of the points and are therefore estimates for intermediate observer fee rates/budget scenarios. The amount of increase in data utility is shown by the slope of the line; lines that quickly increase are those where the data quality is increasing quickly between funding levels (fee amounts).

The last row of plots show how quickly those proportions change between the different fee levels (available funding). The rate of change of the proportions of trips in each coverage level is plotted for the different fee percentages; again how quickly the proportion of trips changes at one level is tied to how quickly that proportion changes at another level. These rate of change plots are useful for identifying the observer fee rates between which the coverage gaps change most quickly. The scenarios where the COVER and AREA category proportions are increasing quickly (larger positive values) are where data quality is increasing quickly between funding levels. Values closer to zero indicate places where small change in the number of trips in a category occur with the change in fee rate. Positive and negative values represent rates at which the proportions increase or decrease, respectively, and the magnitude of the value shows how quickly the proportions are changing.

Several overarching patterns are apparent in these figures. Firstly, as the observer fee rate and resulting funding level increases from left-to-right, a higher proportion of the trips are selected for coverage (increase in COVER), which in turn reduces the total number of gaps and allows more un-observed trips to obtain data from observed trips that are geographically closer and occur in a smaller time span (higher

resolution data). Secondly, because the cost per observer day changes with increased number of days observed, these patterns are nonlinear. Recall that these simulations operate under the assumption that NMFS is not required to purchase all guaranteed days and is instead able to purchase only days that can be afforded. The cost per day is constant as additional days are purchased until the number of days guaranteed by the contract has been reached; at that point, additional days are purchased at a lower cost-per-day. This break point is seen in the plots with the rapid increase in the proportion of COVER and AREA trips.

Another break point in the plots occurs at the 15% base observer deployment rate when additional observer days are allocated differentially to the different deployment strata. Below deployment rates of 15%, the number of trips in COVER increases similarly in each deployment stratum (e.g., Trawl, trawl-tender, hook and line, *etc*.). As additional days become available, they are allocated preferentially to the Trawl stratum (Table 10), hence with increasing funding, deployment rates in trawl increase faster than in the other strata resulting in faster increases in proportion of trips in COVER. This can be seen within the TRW and TRW_TENDER strata plots where the proportion of covered trips reaches a maximum rate of change after funding becomes available for optimized days. Conversely, the lower sample allocation percentages to the POT and POT_TENDER strata are reflected in the slightly-positive but constant rate of change for the COVER level.

Although the simulation was based on the effort from 2017, the effort in the observer pool is expected to be much lower in 2019 (per 2019 Final Annual Deployment Plan). This means that fewer observer days need to be purchased in order to meet the 15% hurdle, making allocation based on optimization possible at lower funding levels.

4.2.2.6 Additional Supporting Analyses

To further evaluate these trends, additional analyses were conducted. In lieu of simulation methods, a numerical solution was developed where the probability of each coverage category was calculated directly as a function of available funding. Patterns in those results were similar to the simulation results and because they included many more fee scenarios, were of higher resolution. That higher resolution is useful to show the effect of the change in observer cost-per-day and the allocation of sample-days above the 15% base deployment rates, however, due to confidentiality constraints, those results cannot be presented here. An example plot is provided below to more explicitly show the two break points in the rate of change in data resolution (rate of change in COVER and AREA proportions) with increasing funding (Figure 14). The two breaks occur at the change in observer cost-per-day resulting for reaching the minimal number of days specified in the contract (left-most break) and at the 15% base deployment rate at which allocation to sampling strata changes (right-most break). While these breaks are contained within the simulation results, because simulations were conducted with fewer fee scenarios and lines were fit using a smoothing routine, these breaks are not explicit in the results.

Observer coverage for biological data in regards to EM

With the incorporation of EM into the Observer Program for vessels fishing with longline (2018) and pot (2019) gears, it is important that base observer coverage is sufficient to ensure that data elements not collected by EM systems are available in the observer data (e.g., data to estimate average weights per fish, biological data collections such as lengths and otoliths, and other observer-collected data elements). Similar to the situation in the observer zero selection stratum, these data elements are critical components of stock assessments and discard estimation routines.

Figure 15, Figure 16, and Figure 17 compare the expected number of observed trips to the effort within the whole EM pool and no-selection pool, separated by gear/strata, target, and NFMS Area. The number of EM trips (orange) and no-selection pool trips (green) within the post-strata is constant because it reflects the effort in 2017 and does not vary with the observer rate. However, the number of observed

trips (purple) within the post-strata does vary with changes in the observer fee rate. Note that the counts for EM/no-selection/observed trips are layered (i.e. not stacked).

The estimation of at-sea discards which depend on mean weight per fish or catch-at-age distributions used in stock assessments will be based on expansions of observer data to the EM and no-selection pool base-data. In those cases where there are few observed trips relative to the number of trips with EM deployed or trips in the no-selection pool, those expansions will be larger and the resulting estimates will have higher uncertainty (for example, Figure 17, Pot Cod fisheries in NMFS Area 630, or Figure 15, HAL Halibut fisheries in NMFS Area 521).

In terms of discard estimation, the gaps considered in Figure 10, Figure 11, Figure 12, Figure 13 represents gaps in at-sea coverage within each sample stratum. Since EM is its own sampling stratum, final estimates in CAS are specific to the EM strata. A similar process is used CAS for all Annual Deployment Plan sampling strata in that estimates are made consistent with the sample design. For example, CAS estimates from a tender stratum would not generally be used to estimate discard on a non-tender stratum. One situation where CAS crosses a sample stratum to estimate is for vessels in the zero coverage strata. In this case, samples from the appropriate gear strata (hook and line or pot) is used to estimate for vessels in the zero coverage stratum.

4.2.2.7 Effective Fee Percentages for Observer Coverage Considering EM Costs

The 2019 Annual Deployment Plan indicates that funding for electronic monitoring (EM) deployment reflects a combination of federal funds ($600,000) and anticipated funding from external sources such as the US National Fish and Wildlife Foundation (NMFS 2018). NMFS intends to use discretionary appropriated funds from its budget for EM system deployment until observer fees are available to fund EM system deployment. Once observer fee proceeds are available and a contract issued to one or more EM service providers, NMFS would use the observer fee proceeds collected from partial coverage category participants to pay for both EM system deployment and observer deployment in the partial coverage category. Section 313 of the Magnuson-Stevens Act authorizes the Council to use the fees collected under that section to pay for the cost of implementing the fisheries research plan, including stationing EM systems on vessels and for inputting collected data. The annual decision to apportion fees between observer deployment and EM system deployment would be made by NMFS in consultation with the Council during the Annual Deployment Plan process.

Although EM will be funded from the observer fee revenues in the future, the cost of an operational program is currently unavailable. Table 12 and Table 13 estimate the impact of a range of EM deployment costs on fee revenues available for observer coverage at different observer fee percentages. The EM costs shown in Table 7 and Table 8 range from $250,000 to $2,000,000, in increments of $250,000. This range was used in an attempt to bracket the potential cost of EM deployment. Costs will be dependent on the number of vessels participating in the EM program, the number of systems that need to be purchased and/or replaced on an annual or recurrent basis, deployment rates, field support services, video review, and other factors. Since pre-implementation of EM, several estimates have been made regarding costs and they serve as the basis for the range of costs used. The 2016 Annual Report states, "The EM Workgroup has reviewed additional EM cost information provided by the EM service provider that is broken out between one-time expenses, amortized costs, and recurrent costs. On this basis, the estimated cost of an ongoing program similar to the 2016 EM pre-implementation program would be $191,049/year" (NMFS 2017a). Considering inflation and because more vessels are currently in the EM selection pool, a low-end cost of $250,000 was used in Table 12 and Table 13. The 2017 Annual Report indicates, "In their cost analysis of the 2017 EM program, [Archipelago Marine Research Ltd.] AMR divided the estimated costs between one-time expenses (as with a pilot program), amortized costs (for infrastructure, equipment, and capacity building, where the benefit extends over several years and the cost is proportioned among each of those years), and recurrent costs. On this basis, AMR estimates that the cost of an ongoing program similar to the 2017 EM pre-implementation program would be approximately

$478,526/year" (AFSC 2018). The 2017 Annual Report also states, "a total of $2,108,540 in NMFS funds were obligated towards EM in Alaska. Additional funds were also provided by the National Fish and Wildlife Foundation (NFWF) in support of EM deployment" (AFSC 2018). Due to the amount of equipment purchased in 2017 for this pre-implementation year, $2,000,000 was used as the high end of the range of EM costs in Table 12 and Table 13.

Table 12 is based on annual ex-vessel values between 2009 and 2017 and estimates the impact of a range of EM deployment costs on fee revenues available for observer coverage at different observer fee percentages. For example, at a fee percentage of 1.25%, mean fee revenues for (2009-2017) are estimated at $4,384,971. If $1,000,000 of the fee revenues are used for EM deployment, $3,384,971 remains and this equates to an effective fee percentage of 0.96% for observer coverage. The GAP Analysis (in Section 4.2.2) assumes that all of the fee revenues were used to fund observer coverage and not EM deployments. However, if EM costs are taken into consideration with these figures, Table 12 provides a translation from the observer fee percentage to an effective fee percentage, given different EM costs. The effective fee percentage can be used to shift expectations for the observer daily rate and in the GAP Analysis figures to assess the frequency of having no biological data. From the example stated above, with a fee of 1.25% and EM costs of $1,000,000, the effective rate is 0.96%. Instead of a daily observer rate of $1,573 based on fees amounting to $4,384,971, a daily observer rate closer to $1,836 can be expected for the remaining $3,384,971 fees or effective fee of 0.96% (Table 9).

Table 13 also estimates the impact of a range of EM deployment costs on fee revenues available for observer coverage at different observer fee percentages, but is based on the mean annual ex-vessel value of landings subject to observer coverage fees between 2013 and 2017. Fee revenues were, on average, lower in these years, so the underlying fee revenues in this table are lower than those in Table 12. As a result, the effective fee percentage at corresponding fee percentages and EM costs are lower in Table 12 than Table 13.

Comparison: Lower Revenue Scenarios

Appendix D contains a similar evaluation as in Section 3.2.2, but focuses on the low revenue period since the observer program was restructured in 2013. The mean revenues generated between 2013 and 2017 shown in Table 8 are evaluated in the appendix. Several important trends are noted in the appendix and brought forward:

- The fee percentage required (and associated revenue), given the same cost curve used in 3.2.2, results in the 15% deployment hurdle and cost-per day reductions occurring at a higher fee percentage rate (gap rates of change are shifted left).
- The Annual Deployment Plan allocation corresponding to the 15% hurdle is slightly larger than 1.5% for the restructure revenue period (2013-2017), and at a slightly lower rate than 1.5% when the full revenue period is used (2009-2017). In both scenarios, a 1.5% rate would likely meet the hurdle expectation.
- The economy of scale realized when optional days can be afforded is unlikely to consistently occur below fee rates of 1.5%.
- Both the analysis in Section 3.2.2 and Appendix D show a considerable amount of uncertainty in terms of available revenue at a given fee percentage.
- Fishing effort was the same for both analysis (effort year of 2017). A reduction in effort would result in a higher rate of coverage, and thus would have similar responses in terms of gaps as an increase in revenue (i.e., reduce probability of data gaps). However, a decline in effort may also a signal a decline in revenue (less effort and landings), which would offset some of the gain in terms of an increased deployment rate (due to lower

effort), noting that revenue from fees crosses a calendar year, thus delaying its effects on cost-per-day and available days.

- Neither analysis considers EM costs off the top, but the effective result of accounting for EM costs would be to reduce the available revenue for observers. Gaps can be evaluated by assuming a lower fee percentage for at-sea deployment.
- In both analysis, trawl receives most of the allocated days above the hurdle (15%), and trawl effort tends to not be as spread our geographically or temporally as hook-and-line. Thus, estimation gaps that require FMP level information are greatly minimized above the hurdle level and stabilize there after except for fisheries with few trips (e.g., trawl shallow water flatfish), while the amount of covered trips increases to a rate consistent with the allocation above the hurdle level (as specified by the Annual Deployment Plan). For example, the rate of change for trawl gear becomes constant (linear slope) because the Annual Deployment Plan optimized allocation rate has been realized (above the hurdle), and changes in costs per day are small.

Table 9 Observer fee rates and resulting budget scenarios, observer daily rates, and deployment rates used in the gap analysis simulations.

Observer Fee Rate	Observer Coverage Budget	Observer Daily Rate	Strata	Deployment Rate
0.75	$2,630,983.00	$1,836.41	HAL	0.069
			POT	0.069
			POT_TENDER	0.069
			TRW	0.069
			TRW_TENDER	0.069
1.00	$3,507,977.00	$1,836.41	HAL	0.092
			POT	0.092
			POT_TENDER	0.092
			TRW	0.092
			TRW_TENDER	0.092
1.25	$4,384,971.00	$1,572.89	HAL	0.134
			POT	0.134
			POT_TENDER	0.134
			TRW	0.134
			TRW_TENDER	0.134
1.50	$5,261,965.00	$1,400.18	HAL	0.169
			POT	0.153
			POT_TENDER	0.154
			TRW	0.211
			TRW_TENDER	0.225
1.75	$6,138,959.00	$1,298.35	HAL	0.198
			POT	0.158
			POT_TENDER	0.160
			TRW	0.303
			TRW_TENDER	0.337
2.00	$7,015,954.00	$1,231.20	HAL	0.227
			POT	0.163
			POT_TENDER	0.166
			TRW	0.395
			TRW_TENDER	0.449
2.25	$7,892,948.00	$1,183.58	HAL	0.256
			POT	0.168
			POT_TENDER	0.173
			TRW	0.486
			TRW_TENDER	0.561

Table 10 Optimization weightes based on discards, PSC chinook, and PSC halibut.

Strata	Optimization weights
Hook-and-line	0.23349
Pot	0.01654
Tender Pot	0.00177
Trawl	0.72026
Tender Trawl	0.02794

Table 11 Data levels and definitions that were assigned to each trip (trip X strata/gear X trip target X NFMS Area) in after each iteration of trip selection in the gap analysis.

Data Level	Definition
COVER	Trip was selected for observer coverage
AREA	Trip's start/end date was within 15 days of a trip with same gear type, trip target and NFMS area
FMP	Trip/start date was within 45 days of a trip with the same gear type, trip target, and FMP
YTD	Trip was not within COVER, AREA, or FMP

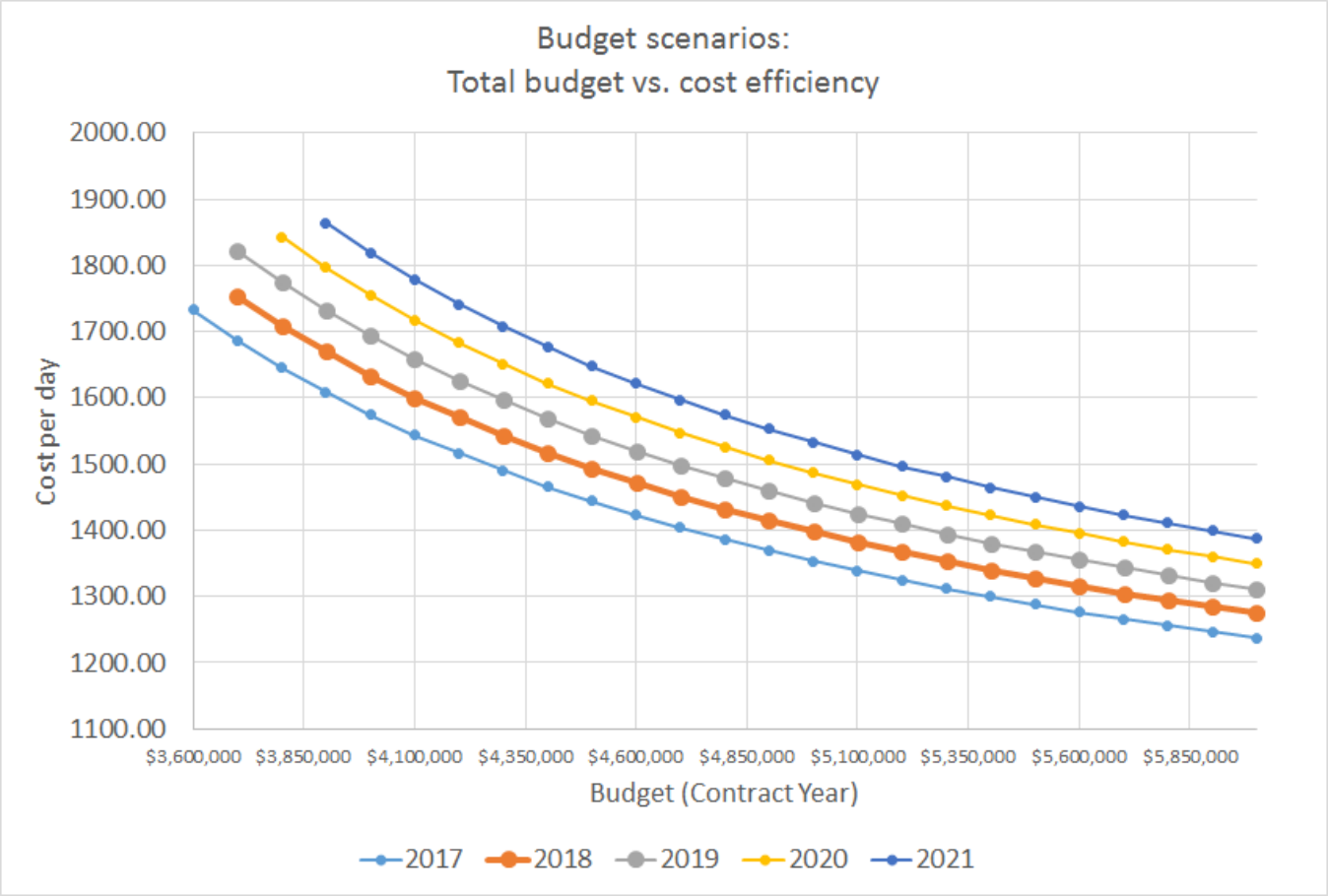


Figure 9 **Anticipated cost per observer sea day in the partial coverage contract under varying budget scenarios. The cost incorporates the anticipated cost per day for guaranteed and optional days in the future (given the current contract year-over-year cost increases) and illustrates the relationship between the budget and the cost per day (not inflation corrected). Note the 2019 budget curve was used in the gap analysis.**

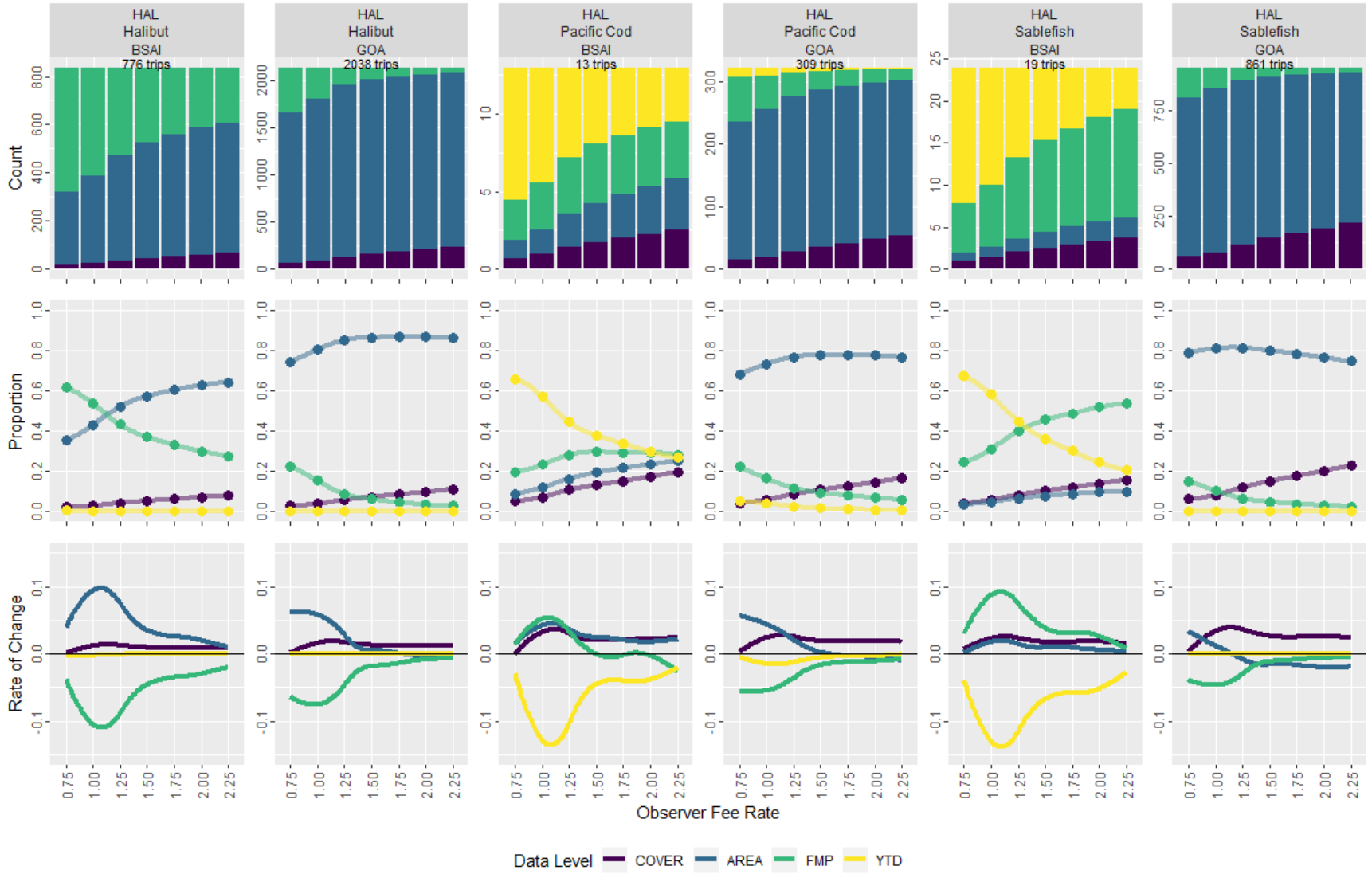


Figure 10 Gap analysis results for 2017 HAL gear trips within the observer pool's HAL stratum and no-selection pool.

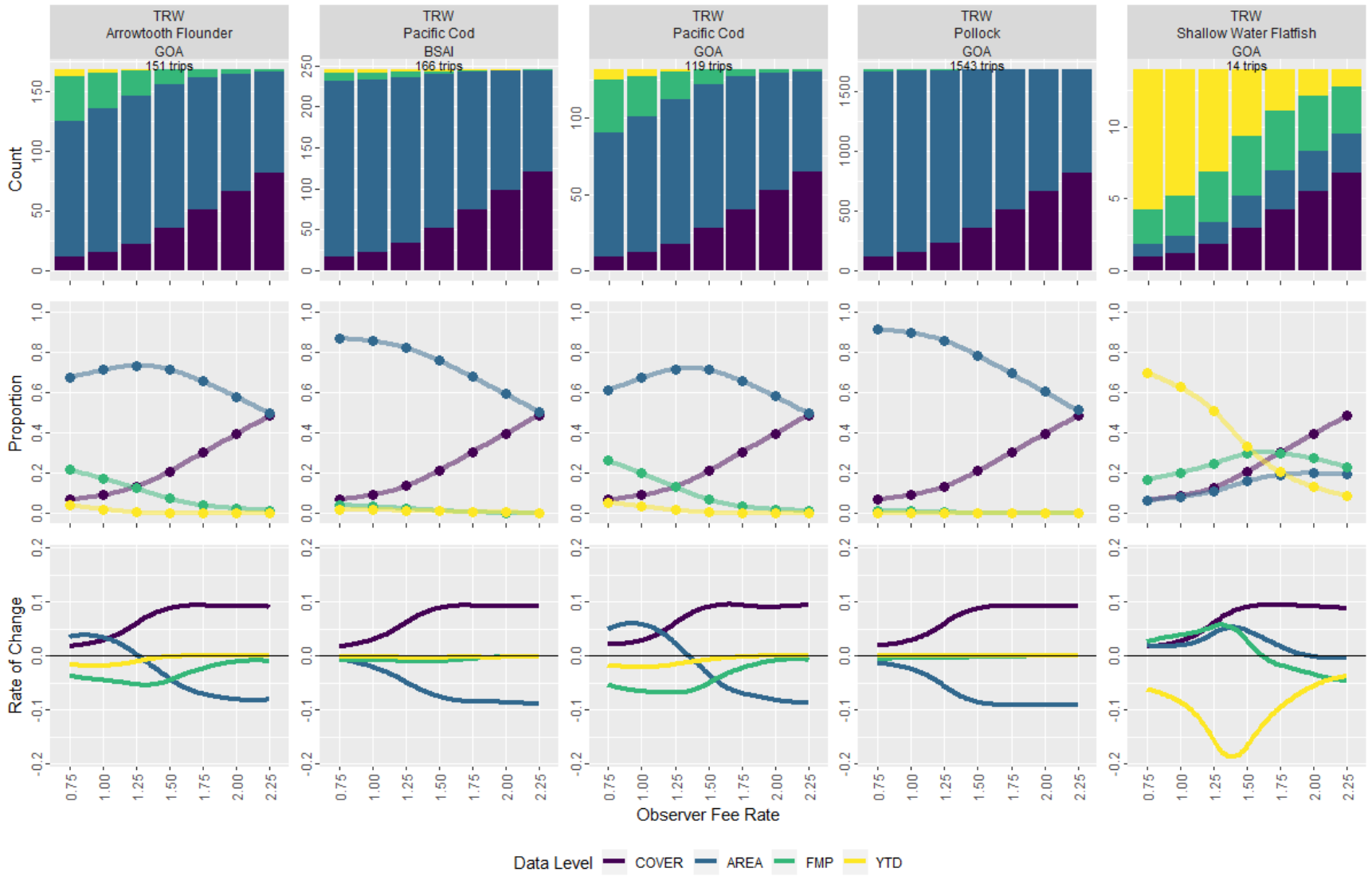


Figure 11 Gap analysis results for 2017 TRW gear trips within the observer pool's TRW stratum.

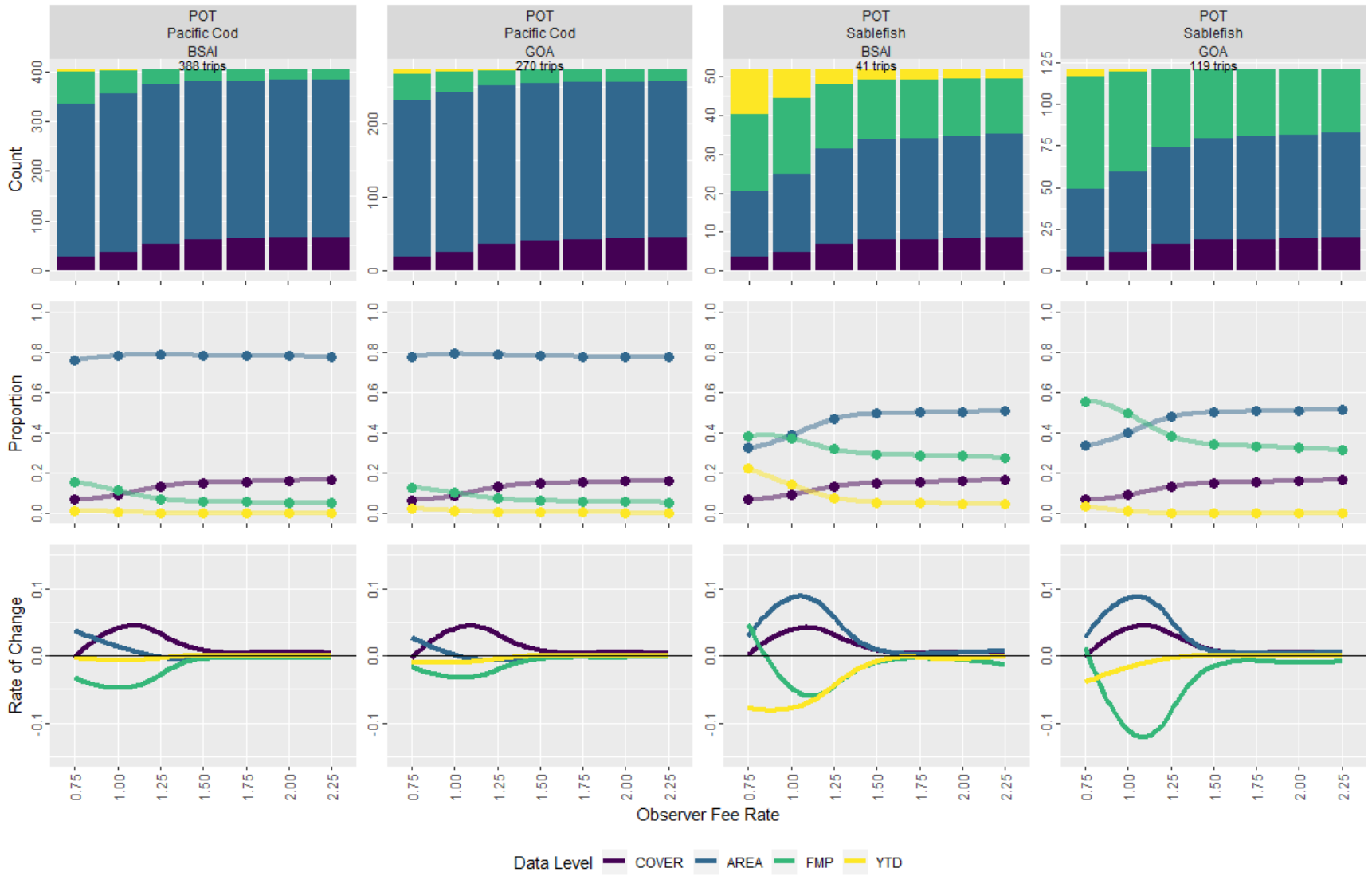


Figure 12 Gap analysis results for 2017 POT gear trips within the observer pool's POT stratum and no-selection pool.

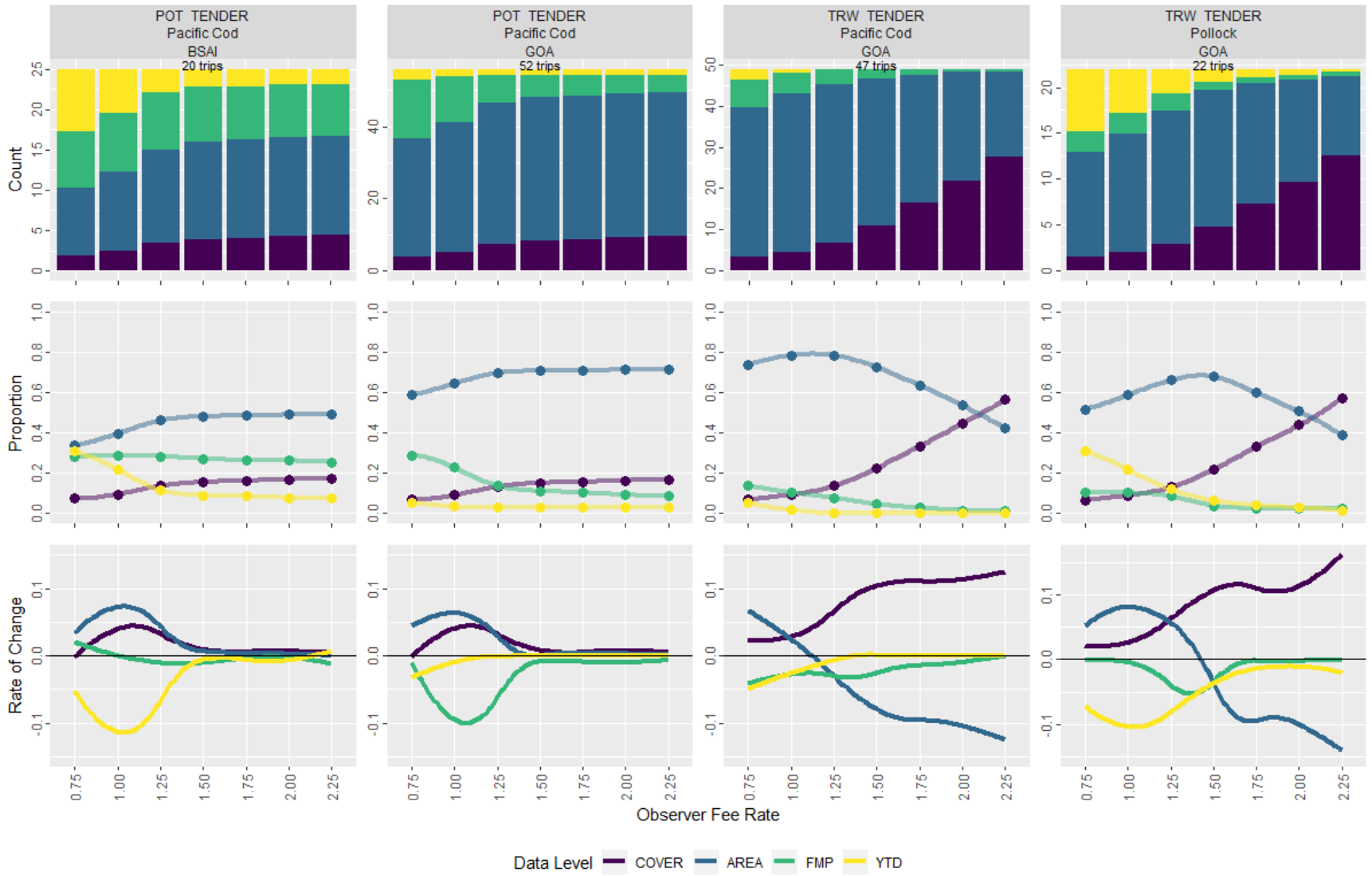


Figure 13 Gap analysis results for 2017 tender trips within the observer pool's POT_TENDER and TRW_TENDER strata.

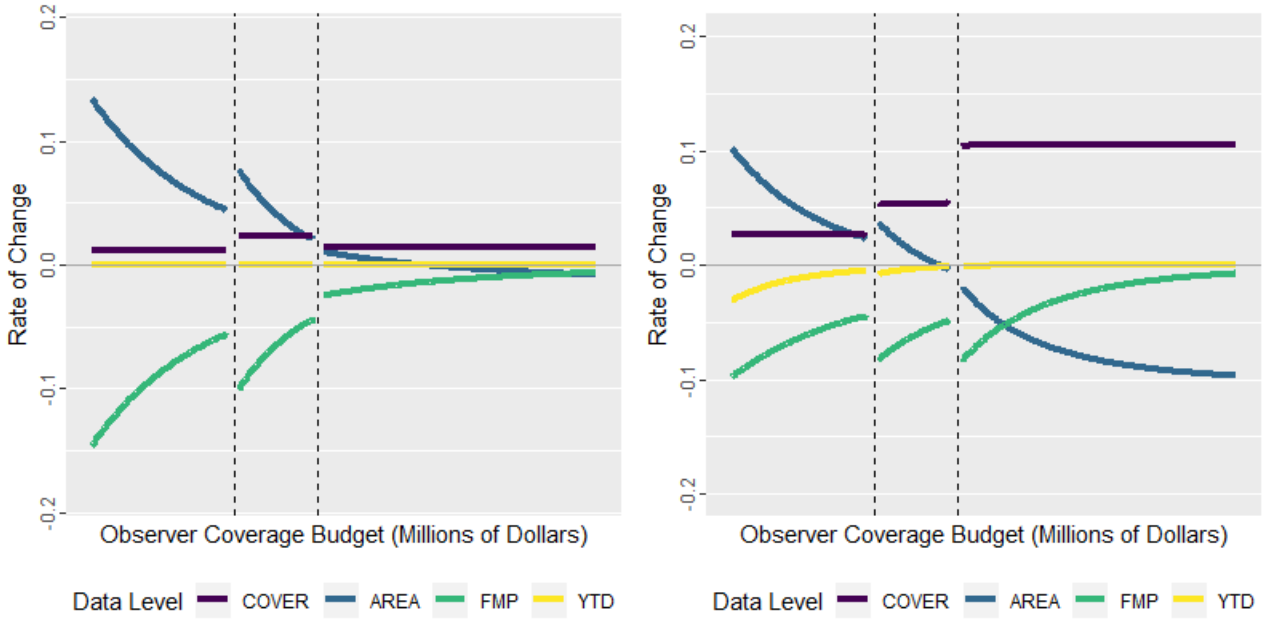


Figure 14 **Example rate of change curves from numerical approach to gap analysis.**
The two vertical lines highlight breakpoints at which the budget is sufficient to afford all guaranteed days (leftmost) and is sufficient to afford enough optional days to meet the 15% hurdle and allocate based on optimization (rightmost). The example on the left may be representative of the HAL stratum, where budgets that can afford optional days are not as efficient in reducing gaps because the HAL optimization weights are low. In contrast, the example on the right may be representative of the TRW stratum, where the higher deployment rates allocated through high optimization weights result in greater efficiencies in increasing coverage and reducing gaps.

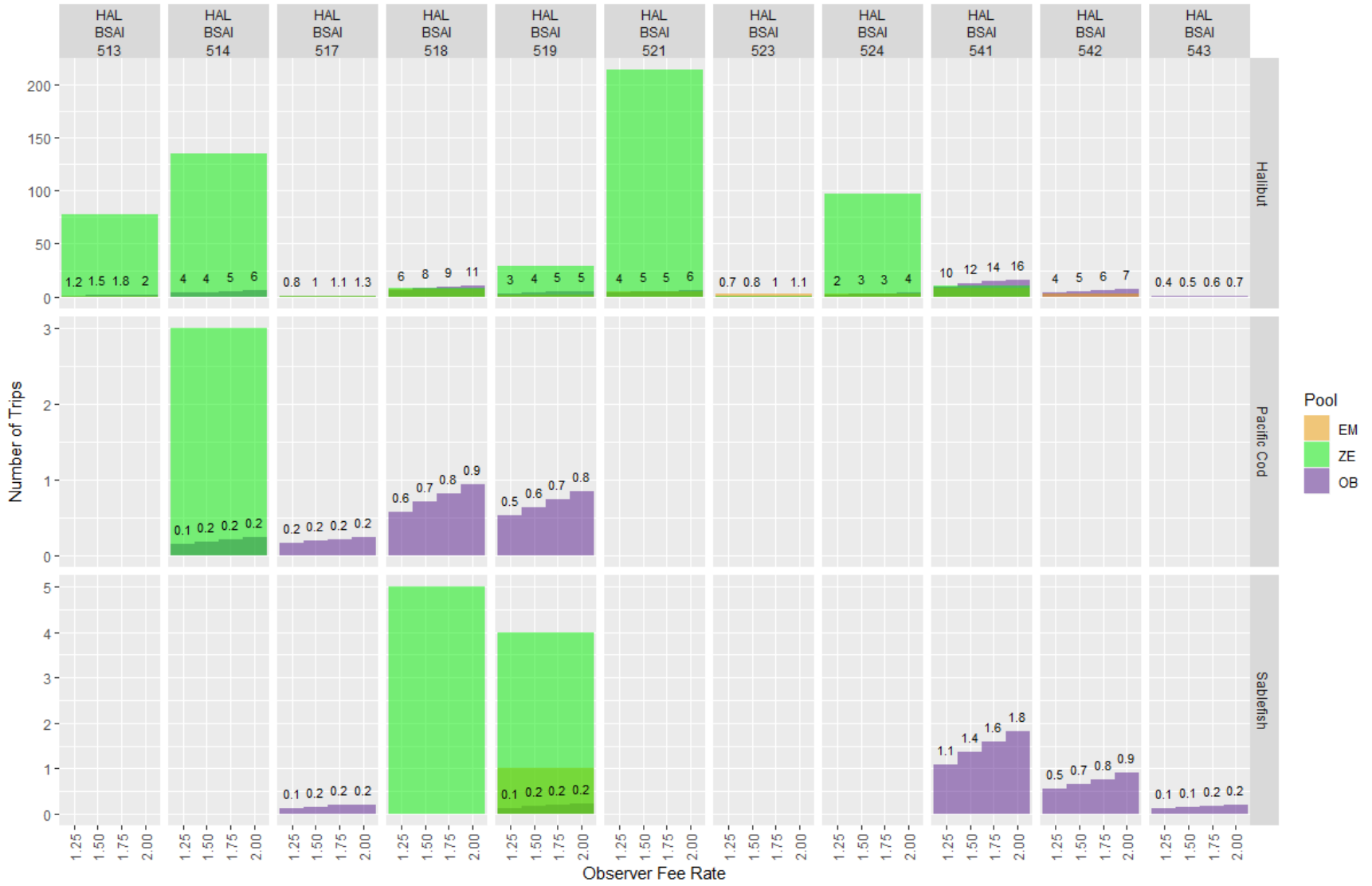


Figure 15 **EM pool effort, no-selection pool effort, and expected number of observed trips fishing with HAL gear in the BSAI, separated by NMFS Area and trip target. The numbers represent the average number of observed trips at the given observer fee rate from 500 trip-selection iterations.**

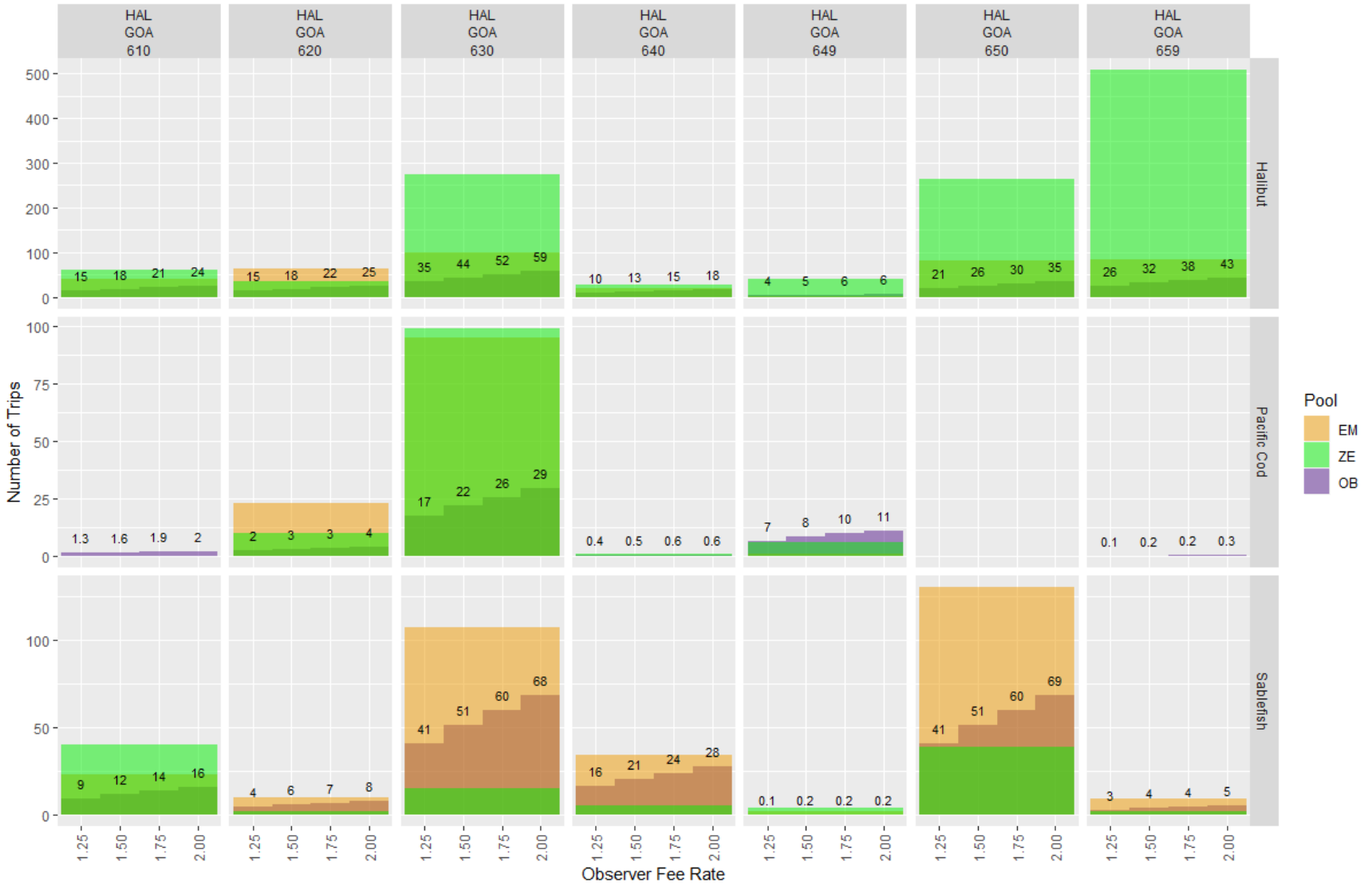


Figure 16 **EM pool effort, no-selection pool effort, and expected number of observed trips fishing with HAL gear in the GOA, separated by NMFS Area and trip target. The numbers represent the average number of observed trips at the given observer fee rate from 500 trip-selection iterations.**

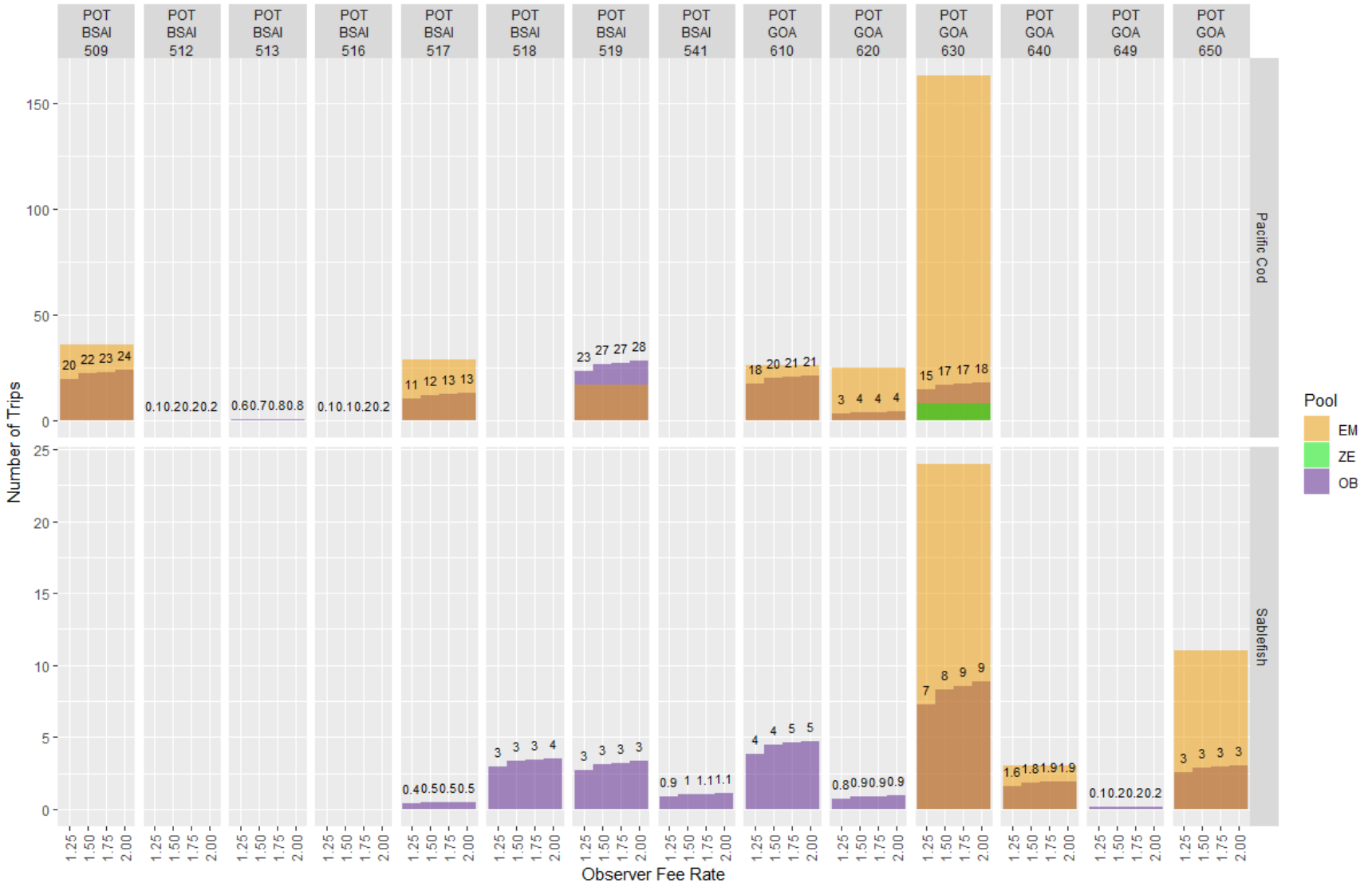
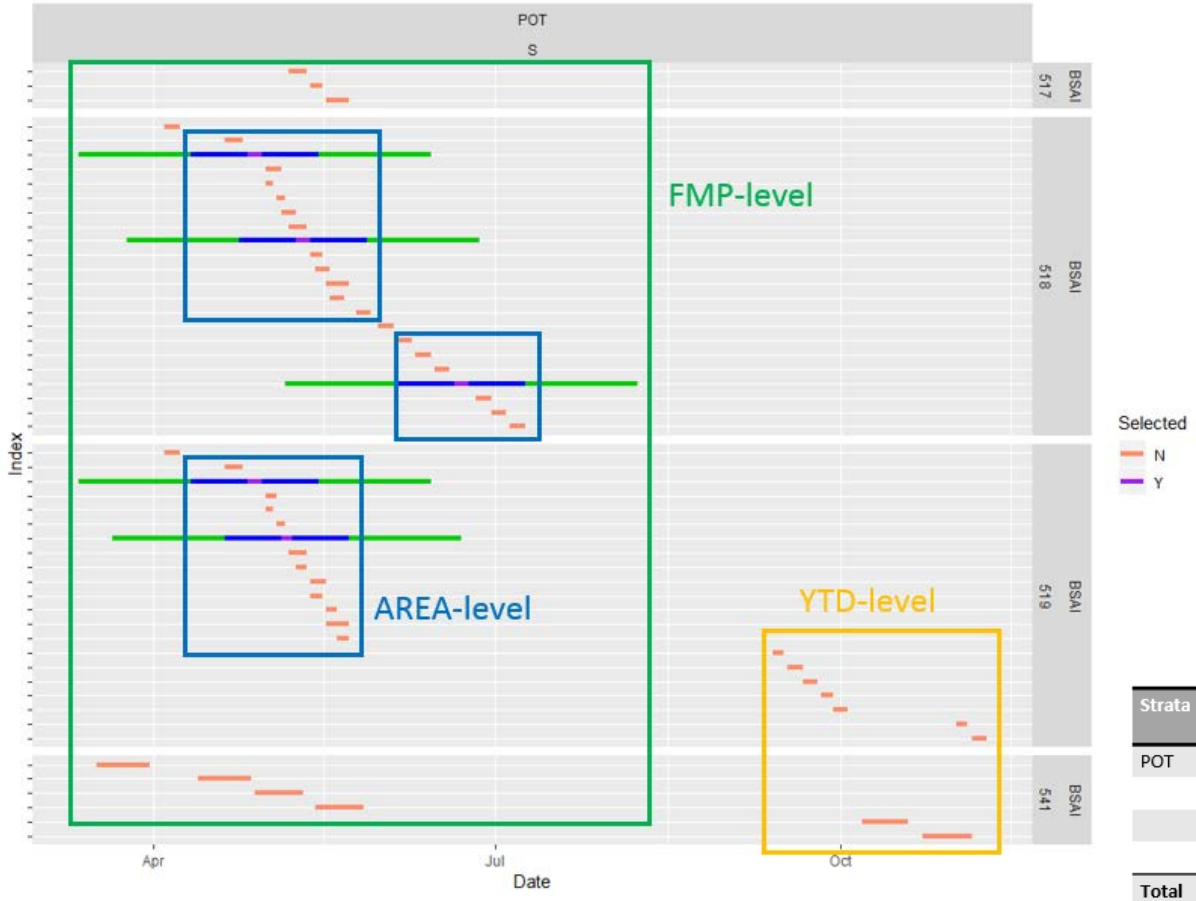


Figure 17 **EM pool effort, no-selection pool effort, and expected number of observed trips fishing with POT gear, separated by NMFS Area and trip target. The numbers represent the average number of observed trips at the given observer fee rate from 500 trip-selection iterations.**



Strata	FMP	Target	NMFS Area	COVER	AREA	FMP	YTD
POT	BSAI	S	517	0	0	3	0
			518	3	17	2	0
			519	2	11	1	7
			541	0	0	4	2
Total				**5**	**28**	**10**	**9**

Figure 18 Illustration of an example of a gap check routine.
After grouping using the deployment rates resulting from the observer fee rate/budget scenario and selecting trips for observer coverage, all trips were split into separate trips (trip X target X area) and grouped up by strata, FMP, and trip target (in this case, POT strata in the BSAI with sablefish trip target). 4 trips were selected for coverage (in purple, one of which took place in NMFS areas 518/519 and therefore represents two trips). Unobserved trips are presented in pink. The first gap check occurred at the AREA data level - any un-observed trips that occurred within the 15-day extended date range (blue lines) of an observed trip were categorized at the AREA level. Any remaining unobserved trips were then grouped up across the FMP. Unobserved trips that fell within a 45-day extended date range of the observed trips within the FMP were categorized within the FMP data level. Any remaining unobserved trips were categorized in the YTD data level. The number of trips within each data level in each NMFS area were totaled.

Table 12 The Effective Fee Percentage for Observer Coverage after a Range of Possible EM Costs are Removed from Observer Fee Revenues at Different Fee Percentages, and Based on the Average Fee Revenue for All Gears between 2009 and 2017

Fee %	Avg. Fee Revenue for All Gears (Table 7)	$250,000 EM Costs		$500,000 EM Costs		$750,000 EM Costs		$1,000,000 EM Costs		$1,250,000 EM Costs		$1,500,000 EM Costs		$1,750,000 EM Costs		$2,000,000 EM Costs	
		Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %
1.25	$4,384,971	$4,134,971	1.18	$3,884,971	1.11	$3,634,971	1.04	$3,384,971	0.96	$3,134,971	0.89	$2,884,971	0.82	$2,634,971	0.75	$2,384,971	0.68
1.3	$4,560,370	$4,310,370	1.23	$4,060,370	1.16	$3,810,370	1.09	$3,560,370	1.01	$3,310,370	0.94	$3,060,370	0.87	$2,810,370	0.8	$2,560,370	0.73
1.35	$4,735,769	$4,485,769	1.28	$4,235,769	1.21	$3,985,769	1.14	$3,735,769	1.06	$3,485,769	0.99	$3,235,769	0.92	$2,985,769	0.85	$2,735,769	0.78
1.4	$4,911,168	$4,661,168	1.33	$4,411,168	1.26	$4,161,168	1.19	$3,911,168	1.11	$3,661,168	1.04	$3,411,168	0.97	$3,161,168	0.9	$2,911,168	0.83
1.45	$5,086,567	$4,836,567	1.38	$4,586,567	1.31	$4,336,567	1.24	$4,086,567	1.16	$3,836,567	1.09	$3,586,567	1.02	$3,336,567	0.95	$3,086,567	0.88
1.5	$5,261,966	$5,011,966	1.43	$4,761,966	1.36	$4,511,966	1.29	$4,261,966	1.21	$4,011,966	1.14	$3,761,966	1.07	$3,511,966	1.0	$3,261,966	0.93
1.55	$5,437,364	$5,187,364	1.48	$4,937,364	1.41	$4,687,364	1.34	$4,437,364	1.26	$4,187,364	1.19	$3,937,364	1.12	$3,687,364	1.05	$3,437,364	0.98
1.6	$5,612,763	$5,362,763	1.53	$5,112,763	1.46	$4,862,763	1.39	$4,612,763	1.31	$4,362,763	1.24	$4,112,763	1.17	$3,862,763	1.1	$3,612,763	1.03
1.65	$5,788,162	$5,538,162	1.58	$5,288,162	1.51	$5,038,162	1.44	$4,788,162	1.36	$4,538,162	1.29	$4,288,162	1.22	$4,038,162	1.15	$3,788,162	1.08
1.7	$5,963,561	$5,713,561	1.63	$5,463,561	1.56	$5,213,561	1.49	$4,963,561	1.41	$4,713,561	1.34	$4,463,561	1.27	$4,213,561	1.2	$3,963,561	1.13
1.75	$6,138,960	$5,888,960	1.68	$5,638,960	1.61	$5,388,960	1.54	$5,138,960	1.46	$4,888,960	1.39	$4,638,960	1.32	$4,388,960	1.25	$4,138,960	1.18
1.8	$6,314,359	$6,064,359	1.73	$5,814,359	1.66	$5,564,359	1.59	$5,314,359	1.51	$5,064,359	1.44	$4,814,359	1.37	$4,564,359	1.3	$4,314,359	1.23
1.85	$6,489,758	$6,239,758	1.78	$5,989,758	1.71	$5,739,758	1.64	$5,489,758	1.56	$5,239,758	1.49	$4,989,758	1.42	$4,739,758	1.35	$4,489,758	1.28
1.9	$6,665,156	$6,415,156	1.83	$6,165,156	1.76	$5,915,156	1.69	$5,665,156	1.61	$5,415,156	1.54	$5,165,156	1.47	$4,915,156	1.4	$4,665,156	1.33
1.95	$6,840,555	$6,590,555	1.88	$6,340,555	1.81	$6,090,555	1.74	$5,840,555	1.66	$5,590,555	1.59	$5,340,555	1.52	$5,090,555	1.45	$4,840,555	1.38
2.0	$7,015,954	$6,765,954	1.93	$6,515,954	1.86	$6,265,954	1.79	$6,015,954	1.71	$5,765,954	1.64	$5,515,954	1.57	$5,265,954	1.5	$5,015,954	1.43

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values upon which hypothetical fees between 2009 and 2012 are based. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

[2] All fee revenues are shown in inflation adjusted dollars. Ex-vessel value and fee revenues were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[3] The basis of the fee revenue in this table is the mean annual ex-vessel value of halibut, sablefish, Pacific cod, and Pollock between 2009 and 2017 on all gears.

Table 13 The Effective Fee Percentage for Observer Coverage after a Range of Possible EM Costs are Removed from Observer Fee Revenues at Different Fee Percentages, and Based on the Average Fee Revenue for All Gears between 2013 and 2017

Fee %	Avg. Fee Revenue for All Gears (Table 8)	$250,000 EM Costs		$500,000 EM Costs		$750,000 EM Costs		$1,000,000 EM Costs		$1,250,000 EM Costs		$1,500,000 EM Costs		$1,750,000 EM Costs		$2,000,000 EM Costs	
		Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %	Remaining Revenue	Effect. Fee %
1.25	$3,862,872	$3,612,872	1.17	$3,362,872	1.09	$3,112,872	1.01	$2,862,872	0.93	$2,612,872	0.85	$2,362,872	0.76	$2,112,872	0.68	$1,862,872	0.6
1.3	$4,017,387	$3,767,387	1.22	$3,517,387	1.14	$3,267,387	1.06	$3,017,387	0.98	$2,767,387	0.9	$2,517,387	0.81	$2,267,387	0.73	$2,017,387	0.65
1.35	$4,171,902	$3,921,902	1.27	$3,671,902	1.19	$3,421,902	1.11	$3,171,902	1.03	$2,921,902	0.95	$2,671,902	0.86	$2,421,902	0.78	$2,171,902	0.7
1.4	$4,326,417	$4,076,417	1.32	$3,826,417	1.24	$3,576,417	1.16	$3,326,417	1.08	$3,076,417	1.0	$2,826,417	0.91	$2,576,417	0.83	$2,326,417	0.75
1.45	$4,480,932	$4,230,932	1.37	$3,980,932	1.29	$3,730,932	1.21	$3,480,932	1.13	$3,230,932	1.05	$2,980,932	0.96	$2,730,932	0.88	$2,480,932	0.8
1.5	$4,635,447	$4,385,447	1.42	$4,135,447	1.34	$3,885,447	1.26	$3,635,447	1.18	$3,385,447	1.1	$3,135,447	1.01	$2,885,447	0.93	$2,635,447	0.85
1.55	$4,789,962	$4,539,962	1.47	$4,289,962	1.39	$4,039,962	1.31	$3,789,962	1.23	$3,539,962	1.15	$3,289,962	1.06	$3,039,962	0.98	$2,789,962	0.9
1.6	$4,944,476	$4,694,476	1.52	$4,444,476	1.44	$4,194,476	1.36	$3,944,476	1.28	$3,694,476	1.2	$3,444,476	1.11	$3,194,476	1.03	$2,944,476	0.95
1.65	$5,098,991	$4,848,991	1.57	$4,598,991	1.49	$4,348,991	1.41	$4,098,991	1.33	$3,848,991	1.25	$3,598,991	1.16	$3,348,991	1.08	$3,098,991	1.0
1.7	$5,253,506	$5,003,506	1.62	$4,753,506	1.54	$4,503,506	1.46	$4,253,506	1.38	$4,003,506	1.3	$3,753,506	1.21	$3,503,506	1.13	$3,253,506	1.05
1.75	$5,408,021	$5,158,021	1.67	$4,908,021	1.59	$4,658,021	1.51	$4,408,021	1.43	$4,158,021	1.35	$3,908,021	1.26	$3,658,021	1.18	$3,408,021	1.1
1.8	$5,562,536	$5,312,536	1.72	$5,062,536	1.64	$4,812,536	1.56	$4,562,536	1.48	$4,312,536	1.4	$4,062,536	1.31	$3,812,536	1.23	$3,562,536	1.15
1.85	$5,717,051	$5,467,051	1.77	$5,217,051	1.69	$4,967,051	1.61	$4,717,051	1.53	$4,467,051	1.45	$4,217,051	1.36	$3,967,051	1.28	$3,717,051	1.2
1.9	$5,871,566	$5,621,566	1.82	$5,371,566	1.74	$5,121,566	1.66	$4,871,566	1.58	$4,621,566	1.5	$4,371,566	1.41	$4,121,566	1.33	$3,871,566	1.25
1.95	$6,026,081	$5,776,081	1.87	$5,526,081	1.79	$5,276,081	1.71	$5,026,081	1.63	$4,776,081	1.55	$4,526,081	1.46	$4,276,081	1.38	$4,026,081	1.3
2.0	$6,180,596	$5,930,596	1.92	$5,680,596	1.84	$5,430,596	1.76	$5,180,596	1.68	$4,930,596	1.6	$4,680,596	1.51	$4,430,596	1.43	$4,180,596	1.35

Sources: NMFS Alaska Region Catch Accounting System (CAS), Restricted Access Management (RAM) IFQ Landing Data, IFQ Buyer Reports, and Observer Fee Standard Prices; and CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset)

[1] Fee revenues in this table only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded in order to simplify estimating 2009 through 2012 ex-vessel values upon which hypothetical fees between 2009 and 2012 are based. Between 2013 and 2017, other groundfish accounted for, on average, 1.95% of the ex-vessel value subject to observer fees. The 2009 through 2012 ex-vessel values were estimated for years preceding the restructured Observer Program using the same methodology as calculating actual ex-vessel values.

[2] All fee revenues are shown in inflation adjusted dollars. Ex-vessel value and fee revenues were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

[3] The basis of the fee revenue in this table is the mean annual ex-vessel value of halibut, sablefish, Pacific cod, and Pollock between 2013 and 2017 on all gears.

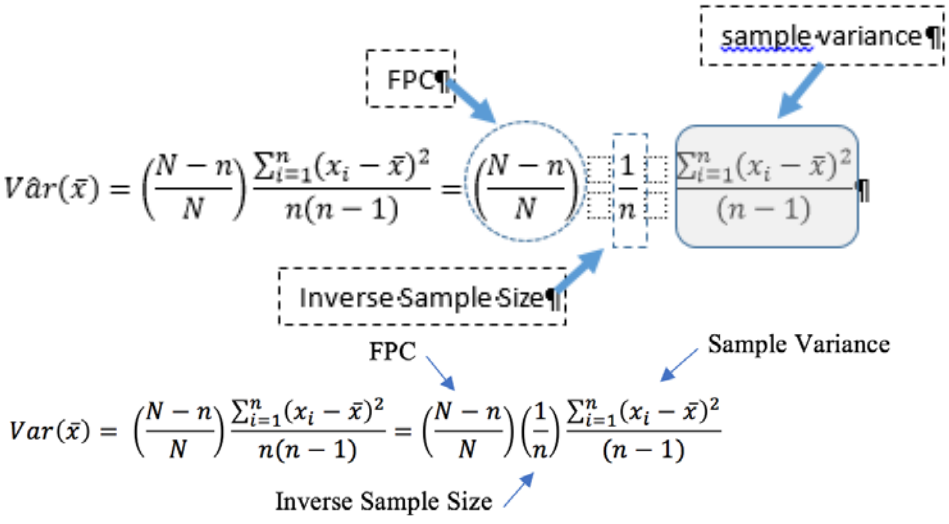
4.2.3 Variance and Sample Size

There are several components to estimated variance, some of which are affected by sample size and sample intensity. All of these components contribute to the overall variance of an estimate and our ability to estimate a given parameter or characteristic of a population.

Not affected by sample size is the underlying population structure. The variability between elements in the population (sampling units) forms the underlying base variance from which we start, also termed the population variance. This population variance will change depending how we define our sample units (size of our sample units). It is the average of the squared differences between each measured value and the mean value, averaged over all sample units: $Var(X) = \frac{\sum_{i=1}^{N}(X_i-\bar{X})^2}{N}$ where we have *N* units in the sample frame (population) indexed by the subscript *i*. The square root of this variance is the standard deviation (SD). The standard deviation divided by the population parameter (i.e. the mean) is the coefficient of variation (CV) and is a relative measure of the amount of variation in a population.

In most cases we do not collect information from every sample unit in the population, but rather we randomly select a number of sample units (our sample) from which we collect our information (data). The unbiased estimate of the sample variance is computed in a similar manner as the population variance; the denominator (*n-1*) replaces *n* (this is the minimum unbiased estimator of the sample variance): $Var(x) = \frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}$. Notice that the total number of sample units, *N*, has been replaced with our sample size, *n*. In addition, we use lower case text for our sample unit measurements (*x* for *X*). *The sample variance is the variance in the data (between sample unit variance).*

Typically, we are not interested in the amount of variability in our population, we are interested however, in the uncertainty surrounding an estimate of some population quantity (*e.g.*, the mean). If we have a known, finite number of sample units in our population, and are interested in the mean value per unit (fish per sample unit, for instance), we would estimate the mean in the usual fashion: $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$. Since we know that if we select a different set of sample units (i.e., a different random sample) we will estimate a different mean, we are also interested in the amount of variability in those estimates. This is the estimated variance of the mean and is given by the equation below.



Note there are three components to the estimated variance: the sample variance, the inverse of the sample size, and the finite population correction factor (FPC). The FPC is a factor that takes into account how much of the population was sampled; the more we know about the population (*N-n*, the more sample units

selected), the more certain we are about our estimate. As the sample size *n* approaches the total size of the population, *N*, the FPC will get closer to zero and the variance will decrease to zero as well. Hence when we 'census' a population, the FPC becomes zero and we have no variability in our estimates. Similarly, as the number of samples collected (larger *n*) increases, the estimated variance decreases as we are dividing the sample variance by larger numbers of samples. Since for any population, the base sample variance will be fixed, we can look at relative changes in the estimated variance as we change the sampling rate and thereby change the inverse sample size (1/*n*) and the FPC.

Because the FPC varies linearly with the sampling rate regardless of the population size (Figure 19 right panel; FPC reduces to FPC = 1 -1/*n*), it is more interesting to look at how the FPC changes with sample size (*n*, Figure 19 left panel). The steeper the slope of the line, the greater the relative impact on the variance (greater relative reduction) as a result of increasing number of samples in smaller strata. The FPC reduction in variance is simply the 1-sample rate. Hence a 30% sample rate results in FPC of 70%; equivalent to an estimated variance of 70% of the sample variance.

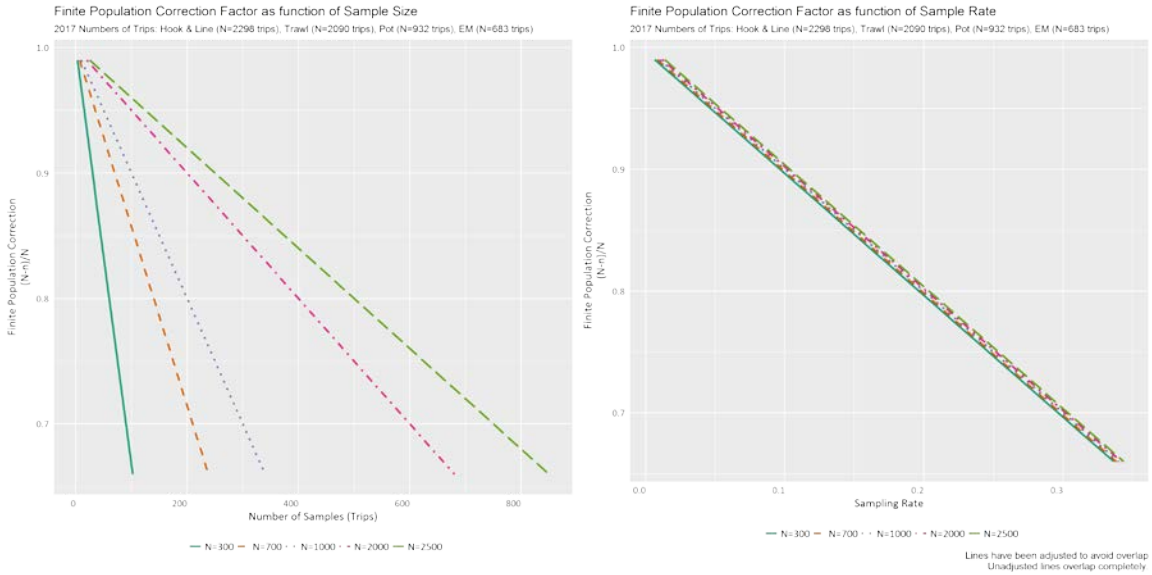


Figure 19 Finite population correction as a function of sample size and rate. For reference, the realized number of trips in 2017 were as follows: hook-and-line = 2,298, trawl = 2,090, pot=932, and EM=683.

In contrast, the denominator of the estimated variance (1/*n*) is the same for all population sizes, but varies with different sample rates (Figure 20 right panel). Again, the impacts are greatest for the smaller populations (Figure 20).

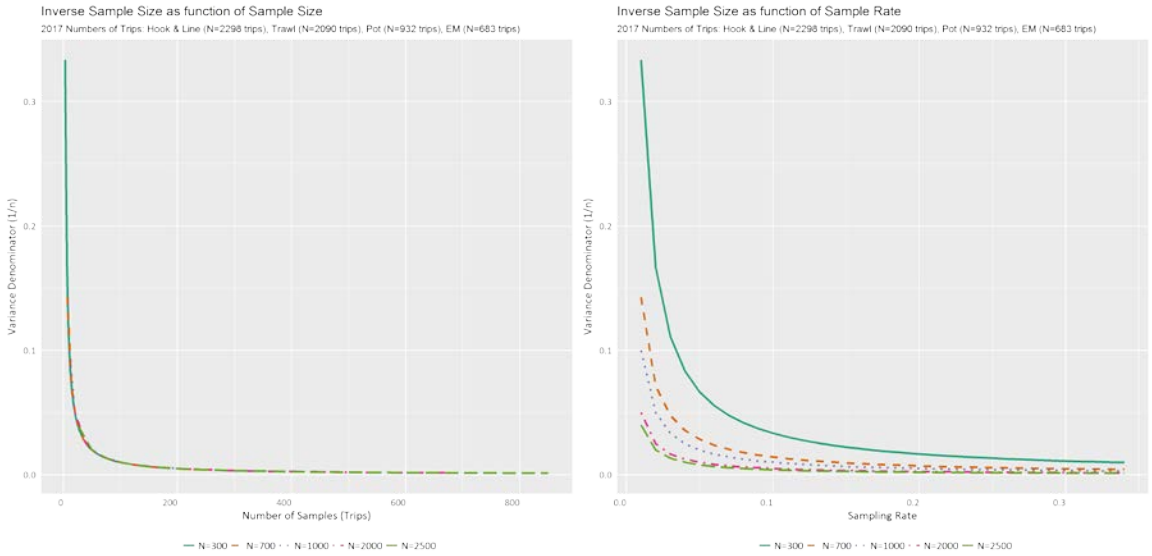


Figure 20 Inverse sample size (1/n) as a function of sample size (left panel) and sampling rate (right panel) across several population sizes(N), including reference to the realized number of trips in 2017 (hook-and-line = 2,298, trawl = 2,090, pot=932, and EM=683).

The population sizes plotted are similar to some of the sampling strata sizes in the Partial Coverage Pool. Many of the post-strata used in in-season estimation of bycatch typically have fewer trips than the population sizes in the graph presented and for those post-strata the impacts of sampling rate will be greater.

Since our sampling rates are generally small, the variance scaling (FPC and 1/*n*) is dominated by the sample size (*1/n;*

Figure 21 left panel). For a given population variance, the estimated variance of a simple mean will be 20% of the sample variance in a population of 300 trips and a sample rate of approximately 2%. How quickly that reduction occurs is described by the slope of the variance scaling (

Figure 21 right panel). As sample rate increases, the greatest reductions in variance are seen where the slope of the variance changes the fastest; in the rightmost plot, where the lines increase most steeply. The effect of sample rate is most pronounced for smaller populations while the gains in terms of efficiency are the least in larger populations.

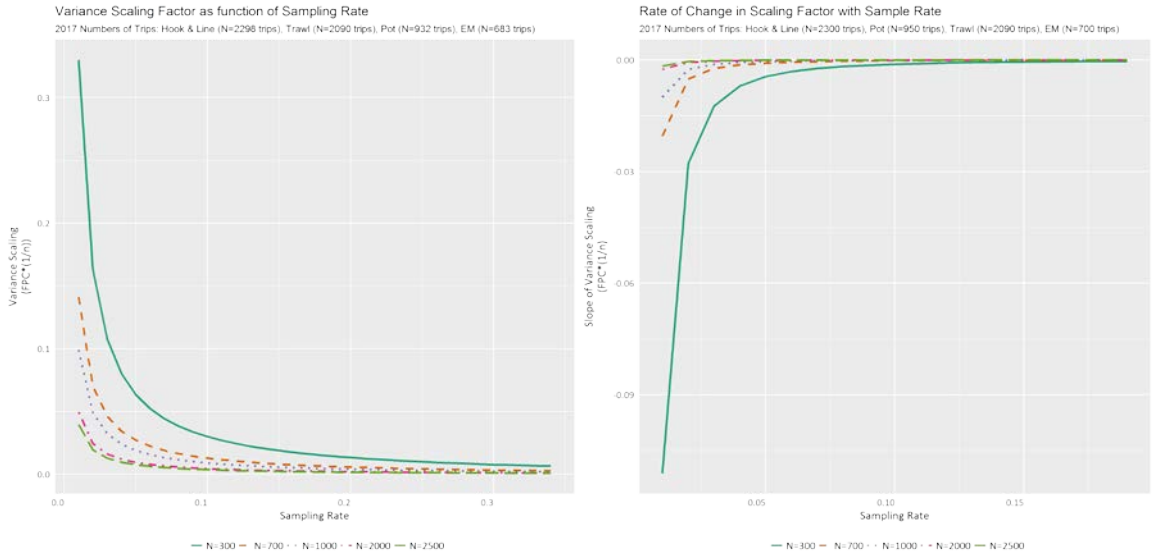


Figure 21 Variance scaling function as a function of sampling rate.

If we want to discuss the relative uncertainly associated with an estimate, we need to have the estimate and the uncertainty measure on the same scale, hence we take the square root of the estimated variance (the standard error) and divide by the estimate to get the percent standard error (PSE). This measure of uncertainty is often called the CV, however, since the CV also refers to the percent standard deviation, we will use the term PSE to avoid confusion. The PSE is a relative measure of the amount of variation associated with an estimate.

For a base standard deviation (square root of sample variance), we can see how the PSE will change with increasing sample size (Figure 22 left panel). For a population with 300 sample units and a given SD, the SE will be 25% of the SD at a sample rate of 5%. If we sample at a rate of 10%, the PSE will be approximately 17% of the SD.

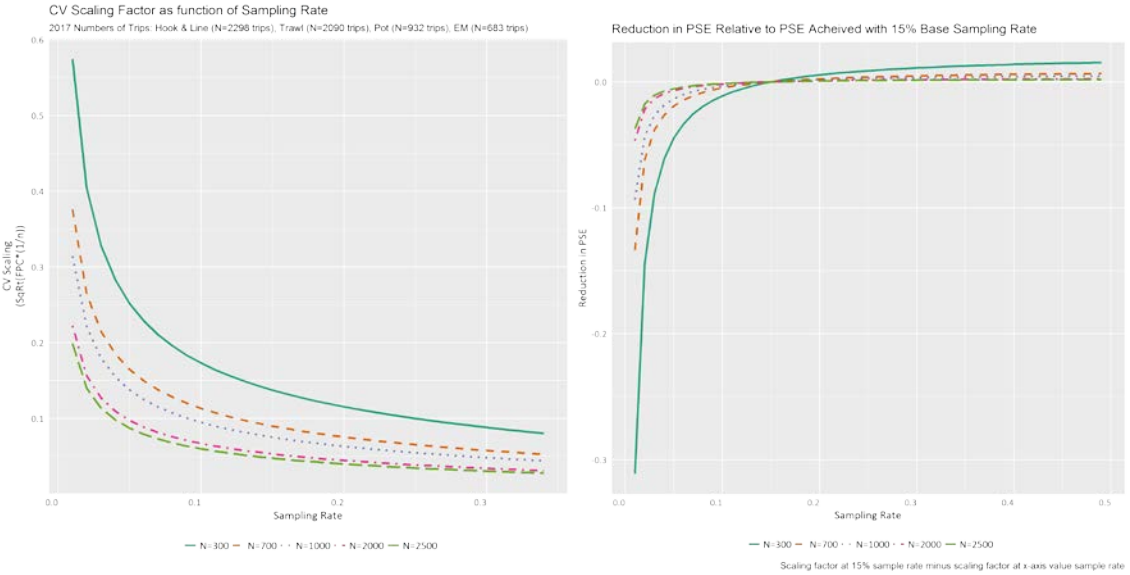


Figure 22 Percent Standard Error scaling function as a function of sampling rate.

If we are interested in how the PSE will change relative to a base sample rate of 15%, we can look at the difference between the PSE expected at 15% minus the PSE expected at another sample rate (**Figure 22** left panel). For sample rates less than 15%, the expected PSE increases (negative values on y-axis)

relative to what we would expect at the higher sampling rates. As sample rates increase beyond 15%, the PSE decreases. The gains in the PSE of an estimated mean become smaller as sample rates increase.

4.2.3.1 Variance estimates and CAS

NMFS is developing methods to calculate variance associated with the point estimates and catch estimation that is done in the Catch Accounting System (CAS), taking into account the hierarchical sampling design. The information presented the previous section (Section 4.2.3) is a simplified view of one estimator (simple mean) and does not include more complex sample design components (ratio estimators, hierarchical sampling, differential sampling probabilities) that are included in the CAS bycatch estimation process. In addition, the example provided does not consider multiple sampling strata nor post-strata weighting. The CAS uses a large number of post-strata and a different method of estimation than the described example (Cahalan et al. 2014); however, the same patterns of change in precision related to sample size and sampling rate will occur in CAS estimation.

For the purposes of calculating variance, information from trips is aggregated within a sampling strata, and this information is weighted based on the size of the post-strata relative to the size of the sampling strata, thus variance calculations are scaled. Both the design of post-strata and sampling strata change the precision of estimates, particularly if the population is stratified into more homogenous groupings than would be realized by not stratifying (improve precision); or the design results in large or small sample sizes (large sample size may increase precision while small sample size may decrease precision). The size of the post-strata relative to the population (e.g., Number of $Trips_{post\ strata}/Trips_{population}$) and the overall size of the post strata (e.g., Number of $Trip_{post\text{-}strata}$) will also scale variance estimates. For example, a post strata that represents a small part of the population, will contribute less to the overall variability of a population estimate than a large post-strata with similar variance characteristics. While there are nuances that are not captured in the background example, the asymptotically driven trends are still present. As such, the largest gains in precision will occur when sample sizes increase from low levels, and gains in efficiency will be largest as sampling rates increase from low levels.

NMFS presented preliminary estimates of variance to the Council[5] using a simple mean estimator for vessels fishing the partial coverage category. These variances incorporated the nesting of the sampling hierarchy, and were estimated at the fishery level based on gear, reporting area, and sampling strata. An important assumption with variance estimates is that landed catch is assumed 'known', so precision is largely an issue for discarded species. Of the major discarded species the results showed that the 2015 estimates of variance were generally below a CV (PSE) of 20% at the federal reporting area, and variance of the halibut PSC estimates (a Council policy priority) were less than 5% for reporting areas that accounting for most of the discard. Species that were patchy and commonly discarded, such as yelloweye rockfish, had the highest variance however, mandatory retention of all rockfish is anticipated in the near future (e.g., 2020) and those areas showing the lowest precision will be comprised of predominantly landed rockfish.

In general, preliminary variance results indicate that the majority of percent standard errors are relatively small and trends follow the patterns discussed in the section above. The largest strata and the strata with the highest sample fractions have the highest precision relative to smaller strata and reporting areas. The fact that most sampling strata are large likely contributes to most PSEs being less than 20% for species that are discarded and high precisions (<10%) for species that are predominantly retained or commonly discard (e.g., halibut PSC and Pacific cod). These trends in variance appear to be consistent across multiple years of deployment. A preliminary analysis of variance estimates that were reported to the Observer Advisory Committee in 2018 (based on 2017 data) showed similar results as 2016 despite the lower sample size, which may reflect the sampling strata being changed from large/small vessel to gear-specifics strata and differences in catch composition. Work is ongoing to finalize variance estimates and produce these on annual basis with the annual report.

[5] https://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/OACVarianceMay16.pdf

The variance of salmon and crab PSC, which tend to be rare, has not yet been evaluated for the partial coverage category; however, Cahalan et al. (2015) found in the full coverage stratum that species that are uncommon and clustered will have higher variances than the more consistently caught species. In these cases, intensive sampling maybe required to achieve high precision, which is logistically difficult or not cost-effective for some operations (e.g., NPFMC 2014). Sampling methods that rely on technology and full retention may be provide better approaches for these highly variable species (such as salmon). For example, the Council is currently considering full retention and Electronic Monitoring (EM) options for salmon accounting in trawl fisheries.

4.2.4 Bias

The SEA provides a lengthy discussion on statistical bias, which can occur when estimates are made based on non-representative sampling, or the estimator has biased properties. This error can be categorized into two main types: sampling errors and non-sampling errors. Sampling errors include selection bias and variance arising from the random sample. Selection bias is introduced to the analysis when the actual probability of a sample unit being selected differs from that assumed in the analysis. Sample variance is directly related to sample size and the definition of a sample unit. Non-sampling errors include sample frame inconsistencies (under and over coverage), non-response errors (fishing activities selected for observation that are not observed), and bias related to observer effects. In addition, statistical variability and bias are introduced through the choice of estimator, definition of post-strata, and sample size. Each Annual Report[6] provides information on the amount of difference between unobserved and unobserved events (i.e., trips), and uses a set of performance metrics to evaluate these issues on an annual basis. The reports have shown differences between unobserved and unobserved fishing events such as trip length, diversity of species landed, and amount of retained catch. The Council and NMFS has responded to these issues by making changes to sampling strata, changing sampling allocations among strata, and incorporating new technologies such as EM. This will be an ongoing process, noting that these potential biases and sources of error will always be an important issue for the observer program.

4.3 Trends and Conclusions

The sections of this analysis are complimentary and when viewed as such show considerable uncertainty in projecting revenue, which translates into uncertainty in gaps and the money available to meet the hurdle thresholds and allow for optimization. For example, Figure 7 shows a range of risks of not realizing certain revenue amounts for a given fee percentage. This range is indicative of variability in ex-vessel prices and changes in allowable catch. This is particularly evident when comparing a full time series (2009-2017), with recent low revenue trends (2013- 2017). In addition, coverage will be driven by costs, with costs increasing at lower revenue levels (see cost curves).

The gap analysis used mean revenues, which does not explicitly consider how periods of low or high revenue may impact observer budgets. Several elements in this analysis can viewed together to help the reader understand risk: (1) exploring past revenue performance trends over time- e.g., the full time series (Figure 7, Table 7) versus the post-restructure period Figure 8, Table 8); (2) a range of fee percentages and associated revenue; and (3) EM cost levels. For example, a 1.5% fee would appear to meet the hurdle threshold based on mean revenue performance (see gaps); however, when viewed in context with annual revenue performance (Figure 7 and Figure 8), the time series presents different views. For the full 2009-2017 revenue period, revenue at a 1.5% fee ranges from \$4.5 to \$6.5 million Figure 7[7]). The mean revenue for this is \$5.26 million (Table 7 - all gears), with annual revenue falling below \$4.5 million 11% of the time and total revenue never falling below \$4 million (Figure 7). Whereas the shorter post-

[6] Annual Reports available at: https://alaskafisheries.noaa.gov/fisheries/observer-program

[7] The range of revenue can be found by looking at a fee percentage (y axis) and comparing the revenue vales (x axis) across cells not equal to zero or 1. For example, a revenue range in Figure 6 at 1.25% range from 3.5 (cell value =0.11) to approximately 5.5 (cell value =0.89), noting that these are approximate range, and the true range can be found in Tables 4 and 5.

restructure period shows revenue ranging from $4.5-5.0 million, with a mean value of $4.64 million at a 1.5% rate (Table 8, all gears). Note the two periods have the same lower range values of revenue.

Following the example above, the reader can navigate tables and figures, and highlight differences in mean revenues versus the distribution of revenues. Suppose a policy goal is to avoid revenue ever falling below a mean $4.64 million (mean at 1.5% during post-restructure), then a fee percentage of 1.65-1.7% would be required (Figure 6 and Figure 8). This fee percentage corresponds to cells where a revenue amount (x-axis) was met in all years (a zero in the cell). However, EM costs would still need to be considered such that if they were subtracted from the fee revenue, then a rate above 1.7% would be required to achieve the policy objective (as shown in Table 12 and Table 13). Looking at Table 13 (consistent with post-restructure years), an EM budget of $250,000 may require a fee of approximately 1.8 percent[8] to accommodate both the time series variability in revenue (risk) and EM costs (example of $250,000 annually). A 1.8% fee results in an average expected total fee revenue of approximately $5.5 million.

An important issue not quantitatively evaluated in this analysis (due to its complexity) is annual budgeting for the Annual Deployment Plan. The annual Annual Deployment Plan budget is contingent on the federal budget cycle, calendar year for which fees were collected, NMFS contributions, and the ability of NMFS to smooth revenue across multiple years. The current budget cycle runs from October – June, whereas fees are collected for a calendar year. Thus, there is a delay when the fee revenue is available (spring of the year following the fee collection), and when revenue is needed for the first part of the federal budget year (which is dependent of fees from two years prior). In addition, the agency has some discretion to smooth spending of the observer fee revenues across multiple years to accommodate some of the variability in fee revenue. In the future, EM costs will have to be added to this mix of budget considerations.

The ability of NMFS to smooth revenue likely plays a role in risk tolerance against a low revenue period. However, low revenue years are not necessarily random, and it is likely there will be low revenue periods, which has occurred in recent years. These periods limit the amount of money NMFS has to make up low revenue periods, which means an extended period of low revenue and low coverage is also likely. These situations may result in NMFS also be unable to meet hurdle levels. Thus, in considering fee levels, the post-restructure period is extremely useful for evaluating revenue ranges. As discussed in Section 4.2.1, the range of revenue for a given fee level is narrow, requiring NMFS to spend all fee revenue quicker (at higher per day costs) to maintain coverage at levels near the hurdle level. An analogy would be living pay check-to-check rather than having some savings to ride out periods of low revenue.

NMFS is in process of finalizing a new observer contract and as such cost curves may change. However, general trends in costs are likely to remain consistent under a new contract. An important feature of the observer provider contract is guaranteed days versus optional days. Guaranteed days are a certain number of days that NMFS must fund, whereas optional days can be purchased when revenue is available. There is a break-even funding level where revenue raised is equal to the cost of guaranteed days. The exact revenue point for these guaranteed days is confidential; however, it is important to note that lower fee percentages (e.g., 1.25%) combined with years of low ex-vessel value may put NMFS into a position of needing to fund the shortfall.

[8] This can be found by looking up a fee percentage of 1.72% on the EM costs column of $250,000 and comparing that to the fee % column (1st column of table).

4.4 Probable Environmental Impacts

This section evaluates the potential environmental and cumulative impacts of raising the observer fee percentage on the biological and physical components of the environment. The potential socio-economic impacts of this action are described in the Regulatory Impact Review (RIR) (Section 5). A description of the vessels and processors that would be impacted by this action is provided in Section 5.5.3 and a description of potentially affected small entities is provided in Section 5.7 of this analysis.

The analysis presented in the 2011 EA/RIR/IRFA used the best available information to analyze the potential environmental impacts of the restructured Observer Program and its alternatives (NPFMC 2011). The NPFMC and NMFS analyzed the effects of the restructured observer program and its proposed alternatives on the biological, physical, and human environment in Section 4.3 of the 2011 EA/RIR/IRFA (NPFMC 2011). NMFS provided additional analysis of the environmental impacts of the Observer Program using new information after implementation of the program to supplement the analysis of the environmental impacts completed in 2011 (NMFS 2015, Section 6). In 2017, the NPFMC and NMFS analyzed the impacts of integrating Electronic Monitoring in to the Observer Program for catch estimation on fixed gear vessels (NPFMC 2017).

The Observer Program collects data necessary to support the management of the North Pacific fisheries. This includes monitoring harvest amounts relative to specified TACs and the collection of data that are incorporated into annual stock assessments. The Observer Program provides information to monitor the effectiveness of, and compliance with, fisheries management decisions made through the annual TAC-setting process.

Note that the annual TAC specifications and PSC limits that are implemented each year through proposed and final rulemaking are separate and distinct actions from the restructured Observer Program. Those actions are informed by an environmental impact statement (EIS) and supplemental reports prepared annually on the TAC specifications and PSC limits, as referenced above. Likewise, parameters under which the North Pacific groundfish and halibut fisheries operate (who, what, where, when), remain in effect. Therefore, the effects of this action, which determine some of the parameters under which those fisheries are monitored, are evaluated based on the assumption that the effects of the fisheries themselves on the marine resources have been evaluated in separate NEPA analyses. It is thus assumed that the action is implemented in conjunction with harvest limits set annually by the harvest specification process and according to current regulations governing fishing within the exclusive economic zone off Alaska (50 CFR 679).

Restructuring observer deployment methods allowed NMFS to redesign observer coverage requirements to reduce bias and improve data quality. Improved observer data and monitoring generates better information to make in-season management and policy decisions, facilitating the attainment of optimum yield, and enhancing the sustained health of the resource, fishing sectors, and dependent communities. The restructured Observer Program achieves these benefits predicted in the 2011 EA/RIR/IRFA at the realized coverage rates and with the deployment methods implemented since 2013. Additionally, due to the implementation of a statistically reliable sampling design and estimation procedures in the catch accounting system (CAS), NMFS expects to realize these benefits at a realistic range of coverage levels resulting from variable fee revenues, effort levels, and costs (NMFS 2015).

The Observer Program improves the utility of observer data by improving the ability of NMFS to deploy observers when and where necessary to improve the quality of observer data and allow for the deployment of observers and the collection of data on vessels that were not covered under the previous program (less than 60 ft LOA groundfish vessels and halibut vessels).

The Observer Program does not increase fishing activity or change the measures currently in place to protect the physical and biological environment. Overall fishing effort, including the spatial and temporal distribution of fishing effort, in the groundfish and halibut fisheries is not expected to change under the alternatives. None of the alternatives affect how, where, or when fishing is conducted.

The 2011 EA/RIR/IRFA and the 2015 Supplemental EA identified that the Observer Program had the potential to impact the data collected on groundfish, halibut, prohibited species, marine mammals, and seabirds (see Table 14). However, no adverse impacts to these resources were anticipated from the Observer Program because it is a data collection program. Alternatives 2 and 3 for this proposed action would provide additional funding in future years (as compared to the status quo fee percentage, not the comparing the dollar amounts) for data collection under the Observer Program, funds generated from an increase in the observer fee are anticipated to improve data collection over the status quo. The alternatives considered in this analysis would not change how the Observer Program is implemented through the annual review and planning process or which vessels would be monitored in the partial coverage category. The alternatives analyzed in this document would increase the fee levied on landings made in the partial coverage category impacting the available funding for deployment of observers and EM.

None of the alternatives considered in this analysis would change the management of the fisheries, the location of the fisheries or fishing effort, nor the process used to establish total allocable catches. The action alternatives differ in whether an increase in the fee percentage is assessed equally across all gear sectors or differentially by gear: trawl, H&L, pot, and jig. Some vessels affected by this action may use more than one gear type depending on the time of year or fishery and if fees are assessed at a higher rate on one gear type than another alternate gear type, there may be a financial incentive to use one gear type over another within existing fishery and seasonal catch limitations (e.g., allowable catch limits). Raising the observer fee would not change season dates, authorized gear types, or allocations and therefore any gear switching that may occur as a result of differentially raising the observer fee would not impose additional potential environmental impacts than are already analyzed annually through the harvest specification process.

The changes considered in this action would not cause adverse impacts to the physical or biological environment. Therefore, all potential impacts analyzed in this EA are assumed to be beneficial. No potential impacts on habitat or the ecosystem have been identified. This section analyzes whether implementing an increase in the fee percentage would change any of the potential impacts of the Observer Program.

Table 14 Resources for which data collection is potentially affected by the proposed action and alternatives.

Resource component	Potentially Affected?
Groundfish	Yes
Halibut	Yes
Prohibited & Ecosystem Component Species (non-target)	Yes
Marine Mammals	Yes
Seabirds	Yes
Habitat	No
Ecosystem	No
Social and economic	Yes

No = no impact anticipated by each alternative on the component.
Yes = an impact is possible if each alternative is implemented.

4.4.1 Benefits from Improved Observer Data

Improving data reliability was one of the primary drivers for restructuring the Observer Program. The restructuring of the Observer Program expands observer coverage to fill scientific data gaps, reduce bias in the data, and equitably distribute costs. The 2011 EA/RIR/IRFA identified three types of scientific benefits from the restructured Observer Program—

- Reducing sources of bias.
- Reducing data gaps
- Targeting observer coverage to address data needs.

The restructured Observer Program achieves these benefits predicted in the 2011 EA/RIR/IRFA at the realized coverage rates and with the deployment methods implemented since 2013. Additionally, due to the implementation of a statistically reliable sampling design and estimation procedures in the CAS, NMFS expects to realize these benefits within a range of coverage levels resulting from variable fee revenues, effort levels, and costs (NMFS 2015). Integrating EM into the Observer Program maintains these benefits of expanded observer coverage to fill scientific data gaps and reduce bias in the data. Integrating EM into the partial coverage category will also allow the Council and NMFS additional flexibility to target EM coverage to address data needs within the partial coverage category. NMFS will provide the first full evaluation of the EM trip selection pool in the 2018 Annual Report in May 2019. This evaluation will inform the development of Observer and EM Annual Deployment Plan for 2020.

Under the alternatives considered in this analysis, the Council and NMFS would continue to annually decide the rate of observer coverage and EM coverage that can be afforded with the budget from fee revenues. The amount of coverage allocated to both deployments would continue to be determined annually in the Annual Deployment Plan based on an analysis of the costs, budget, and effort in the partial coverage category. An important part of this annual analysis is understanding gaps in observer data when a portion of the partial coverage vessels opt-in to EM. NMFS implemented Amendment 114/104 in the 2018 Annual Deployment Plan and will present the first full evaluation of the EM strata in the 2018 Annual Report to be presented to the Council in June 2019. Through this annual review and planning process, NMFS and the Council will make decisions about how to balance EM coverage and observer coverage within the expected available budget. NMFS provided an evaluation of the potential impacts of approving all vessels that opted-in to the EM selection pool in Appendix C of the 2019 Annual Deployment Plan (NMFS 2018a). NMFS determined that the impact of adding all vessels requesting EM for 2019 appeared to be relatively minor for both discard estimation and biological data collection. The greatest number of trips impacted was expected to be within the Halibut hook and line fishery, where both types of data (observer and EM) are expected to be less available at the Area, FMP, and YTD levels.

The action alternatives considered in this analysis would result in a range of funding levels depending on a variety of factors including the fee percentage, annual standard prices, and annual landings in the partial coverage category. The sections of this analysis are complimentary and when viewed as such show considerable uncertainty in projecting revenue, which translates into uncertainty in gaps and the money available to meet the hurdle thresholds and allow for optimization.

4.4.1.1 Reducing Sources of Bias

The restructured Observer Program uses scientific methods to deploy observers and EM. The random sampling established under the restructured Observer Program addresses sampling biases that federal regulations built into the previous program. The goal of sampling under the restructured program is to randomize the deployment of observers into fisheries to collect representative data used to estimate catch and bycatch, assess stock status, and determine biological parameters used in ecosystem modeling efforts and salmon stock-of-origin analyses (NMFS 2013). In 2018, NMFS implemented regulations integrating EM into the Observer Program and establishing EM as an option for fixed gear vessels in the partial coverage category. Vessels may request to be in the EM selection pool and are sampled randomly using the same trip selection methods as used to deploy observers. Random sampling results in better spatial and temporal distribution of observer coverage across all fisheries. This generates data that is representative of fishing and greatly improves our confidence in catch and bycatch estimation and the quality of data collected in all Federal fisheries.

NMFS Alaska Region requires representative sampling methods (e.g., random) be used to provide the unbiased discard information used in CAS. Providing unbiased at-sea discard information is a critical function of the Observer Program. The random deployment methods described in the Annual Deployment Plans are evaluated using performance metrics described in the Annual Reports. These performance metrics rely on random sampling theory to evaluate whether unobserved events are similar to observed events (a basic premise for random sampling and assessment of deployment bias), and the degree to

which sampling targets were achieved. The annual review and deployment process will result in continuous improvement in the representativeness of observer data through scientific evaluation of the sampling plan.

Section 4.2.2 of this analysis evaluates the effect of funding levels on observer deployment rates and the resulting resolution of observer data. The results from the sampling simulations were also used to evaluate the extent to which observer deployments (collection of biological data) may be spatially representative of the effort within the EM and no-selection pools (i.e. similar gear, target, and NMFS Area) at varying funding levels.

As explained in Section 4.2.4, a variety of factors contribute to sampling errors and non-sampling errors which are both potential sources of bias in the partial coverage category. The annual review and planning process allows for these sources of potential bias to be evaluated by examining differences between unobserved and unobserved events (i.e., trips), and using a set of performance metrics to evaluate these issues. The reports have shown differences between unobserved and unobserved fishing events such as trip length, diversity of species landed, and amount of retained catch. The Council and NMFS have responded to these issues by making changes to sampling strata, changing sampling allocations among strata, and incorporating new technologies such as EM. This will be an ongoing process, noting that these biases and sources of error will always be an important issue for the Observer Program.

Section 4.2.3 describes factors contributing to variance in catch estimation under the Observer Program and ongoing work to develop methods to calculate variance associated with the point estimates and catch estimation that is done in the Catch Accounting System (CAS), taking into account the hierarchical sampling design. In general, preliminary variance results indicate that the majority of percent standard errors are relatively small, and trends follow the patterns discussed in Section 4.2.3 and appear to be consistent across multiple years of deployment.

Under Alternatives 2 and 3, NMFS would continue to use representative sampling methods to deploy observers and EM on vessels in the trip selection pools of the partial coverage category. This would maintain the ability to provide the unbiased discard information used in CAS and conduct an annual review using performance metrics. Under any of the proposed alternatives, the amount of funding available for deployment of observers and EM could increase, possibly allowing for more trips to be observed.

4.4.1.2 Reducing Data Gaps

Under the restructured Observer Program, coverage was expanded to nearly all catcher/processor vessels, the halibut IFQ fishery, and vessels between 40ft and 60ft length overall (LOA). In summary, restructuring dramatically reduced the proportion of trips that do not have any coverage (i.e., no observer data) and, compared with the previous program, improved discard estimates by using observer information that better represents the fishing activities across the entire federal fishing fleet. Under status quo funding levels (1.25% fee), the restructured Observer Program results in better spatial and temporal distribution of observer coverage across all fisheries than the previous program. Taken together, the improvement in data quality greatly improves our confidence in catch and bycatch estimation and greatly improves the quality of data collected in all Federal fisheries.

Prior to 2013, vessels less than 60ft LOA and halibut IFQ vessels were unobserved, and the new data from these vessels is providing important information on discards at-sea. Species that currently present catch accounting and management challenges in GOA fixed-gear (hook-and-line and pot) fisheries include: most rockfish species, sharks, skates, Pacific cod, Pacific halibut, and sablefish. Current TACs of some species, including sablefish, in the GOA groundfish fishery are already close to their ABC amounts. In particular, many rockfish and skate species are of management concern because the fixed-gear fisheries catch most of the TAC of these species and the TAC is set equal to ABC. Sculpins and sharks present a management challenge because of the high discards of these species by the hook-and-line fisheries, and life history characteristics that make them sensitive to fishing pressure (e.g., sleeper sharks). In addition,

the key element for seabird issues that came along with the restructured Observer Program is that for the first time we have fishery observers on board halibut IFQ vessels and can then monitor seabird interactions and calculate estimates of the seabird bycatch. This is of particular importance for short-tailed albatross. Further, marine mammal incidental take is now monitored in this previously unobserved sector, providing more complete understanding of the impacts of commercial fisheries on marine mammal stocks in Alaska.

While the restructured Observer Program expanded observer coverage, there are still many vessels in the partial coverage category that are excused from observer coverage. Vessels less than or equal to 40ft LOA are in the zero selection pool. Under Alternatives 2 and 3, additional funding for observer and EM deployment could allow for some level of deployment on these vessels to collect data that may better represent the fishing activities across the entire Federal fishing fleet.

Section 4.2.2 of this analysis evaluates the effect of funding levels on observer deployment rates and the resulting resolution of observer data. The results from the sampling simulations were also used to evaluate the extent to which observer deployments (collection of biological data) may be spatially representative of the effort within the EM and no-selection pools (i.e. similar gear, target, and NMFS Area) at varying funding levels.

4.4.1.3 Targeting Observer Coverage to Address Data Needs

The 2011 EA/RIR/IRFA identified an additional benefit to a restructured program for fisheries with partial coverage, the ability for NMFS to adapt coverage to address specific data needs. For example, the flexibility afforded to NMFS to deploy observers through restructuring has enabled NMFS to explore alternative designs for genetic Chinook salmon bycatch sampling in the GOA pollock fishery that should result in representative data being collected cost-effectively. Through the annual process, the restructured Observer Program allows for iterative adaptation so as to make continuous improvements, rather than rely on fixed regulation for change (Faunce 2015).

In 2018 and 2019, NMFS implemented an observer deployment allocation strategy of 15% plus optimization based on discarded groundfish and halibut PSC, Chinook PSC. This allocation strategy provides a balance between minimizing the variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce gaps in observer coverage in the partial coverage category.

Under Alternatives 2 and 3, the Council and NMFS retain this flexibility to adapt observer coverage to address data needs through the Annual Deployment Plan process. Alternatives 2 and 3 would increase the fee percentage assessed on landings in the partial coverage category potentially resulting in additional funding to deploy observers and EM. This additional funding could increase coverage rates to better address specific data needs in currently monitored fleets or additional funding could allow for expansion of monitoring to vessels that have been never been monitored before such as on vessels less than 40ft LOA.

4.4.2 Physical and Biological Impacts

Restructuring observer deployment methods allowed NMFS to redesign observer coverage requirements to reduce bias and improve data quality. Improved observer data and monitoring is anticipated to generate better information to make in-season management and policy decisions, facilitating the attainment of optimum yield, and enhancing the sustained, ecological health of the resources, fishing sectors, and dependent communities. The restructured Observer Program achieves these benefits predicted in the 2011 EA/RIR/IRFA at the realized coverage rates and with the deployment methods implemented in 2013, 2014, and 2015 (NMFS 2015 – Supplemental EA). Additionally, due to the implementation of a statistically reliable sampling design and estimation procedures in the CAS, NMFS expects to realize these benefits within a realistic range of coverage levels resulting from variable fee revenues, effort levels, and costs.

According to the 2011 EA/RIR/IRFA, given that an overall increase in fishing activity was not expected and measures remain in place to protect the physical and biological environment, no significant adverse impacts to target species, other species, prohibited species, marine mammals, seabirds, habitat, or ecosystem relations are anticipated.

Alaska groundfish fishery managers use the best scientific information available to determine the status of each stock or stock complex. Total catch accounting for all managed species is mandated by the Magnuson-Stevens Act and is necessary to comply with statutory requirements for status determination criteria. NMFS and the Council assess the status of the stocks that comprise the groundfish category in the annual Stock Assessment and Fishery Evaluation Report. The most recent report is available on the Alaska Fisheries Science Center webpage at http://www.afsc.noaa.gov/Publications/assessments.htm. The North Pacific Fishery Management Council (Council) and its Scientific and Statistical Committee then use this information to establish the overfishing levels (OFLs), acceptable biological catch (ABC), and total allowable catch (TAC) for each stock or stock complex. Each year, the Council recommends, and the Secretary of Commerce publishes, harvest specifications for the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) groundfish fisheries. Harvest specifications establish specific annual limits on the harvest of groundfish used to manage the groundfish fisheries. Harvest specifications establish the OFL, ABC, and TAC for each stock or stock complex, and PSC limits. NMFS publishes the annual harvest specifications in the Federal Register and on the NMFS Alaska Region webpage at https://alaskafisheries.noaa.gov/harvest-specifications/field_harvest_spec_year/2016-2017-751.

The Inseason Management Branch of the NMFS Alaska Region monitors the catch rate of groundfish and prohibited species according to the allocations and the gear, seasonal, and sector apportionments found in the harvest specifications. Further description of the inseason management process is available at: https://alaskafisheries.noaa.gov/sites/default/files/harvestdiscussion.pdf.

Each year, accounts are established in the Alaska Region's CAS that match the annual harvest specification tables; these accounts are monitored by NMFS to limit catch within prescribed limits in the specification tables. The system uses information from multiple data sources to provide an estimate of total groundfish catch, including at-sea discards, as well as estimates of PSC and other non-groundfish bycatch. Currently in the partial coverage hook-and-line fisheries, NMFS uses observer data to generate discard rates to estimate discarded catch. Observer data from the small catcher vessel hook-and-line fleet are transmitted from observers in the field to staff in the observer program office in Seattle where the data are entered into the observer program database. At this point, the data are integrated into the CAS and available for inseason management. The data are usually available for management within days of the trip ending. This action does not change the methods used in CAS for bycatch estimation, and should fees increase under this action (Alt 2 or 3), the additional revenue will improve the quality of observer data used by CAS for bycatch estimation.

The Council and NMFS annually determine the TACs based on the projected biomass of the fish species, and effective monitoring and enforcement would continue to ensure that the overall TACs are not exceeded. Therefore, the alternatives only impact the amount and types of data collected, and the timeliness of the availability of the data to managers.

NMFS needs reliable estimates of catch from all sectors of the GOA and BSAI fishing fleet regardless of vessel size in order to properly assess groundfish stocks (target and non-target). The critical outcome of deploying observers or EM systems is to get reliable total catch estimates for both target and non-target stocks to ensure overfishing is not occurring. Monitoring requires not only total catch amounts but also obtaining representative biological information needed for stock assessment (Section 3.3.2). Representative individual lengths and weights in addition to otoliths and sex composition data are important to ensure that stock assessment models can track which segment of the population is being impacted by fisheries. The data collection system is continually being refined across all fisheries to ensure representatives samples and adequate sample sizes for stock assessment, and the Annual Deployment Plan allows NMFS the flexibility to maintain these data under the current fee percentage. Alternatives 2 and 3

would simply allow more revenue to be raised and would improve NMFS ability to collect data in comparison to the status quo alternative. None of the Alternatives considered would reduce NMFS ability to collect biological information, or information on discards, in comparison to the current program.

4.4.2.1 Target and Incidental Catch

The restructured Observer Program improved the reliability of the information used to manage the fisheries and set harvest levels compared to the previous program. The restructured Observer Program provides managers with better estimates of target and incidental harvest and bycatch, increases flexibility in deploying observers, and ensures harvest remain within TAC levels. Also, observer data that reflects the temporal and spatial distribution of fishing effort allows fishery managers to open and close fisheries to more precisely meet, but not exceed, TAC levels. There is a long history of analysis related to this subject. NMFS publishes annual reports evaluating the representativeness of data collected from the observer program (see NMFS 2017a[b], NMFS 2016[b], NMFS 2015[b], NMFS 2014[b], NMFS 2013[b]), and evaluated changes in the information used for management under observer program in 2015 (NMFS 2015). In addition, the random sampling has improved NMFS ability to estimate uncertainty (Cahalan and Gasper 2016).

NMFS manages for total catch accounting. Total catch includes retained catch and discarded catch (also called bycatch). For example, NMFS collects data on rockfish catch and bycatch in the rockfish fishery and rockfish bycatch in the Pacific cod fisheries. NMFS uses all of this information to estimate total rockfish catch by all fisheries. The restructured Observer Program focuses on achieving representative samples of catch in the partial coverage category. Observer data is then used by the CAS to estimate catch and bycatch. The estimation procedures used by the CAS rely on the expansion of available observer data and on catch reports provided by industry. These are combined to obtain estimates of retained catch, at-sea discards of groundfish species, and at-sea discards of non-target and prohibited species. Additional details are provided in Chapter 3 of NMFS (2015) and Cahalan et al. (2014).

Prior to 2013, the catcher vessels less than 60 ft LOA and halibut IFQ vessels were unobserved, and the new data from these vessels is providing important information on discarded catch, including many groundfish species.

Despite the per-day costs being higher than anticipated in the 2011 EA/RIR/IRFA, inclusion of small catcher vessels and halibut IFQ vessels under the restructure Observer Program improved the representativeness of data compared to the previous program (see NMFS 2015, Section 3.1). These improvements also resulted in more nearshore data and better representation of the small catcher vessels and halibut IFQ fisheries in 2013 and 2014 (see NMFS 2015, Section 3.2.1).

One important improvement under the new program is that for the first time, NMFS has observer data from which to estimate the bycatch of groundfish (e.g., skates, sharks, rockfish), invertebrates (e.g., crab and coral), and seabird and marine mammal interactions in the halibut fishery. This improves NMFS's ability to assess the status of each stock and estimate total catch in compliance with Magnuson-Stevens Act's requirement for annual catch limits (16 U.S.C. 1853(a)(15)). This improved data in turn allowed estimation to occur when it previously had not under the previous program. These new estimates provided important new information to stock assessment authors and inseason managers on sensitive species such as skates, sharks, and rockfish. This new information raised management concerns for rockfish in the BSAI and skates in the GOA due to catch exceeding ABC limits because inseason mangers did not previously have information from which to manage these species (NMFS 2015). NMFS has also implemented and EM program as part of the Annual Deployment Plan cycle, which has likely also improved data collection a portion of the longline and pot fleet. This new technology has been integrated into the CAS and is being used to estimate bycatch. Increases in revenue could be used to improve both the EM and observer program. For example, further work continues on the collection of information from the currently unobserved fleet, and this remains an important information gap.

Implementation of the random sampling methods for the large vessel stratum improved the representativeness of effort for vessels that had had observer coverage under the previous program. This was apparent by observer coverage better tracking actual fishing effort through the year rather than deviating from effort as fishery participants chose when to carry an observer. There were also spatial improvements in the trawl fishery as noted by coverage in the western GOA, which previously had limited coverage.

The potential beneficial impacts of the action alternatives considered in this Analysis can be summarized in terms of the potential impact on reducing data gaps as discussed in Section 4.2.2. Several overarching patterns are apparently related to increasing funding levels with increasing fee percentages; specifically, a reduction in the cost per observer deployment day at higher funding levels, and a reduction in the number of data gaps at higher coverage levels.

4.4.2.2 Prohibited Species Catch

The BSAI and GOA groundfish FMPs establish categories for prohibited species and ecosystem component species. Prohibited species in the groundfish fisheries include Pacific salmon (Chinook, coho, sockeye, chum, and pink), steelhead trout, Pacific halibut, Pacific herring, king crab, and Tanner crab. Ecosystem component species in the groundfish fisheries are forage fish and grenadier species. The effects of the groundfish fisheries in the BSAI and GOA on prohibited species and ecosystem component species are primarily managed by conservation measures developed and recommended by the Council over the history of the FMPs for the BSAI and GOA and implemented by Federal regulation. Information on prohibited species catch (PSC) and catch of ecosystem component species are available on the NMFS Alaska Region webpage at https://alaskafisheries.noaa.gov/fisheries-catch-landings.

NMFS relies on at-sea observer data to estimate PSC, including Pacific halibut and different salmon species, such as Chinook salmon. When a particular PSC limit is reached, NMFS closes those directed fisheries that would otherwise incur additional PSC to that limit. NMFS closes directed fisheries based on attainment of PSC limits per applicable regulatory requirements that detail the specific areas, fisheries, and sectors (i.e., gear type or management program) subject to such closures. These measures can be found at 50 CFR 679.21 and include PSC limits on a year-round and seasonal basis, year-round and seasonal area closures, gear restrictions, and an incentive plan to reduce the incidental catch of prohibited species by individual fishing vessels. Limits regulate the catch of prohibited species in Federal fisheries, and these limits are not affected by Observer Program or the alternatives considered in this analysis.

Many of the vessels with PSC limits are in the full coverage category (Catcher/processors and vessels that participate in specific catch share programs). This category was expanded with the restructured Observer Program so more vessels that catch prohibited species are in the full coverage category compared to the previous program, thereby improving the data collected on PSC. In the partial coverage category, PSC limits apply to trawl vessels that harvest groundfish and hook-and-line vessels that harvest Pacific cod. Halibut and sablefish IFQ vessels and Pacific cod pot vessels are not subject to PSC limits. In October 2018, Council recommended that NMFS implement regulations allowing the retention of halibut in pot gear in the BSAI. That action would also give NMFS the inseason authority to close halibut IFQ fishing with pot gear if incidental catch of crab becomes a conservation concern in the directed halibut pot fishery.

NMFS has increased the use of PSC limits for Chinook salmon and halibut. Observer coverage since 2013 resulted in most PSC estimates being made specific to a target and reporting area, which is a result of deployment better representing fishing effort. This means that the PSC estimates are more representative of actual PSC in the fisheries than they were prior to 2013.

In general, harvest information collected by observers, together with information from other sources, is used by NMFS's in-season managers to assess PSC. When harvest information is not timely or accurate, NMFS may inadvertently close fisheries after PSC levels have been reached, resulting in overharvest of PSC species. Or, NMFS may inadvertently close fisheries early, resulting in an underharvest of the target

species. The restructured Observer Program minimizes these two cases by providing observer data consistently during the fishery. While this does not necessarily represent a conservation concern for these species, the more observer information available to managers on a near real-time basis, the more closely the closures would approximate the intended PSC limits set by the Council.

The variance of salmon and crab PSC, which tends to be rare, has not yet been evaluated for the partial coverage category; however, Cahalan et al. (2015) found in the full coverage stratum that species that are uncommon and clustered will have higher variances than the more consistently caught species. In these cases, intensive sampling maybe required to achieve high precision, which is logistically difficult or not cost-effective for some operations (e.g., NPFMC 2014). Sampling methods that rely on technology and full retention may be provide better approaches for these highly variable species (such as salmon). For example, the Council is currently considering full retention and Electronic Monitoring (EM) options for salmon accounting in trawl fisheries (additional explanation of potential future changes is described in Section 4.4.3).

Under the action Alternatives, additional funding may be available (as compared to the status quo) for the deployment of observers and EM in the partial coverage category. None of the alternatives considered in this analysis would change the management of the fisheries, the location of the fisheries, fishing effort, or methods for estimating PSC. Any realized benefits of a potential increase in observer coverage rates would not impact this potential estimation bias because this issue is unrelated to sample size. NMFS would continue to work to address the average weight issue for wastage in both the at-sea and EM programs at any level of observer or EM coverage.

4.4.2.3 Marine Mammals

Alaska supports one of the richest assemblages of marine mammals in the world. Twenty-two species are present from the orders Pinnipedia (seals and sea lions), Carnivora (sea otters), and Cetacea (whales, dolphins, and porpoises). Some marine mammal species are resident throughout the year, while others migrate into or out of Alaska fisheries management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf.

Marine mammals have been given various levels of protection under the current fishery management plans of the Council, and are the subjects of continuing research and monitoring to further define the nature and extent of fishery impacts on these species. The most recent status information is available in the Marine Mammal Stock Assessment Reports (SARs), available on the AFSC webpage at http://www.nmfs.noaa.gov/pr/sars/region.htm.

The Observer Program provides reliable information to managers of marine mammal resources on direct and indirect interactions with fisheries and increased flexibility to meet management objectives. None of the alternatives considered in this analysis would change the management of the fisheries, the location of the fisheries, fishing effort, or the marine mammal protection measures in place. Spatial and temporal concentration effects by these fisheries, vessel traffic, gear moving through the water column, or underwater sound production which could affect marine mammal foraging behavior, would not be affected by the proposed action. Significant incentives for compliance with marine mammal protection management measures, such as area closures, would remain in place under all of the alternatives.

Observers are important sources of data for the marine mammal stock assessment reports (Muto et al 2015) and the List of Fisheries (81 FR 20550, April 8, 2016) for compliance with the Marine Mammal Protection Act. Under the restructured Observer Program, NMFS is monitoring the take of all marine mammals in the BSAI and GOA groundfish fisheries and deploys NMFS-trained observers on vessels per the Annual Deployment Plan.

NMFS's List of Fisheries annually classifies U.S. commercial fisheries into one of three categories according to the level of incidental mortality or serious injury of marine mammals. The Alaska halibut IFQ fishery and the Pacific cod pot fishery are Category III fisheries in 2016, meaning there is either a

remote likelihood of or no known incidental mortality or serious injury of marine mammals in these fisheries. Prior to 2013, when the restructured Observer Program included a requirement for the halibut IFQ vessels to carry observers, the only source of data on incidental injuries to marine mammals from that fishery was self-reports of any injury, incidental mortality, or serious injury of marine mammals.

Vessels have to comply with existing Federal regulations protecting Steller sea lion rookeries and haulouts. As the western distinct population segment of the Steller sea lion is listed as endangered under the Endangered Species Act, current Steller sea lion protection measures close much of the Aleutian Islands region to trawling up to 10 or 20 nautical miles offshore from rookeries and haulouts, with less restrictive no-fishing zones for hook-and-line and pot gear.

In 2014, NMFS published a final EIS, biological opinion, and final rule to implement modified Steller sea lion protection measures (79 FR 70286, November 25, 2014). The 2014 biological opinion included the following Reasonable and Prudent Measure as necessary and appropriate to minimize the impact of incidental take of western distinct population segment of Steller sea lions (NMFS 2014): NMFS will monitor the take of ESA-listed marine mammals in the BSAI groundfish fisheries. In order for any incidental takes to be exempt from the prohibitions of section 9 of the ESA, NMFS must comply with the associated terms and conditions below, which implement the Reasonable and Prudent Measure:

1. NMFS-trained observers will be deployed on vessels in these fisheries per the Observer Program's Annual Deployment Plan.
2. NMFS will use observer data to estimate the minimum mean annual mortality for each fishery.
3. NMFS will evaluate the observer coverage to determine if changes in coverage are warranted to better assess take of listed marine mammals.

The Observer Program reports mammal interactions to MML staff and estimates are made independent of the CAS. In the absence of at-sea observer data, logbooks are another source of information on whale depredation; however, this is an unverified source of information for interactions.

As explained in the 2011 EA/RIR/IRFA and the 2015 SEA, the expanded sampling frame created by the restructured Observer Program resulted in a better special distribution of sampling relative to the fishery footprint. The changes to the observer fee percentage assessed on landings made in the partial coverage category are not expected to affect current rates of marine mammal interactions and would not negatively impact marine mammal interaction data collection.

The 2011 EA/RIR/IRFA explained that, under the action, vessels would still have to comply with existing Federal regulations protecting Steller sea lion rookeries and haulouts. As the western distinct population segment of the Steller sea lion is listed as endangered under the Endangered Species Act, current Steller sea lion protection measures close much of the Aleutian Islands region to trawling up to 10 or 20 nautical miles offshore from rookeries and haulouts, with less restrictive no-fishing zones for hook-and-line and pot gear.

4.4.2.4 Seabirds

As explained in the 2011 EA/RIR/IRFA and the 2015 SEA, the effects of the restructured Observer Program on seabirds are considered insignificant. The changes to the observer fee percentage assessed on landings made in the partial coverage category are not expected to affect current rates of seabird interaction. No changes in the indirect effects of fisheries on prey (forage fish) abundance and availability, benthic habitat as utilized by seabirds, and processing of waste and offal, all of which could affect seabirds, are expected under the alternatives.

4.4.2.5 Ecosystem and Habitat Considerations

The 2011 EA/RIR/IRFA and the 2015 SEA concluded that no significant adverse impacts to habitat or ecosystem relations are anticipated under the Observer Program. None of the alternatives considered in this analysis would change the management of the fisheries, the location of the fisheries, fishing effort, or

the ecosystem and habitat management measures in place. Given that the range of alternatives considered in this analysis would not result in an increase in fishing activity, and there are measures currently in place to protect the physical and biological environment (explained in prior analyses), the potential effect of this action on an ecosystem scale is very limited and would be considered to be beneficial.

4.4.3 Cumulative Effects

An environmental assessment must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality regulations for implementing NEPA define cumulative effects as:

"the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the Council on Environmental Quality guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful. As discussed in the proceeding sections, the meaningful effects of this proposed action and alternatives are those that effect the amount of funding available for the deployment of observers and EM in the partial coverage category. As such, this a cumulative effects analysis focused on other actions that may impact the number of vessels or landed catch in the partial coverage category and subsequently impact the observer fees assessed in the partial coverage category. The Council and NMFS have implemented changes to the Observer Program since 2013. The Council is also considering a number of amendments to the regulations governing the Observer Program that may be implemented in the next few years. Several of the proposed regulatory amendments were suggested in comments on the proposed rule on Observer Amendments 86/76 (77 FR 23326; April 18, 2012) but were outside of the scope of changes NMFS could make in the final rule. Other proposals were brought to the Council after implementation of Observer Program Restructuring.

The most important aspects of any changes to the Observer program are 1) the impacts on observer fee collections, 2) the total number of trips in the partial coverage category, 3) information relative to the cost or efficiency of deploying observers on EM in the partial coverage category, and 4) impacts on data quality. The impact of an action on the amount of the observer fee is important because it determines the amount of money available to deploy observers or EM in the partial coverage category. The impact of an action on the total number of trips in the partial coverage category is important because it affects the sampling or deployment rate that can be achieved for a given amount of observer fees or budget. The cost of deploying observers or EM in the partial coverage category is affected by a number of factors that are described in more detail in the 2019 Annual Deployment Plan and prior Annual Reports. Circumstances that affect travel costs or non-fishing days may affect the average cost of deploying observers in the partial coverage category in a particular year, or may affect bids in future contracts. Therefore, it is of note if a proposal would add or remove fishing trips that it may be relatively more expensive to observe.

Implemented changes to the Observer Program described in this section are—

1. Observer coverage requirements for small vessels in the Western Alaska Community Development Quota (CDQ) Program fisheries (Amendment 109 to the BSAI groundfish FMP, final rule 81 FR 26738, May 4, 2016)).

2. Observer coverage requirements for small catcher/processors (Amendments 112 to the BSAI FMP and 102 to the GOA groundfish FMP, final rule 81 FR 17403, March 29, 2016).

3. Full observer coverage for trawl catcher vessels in the BSAI trawl limited access fisheries (final rule 81 FR 67113, September 30, 2016).

4. Integration of Electronic Monitoring into the Observer Program (Amendments 114 to the BSAI groundfish FMP and 104 to the GOA groundfish FMP, final rule 82 FR 36991, August 8, 2017).

Additional potential revisions to the Observer Program described in this section are—

5. Observer coverage requirements for vessels delivering to tenders.

6. Development of EM for compliance monitoring on pelagic trawl vessels.

Additionally, other actions that impact observer fee revenues described in this section are—

7. Charter Halibut Recreational Quota Entities

8. Guided Angler Fish (GAF) Program

Implementation of the Restructured Observer Program and the annual review and planning process increased the workload on NMFS staff that contribute to Analyses prepared by the NPFMC regarding the Observer Program. Because of this increase in workload, the Council has prioritized the order in which potential changes to the Observer Program are analyzed. The Council expresses priority for analyses of proposed changes to the Observer Program through individual action to task its staff with preparation of a particular analysis and by evaluating the scope of and availability of staff to work on proposed changes through discussion papers and a tasking priority list that originated from a discussion paper in February 2014 (NMFS 2014). Since 2014, NMFS and Council staff record and report progress and assumed priority to the Council at each meeting.

Following is a short description of the implemented changes to the Observer Program and proposed regulatory amendments under consideration by the Council and NMFS. Table 15 provides a very general overview of the possible magnitude and applicability of the proposed action on the key issues described at the beginning of this section.

Table 15 Summary of Observer Program changes with general information about potential impacts relevant to observer fee revenues, fishing effort in the partial coverage category and monitoring costs.

Regulatory changes that affect participation in the partial coverage category	Potential Impacts		
	Observer fee Collection	Number of Trips in Sampling Frame	Monitoring costs (Observer or EM deployment)
1. CDQ small hook-and-line catcher vessels	minor increase	minor increase	Minimal, if any, trips starting in remote ports may add to the average cost per day of deploying observers. May be in EM selection pool and vessels may opt-in to EM coverage
2. Small catcher/processors	Increase of $23,000 (0.5% of total observer fee collection in 2013)	67 to 109 additional days subject to observer coverage, relatively small proportion of observed fishing days in 2013.	Cost slightly more to observe than contribute to the observer fee. May be in EM selection pool and vessels may opt-in to EM coverage
3. BSAI Pacific cod trawl vessels	Reduction – up to 8% of annual fees ($123k - $153k)	Minor change because option has been in place since 2013.	No change expected, Not eligible to opt-in to fixed gear EM selection pool
4. Integration of EM into the Observer Program	No change expected	No change expected	Possible increase in cost per day for observers due to fewer days purchased each year. Possibly lower overall costs due to expected low EM cost per day.
5. Vessels delivering to tenders	No change expected	Increase in # of trips due to change in definition of the end of a trip but not fishing effort	Unknown – will be analyzed
6. Trawl EM	No change expected	Unknown – will be analyzed	Unknown – will be analyzed
7. Charter Recreational Quota Entity	Reduction in annual fees	Reduction in observer days	No change expected
8. Guided Angler Fish (GAF) Program	Reduction in annual fees ($2.5k - $7k annually)	Reduction in observer days	No change expected

4.4.3.1 Observer Coverage Requirements for Small Vessels in the CDQ Program Fisheries

This action implemented a number of regulatory revisions that would apply to catcher vessels less than or equal to 46 ft LOA using hook-and-line gear in the CDQ fisheries (NPFMC 2015). One of those provisions moved these small catcher vessels from full to partial coverage. These vessels were in the full coverage category because the groundfish CDQ fisheries include transferable PSC limits as part of a catch share program. Full coverage for fisheries with transferable PSC limits as part of a catch share program is one of the requirements implemented under Observer Program Restructuring. The Council took final action on this amendment in February 2015 and NMFS implemented it in early 2016 (81 FR 26738, May 4, 2016).

Although analysts were not able to specifically project the number of vessels that may participate in the CDQ small hook-and-line gear fisheries or the number of additional fishing trips that may be added to the partial coverage category, this additional fishing is expected to be small relative to the total number of participants and trips in the partial coverage category. Therefore, the projected increase in observer fees

collected as a result of this action also is expected to be small. In addition, some of the vessels affected by this action are less than 40 ft LOA so will be placed in the no selection pool under the current and recent Annual Deployment Plans. If a small CDQ hook-and-line catcher vessel is selected for observer coverage, these vessels likely depart from more remote ports so they may represent some of the more expensive trips to observe based on travel costs and possibly wait time or non-fishing days. However, all of approximately 230 hook-and-line catcher vessels less than 46 ft LOA that participated in the halibut CDQ fisheries already are in the partial coverage category. Those over 40 ft LOA are in the trip selection pool, and any vessels selected for observer coverage likely already are being deployed from remote ports in Western Alaska.

4.4.3.2 Observer Coverage Requirements for Small Catcher/Processors

This action revised allowances for small catcher/processors to be placed in the partial coverage category. Previously, all catcher/processors were assigned to the full coverage category unless the vessel met a few limited allowances to be placed in the partial coverage category. These allowances were developed by the Council as part of its final action on Observer Program Restructuring. Three catcher/processors had qualified for partial coverage under these allowances. NMFS received comments on the proposed rule for Observer Program Restructuring requesting revisions and additions to these allowances but determined that such changes were outside of the scope of revisions that could be made to the proposed rule. Starting in early 2013, the Council received requests from industry to modify these allowances and identified this issue as one of its highest priorities for analysis. The objective of the action is to maintain a limited exception to the general requirement for full coverage for catcher/processors, provide an appropriate balance between data quality and the cost of observer coverage, and not be unduly difficult to apply or enforce.

This action established a maximum production threshold that NMFS will apply on an annual basis to identify those catcher/processors that are eligible to request to be placed in partial coverage in the upcoming year. The action is anticipated to increase the number of catcher/processors eligible to be placed in the partial coverage category from three to between six and ten. Newly qualifying small catcher/processors may contribute about $23,000 to the observer fee collection (based on 2013 fishing activity and standard ex-vessel prices). This amount is about 0.5% of the 2013 observer fee collection of $4,251,452. The newly qualified vessels will add more additional days subject to observer coverage in the partial coverage category than they will fund through additional observer fee proceeds. However, this additional number of days (67–109) is small relative to the total number of observer days in partial coverage in 2014 (4,368) or the total number of days fished by vessels in the vessel or trip selection pools 2013 (27,437 total days). The newly qualifying catcher/processors generally have longer fishing trips than the catcher vessels in partial coverage and for those fishing in more remote areas, the trips have a greater proportion of non-fishing days. The Council took final action on this amendment in June 2015 and NMFS implemented it in early 2016 (81 FR 17403, March 29, 2016).

4.4.3.3 Observer Coverage for Trawl Catcher Vessels in the BSAI Trawl Limited Access Fisheries

In February 2016, the Council recommended NMFS implement a regulatory amendment to allow BSAI trawl CVs to request to be placed in the full coverage category for all fishing activity in the BSAI. NMFS published the final rule in September 2016 (81 FR 67113, September 30, 2016). This action modified observer coverage requirements for catcher vessels participating in the trawl limited access fisheries in the Bering Sea and Aleutian Islands management area (BSAI). This final rule implemented regulations that allows the owner of a trawl catcher vessel to request, on an annual basis, that NMFS place the vessel in the full observer coverage category for all directed fishing for groundfish using trawl gear in the BSAI in the following calendar year. When implemented, these regulations were necessary to relieve vessel owners who requested full observer coverage of the trip logging requirements and observer fee liability associated with the partial observer coverage category.

In 2013, the restructured Observer Program placed all catcher vessels participating in the BSAI trawl limited access fisheries are in the partial coverage category. These vessels were placed in the partial coverage category based on NMFS's data needs for this fishery.

In the RIR prepared for this action, this action was estimated to reduce observer fee revenues by $123,000 to $153,000 based on 2013 and 2014 fishing activity. Prior to the implementation of this regulatory change, vessels that volunteered to carry full observer coverage independently contracted with observer providers to maintain 100% observer coverage during all fishing in the BSAI and also paid the 1.25% fee and continued to report trips in ODDS. This meant that vessels wishing to maintain full observer coverage paid duplicative costs of observer coverage. Beginning in 2017, the observer fee was not assessed on landings made by BSAI trawl CVs placed in the full coverage category under the new regulatory opt-in process. This resulted in less fee revenue with no corresponding decrease in fishing effort in the partial coverage category because it is assumed that vessels opting into the full coverage category under the regulated process would be similar to the vessels opting to voluntarily carry full coverage prior to the regulatory change.

Information in the Observer Program 2014 Annual Report provides some information about the maximum amount of the reduction in the observer fee that could result from this action (NMFS 2015a). Table 2-4 in the 2014 Annual Report shows that BSAI trawl catcher vessels contributed $276,454 in observer fees for Pacific cod in 2014. This amount represented about 8% of the $3,458,716 collected overall in 2014. This represents a rough estimate of the maximum amount of reduction in observer fee liability because not all of the trawl catcher vessels in the BSAI Pacific cod fishery will choose to take full coverage. Thirty-one out of a total of 48 participants in the 2015 BSAI Pacific cod fishery opted for full coverage. This is a reduction from prior years (40 out of 53 in 2013 and 37 out of 48 in 2014). Although some vessels will move from partial to full coverage, this will not result in a significant reduction in the number of fishing trips subject to selection in the partial coverage category because many of these fishing trips have been out of the partial coverage sampling frame since 2013 under the interim policy that has allowed vessels to request full observer coverage.

4.4.3.4 Integration of EM into the Observer Program

In December 2016, the Council adopted Amendments 114/104. The Council and NMFS developed EM for data collection for the non-trawl gear fisheries to address their desire for an alternative way to collect fisheries data in consideration of the operating requirements in these fisheries. EM systems can collect at-sea data for NMFS to estimate discards of fish, including halibut, and mortality of seabirds. EM has the potential to reduce economic and operational costs associated with deploying observers throughout coastal Alaska. EM has the potential to reduce monitoring costs relative to observer coverage because it does not require deploying a person on the vessel and eliminates the logistical and travel expenses that this deployment generates. Through the use of EM, it may be possible to cost effectively obtain at-sea data from a broader cross-section of the non-trawl gear fleet and increase NMFS' and the Council's flexibility to respond to the scientific and management needs of these fisheries.

On August 8, 2017, NMFS published a final rule to integrate electronic monitoring (EM) into the North Pacific Observer Program. EM deployment in 2018 was funded through a combination of federal funding and additional sources such as from the National Fish and Wildlife Foundation. NMFS placed 141 vessels in the EM selection pool for 2018 and 168 vessels in 2019. NMFS will complete the first review of the EM trip selection pool in the 2018 annual report to be completed in May 2019.

4.4.3.5 Observer Coverage Requirements for Vessels Delivering to Tenders

Tender vessels are vessels that receive catch from catcher vessels and deliver it to a processing plant. NMFS and the Council have identified two potential data quality issues with catcher vessels delivering to tenders: 1) a possible bias in the data, and 2) a decrease in stock-of-origin genetic data for salmon. The potential for data bias was noted by NMFS in June 2013; it appeared that vessels selected for observer coverage were taking shorter trips than vessels not selected for observer coverage (NMFS 2014). This

could introduce bias if the information collected from observed trips does not represent the fishing activities of all fishing trips. In June 2014, NMFS evaluated a full year of fishing under the restructured Observer Program and analysis of trip length for vessels in the trip selection pool delivering to tenders did not show a systematic difference in trip length between observed and unobserved vessels. However, the small number of observed trips in 2013 for vessels delivering to tenders may be insufficient to clearly capture any differences in trip length. Analysis of observer coverage on vessels delivering to tenders was included in the 2014 and 2015 annual reports presented to the Council at the June meetings in 2015 and 2016. The analysis of 2014 data found no differences in NMFS areas visited during a trip, trip duration, the total weight of landed catch, or the number of species in the landed catch for observed vs. un-observed tendered trips. The analysis did, however, indicate a difference in vessel length and the proportion of the predominant species in the landed catch for observed and unobserved vessels delivering to tenders. Observed vessels delivering to tenders were 8.8% shorter than unobserved vessels delivering to tenders. The landed catch by observed vessels delivering to tenders was 6% less "purely the predominant species" than landed catch by unobserved vessels delivering to tenders. The conclusions presented in 2016 from the analysis of data collected in 2015 identified that there was a difference between tendered and non-tendered trips, and that there was only some evidence on an observer effect within the trips delivered to tenders in 2015. Observed trips in the small vessel trip-selection stratum that delivered to tenders landed catch with 24.7% fewer species than unobserved trips that delivered to tenders. Observed trips in the large vessel trip selection stratum that delivered to tenders were 50.8% shorter than unobserved trips that delivered to tenders.

The second issue of concern with tender deliveries is that observers on catcher vessels must follow different sampling protocols when vessels deliver to a tender, as opposed to when vessels deliver to a shoreside processing plant. The Council has specifically placed a high priority on genetic sampling of salmon intercepted in pollock fisheries. When vessels targeting GOA pollock deliver to a tender, the observer does not have the opportunity to census the offload to account for all the salmon that might have been caught, and then take systematic genetic samples. As pollock deliveries to tenders represent a significant portion of pollock deliveries in some areas of the GOA, this may create a gap in the analysis of the genetic stock composition of GOA salmon bycatch.

Allowing the deployment of observers from or on tenders would add a significant new component to the Observer Program. It would bring tender vessels into the Observer Program for the first time. Deploying observers from tender vessels would require the transfer of observers at sea, which raises safety concerns. It would impose additional costs and restrictions on tender vessels. It might also result in some vessels no longer being able to tender groundfish which could, in turn, affect shoreside processors. These and other logistical and administrative aspects of deployment of observers from or on tenders will need to be addressed in a thorough analysis.

The proposal to deploy observers from or on tenders would not have any effect on the amount of observer fees collected because it would not change which observer coverage category the landings are made in. It would likely impact the number of observer days needed to deploy observers on selected trips. The impact on the cost of deploying observers in the partial coverage category will depend on whether deploying observers on or from tenders increases efficiencies thereby possibly reducing costs or adds new cost components to the program due to more complex deployment logistics. These impacts would need to be to be explored in more detail in the analysis.

The Council reviewed additional analysis of this issue in the 2015 Observer Program annual report presented at its June 2016 meeting and recommended that further analysis of this issue be included in the development of the 2017 Annual Deployment Plan and that future action be evaluated in October 2016. This issue would be impacted by decisions made by the Council on the Gulf Trawl Bycatch Management action. If full observer coverage were required for all trawl vessels in the GOA, the concern about data quality would be addressed, but the issue of less genetic sampling would not be addressed. Since February 2018, the Council has prioritized the development of EM for compliance monitoring on vessels using pelagic trawl gear ahead of this issue. In December 2018 the Council reviewed an update about

observer coverage on vessels delivering to tenders, and decided, given staff availability, that other analytical projects remained a higher priority at that time.

4.4.3.6 Development of EM for Compliance Monitoring on Pelagic Trawl Vessels

The Council has established an intention to integrate EM tools into the Observer Program. The Council's EM Committee provides a forum for all stakeholders including the commercial fishing industry, agencies, and EM service providers to cooperatively and collaboratively design, test, and develop EM systems. In February 2018, the Council changed priorities for the EM Committee from a focus on fixed gear vessels to a focus on developing EM as a tool for meeting monitoring objectives on trawl catcher vessels in the Bering Sea (BS) and Gulf of Alaska (GOA) pelagic pollock fisheries.

In the Cooperative Research Plan, adopted by the Council in December 2018, four objectives for the development of trawl EM were identified; 1) improve salmon accounting; 2) reduce monitoring costs; 3) improve monitoring data; and 4) examine retention and discard requirements that may impact EM implementation for trawl vessels.

Information learned through cooperative research will inform evaluation of multiple EM program design options and consider various EM integration approaches to achieve management needs. Research will: 1) assess the functionality of EM for compliance monitoring on trawl catcher vessels, 2) evaluate operational costs for implementation of EM technology on different types of trawl catcher vessels operating under different management regimes, 3) identify implementation needs (e.g., people, training, infrastructure), and 4) identify what self-reported data is required from trawl vessel operators for data validation, accountability, and compliance monitoring. Information produced on costs, data quality, risks, operational procedures, and vessel compatibility will inform decisions on implementation phases, future investments in technology, and the combination of tools that will best meet NMFS, Council, and stakeholder objectives for EM on trawl vessels.

In February 2018, the NPFMC prioritized the development of EM for use on catcher vessels using trawl gear. The Council's EM Committee was reconstituted in April of 2018 with membership comprised of representatives and participants in the catcher vessel pelagic trawl pollock fisheries, agency staff, and EM service providers. In December 2018, the Council adopted the Trawl EM Cooperative Research Plan as prepared by the EMC. This Cooperative research plan includes the following objectives: 1) improve salmon accounting, 2) reduce monitoring costs, 3) improve the quality of monitoring data, and 4) examine current retention and/or discard requirements as necessary to achieve Objectives 1-3.

Two projects are currently underway to test EM applications for improving salmon PSC accounting in the pelagic trawl fisheries. One project that will evaluate the use of EM to monitor for compliance with the no-discard requirement in the GOA trawl fisheries including when delivered to a tender vessel to allow dockside monitoring of tendered pollock deliveries in the WGOA. The second project is testing smart technology using stereo cameras to automatically detect and identify salmon in shoreside rockfish deliveries.

4.4.3.7 Halibut Charter Recreational Quota Entity

In December 2016, the Council recommended the implementation of an RQE Program. On September 21, 2018, NMFS issued a final rule that allows an RQE to be established as an eligible entity to purchase halibut QS in Area 2C and Area 3A, with limitations, for use by the charter fishery as a whole. This final rule designates the RQE as an eligible participant in the IFQ Program that can purchase Area 2C and 3A halibut QS for use by all charter halibut anglers in the respective area. Any halibut QS purchased by the RQE will be held by this entity for the common use of charter halibut anglers.

Catcher vessels participating in the commercial halibut IFQ fishery are in the partial coverage observer category where landings made by these vessels are subject to the observer fee to fund observer deployment in this coverage category. The Analysis prepared for this action examined a two-part question with regard to observer coverage and fees: 1) How much observer fee liability would be foregone if

halibut IFQ were used in the halibut charter sector rather than the commercial halibut IFQ sector? 2) How would the proposed RQE change the demand for the number of observer-days in the partial coverage fleet? The Analysis prepared for the April 2016 meeting included several examples of potential impacts on the observer program depending upon the type of QS and the transfer restrictions chosen as part of the preferred alternative. Overall, the various scenarios could result in a net negative impact on coverage rates, where more fee liability is removed than demand for observer days, or a net positive impact on coverage rates where, more demand for observer days is removed than fee liability.

Moreover, while the RQE committee expressed a desire to keep the program cost neutral for other sectors, the analysis revealed that there was no legal mechanism currently in place to allow for the transfer of observer coverage fees that might be displaced from the program. Thus, the Council took final action to recommend the potential formation of an RQE with no further action to transfer the Observer Program fee.

4.4.3.8 Guided Angler Fish (GAF) Program

In 2014, NMFS implemented the Guided Angler Fish (GAF) Program as part of the Catch Sharing Plan for International Pacific Halibut Commission (IPHC) Regulatory Areas 2C (Southeast Alaska) and 3A (South Central Alaska) (78 FR 75843, December 12, 2013). The GAF Program authorizes limited annual transfers of commercial halibut individual fishing quota (IFQ) as GAF to qualified charter halibut permit holders for harvest by charter vessel anglers in Area 2C and Area 3A. When charter management measures place size or harvest restrictions on charter anglers, qualified charter halibut permit holders may offer GAF to charter anglers as a means for the angler to retain halibut of any size, and up to the limits allowed for unguided anglers. Charter halibut landings are not subject to the Observer fee, therefore halibut harvested under the GAF program represent foregone fee revenues as well as a potential reduction is fishing effort that may have otherwise been in the partial coverage category.

Table 16 Summary of IFQ pounds converted to GAF fish from 2014 through 2018 and estimated foregone fees.

Year	Total IFQ Pounds Transferred	Halibut Standard price per pound for all ports	Estimated foregone fees
2014	41,152	$5.04	$2,593
2015	47,271	$6.14	$3,628
2016	57,506	$6.42	$4,615
2017	62,992	$6.65	$5,236
2018	93,416	$6.36	$7,427

5 Regulatory Impact Review

This Regulatory Impact Review (RIR) examines the benefits and costs of a proposed regulatory amendment to adjust the partial coverage observer fee as part of the North Pacific Fishery Management Council (Council)'s fisheries research plan for monitoring in the partial coverage groundfish and halibut fisheries of the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI). The Council's fisheries research plan is implemented by the Fisheries Monitoring and Analysis Division (FMA) at the National Marine Fisheries Service's (NMFS) Alaska Fisheries Science Center (AFSC), and its purpose is to collect data necessary for the conservation, management, and scientific understanding of the groundfish and halibut fisheries off Alaska. The observer fee supports deployment of observers and electronic monitoring (EM) in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring, throughout the GOA and BSAI.

This analysis examines costs and benefits of raising the observer fee (to some level(s) above 1.25 percent and not above 2 percent of ex-vessel values) or leaving it at the current level, 1.25 percent of ex-vessel values. The alternatives under consideration vary as to whether the observer fee would be levied equally on fishing vessels in the partial coverage category of the North Pacific Observer Program, or whether a fee adjustment would be differentially applied by gear sector. Under any alternative, the scope of this analysis is limited to changes in the observer fee percentage. The alternatives considered in this analysis would not change the current process annual planning process for the deployment of observers and electronic monitoring in the partial coverage category through the Annual Deployment Plan process.

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and Benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

5.1 Statutory Authority

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801, *et seq*.), the United States has exclusive fishery management authority over all marine

fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the Council has the responsibility for preparing fishery management plans (FMPs) and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine and anadromous fish.

The Observer Program provides a regulatory framework for NMFS-certified observers or approved EM devices to obtain information necessary to conserve and manage groundfish and halibut fisheries in the GOA and the BSAI management areas. Section 313 of the Magnuson-Stevens Act (16 U.S.C. 1862) authorizes the Council, in consultation with NMFS, to prepare a fishery research plan that includes stationing observers to collect data necessary for the conservation, management, and scientific understanding of the fisheries under the Council's jurisdiction. Section 313(d) of the Magnuson-Stevens Act authorized creation of the North Pacific Fishery Observer Fund within the U.S. Treasury. Funds for deploying observers on vessels in the partial coverage category are provided through a system of fees based on the gross ex-vessel value of retained groundfish and halibut. The fee system used in the restructured Observer Program follows Magnuson-Stevens Act requirements in 16 U.S.C. 1862(a)(2) and (b)(2). The observer fee may not exceed 2 percent of the unprocessed ex-vessel value of fish or shellfish landings subject to the Observer Program and is assessed on all landings by vessels that are not otherwise participating in a full coverage fishery.

In the Magnuson-Stevens Act, Section 313 – the fee authority, allows that fees may vary by fishery. Fishery is defined in the Magnuson-Stevens Act as "one or more stocks of fish that can be treated as a unit for purposes of conservation and management and that are identified on the basis of geographic, scientific, technical, recreational, or economic characteristics, or method of catch; or any fishing for such stocks." Alternative 3 of this analysis considers adjusting fee levels by fishery, with further refinement based on the 'method of catch' distinction. 'Method of catch' in this case refers to different types of gear. This analysis does not define an exhaustive list of possible 'methods of catch'. For purposes of this analysis 'method of catch' corresponds to 'fishery,' which in turn corresponds to four gear types in the partial coverage category of the Observer Program: hook-and-line, jig, trawl, and pot.

The proposed action under consideration would amend Federal regulations at 50 CFR 679.55(f) to specify the fee percentage, as recommended by the Council. Actions taken to modify regulations governing the observer program partial coverage fee must meet the requirements of Federal law and regulations.

5.2 Purpose and Need for Action

The Council initiated this action in October 2017, and adopted the following purpose and need statement in February 2018:

> The North Pacific Observer Program (Observer Program) is widely recognized as successful and essential for the management of the North Pacific groundfish and halibut fisheries. The funding and annual planning and review process for monitoring vessels and processors in the partial coverage category are designed to implement a scientifically reliable sampling plan to collect data necessary to manage the commercial groundfish and halibut fisheries. This system distributes the cost of observer coverage across participants in the partial coverage category and provides annual flexibility to evaluate the performance of and improve the sampling plan, in consultation with the Council. Through this process, monitoring selection rates are adjusted annually according to the available budget. In addition, the monitoring selection rates may be adjusted in response to fishery management objectives, as funding allows.
>
> The annual process of establishing observer coverage and EM selection rates in the partial coverage category using the Observer Program Annual Report and Draft Annual Deployment

Plan is a well-designed, flexible, and legally defensible process. This annual process produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage and can allow for annual consideration of policy-driven monitoring objectives identified through the Council process.

To continue to improve the Observer Program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems, additional funding for monitoring in the partial coverage category may be necessary.

5.3 Alternatives

The Council adopted the following alternatives for analysis in February 2018.

Alternative 1: Status quo. Observer fee of 1.25 percent applies equally to all landings in the partial coverage category.

Alternative 2: Increase the observer fee up to 2 percent (analyze a range), to apply equally to all landings in the partial coverage category.

Alternative 3: Maintain the 1.25 percent observer fee applying equally to all landings in the partial coverage category, and additionally, raise the fee up to 2 percent (analyze a range) by fishery sector (longline, pot, jig, trawl).

See Chapter 2 for a more detailed description of these alternatives.

5.4 Methodology for Analysis of Impacts

The evaluation of impacts in this analysis is designed to meet the requirement of E.O. 12866, which dictates that an RIR evaluate the costs and benefits of the alternatives, to include both quantifiable and qualitative considerations. Additionally, the analysis should provide information for decision makers to be able to select the approach(es) that "maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach."[9] The costs and benefits of this action with respect to these attributes are described in the sections that follow, comparing the No Action Alternative (Alternative 1) with the action alternatives. The analysts then provide a qualitative assessment of the net benefit to the Nation of each action alternative, as compared to Alternative 1. (The net benefits summary will be expanded once the Council selects a preliminary preferred alternative.)

The analysis explores the potential effect of maintaining the current observer fee, as well as potential impacts of a fee adjustment on vessel operators and processors (and registered buyers) in the partial coverage category of the Observer Program. The alternatives under consideration to not directly regulate harvesters and processors in the full coverage (100%) category, and thus that aspect of the monitoring plan is not analyzed in this document.

The alternatives under consideration vary as to whether an upwards fee adjustment would be levied equally on all fishing vessels in the partial coverage category of the Observer Program (Alternative 2) or whether the fee could be differentially applied by fishery – i.e., gear sector (Alternative 3). The scope of this analysis is limited to a change in the fee percentage, holding all else equal to the extent possible. The deployment of observers and electronic monitoring (EM) would continue to be implemented using the statistically-reliable, random sampling model and Annual Deployment Plan process designed during the

[9] https://govinfo.library.unt.edu/npr/library/direct/orders/2646.html

Observer Program restructure under 77 FR 15019.[10] The analysis does not consider changes to the current methods for calculating the standard prices that determine the fee. The potential outcomes associated with different fee levels are assessed in relation to the sampling needs and policy objectives defined in Chapter 3 of this document. The analysis of how different fee percentages relate to yielded deployment rates and the resulting resolution of observer data is provided in the EA (Section 4.2) and results are referenced in the RIR.

The analysis considers recent and expected trends in factors that affect fee revenues directly. These include: TAC levels for the groundfish and halibut species in the partial coverage category of the Observer Program; ex-vessel values for partial coverage species as they relate to the standard prices upon which the fee is based and the relative contribution to the fee base from the different partial coverage fisheries; the cost of a contracted partial coverage observer-day; and the cost required to execute the fixed-gear EM program and the coverage that program provides. Given recent trends of decreasing TACs for some species (i.e., Pacific cod and halibut) and uncertainties related to future abundance, effort, ex-vessel prices, and monitoring costs, any of the three alternatives *could* result in a situation where the program's ability to purchase monitoring does not keep pace with the years that directly followed the implementation of the restructure (2013 through present). The analysis describes factors that could affect purchasing ability quantitatively and qualitatively. Future data points for these factors are often described in terms of a range.

Several foreseeable potential changes to the regulatory environment are not analyzed. These include the possibility of EM on pollock trawl catcher vessels, and potential contracting changes that could emerge from ongoing cost/coverage efficiencies work by the FMAC partial coverage Subgroup. Additionally, there are several potential Observer Program changes that might occur after the Council fully considers this action. The Council plans to consider changing the way observer coverage is deployed on vessels delivering to tenders after this fee analysis will have been completed. Also, NMFS is in the process of finalizing a new observer contract, which may result in changes to existing cost curves (i.e., the marginal cost of an additional observer-day) similar to those shown in Figure 9 (Section 4.2.2.7).

Net benefits are considered qualitatively because NMFS has found in its ongoing analysis of the restructured Observer Program that there is no definition of what a minimum level of observer or EM coverage must be in order to provide statistically reliable estimates to manage the fishery. However, there may be observer coverage levels at which NMFS may not have data in specific strata, in which case management decisions would be more precautionary. The Annual Deployment Plan process provides a risk assessment tool and information to guide policy decisions about where to reduce the risk of no coverage, rather than a single defining rate below which data become unreliable. The flexibility afforded NMFS and the Council through the Annual Deployment Plan process allows the Observer Program to adapt as new scientific information is available and to inform future changes in estimation methods that will result in better use of observer data to meet policy objectives under existing funding levels. The eight policy objectives defined by the Council for the Observer program are:

- Minimizing a "monitoring effect" so data from observed vessels are representative of unobserved vessels
- Improving discard estimates for fishery species, including minimizing variability and reducing gaps in coverage in all strata/reporting areas
- Priority for monitoring PSC
- Detecting species decline or rare events
- Design the program with flexibility to respond to evolving data and management needs in individual fisheries
- Provide for equitable distribution of the burdens of monitoring among fishery participants

[10] https://www.federalregister.gov/documents/2012/03/14/2012-6197/groundfish-fisheries-of-the-exclusive-economic-zone-off-alaska-and-pacific-halibut-fisheries

- Design the program, to the extent practical, so that the requirement for monitoring does not impact operational choices of vessel operators
- Foster and maintain positive public perception/stakeholder support

Given the lack of anticipated significant environmental impacts related to this decision (see Section 4.4), the Council might choose to make preliminary determinations about the fee at Initial Review based on its own policy goals. The first step in that decision process could be for the Council to consider whether the current system of equal fees across the board is or is not equitable based on its own current understanding of the fishery and the operation of a now-mature observer program. The Council could provide direction on metrics to assess equitability that can be analyzed in the next iteration of this document.

5.4.1 Data sources

This analysis was prepared using data from the NMFS catch accounting system (CAS), the Observer Program, and NMFS Restricted Access Management (RAM) division IFQ Landing Data. CAS is the best available data to estimate total catch in the groundfish fisheries off Alaska. Total catch estimates are generated from information provided through a variety of required industry reports on harvest and at-sea discards, and data collected through an extensive fishery observer program. In 2003, NMFS changed the methodologies used to determine catch estimates from the NMFS blend database (1995 through 2002) to the CAS (2003 through present). Debriefed Observer Program data is entered into a database dataset that was developed for evaluation of observer deployment. This database combines data from the CAS, the AFSC Observer Program Database (NORPAC), and eLandings information to associate observer deployment strata and coverage with past fishing trips. That dataset includes data corresponding to the most recent full year of fishing in the partial-coverage category.

The CAS was implemented to better meet the increasing information needs of fisheries scientists and managers. Currently, CAS relies on data derived from a mixture of production and observer reports as the basis of the total catch estimates. The 2003 modifications in catch estimation included providing more frequent data summaries at finer spatial and fleet resolution, and the increased use of observer data. Redesigned Observer Program data collections were implemented in 2008 and include the recording of sample-specific information in lieu of pooled information, increased use of systematic sampling over simple random and opportunistic sampling, and decreased reliance on observer computations. As a result of these modifications, NMFS is unable to recreate blend database estimates for total catch and retained catch after 2002. Therefore, NMFS is not able to reliably compare historical data from the blend database to the current catch accounting system. That limitation does not impact this analysis because, where fishery data is informative, this analysis focuses on the years under the restructured Observer Program (since 2013). CAS data is provided through the Alaska Fisheries Information Network (AKFIN), which pulls together CAS data, Alaska Department of Fish & Game (ADFG) Commercial Fisheries Entry Commission (CFEC) Fish Ticket data, and Commercial Operators Annual Report data to supply catch and discard records, as well as estimates of gross ex-vessel revenues.

Ex-vessel value information for groundfish and halibut are taken from CFEC Gross Earnings (sourced as AKFIN's Comprehensive Fish Ticket dataset), as well as IFQ Buyer Reports, and the Observer Fee standard prices that are published each year in the Federal Register.[11] The IFQ Buyer Report – submitted annually to NMFS under § 679.5(l)(7)(i) – is used for halibut IFQ/CDQ, sablefish IFQ, and sablefish accruing to the fixed gear sablefish CDQ reserve. CFEC Gross Earnings data, which are based on the Commercial Operator Annual Report (COAR) and Alaska Department of Fish and Game (ADF&G) fish tickets, are used for all groundfish except for sablefish IFQ and sablefish accruing to the fixed gear sablefish CDQ reserve. Note that AKFIN receives ex-vessel price information for a year during the late-summer or fall of the following year; as a result, ex-vessel price information for 2018 is not available at the time of this writing so 2017 data represent the most recent information.

[11] For example: 83 FR 65146, December 18, 2018, https://www.govinfo.gov/content/pkg/FR-2018-12-19/pdf/2018-27441.pdf

5.5 Description of Partial Observer Coverage Fisheries

5.5.1 Monitoring coverage, fee revenues, and costs

Coverage levels

Section 3.6.3 described the observer coverage levels that have been achieved under partial coverage since the 2013 implementation of the current program structure. Those coverage levels were achieved through the expenditure of fee revenues collected from all vessels not in full coverage when landing Federally managed species, and from supplementary Federal funds. NMFS supplied Federal funds for the first four years of the restructured program to ensure stability during the initial stages. Coverage levels were low in 2017 relative to previous years due to the lack of Federal fund supplements. Those low levels spurred the Council to initiate this analysis. In June 2017 NMFS allocated $1 million to stabilize coverage rates for 2018 and 2019; the availability of such funding in the future cannot be relied upon.

Table 17 (reprinted from Section 3.6.3) uses fee and Federal funding data from the 2016 Annual Report and the 2018 Annual Deployment Plan to identify how many days could have been afforded in each of the previous years, if relying exclusively on the observer fee. The table also identifies approximately how many observer days have been purchased with supplementary Federal funding and reports the actual coverage days that were used (or predicted) in each year, along with the actual coverage levels that were achieved (or predicted) using those observer days. The observer fee's purchasing power has varied between 3,200 and 3,800 observer days since 2013. The additional NMFS funding allowed the purchase of between 800 and 2,100 additional days per year, which substantially increased the selection rate. If the partial coverage category were entirely industry-funded, the Council would likely only be able to afford coverage at selection rates slightly greater than 2017, which realized approximately 3,050 observer days at coverage rates of 4 percent for pot gear vessels, 11 percent for longline vessels, and 18 percent for trawl vessels. Although NMFS has developed an annual process that produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage, the 2015 Supplemental EA found that spatial and temporal bias in the observer data was much reduced when selection rates were increased to 15 percent and above. The Council has stated its interest in maintaining observer coverage in the future at selection rates of 15 percent and above, in order to continue to get high quality data from observer coverage and maintain stakeholder confidence in estimates of bycatch.

Table 17 Coverage levels resulting from the observer fee plus Federal funding, 2013-2018. EM values not included. (From Section 3.6.3)

Year	Total deployment of at-sea observer days in partial coverage	Observer fees received during calendar year (assessed from previous year's landings) in $ millions	Industry/Federal breakout		What coverage levels have we achieved in the partial coverage fleet with these observer days?		
			How many days could we have afforded with the previous year's industry fee	Days purchased with supplementary Federal funding during calendar year	Pot/longline vessels 40-57.5' LOA	All trawl vessels, and pot/longline >57.5' LOA	
2013	3,533	n/a	0	6,450*	11%	15%	
2014	4,573	$4.25	3,800	1,675	16%±	15%	
2015	5,318	$3.46	3,200	2,500	12%	24%	
					Pot	Longline	Trawl
2016	4,677	$3.90	3,700	375	15%	15%	28%
2017	3,059	$3.77	3,600		Pot: 4% Tender pot: 4%	Longline: 11% Tender longline: 25%	Trawl: 18% Tender trawl: 14%
2018 *(predicted)*	4,394		3,375	1,900	Pot: 16% Tender pot: 17%	17%	Trawl: 20% Tender trawl: 17%

Fee Revenues

The principal input into coverage funding and the resultant coverage levels – particularly in an environment without supplementary Federal funding – is the amount of fee revenues collected. Section 4.2.1.6 reports the actual fee revenues collected under the restructured program (2013 through 2017) and the revenues that hypothetically would have been collected under the current program if it had existed from 2009 through 2012 (Table 5 and Table 6). Those tables report revenues generated for the program by gear type (HAL, pot, trawl, and jig) and by species (halibut, sablefish, Pacific cod, and pollock). Other groundfish species such as flatfish consistently account for only ~2% of fee revenues, and thus are assumed a constant and relatively inconsequential driver of observer funding regardless of TAC, catch, and ex-vessel price levels. Trends in the catch and value of key partial coverage species are discussed in the Section 5.5.2.

Table 5 and Table 6 show clearly that the bulk of fee revenues have been generated by the hook-and-line gear sector, specifically by catch of halibut and to a slightly lesser extent sablefish. Figure 23 illustrates the relative share of fee revenues generated by each partial coverage species from 2013 through 2017. Together, halibut and sablefish have accounted for more than 50% of fee revenues throughout the entire analyzed period, dating back to 2009. The relative contribution of Pacific cod has generally decreased since 2010, with one uptick – percentage-wise – in 2014 due to a slump in revenues generated by sablefish. In terms of dollars, Table 5 and Table 6 illustrate a decline in Pacific cod fee revenues dating back to 2011.

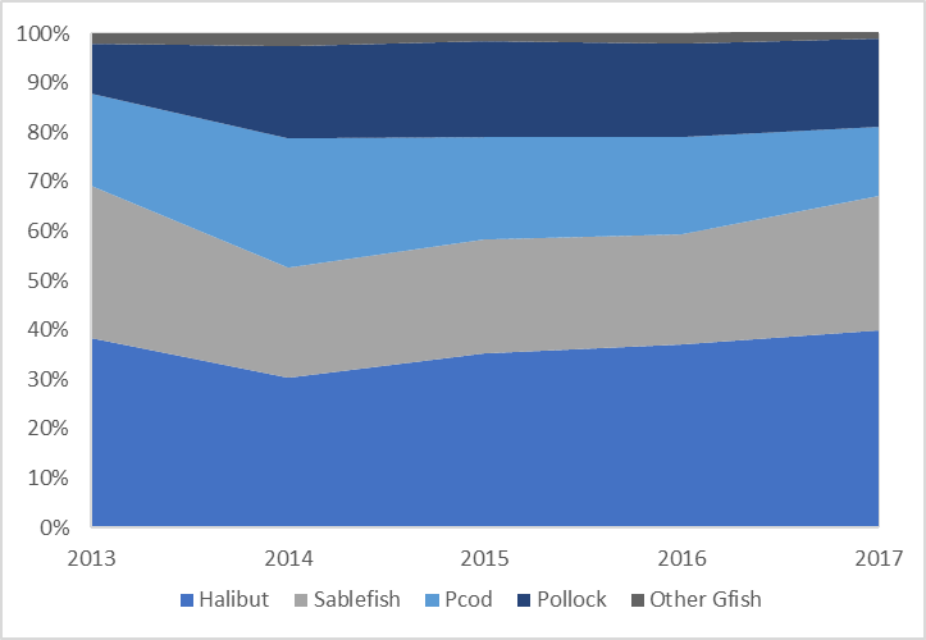


Figure 23 Relative percentage share of fee revenue generation, by partial coverage species (2013 – 2017)
Source: Observer Program Annual Reports

Table 5 and Table 6 also highlight a distinction between the pre- and post-restructure time periods in terms of overall fishery value and, thus, fee revenues. The tables provide inflation-adjusted revenues standardized to the "Urban Alaska" consumer price index for the first half of 2018. Table 18 summarizes the comparison, indicating that the period since restructure has yielded lower revenues due to a combination of factors, including catch limits, harvest rates, and ex-vessel value. **Table 7** and Table 8 make note of the distinction in pre- and post-restructure fee revenues and apply it to the range of fee percentages under consideration (from 1.25% up to 2.00%). The conclusions of the fee revenue analysis in Section 4.2.1 are based on taking the minimum, maximum, and average ex-vessel values that a gear sector (or all gears combined) achieved in a given year during the analyzed period and applying them to the fee percentages under consideration. **Table 7** looks at years dating back to 2009 and thus includes the years when total ex-vessel value for each gear (and all gears) was the highest. Basing this retrospective look at possible fee revenues under higher fee percentages simply illustrates that the effect of a fee percentage increase is moderated by the underlying value of the fisheries. When evaluating the outlook for monitoring funding under either the current fee (1.25%) or higher fees, the analysis considers whether the more recent time period is and indicator of near- to medium-term future revenues or whether it represents a cyclical downturn that could revert to previous levels in real (inflation adjusted) dollars. This is further discussed in the next section.

Table 18 Comparison of total fee revenues across all species and gear types, pre- and post-restructure

		Nominal	Inflation Adjusted
Hypothetical	2009	$4,114,772	$4,786,920
	2010	$3,954,914	$4,518,825
	2011	$4,582,633	$5,080,927
	2012	$5,307,374	$5,763,709
Actual	2013	$4,164,670	$4,371,604
	2014	$3,366,149	$3,493,627
	2015	$3,713,488	$3,834,373
	2016	$3,694,995	$3,774,313
	2017	$3,774,200	$3,840,443

Note: Fees were adjusted for inflation using the Urban Alaska (formerly Anchorage) Consumer Price Index for the 1st half of 2018 (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 10/19/2018).

Costs

Fee revenues only translate into observer coverage and the achievement of monitoring objectives insofar as they fund observer-days and, in the future, electronic monitoring. NMFS will use observer fee revenues to bay for *both* EM deployment and observer deployment once a contract is issued to one or more EM service providers and fee proceeds are available. The annual decision to apportion fees between observer deployment and EM system deployment would be made by NMFS in consultation with the Council during the Annual Deployment Plan process. Because fees will eventually pay for both observers and EM, the analysis provided in the EA's Gap Analysis (Section 4.2.2) appropriately treats monies directed from the fee pool to the EM contract as a cut "off the top" of the amount that can then be translated into available observer-days (Table 12 and Table 13). The resulting fee revenues would then be available to determine the optimized observer selection rates through the Annual Deployment Plan process.

The cost of an observer-day published in the Annual Report reflects the total amount paid through a contract with the service provider divided by the number of days deployed. The published average cost per day over recent years has varied. Annual variation can be attributed to cost growth, but also has much to do with the annual deployment model and the outcomes of the random trip selection that his inherent to the program. For example, nothing prevents ODDS from selecting a series of trips to observe that would require higher travel and variable costs for the observer than another series that was not selected. The average cost per day listed in Annual Reports was $1,083 in 2015, $1,049 in 2016, $935 in 2017, and is estimated to have been $1,260 in 2018 (under the assumption that the total budget was used to purchase the estimated number of days supplied).[12] The 2019 ADP estimates a per-day cost of $1,430.[13] Per-day average observer costs are a rather blunt way of understanding what drives the cost of the program and the achievable selection rates in a given year, but they are the best available metric due to the confidential nature of the observer provider contract.

Figure 9 in Section 4.2.2.7 illustrates the relationship between the average cost of an observer day and the total budget available to purchase days. In theoretical terms, the price of an observer day should decrease as the number of days purchased increases because the provider's fixed costs (e.g., overhead) will be met at some point after which the price the provider would be willing to accept for an additional day would shift downward toward an amount that only covers its variable costs (e.g., travel costs, daily wages). In terms of the existing contract, described below, the first "X" number of days are guaranteed to be purchased by NMFS at a higher rate and subsequent days are invoiced at some lesser amount. The exact

[12] http://npfmc.legistar.com/gateway.aspx?M=F&ID=1d07178d-0a96-41ee-8bd5-f9becdfbc14a.pdf
[13] http://meetings.npfmc.org/CommentReview/DownloadFile?p=13252b3a-482b-4009-85ad-727d01384735.pdf&fileName=B2%202019%20ADP.pdf

terms of this contract are confidential. Figure 94.2.2 estimates a cost curve based on 2017 data and shifts it outward based on the year-over-year cost increases experienced under the current contract to model curves going out to the year 2021. Using 2017 as an example, the number of days afforded by a budget of roughly $6 million would have resulted in a cost per day of just over $1,200. The number of days afforded by a budget of roughly $4 million would have resulted in a cost per day of $1,550. Table 9 in the Gap Analysis illustrates how a higher budget of fee revenues results in a lower cost per day and, thus, higher selection (deployment) rates across partial coverage strata. Note that funds dedicated towards funding EM would be removed from the total fee budget before applying them to the observer contract, so a greater amount of funds going towards EM could indirectly increase the cost per day for an observer.

Appendix C of this document excerpts a section of the 2019 Annual Deployment Plan describing factors that impact the cost of an observer day. Chief among those factors are the structure of the Federal contract for the partial coverage provider and travel costs. As noted above, the existing contract for the provision of observer services is split among guaranteed days, option days, and travel costs. Guaranteed days are set to the minimum number of days that the government will purchase under each year of the contract. Optional days are above and beyond the minimum. Guaranteed days are typically more expensive than option days. This is a common practice for contracting to ensure that the provider's fixed costs – including those that are mandatory under the contract – are largely covered by the minimum number of purchased units. This contract structure front loads fixed costs and provides the government with a price break as the number of option days purchased increases. As a result, there is an inverse relationship between the annual budget and the cost per day. Travel costs are those actual costs incurred by the contractor to deploy observers to the ports necessary to complete the contract. Under the partial coverage category, observers are deployed under a random selection model, requiring the observer provider to send observers to a wide variety of ports across Alaska – sometimes on short notice – and to cover trips that are short in duration. This is a marked difference from the full observer coverage model which deploys observers from a handful of ports for longer periods of time, often for an entire fishing season.

The partial coverage fixed-gear EM program is now an implemented part of the monitoring plan. EM data from the longline sector was fully incorporated into management in 2018 and data from EM pot vessels is being incorporated in 2019. The program was developed through stages of cooperative research and pre-implementation, during which NMFS and external funders (e.g., the US National Fish and Wildlife Foundation, or NFWF) supplied money that was used to purchase equipment, perform vessel installations, train and provide field service technicians, train and execute video review, and transfer and store data. During that build-up the number of vessels in the EM pool grew from several dozen to 165.

Understanding the cost of the fixed-gear EM program in a given future year, and thus the proportion of total partial coverage observer funds required, is a key step in analyzing how changing the fee percentage might impact programmatic monitoring objectives. Even if the maximum number of EM vessels was capped at its current level, the program's cost would vary annually as the program transitions from capital investment and other start-up costs to ongoing support and capital depreciation. While the initial cost of installing equipment on EM vessels is relatively high, vessels that remain in the program are expected to produce data for multiple years at lower ongoing monitoring costs (primarily maintenance/replacement, licensing, and data review). This is a major difference between EM and observer monitoring, where the daily cost of observing vessels relies on a great deal of human capital and frequent travel, the costs of which are likely to increase with time (inflation) and scale positively with the number of trips observed.

Once the EM program is fully transitioned to observer fee funding, analysis of annual program demands and apportionment of the total funding pool between EM and observer coverage will be part of the Annual Deployment Plan process. NMFS intends to present an EM cost evaluation as part of the draft 2020 Annual Deployment Plan. The Annual Deployment Plan's cost model will have the benefit of additional observation of the EM stratum at its current operational scale in terms of maturity, providers, vessels, and service locations. In the long term, relying on an annual modeling approach through the Annual Deployment Plan will be more responsive to new information about the scope and maturation of the EM program and can also respond to the Council's evolving direction on key informational needs.

This analysis, by contrast relies upon a range of potential EM programmatic costs that should encompass low- and high-cost scenarios. The EA's Gap Analysis (Section 4.2.2.7) sets the low end of the range at $250,000 per year based on a 2017 cost report from the current EM service provider describing one-time expenses, amortized costs, and recurring (ongoing) costs for that year. That report estimated that the annual cost of a semi-mature program on the scale of EM pre-implementation during 2016 to be slightly less than $200,000 (NMFS 2017a). The low end of the analytical range is inflated to account for inflation and the growth in the EM vessel pool since that point. The EM provider also estimated the annual cost of an ongoing program similar in scale and maturity to the 2017 EM program, arriving at roughly $480,000 (AFSC 2018). This higher estimate reflects additional vessels, equipment, and investments in capacity building (the costs of which are amortized). The high end of the range analyzed in the EA is set at $2 million. This amount reflects the total amount of funds obligated towards EM in Alaska during 2017 (AFSC 2018). Importantly, that amount includes a large amount of equipment purchases that should be amortized over their expected time in service.

When interpreting the outputs of the EA's Gap analysis in the impacts section of this RIR (Section 5.6), the analysts focus on the middle of the cost range. This decision reflects the fact that the EM vessel pool has grown beyond where it was in 2016 and could continue to grow, and also that as the program matures the rate of capital investment in hardware and installation labor (amortized) should decrease. A cost range is the appropriate level of analytical precision at this time for several reasons: the size of the EM vessel pool is likely to grow (as the Council allows) until it reaches a stable state that balances vessels' interest in participation with available funds as determined through the Annual Deployment Plan process; the EM provider contract has not yet been awarded; and, in the future, the Council could use its objective-setting prerogative to move the EM deployment strategy in the direction of cost-consciousness as opposed to the current priority which is inclusiveness. To the latter point, for example, a cost-focused EM program might restrict participation to vessels that are concentrated in a smaller number of more efficiently serviceable ports.

5.5.2 Partial coverage harvest species: Catch, value, and market trends

In the preceding section, Figure 23 illustrated that the primary species that are harvested within the partial coverage category include halibut, sablefish, Pacific cod, and pollock. Together those species have consistently accounted for 98% of the ex-vessel revenues subject to the partial coverage fee. The "other groundfish" category that makes up the remaining 2% consists of various flatfish taken in the Central GOA and rockfish that are caught by vessels that are not operating under the CGOA Rockfish Program.

The Fee Revenue Analysis provided in Section 4.2.1 provides detailed information about the landings subject to the observer fee. Those landings consist of halibut IFQ or CDQ, sablefish IFQ, fixed gear sablefish CDQ, and the landings of catcher vessels and some small catcher/processors that possess a Federal Fisheries Permit (FFP) and participate in federally managed or parallel groundfish fisheries, excluding non-sablefish CDQ groundfish, AFA Pollock, and the Central GOA Rockfish Program. Data are provided from 2009 through 2017 (the most recent year for which final ex-vessel value data are available). The data from 2009 through 2013 are derived from fishing activity that would have occurred under partial coverage if the program restructure had been in place in its current form. Figure 2 in Section 4.2.1.2 of the EA illustrates catch across the four key partial coverage species. (Halibut catch is shown in headed and gutted weight equivalents while sablefish, Pacific cod, and pollock are show in round weight equivalents.) During the analyzed period, halibut landings were at their highest in 2009 with 445.4 million pounds and at their lowest in 2014 with 163.8 million pounds. Since 2014 the annual amount of halibut landings has remained near the low end of the period's range. Sablefish catch declined from 258.7 million pound in 2012 to 176.3 million pounds in 2016 but has recently trended upward. Pacific cod has fluctuated from 1,324.1 million pounds in 2009 to 2,373.4 million pounds in 2012 and back to 1,506.5 million pounds in 2017. Pacific cod catch levels have declined steadily and precipitously since 2014. Pollock is the only species showing a steady increase in catch between 2009 through 2017 (813.0 million pounds in 2009 to 3,885.7 million pounds in 2017).

The trend evident in Figure 23 denotes a relative shift in the species makeup of partial coverage landings that continued into 2018, where Pacific cod catches have declined due to a reduced TAC and halibut landings remain low compared to the levels around the time of the observer program restructure. During the years shown in the figure, on average, halibut landings accounted for 35% of fee revenues, sablefish accounted for 25%, Pacific cod accounted for 21%, and pollock accounted for 17%. The analysts applied expected revenues based on historical prices to 2018 catch and estimate that the relative contribution of sablefish to the fee base would have increased to around 37% while the contribution of Pacific cod catch would fall to around 3%. Owing to the lower overall partial coverage harvest in 2018, the relative fee contribution from halibut catch slightly increased despite low quotas. The relative contribution from pollock was expected to remain roughly the same in 2018, around 18% of the total.

Figure 3 in the EA plots the weighted average standard prices/lb. (adjusted for inflation) used by NMFS to assess the observer fee from 2009 through 2017. The figure shows that standard prices for each of the four key species peaked prior to the 2013 restructure – in 2010 for Pacific cod and in 2012 for the other three species. Inflation-adjusted standard prices for cod and pollock have steadily declined from their peaks through the end of the time series in 2017. The standard price for halibut dipped from 2012 through 2014 but has since recovered to near the 2012 peak. The standard price for sablefish declined sharply from the 2012 peak through 2014 but has trended upward since.[14] Over the time-period examined, the average inflation-adjusted standard ex-vessel price for halibut has ranged from $3.68 in 2010 to $6.96 in 2012; sablefish from $2.99 in 2014 to $5.49 in 2012; Pacific cod from $0.29 in 2017 to $0.55 in 2010; and Pollock from $0.14 in 2017 to $0.20 in 2012. It is clear that the two IFQ species yield greater value per pound and thus contribute more in potential observer fee revenues on a weight basis. It is notable that standard prices for pollock display the least variation across years, and thus the amount that catch of the species contributes to fee revenues on a weight basis is driven more by volume of harvest than whether the species is experiencing higher or lower market swings. Finally, the standard price trendline for Pacific cod has the potential to display the most "noise" because the species is taken with all four of the considered gear types; different prices are typically offered for fixed-gear (HAL, pot, and jig) versus trawl gear, with the former fetching a market premium. Nevertheless, the trendline in the figure shows an aggregate drop-off in the standard ex-vessel price for Pacific cod, reaching a low and relatively stable level around $0.30/lb. beginning in 2013.

NMFS standard prices for the 2018 and 2019 observer fee years are currently available online.[15] The following compares 2018 and 2019 statewide average prices (the highest level of aggregation that might be used) to the trendlines presented in Figure 3. Note that standard prices for groundfish (pollock, Pacific cod, and non-IFQ/CDQ sablefish) are calculated from a lagged three-year average that only begins to reach 2017 for the 2019 observer fee year. Standard prices for halibut and allocated sablefish are drawn from IFQ Buyer Reports that have only a one-year lag (e.g., 2018 observer fee year price based on 2017 IFQ Buyer Reports).

- For halibut, the statewide standard price was $6.36 in 2018 and declined to $5.37 for 2019. These prices represent a downturn from the trend illustrated in Figure 3.

- For sablefish, the statewide standard price was $4.76 in 2018 and declined to $3.80 for 2019. Relative to the trend shown in Figure 3, these prices represent a flat-to-decreasing trend. The

[14] Note that the standard price for sablefish taken in the IFQ fishery is based upon IFQ buyer reports that reflect the most recent year, while the standard price for sablefish taken in limited access fisheries (i.e. with trawl gear) are subject to the lagged three-year average that is used for other groundfish. The total standard price presented in the figure referenced in the EA comingles the two, but most of the volume occurs in the IFQ fishery. One normally expects the ex-vessel value of IFQ-caught sablefish to be higher than that of sablefish taken as non-target catch in trawl fisheries. However, as the ex-vessel value of IFQ sablefish trended down from 2012 to 2014 the standard price applied to trawl catch became higher in relative terms as it was still supported by the inclusion of higher-price years in the rolling average.

[15] 2018 standard prices available at: https://alaskafisheries.noaa.gov/sites/default/files/2018standardprices.xlsx; 2019 standard prices available at: https://alaskafisheries.noaa.gov/sites/default/files/2019standardprices.xlsx.

trend could be, in part, explained by decreasing average fish size, as the ex-vessel price for sablefish is determined based on size category.

- For Pacific cod, the 2018 standard price was $0.30 for fixed gear and $0.26 for trawl gear. In 2019 the fixed-gear standard price remained at $0.30 and the trawl gear price was $0.27. Those prices are very much in line with the stable trend dating back to 2013, again noting that the time lag in the pricing formula will not incorporate any price effects caused by the 2018 reduction in supply until the 2020 observer fee year.

- For pollock, the statewide standard price continued to decline to $0.12 in the 2018 observer fee year and to $0.10 in 2019. Figure 3 had estimated pollock prices at $0.14/lb. for 2017. Standard prices per pound reported for GOA area aggregations lagged the BSAI by several cents. The area price differences for trawl caught pollock could be explained by several factors, including fish size and processors' capacity to create higher value product forms to name just two.

Figure 24 and Figure 25, below, show a direct AKFIN query of statewide average ex-vessel value-per-pound rather than the NMFS standard prices used to calculate the observer fee. The two figures are in nominal terms, meaning that no inflation adjustment is made. The analysts included data back to 2006 to attempt to capture a period of US macroeconomic shifts following the recession that began in 2008.[16] These figures provide a visual reference for the ex-vessel value information pulled forward from the EA (discussed above), and also provide context for the later discussion of future market direction.

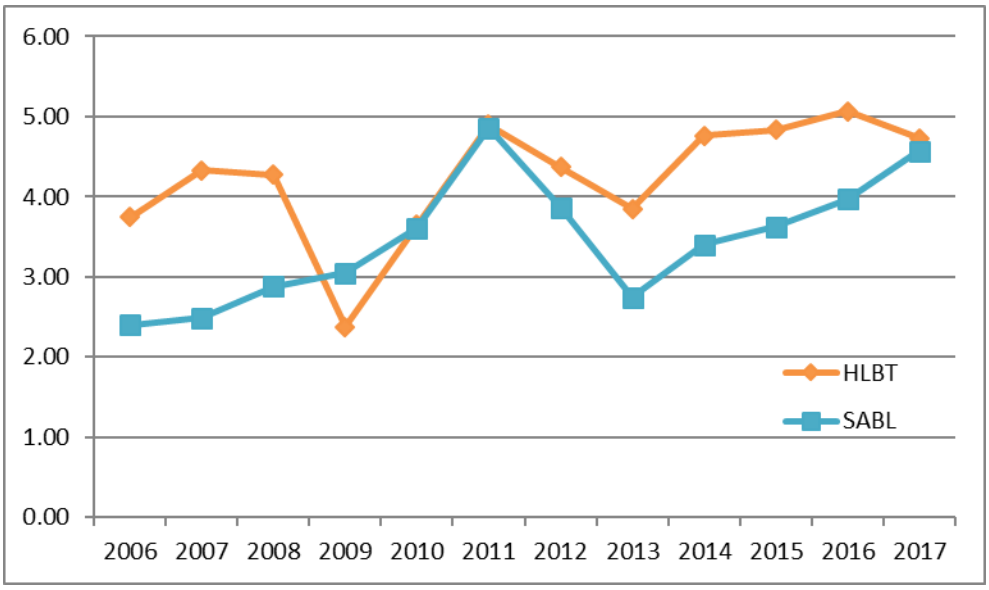


Figure 24 Alaska state-wide average ex-vessel $/lb. (nominal) for halibut and sablefish (2006 – 2017)
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT. *Note:* halibut ex-vessel prices are reported based on delivered weight (H&G).

[16] Prices from before 2006 were omitted due to data quality issues for AKFIN's pricing algorithm.

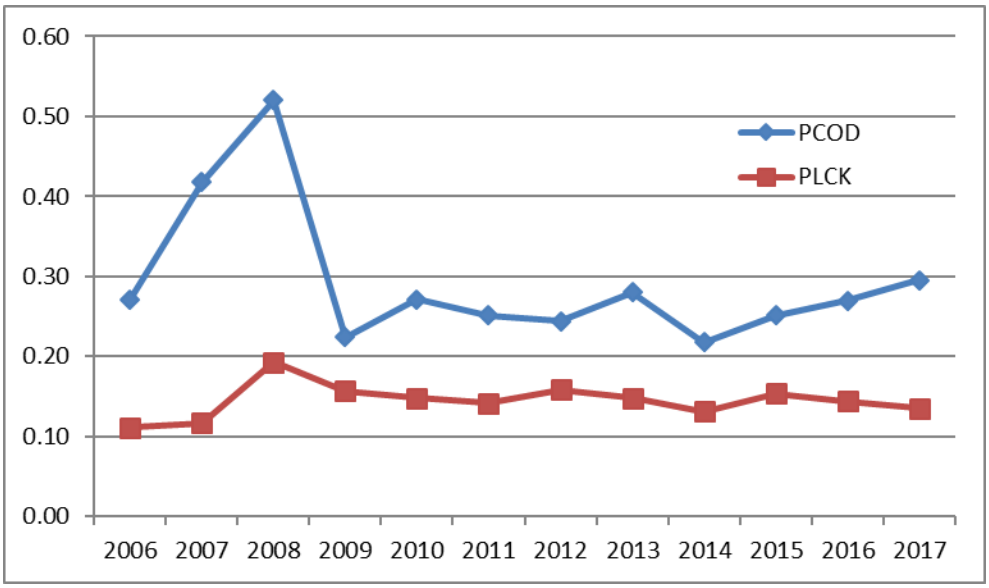


Figure 25 Alaska state-wide average ex-vessel $/lb. (nominal) for pollock and Pacific cod (2006 – 2017)
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Figure 4 in the EA combines actual catch with the weighted-average inflation-adjusted standard prices to model each species' "taxable value" to the observer revenue base, plotted over the examined period from 2009 through 2017. When compared to the shape of the species trendlines in Figure 3, the most notable difference is that the overall value of pollock has generally trended up while the standard price was moving down. This reflects that pollock catch (mt) has been on an upward trend, and also that the price move for pollock was only on the magnitude of several cents. By comparison, the overall value of halibut catch has generally declined despite standard prices rebounding to levels nearing the top of the period trend. This reflects lower overall halibut catch compared to the period prior to restructuring. The total values for Pacific cod and sablefish are both lower in more recent years, having peaked in 2011 and 2012 respectively. When all weights and values are combined, the annual trend in total partial coverage inflation-adjusted ex-vessel value trended up from 2010 to 2012 (peak around $450 million) and then fell to a fairly stable level of roughly $300 million per year from 2014 through 2017. This observation underlines the note of caution identified in the EA that observer fee revenues collected since 2013 under the program (summarized in Table 6) reflect a relatively lower-value period. Later in this section the analysts consider on a species-by-species basis whether price trends evident in recent years are likely to endure in the short- to medium-term or whether there could be significant upward movement that might affect the policy decision to increase the fee percentage as soon as possible to mitigate flagging revenues.

Table 6 in Section 4.2.1.6 as well as Figure 5 and Figure 6 in Section 4.2.1.4 break out the previously discussed trends in overall "taxable" partial coverage ex-vessel value by gear type in addition to species. This analysis is particularly relevant to the Council's consideration of Alternative 3. Table 6 reports actual fee revenues in nominal and inflation-adjusted dollars by species and gear. The figures use the previously described methodology that applies weighted average standard ex-vessel prices to fisheries that now fall under partial coverage to catch data from 2009 through 2012 to create a complete time series for the analyzed period. The figures show the magnitude and relative contribution of the different gear types to the fee base. HAL value peaked in 2012 around $325 million but since 2014 have trended between $150 and $200 million. Pot value peaked in 2011 around $65 million but also declined to a range between $30 and $40 million from 2013 through 2017. Jig value peaked in 2011 around $2 million, coinciding with the recent peak in Pacific cod value, but have been at roughly $0.5 million or less since 2013. The trawl gear fisheries are the only gear sector that displayed an annual trend that has not decreased since 2013, largely owing to the increase in pollock catch volume during the more recent of the analyzed years. Peak trawl value was around $90 million (2012 and 2014 through 2016), but fell to roughly $70 million in 2017.

In each year since 2009, hook-and-line halibut catch comprises the largest proportion of ex-vessel value subject to observer fees, ranging from 31.1 to 59.4%. Hook-and-line sablefish catch comprises the second largest proportion of ex-vessel value subject to observer fees in each year (20.8 to 30.2%). Hook-and-line Pacific cod has represented less than 3% of total partial coverage ex-vessel value during the analyzed period.

In the trawl sector, Pacific cod landings constituted the majority of ex-vessel value subject to observer fees from 2009 through 2012; since 2013, pollock has accounted for a greater share. In 2009 the trawl sector accounted for only 10.3% of (hypothetical) partial coverage revenues. The sector's peak year for partial coverage ex-vessel value was in 2014 when it accounted for 32.6% of total value.

Until the 2017 implementation of the GOA sablefish pot fishery, the pot gear sector primarily produced Pacific cod. A small amount of sablefish is taken with pot gear under partial coverage in the BSAI IFQ fishery. The peak year for ex-vessel value produced in the pot fishery as a proportion of total partial coverage value was 2011 when Pacific cod catch accounted for 15.3% of total value. In the most recent year available, 2017, the pot sector accounted for 12.5% of total ex-vessel revenue in partial coverage, with 7.9% coming from Pacific cod and 4.6% coming from sablefish.

5.5.2.1 Market trends

This subsection explores market trends in the four key partial coverage species. Understanding the likely range – or at least direction of movement – for expected future ex-vessel values is necessary when considering the outlook for observer fee revenues in the near- to medium-term. Many factors influence that range, and not all of those factors can be predicted with precision. However, a general understanding of how the key price-driving factors have performed in the recent past can be instructive. To develop that understanding the analysts look to existing analyses that consider the near-future such as the 2017 Economic SAFE for groundfish (NMFS 2018c) – the most recent available – and economic performance reports produced by AFSC and incorporated into groundfish species SAFE chapters. The analysts also draw on trade press and personal communication with market analysts.

Alaska seafood, particularly whitefish, competes with other sources on a global market. In most cases Alaska seafood producers are price takers on a global market, or are at least constrained in the prices they can demand by competition and product substitutes. In 2016 all the fisheries off Alaska accounted for 18% of global cod production (Pacific and Atlantic), 44% of global pollock production, 57% of global halibut production (Pacific and Atlantic), and 63% of global sablefish production.[17] Seafood producers are also constrained by consumers' willingness to pay for what can be a higher-priced protein option. On the whole, the near-term outlook for global whitefish supply indicates lower supply and higher prices. Because the global protein market is so competitive, industry analysts caution that higher prices could undercut demand for certain products or species. For the US in particular, a strong dollar currency relative to those of major trade partners (e.g., China, Japan, and the European Union) and uncertain trade relations around the issue of tariffs could further suppress demand when global substitutes are available. Some substitute fishery products of note include Russian pollock, Pacific whiting, Atlantic cod, and Atlantic halibut.

Halibut

Pacific halibut is a premium whitefish product that receives high ex-vessel prices relative to other important partial coverage species. The trend in nominal ex-vessel values for Alaskan Pacific halibut has flattened since 2014 (Figure 24), and the market is currently challenged with prices and quota values lower in recent years. The 2018 fishing year opened with low ex-vessel prices relative to the preceding years and, while there was a recovery as existing inventory moved, prices did not match 2016/2017 levels. Three prevailing explanations for stagnant or lower prices are apparent among market analysts

[17] Source: NMFS, ADFG, and UN FAO data compiled by McDowell Group for Seafood Expo 2018 and provided via personal communication.

quoted in trade press: competition from smaller but emerging halibut fisheries; price fatigue at the retail level; and holdover inventory from previous years, which could be partly tied to the first two reasons.

While Pacific halibut is the dominant supply of halibut on the global market and Alaska its largest producer, a small but growing Canadian Atlantic fishery increased its catch by 23% (total of 7 million lbs.) from 2017 to 2018. That Atlantic fishery is able to operate almost year-round, and roughly 90% of its product is said to be available fresh to market. This competition is aided by its relative proximity to large east coast restaurant and consumer markets. The current competitiveness of Canadian imports to US markets could also be aided by a relatively weak Canadian dollar.

As evident in Figure 24 and the preceding section, halibut is the highest value species under the observer program, and the final products derived from the fishery can retail upwards of $30/lb. in the US. While a premium product, halibut is not without substitutes. Substitutes could include other premium seafood or simply other expensive retail food items. Demand for high-price products is relatively more susceptible to boom-bust cycles as the products are more likely to be substituted by cheaper options in the presence of a marginal decrease in the broader economy. For example, ex-vessel values displayed a marked decline in the years that followed the 2008/2009 economic recession.

Holding the broader economy constant, it might also be the case that the value-per-pound of halibut has a ceiling in “real dollar” terms (i.e., adjusting for inflation). In other words, a simple trendline plotted through the inflation-adjusted halibut curve in Figure 3 (Section 4.2.1.3) would suggest that, despite ups and downs, real value should generally increase as time moves forward; however, it is possible there comes a point that the trendline reaches the limit of consumers’ willingness to pay for a food portion. The upward sloping trendline described above could be used in a technical manner to project a real ex-vessel value that is either ever-increasing with time, but that approach to predicting future value ignores the possible effect of fundamental limits like willingness to pay – which might not have been observed yet but could eventually take hold and suppress real-dollar value growth. Thinking about value growth in real-value terms is useful because it separates the notion of simply receiving a higher dock price in the future (nominal growth due to inflation) from the potential for making a larger profit from fishing. If growth occurs only in nominal terms then the position of the fisherman might not improve relative to the current state because his or her costs have also grown due to inflation. Similarly, if the observer fees generated by catching halibut grow only in nominal terms then the only scenario in which the fishery can keep pace with the costs of observer coverage are if those latter cost grow at the same (or slower) relative pace.

The analysts do not suggest that the recent flattening in ex-vessel values for Alaska Pacific halibut and the offered explanations support a conclusion that halibut has reached its maximum real value. Rather, it is simply noted that a lot of real value generation has been accomplished in the fishery since quota shares were introduced in 1995 and that returns to further value-growth efforts are likely to be diminishing. The value gain from rationalizing the fishery, switching from majority frozen product to majority fresh product, and spreading catch out over half the year as opposed to a short derby cannot be repeated. Marketing efforts that have raised the profile of Alaskan halibut will continue, but there are likely to be diminishing returns as fewer consumers will be hearing about the product for the first time. On the other hand, cost factors may continue to grow in real terms for reasons that are outside the control of fishery participants and managers. Those facts are coupled with the reality that competitors and substitutes exist. For example, while the Canadian Atlantic halibut fishery is not likely to surpass Alaska in terms of production, it clearly has the ability to compete and act as a headwind to future ex-vessel price levels. The effect of substitute product prices on the value of halibut could depend on tastes (demand), on the substitute price relative to that of halibut, or on the amount of money that the public is allocating to premium protein given general economic conditions at the time.

Sablefish

The majority of US-caught sablefish occurs in the partial coverage category on fixed-gear vessels and non-Rockfish Program trawl vessels, though sablefish is also taken in the Rockfish Program and as a

secondary species in BSAI trawl fisheries. Alaska is the leading producer of sablefish, which is typically thought of as a premium whitefish product with fewer substitutes compared to pollock and cod. A decreasing trend in biomass from the mid 2000s decade to 2016 had reduced production but the impact of that trend on revenues had been offset by strong ex-vessel price growth.

Presently, the supply of sablefish is trending upwards but ex-vessel prices have weakened. A year-to-date industry report for 2018 noted that first-wholesale prices – which are closely correlated to ex-vessel prices due to the largely head-and-gut nature of the product mix – were down 12% in 2018 compared to 2017. The prevailing explanation for weaker ex-vessel prices is smaller average fish size in a fishery where dock prices are based on weight. In 2018 fish smaller than three lbs. accounted for 14% of catch, whereas typically that number is around 5%. One other potential explanation for weak price trends offered by an independent market analyst via personal communication is growing interest in the key market of Japan for toothfish varieties that are seen as reasonable substitutes at a certain price point. Other factors that could be affecting sablefish prices now or in the near-future include oversupply leading to inventory holdovers, a strong US currency making the product more expensive to international buyers, and price fatigue (i.e. less demand at the retail level as prices rise).

Figure 6.21 (p.151) in the 2017 Economic SAFE shows that ex-vessel values (fixed-gear only) peaked in 2011, declined to 2013, and then recovered to the peak level above $5/lb. in 2017 before falling. This trend up to 2017 is also reflected in Figure 24, above. The figure in the SAFE shows price projections out to 2022, predicting price recovery from the 2018 low for both median and the 90% upper confidence bound. The median projection peaks at $5.12 in 2022, which is around the historic high shown in the trendline going back to 2007. The 90% upper confidence bound shows a higher price projection because it is identifying the ex-vessel value that is higher than 90% of all the other model run projections. In this case the 90% upper bound peaks at $6.62/lb. in 2022.

Whether or not the actual ex-vessel price recovers as this model predicts depends on several factors. First, biomass is increasing due to a large year class of fish that are currently small. The extent to which those fish will survive natural and fishing mortality to be caught at an age where they yield more value is unknown. Second, past experience has shown that ex-vessel price growth was positively influenced by low supply. More catch in the future could slow the rate of price recovery. Third, US domestic consumption of sablefish and exports to markets other than Japan have increased markedly since around 2012. The saturation point where marginal demand decreases for those markets is not known, but could be reached if production continues to grow. Relatedly, the sablefish retail market tends to demand larger fish, which could be less available. Similar to what was described for halibut above, a high-priced retail product like sablefish risks reaching a ceiling of consumer willingness to pay at the retail level. In that case, the rate of growth in ex-vessel value for larger fish could slow, meaning that growth in the total *average* ex-vessel value of the fishery would depend more on demand and performance of smaller and medium size categories. In general, the size-differentiated pay structure for sablefish underlines the fact that total average ex-vessel value is greatly influenced by the age-structure of the fishery's catch.

Pacific cod

Pacific cod caught in Alaska accounts for roughly 20% of global cod supply, with the majority coming from European Atlantic cod fisheries (e.g. the Barents Sea fishery conducted mostly by Russia, Norway, and Iceland). In recent history, the GOA contributes approximately 20% of US cod production (Atlantic and Pacific). Pacific and Atlantic cod are substitute products, and the market for cod is also affected indirectly by catch and markets in fisheries like pollock. The two primary product forms produced from cod in the GOA are fillets and H&G, which comprise approximately 55% and 30% of the value on average (2007 through 2017), though the relative share can fluctuate year over year depending on relative prices and processing decisions. A February 2019 report by McDowell Group (pers. comm.) notes that wholesale export values for Pacific cod fillets are up 10% compared to the previous year, while head-and-gut values are 3% lower. Production of valuable ancillary cod products has increased in recent years, statewide; 2018 roe production was up 21% relative to 2017 despite lower overall catch.

Both globally and in Alaska, the value of cod has largely tracked global supply and demand of whitefish over the last 15 years. Notably, a peak around 2007/2008 and an uptick in 2012/2013 were followed by downturns said to be driven by market reaction to high prices by substituting to comparable fish and non-fish proteins. Prices and demand for commodity products are also influenced by the global economy; the earlier record peak was closely followed by the effects of the economic recession in the late 2000s. These trends are evident in Figure 25, above, and in Figures 6.19 and 6.20 (p.150) in the 2017 Economic SAFE (NMFS 2018).

Global cod supply is currently in a multi-year decline that is expected to continue through 2019. In addition to the well-documented reduction in Alaskan Pacific cod quotas, Atlantic cod supply is expected to decline by around 6% in 2019.[18] Strong demand coupled with tight supply has kept export prices high (Alaska H&G first wholesale up 12% in 2018 year-on-year), and GOA ex-vessel prices have remained stable or increasing since 2014. Whether or not demand for cod will remain strong alongside shrinking supply is unknown. Some industry analyses and trade press cite concern that high prices will lead to substitution, as occurred after the 2007/2008 peak. While all commodity products have a price ceiling at some point, it is also possible that demand for the product has been successfully cultivated and new products have been developed to maintain interest in the product. A higher fundamental level of demand should increase the quantity demanded at a given price. It is also worth noting that prices for some substitute products, such as pollock, have also increased while their own supply levels have flattened. As with other species, the analysts caution that supply is a strong driver for cod values but it is not the only one. Markets will substitute or turn to production for weak currency markets based on the general economic trends that influence demand for high quality protein.

The one nation where production is not trending downwards is Russia, which is also seeking MSC certification for its longline fishery that could allow it to enter US and European markets that prefer the certification directly[19]. Russian production can also affect the ceiling for global prices by offering head-and-gut product at a significantly discounted dollar price due to its weak currency. With wholesale export prices nearing record levels, buyers will be tempted to accept fish that is not from their typical certified suppliers.

The 2017 Economic SAFE figures cited above show both fixed-gear and trawl-caught GOA Pacific cod ex-vessel values remaining at or slightly above 2018 levels through 2022. Those 2018 levels were modeled to be an increase over 2017, rising from prices in the low $0.30/lb. range closer to $0.40/lb. (Final 2018 ex-vessel price information is not available from ADGF/CFEC until late-summer 2019.) Median projections through 2022 predict prices spread around $0.47/lb. for fixed-gear by 2022 and $0.42/lb. for trawl by 2022.

Pollock

Important value-drivers for Alaska pollock include the status of supply competition from Russia, supply of other commodity whitefish, currency exchange rates, and markets for higher-value ancillary products such as surimi and roe. Alaska pollock in 2018 generally experienced a positive bounce-back from price lows in 2016 and 2017. This is explained partially by improved demand for surimi and roe and by flat supply growth from Russia, which had markedly increased its production and hampered Alaska export prices over the past decade. Russia increased its share of the global pollock supply to more than 50% beginning in the 2005 to 2007 period and – more significantly to Alaska pollock markets – gained MSC certification for roughly half of its catch in 2013 thereby gaining access to retail markets in the EU and US and putting downward pressure on Alaska pollock fillet prices.

A report by McDowell group notes that, state-wide, surimi export value was up 11% in 2018 relative to 2017 and roe export value was up 10%. The uptick in roe prices is a positive change from a downward

[18] Source: Presentation by McDowell Group for Seafood Expo 2018, provided via personal communication.
[19] Note that some Russian production already enters global supply through reprocessing and shipment from other countries.

trend over the preceding decade that had been attributed to changing demand from Asian consumers as well as competition from Russia. The uptick in surimi is also reversing a downward trend. Around 2008, Asian surimi importers had sought lower-priced options and turned to warm-water fish products from southeast Asia, but production from those fisheries has slowed in recent years while demand has stayed strong.

The recent decrease in global whitefish supply has supported pollock prices. However, because most of Alaska's pollock are exported, the strength of the US dollar against Asian and European currencies could be a drag on the market going forward. The most recent 2017 Economic SAFE for groundfish projects GOA pollock ex-vessel prices through 2022 (NMFS 2018). Figure 6.16 (p.148) in the 2017 report shows that the 2018 recovery from 2016/2017 lows is expected to flatten out and remain in the $0.11 to $0.12 range (median projection outcomes for all years). The projection's 90% upper confidence bound reaches $0.16 in 2020, $0.17 in 2021, and $0.19 in 2022.

While the statewide outlook is positive, it is important to note that GOA pollock producers (i.e. partial coverage pollock) turn out lower volumes and average ex-vessel price levels tend to lag BSAI pollock, as is evident in regional standard price reports for the observer fee calculation. This could be the result of the product mix (e.g. more head-and-gut), less coordination between harvesters and processors in an open access fishery, and smaller average fish size in recent years. The portfolios of products produced in the GOA differs somewhat from the BSAI. The primary products processed from pollock in the BSAI are fillets, surimi and roe, with each accounting for approximately 40%, 35%, and 10% of first-wholesale value. In the GOA the primary products are head-and-gut, surimi, fillets, and roe, each have typically accounted for approximately 35%, 25%, 25%, and 13% of first-wholesale value in recent years. Over the 2005 to 2016 period covered in the most recent Economic SAFE for groundfish, GOA fillets are actually 5% more valuable at wholesale than shoreside BSAI fillets, but fillets account for a smaller share of production. Roe prices were reported to be roughly 10% lower for the GOA relative to BSAI. Low prices for head-and-gut pollock particularly impact the GOA since much of Russian production goes to China in that form and drives down US head-and-gut prices due to the weak value of the Russian currency.

Whatever the cause, there appears to be some disconnect between the state-wide pollock price trend and that of the GOA, meaning that the partial coverage pollock fishery might not realize the positively projected trend to the full extent. That said, pollock is a high-volume fishery so a $0.01 ex-vessel price increase is more notable for this species than for others.

5.5.3 Partial coverage harvesting and processing participation

This section provides an overview of the stakeholders that harvest and process the key partial coverage fisheries. Information linking harvesters and processors to communities in Alaska and elsewhere is interwoven into this section and the tables in Appendix E. The Alaska Fisheries Science Center has compiled fishing community profiles for 196 Alaskan communities; this is available at: https://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communities/profiles.php. The Northwest Fisheries Science Center has similarly compiled fishing community profiles that include those identified later in this section as stakeholders in Alaska's partial coverage fisheries; those are available at: https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/humandim/communityprofiles/index.cfm.

Some of the tables provided rely on the community of vessel ownership registration as a marker of where the operator resides and/or where most of the economic benefits of fishing will flow; this is not always the case, but better region-wide information on owner, operator, and crew residence is not available. Moreover, vessel registration location or even homeport (not reported here) do not necessarily indicate where a vessel will fish or in which fisheries. For instance, vessels based in Petersburg, AK could be a mix of those that fish locally in Southeast Alaska for salmon and IFQ species, those that fish IFQ species in multiple regulatory areas throughout the GOA in a given year, and vessels that trawl for groundfish and seine for salmon in the Western GOA. The community of a vessel owner's listed residence is a weak indicator of where the net benefits of fishing will accrue or where local fish taxes might be generated. As a result, it is also useful to consider the location of shorebased processing operations that rely on

deliveries of fish caught in partial coverage. Processing plants provide important employment opportunities throughout Alaska and can be community tent-poles in terms of social organization.

5.5.3.1 Harvesting Vessels

Vessels that possess a Federal Fisheries Permit (FFP) must comply with Observer Program regulations when fishing in Federal waters off Alaska or in state-waters when participating in fisheries that are under parallel management. The fishing activity that is subject to the observer fee are landings of halibut IFQ or CDQ, sablefish IFQ, fixed gear sablefish CDQ, and the landings of catcher vessels and some small catcher/processors that possess a Federal Fisheries Permit (FFP) and participate in federally managed or parallel groundfish fisheries, excluding non-sablefish CDQ groundfish, AFA Pollock, and the Central GOA Rockfish Program. The harvester and processor data in this and the following section use Fish Ticket data to pull only from those landings. The same rules that define the landings currently subject to the fee (partial coverage) have been applied in retrospect to activity that occurred prior to 2013.

The partial coverage category is primarily made up of CVs that are not participating in a catch share program that has a transferrable PSC limit. CVs are those that are not equipped to process fish and do not hold a groundfish license that permits them to process fish onboard the vessel. CVs deliver their product to a shoreside processor or, in some fisheries, to a catcher/processor (CP) acting as a mothership. Shoreside processors include plants physically located on land (shorebased) and stationary floating processors. There are a wide variety of CVs, distinguished in this section by product and gear type. The CVs that operate in partial coverage deploy four gear types: trawl, hook-and-line, pot, and jig.

Note that following a regulatory change implemented in October 2016 trawl CVs operating in BSAI trawl limited access fisheries that would otherwise be in partial coverage may elect full coverage and are not then subject to the observer fee in that fishery (82 FR 36991). The ex-vessel revenues of BSAI trawl CVs that are opting into full coverage for that fishery are screened from the data used in this document when, and only when, they are operating trawl gear in the BSAI. In the most recent year of historical data included in this document (2017), 30 CVs opted into full coverage for BSAI trawl fishing. Of those CVs, seven were still subject to the observer fee when trawling in the GOA or, in one case, when fishing hook-and-line gear.

The partial coverage category also includes a small number of non-trawl CPs. When the restructured Observer Program was implemented in 2013, three non-trawl CPs were included in partial coverage under exemptions. Since then, Amendment 102/112 of the GOA/BSAI FMPs has allowed a small number of additional non-trawl CPs to opt into the partial coverage category if they fall under a certain production threshold. From 2016 to 2019, sequentially, the number of CPs opting into partial coverage was 2, 7, 6, and 6. Table 19 and Table 20, below, include these CPs.

Table 19 shows the number of vessels that participated in the fisheries that have been defined as partial coverage under the Observer Program since the 2013 restructure. Vessel counts for years prior to 2013 are based on the future classification of fishing activity that occurred in those years. The table indicates that 81% of partial coverage vessels are registered to owners with Alaska addresses. Over the last decade the number of active vessels in partial coverage fisheries peaked in 2011 and has declined since. This data summary does not imply a causal link between reduced participation and the Program restructure (introduction of the current fee system), or any single cause in particular for that matter. Individual choices about commercial fishery participation are complex and account for multiple factors including catch limits (TAC), ex-vessel price trends, or consolidation in quota-based fisheries, to name only a few. The reader is referred to Figure 2 and Figure 4 in Section 4.2.1 of the EA for evidence of landings and total ex-vessel revenues peaking around 2011 – or at least declining since then – for three of the four key partial coverage species (halibut, Pacific cod, and sablefish, but not pollock).

Table 19 Count of vessels operating in Alaska partial coverage fisheries (landings that would have been under partial coverage prior to 2013) by place of vessel registration (2008 – 2017)

Geography	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Annual Avg.	Annual Avg.	Total Distinct Vessels
Alaska	804	1,212	1,217	1,242	1,186	1,108	968	892	900	841	1,037	81.4%	2,085
Washington	190	182	173	182	180	164	162	152	149	141	168	13.1%	297
Oregon	53	51	48	52	48	46	45	37	37	36	45	3.6%	69
Other	18	22	24	27	27	27	23	28	24	28	25	1.9%	61
Total	**1,065**	**1,467**	**1,462**	**1,503**	**1,441**	**1,345**	**1,198**	**1,109**	**1,110**	**1,046**	**1,275**	**100%**	**2,512**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

An expanded version of Table 19 is included in Appendix E. That table (Table 27) breaks out Alaska into 44 identified communities where a partial coverage vessel owner that fished during 2008 to 2017 lists his or her residence. That table shows that the Alaska communities with the highest annual average participation in terms of vessel ownership are Kodiak, Sitka, Petersburg, and Homer.

Table 20 illustrates the vessel participation trend with breakouts for fishery (gear type) and species. (Note that the difference between the "Total" vessel count in this table and the one preceding is the result of double-counting vessels that participated in multiple gear types; the "Total" row in Table 20 sums across gear types.)

Vessel participation in the key directed trawl fisheries – pollock, Pacific cod, and other species (i.e., flatfish) – has been stable, perhaps showing an uptick around 2012 when the Council began to actively consider a GOA trawl LAPP based on catch history.

Participation in the pot fishery, which is focused primarily on Pacific cod, appears stable but would show a decline in 2018 with the sharp TAC reduction that first occurred in that year. The number of vessels landing sablefish and halibut with pot gear jumped up in 2017 with the implementation of rules allowing the use of pot gear to target sablefish IFQ and the retention of incidentally caught halibut; prior to that pot fishing for sablefish IFQ was a niche fishery in the BSAI and halibut retention was not allowed.

The most visibly obvious declines in vessel participation occurred in the hook-and-line fisheries. While no conclusion is drawn, one could speculate that this relates to downtrending TACs and catch rates for halibut and cod. Though sablefish has recently displayed a positive ex-vessel price trend (Figure 24) and recently rebounded TAC levels, flat or decreasing vessel participation could be an artifact of harder times across the gear sector as a whole since many vessels that longline for sablefish also rely on halibut to make their business plans work. In other words, viable fishing businesses often rely on a portfolio of fisheries to succeed, so a trend in abundance or ex-vessel price for a single species fishery should not drive expectations of greater participation in and of itself. Again, any marginal change in vessel participation will have multiple explanations. Aside from any abundance or price trends, the recent decline in sablefish longline effort could be partly attributed to vessels switching to pot gear to mitigate whale depredation.

Participation in the jig fishery is smaller in scale relative to other gear types. The 2017 drop-off in what is primarily a Pacific cod fishery was possibly a reflection of the GOA stock decline that resulted in lower TACs for the years since.

Table 20 Count of vessels that were (or would have been) fishing under partial coverage, by landing of target species by gear type (2009 through 2017)

Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average	Median
Hook-and Line	Halibut	1,181	1,159	1,146	1,109	1,031	963	887	876	854	1,023	1,031
	Sablefish	344	346	346	344	317	303	299	295	276	319	317
	Pacific cod	376	389	397	389	341	350	344	302	272	351	350
Pot	Pacific cod	119	122	143	137	126	116	124	133	130	128	126
	Sablefish	10	7	9	5	4	4	3	4	26	8	5
	Halibut*	0	0	0	0	0	0	0	0	14	2	0
Trawl	Pollock	86	84	80	86	87	87	87	87	85	85	86
	Pacific cod	91	84	81	86	87	88	87	88	85	86	87
	Other species	85	79	79	84	85	82	85	85	79	83	84
	Sablefish	29	30	34	34	23	22	49	51	43	35	34
Jig	Pacific cod	25	54	84	85	71	72	51	70	18	59	70
Total	ALL	1,584	1,569	1,612	1,580	1,473	1,312	1,238	1,248	1,166	1,420	1,473

* Halibut retention in pot gear was first authorized in 2017 for vessels that possessed the necessary IFQ.
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 21 shows ex-vessel gross revenues (nominal millions of dollars) generated in the partial coverage fisheries from 2008 through 2017. An expanded version of Table 21 is included in Appendix E. That table (Table 28) also breaks out Alaska communities of listed partial coverage vessel ownership. Additional information on partial coverage ex-vessel value was included previously in Section 5.5.2 and in Section 4.2.1.4 of the EA.

Table 21 Partial coverage ex-vessel gross revenue (nominal $million) by place of vessel ownership address (2008 – 2017)

Geography	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Annual Avg.	Annual Avg.
Alaska	79.59	153.79	217.51	249.34	202.87	150.36	163.43	169.85	170.62	185.96	174.33	57.6%
Washington	73.56	82.01	99.83	125.87	117.96	84.89	96.58	91.03	84.62	81.59	93.79	31.0%
Oregon	26.54	19.92	30.39	36.50	34.91	29.97	25.96	20.42	17.29	21.77	26.37	8.7%
Other	6.16	6.40	8.89	11.97	10.47	8.23	6.50	6.70	8.40	9.50	8.32	2.7%
TOTAL	**185.85**	**262.12**	**356.62**	**423.68**	**366.20**	**273.44**	**292.47**	**287.99**	**280.93**	**298.82**	**302.81**	**100%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 22 shows the proportion of total ex-vessel gross revenues that the partial coverage fleet generates when participating in partial coverage fisheries. For the entire period of 2008-2017, with partial coverage fisheries defined retrospectively, partial coverage participants collectively earned over half (53%) of their gross fishing income in partial coverage fisheries. The other 47% of revenues would have been generated in full coverage fisheries or in fisheries that are not subject to observer coverage (e.g., salmon). Each of the three main participating states – in terms of vessel ownership residence – displayed the same roughly 50/50 split of revenues generated in and out of partial coverage. In other words, roughly half of the revenue generated by the stakeholders addressed in this analysis is subject to the fee (or would have been). Note that this summary information aggregates across many participants, and that some are almost completely dependent on partial coverage fisheries. One way of illustrating this is shown in an expanded version of the table in Appendix E (Table 29). That table breaks out each Alaska community where a partial coverage vessel owner lists his or her residence. Ten of 44 communities generate over 90% of their total average annual revenue from partial coverage; four of those communities of ownership are at 100% dependence. The lower-end of community dependence, as seen through this particular lens, is in the 20% to 30% range. Those communities tend to coincide with high salmon participation and occur across the state of Alaska (e.g., Togiak, King Cove, and Ketchikan).

Table 22 Partial coverage vessels' ex-vessel gross revenue diversification (nominal $million) by place of vessel ownership address (2008 – 2017)

Geography	Annual Avg. Number of Partial Coverage Vessels	Partial Coverage Vessel Annual Avg. Ex-Vessel Gross Revenues from Partial Coverage Fisheries ($ millions)	Partial Coverage Vessels Annual Avg. Total Ex-Vessel Gross Revenues from All Areas, Gears, and Species Fisheries ($ millions)	Partial Coverage Vessels Partial Coverage Ex-Vessel Value as a % of Total Ex-Vessel Gross Revenue Annual Avg.
Alaska	1,037	176.39	323.15	54.58%
Washington	168	93.79	191.19	49.06%
Oregon	45	26.37	50.71	52.00%
Other States	25	8.32	13.34	62.40%
TOTAL	**1,275**	**304.87**	**578.38**	**52.71%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 23 relates the information in the preceding table to the Alaska CV fleet as a whole during the 2008 through 2017 time period. The denominator used in the percentage calculation in Table 23 encompasses all CV operations, and not just partial coverage CVs (plus a small number of opt-in non-trawl CPs). As a result, the percentage of total revenue that's generated in partial coverage falls from 53% to 17%. As with the preceding tables, an expanded version is provided in Appendix E to break out 44 Alaska communities of vessel ownership (Table 30). Table 30 is useful for identifying communities where most vessel owning residents participate only in partial coverage fisheries, and do not have many sources of fishing income that would be unaffected by the observer fee. Dependency as it is framed in Table 23 appears relatively low in salmon-focused communities found in Southeast Alaska or in crabbing communities such as Nome. Dependency on partial coverage fisheries appears moderate in diverse fishing communities like Kodiak, Sitka, and Unalaska. Dependency on partial coverage often appears greatest in halibut-focused communities such as the Pribilof Islands.

Table 23 Partial coverage vessels' and ALL catcher vessels' gross revenue diversification (nominal $million) by place of vessel ownership address (2008 – 2017)

Geography	Annual Avg. Number of Partial Coverage Vessels	Annual Avg. Number of All Vessels	Partial Coverage Vessel Annual Avg. Ex-Vessel Gross Revenues from Partial Coverage Fisheries ($ millions)	All Commercial Fishing Vessels' Annual Avg. Total Ex-Vessel Gross Revenues from All Areas, Gears, and Species Fisheries ($ millions)	Partial Coverage Vessels' Partial Coverage Ex-Vessel Value as a Percentage of Total Ex-Vessel Gross Revenue Annual Avg.
Alaska	1,037	4,286	176.39	674.93	26.13%
Washington	168	1,195	93.79	851.28	11.02%
Oregon	45	207	26.37	83.28	31.66%
Other States	25	430	8.32	156.67	5.31%
TOTAL	**1,275**	**6,119**	**304.87**	**1766.15**	**17.26%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

5.5.3.2 Processors

The intent of the Observer Program is for catcher vessels that deliver fish subject to the observer fee to split the existing 1.25% fee with shorebased or other processors that receive the catch. Each party in the sale would be responsible for a 0.625% fee. Processors collect the vessel's portion of the fee and remit the full amount to NMFS. This section summarizes the number of processing entities that have recently participated in fisheries that are now part of the partial coverage category and provides information about

their general geographical distribution (for shorebased plants), state of ownership (for non-shorebased plants), and reliance on partial coverage activity for revenue.

Table 24 counts the number of processors that received deliveries from fisheries that are, or would have been, in the partial coverage category from 2008 through 2017. The analysts note that nothing in the considered action would preclude a processor (or buyer/exporter) from entering these markets in the future. The universe of processors that operated in Alaska during the years included is larger than those shown in the table, including – in the major categories – 270 shorebased processors, 61 floating processors, and 102 catcher/processors. Note that the definition of catcher/processor is more expansive than the common image of a "factory trawler" or "freezer longliner." With respect to the Observer Program, a catcher/processor is any vessel that is used for, or equipped to be used for, catching fish and processing that fish. Fewer than 10 catcher/processors harvest and process fish in partial coverage fisheries, but a larger number of vessels have been involved in partial coverage by taking deliveries from CVs (acting as a mothership).

Less commonly thought-of processing operations that are subject to the partial coverage fee are included in the last two columns: catcher/sellers and direct marketers, and buyer/exporters. Catcher/sellers are typically individuals who directly sell their unprocessed fish locally to restaurants, grocery stores, and markets. Direct marketer vessels are 65' or less and can process their catch onboard their vessel, at a shorebased facility they own, or have it custom processed; they cannot process another fisherman's catch. Buyer/exporters buy unprocessed fish from fishermen to transport out of state.

Table 24 Processing entities that received partial coverage fishery deliveries (2008 – 2017)

Year	Shorebased Processors	Floating Processors	Catcher/ Processors	Catcher Sellers & Direct Marketers	Buyers
2008	57	9	15	11	1
2009	74	10	18	28	2
2010	73	13	21	29	
2011	79	13	19	21	1
2012	76	13	21	22	2
2013	78	15	19	18	1
2014	69	13	14	21	1
2015	63	15	12	24	2
2016	66	17	14	31	2
2017	61	16	12	32	2
Total	**115**	**31**	**39**	**116**	**7**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

In any given year from 2008 through 2017, between 38 and 45 different communities had a connection to a processing operation that took deliveries of partial coverage catch. The majority of those communities represent a shorebased processing facility, where the tie between the economic activity and the health of the community is fairly direct. A small number of those communities – typically fewer than ten – also represent the listed business registration location for the owner of a floating processor or catcher processor where the link between the fishery and community impacts exists but is less direct.

Table 25 includes the 79 shorebased processors that received partial coverage deliveries from 2013 through 2017, in descending order of the total ex-vessel value of partial coverage deliveries received during that time. All but two of the processors are located in Alaska communities. There is no clear correlation between the magnitude of the total partial coverage value processed in a given community and that community's relative dependence on partial coverage fisheries as opposed to deliveries from other fisheries. Other fisheries include both full coverage fisheries and activities that are not subject to the observer program. For example, the five processors in Homer, AK, combined, ranked seventh in the ex-

vessel value processed; that represented 93% of the community's total processing in terms of ex-vessel value. This relationship indicates that processors in Homer are primarily engaged in fisheries that are subject to the partial coverage fee (e.g., halibut and sablefish IFQ). Processors in Cordova, AK are not known to be engaged in full coverage fisheries, but derive only 9% of revenues in terms of ex-vessel value due to heavy engagement in salmon fisheries where there is no observer fee. Dutch Harbor, AK (and Unalaska, listed separately) are examples of communities where the shorebased processors receive a relatively large amount of partial coverage deliveries relative to other communities, but that volume is a modest portion of their total processing activity since they are heavily engaged in full coverage and crab fisheries. Overall, the processors listed in this table relied upon partial coverage fisheries for 29% of their processing activity, as measured by ex-vessel value paid to fishermen.

Table 25 Communities with shorebased processors receiving partial coverage deliveries, and the ex-vessel value of those deliveries as a percentage of total ex-vessel value delivered to those processors (2013 – 2017)

Geography	Number of Processors	Annual Avg. Partial Coverage Ex-vessel ($)	% Total Ex-vessel
KODIAK	13	77,019,256	54%
SEWARD	4	36,641,170	63%
SITKA	5	20,984,244	44%
DUTCH HARBOR	3	18,383,105	12%
AKUTAN	1	C	16%
SAND POINT	1	C	52%
HOMER	5	12,073,973	93%
PETERSBURG	4	11,523,692	26%
JUNEAU	5	10,715,143	41%
KING COVE	2	C	13%
YAKUTAT	4	7,289,186	68%
ANCHORAGE	7	5,615,536	25%
CORDOVA	3	5,472,566	9%
WRANGELL	2	C	48%
UNALASKA	1	C	12%
KENAI	4	3,438,707	17%
HOONAH	1	C	39%
WASILLA	2	C	39%
ADAK	4	1,811,724	55%
ATKA	1	C	98%
KETCHIKAN	3	1,278,081	3%
ST PAUL	1	C	4%
FALSE PASS	1	C	25%
VALDEZ	1	C	8%
CRAIG	2	C	13%
NOME	3	238,554	8%
BELLINGHAM, WA	1	C	50%
TOKSOOK BAY	1	C	100%
TOGIAK	4	160,524	4%
HAINES	2	C	22%
SAVOONGA	3	131,492	8%
TACOMA, WA	1	C	12%
WARD COVE	1	C	10%
MAKORYUK	1	C	100%
KAKE	1	C	3%
KIPNUK	1	C	100%
HYDER	1	C	55%
TUNUNAK	1	C	100%
CHEFORNAK	1	C	100%
COFFMAN COVE	1	C	81%
HOOPER BAY	1	C	100%
WHITTIER	1	C	16%
NINILCHIK	1	C	2%
Total	**79**	**271,204,349**	**29%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

The "intent to operate" locality for the floating processors and catcher/processors captured in Table 25 reflects the location where the vessel or company owner lists their business residence. As a result, more processing entities are listed with a location outside the state of Alaska (Washington and Oregon). Those locations do not reflect where processing occurred or where taxes might have been paid, but they give some suggestion as to where at least a portion business profits might be spent. Those profits would only reflect the owner's share, and not any crew that were employed and could reside elsewhere.

Twenty floating processors participated in partial coverage fisheries from 2013 through 2017. Nine were registered to a business owned in Alaska (Anchorage, Cordova, Dutch Harbor, Homer, and Kodiak). The other 11 were registered in the state of Washington (Seattle, Kirkland, Renton, and Poulsbo). Overall, 24% of the ex-vessel payments made by these 20 floating processors as a group went to partial coverage fisheries. Due to the small numbers of floating processors registered to each community, community-level data is mostly restricted due to confidentiality. The eight floating processors registered in Seattle, WA processed an annual average of $24.6 million worth of fish, as expressed through the ex-vessel value paid for deliveries (28% of total). The three floating processors registered in Dutch Harbor, AK processed an annual average of $6.4 million in terms of ex-vessel payments (21% of total). Four floating processors owned in Kodiak, Cordova, and Anchorage each relied on partial coverage fisheries for more than 95% of their activity.

5.5.4 Other fees and taxes levied on partial coverage fisheries

In addition to the existing observer fee defined by 77 FR 70062, harvesting and processing participants in partial coverage fisheries are subject to other payments that affect their net revenue. Stakeholders are subject to these fees under status quo regulation; the action alternatives under consideration can be viewed as additive to the total fee liability that a fishery participant faces.

Table 26 lists the cost recovery fees authorized under Magnuson-Stevens Act for limited access privilege programs, the CDQ program, and the halibut/sablefish IFQ program. Cost recovery fees recover actual costs directly related to the management, data collection, and enforcement of the programs. The Magnuson-Stevens Act mandates that cost recovery fees not exceed 3% of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee. NMFS's Cost Recovery and Fee Programs web page (https://alaskafisheries.noaa.gov/fisheries/cost-recovery-fee-programs) links to the Federal Register notice announcing each subject fishery's standard prices and fee percentages by year through 2018, as well as to a cost recovery annual report for most subject fisheries through 2017. In addition to links on the Cost Recovery web page, Federal Register notices can be found at, https://alaskafisheries.noaa.gov/rules-notices/search.

Partial coverage fishery participants do not necessarily participate in all the cost recovery fisheries, and individuals are only subject to the fee for landings they make in a particular cost recovery fishery. Fees are generally determined by dividing direct program costs by the value of the fishery's landings. Table 26 indicates that cost recovery fees increased year-over-year from 2017 to 2018. The annual cost recovery reports available on NMFS's web page identify the sources of direct costs charged to the fee. For example, the increase in the halibut/sablefish IFQ program was attributed to additional costs to maintain information systems.

Table 26 Federal cost recovery program fees for Alaska, 2017 and 2018

Cost Recovery Programs	*Year Implemented*	*Rate in 2017*	*Rate in 2018*
AFA inshore	2016	0.19%	0.24%
AFA mothership	2016	0.22%	0.34%
AFA CP	2016	0.21%	N/A*
Aleutian Islands pollock	2016	0.00%	3.00%
Amendment 80	2016	0.71%	0.75%
CDQ	2016	0.55%	0.66%

BSAI Crab	2005	1.57%	1.85%
Central GOA Rockfish	2011	2.04%	2.86%
Halibut/Sablefish IFQ	2000	2.2%	2.8%

*Lawsuit pending

The state of Alaska levies several taxes on fish landings that could apply to harvesting and processing participants in partial coverage fisheries.[20] Similar to the observer fee, most taxes are collected from the processor. However, whether stated directly or indirectly, the tax levy can also affect the level of ex-vessel payments to fishermen either through direct payment (netted out in purchase price) or by causing the processor to account for the tax in the dock price offered.

Alaska levies a Seafood Marketing Assessment of 0.5% on all seafood processed or first landed in Alaska and any unprocessed fishery products exported from the state. The state collects the tax from the processor or fisherman who exports the resource from Alaska. Processors or fishermen who produce less than $50,000 worth of seafood products during the year are exempt.

Alaska levies a Fishery Resource Landing Tax on fish processed outside the 3-mile limit and first landed in Alaska, based on the unprocessed value of the resource. The unprocessed value is determined by multiplying a statewide average price per pound (derived from ADF&G data) by the unprocessed weight. The tax is collected primarily from CPs that bring their products into Alaska for transshipment. For fisheries classified by ADF&G as "established," such as the fisheries subject to the observer fee, the levy is set to be paid at 3.0%. A small number of CPs operate in the partial coverage category under a provision for vessels that produce less than a threshold amount of product by weight annually (approximately 10).

Alaska levies a Fisheries Business Tax (called the "raw fish tax") on businesses or persons who process or export fisheries resources from Alaska. The tax is based on the price paid to commercial fishermen or fair market value when there is not an arms-length transaction. Fisheries business tax is collected primarily from licensed processors and persons who export fish from Alaska. For fisheries classified by ADF&G as "established," the levy is set to be paid at 3.0% for shore-based processors and 5.0% for floating processors. Tax revenues are placed in the state's General Fund, and 50% of the tax revenue may be shared with the incorporated city or organized borough where the processing took place. Processing that takes place outside of a city or borough can be shared back to that community through an allocation program administered by the Department of Commerce, Community and Economic Development (DCCED). The Fisheries Business Tax annually accounts for the greatest proportion of total fishery resource tax revenues collected by the state. Revenues from this tax were $39.9 million in 2016, while the nearest state fishery tax was the Fisheries Resource Landing Tax at $9.8 million that year.

Local taxes on raw fish products vary throughout the state. Most cities or boroughs with a raw fish tax levy it as a percentage of ex-vessel value. The 2018 DCCED Alaska Taxable Supplement identifies 18 communities with a raw fish tax; most are levied at 2%, with a range up to 3.5%. The Alaska Taxable Supplement is available at https://www.commerce.alaska.gov/dcra/DCRARepoExt/Pages/AlaskaTaxableDatabase.aspx. At that site the reader can refer to Table 1A ("Reported Tax Rates for Each Municipality") for local raw fish taxes rates and revenues in 2018. CPs do not pay taxes that are based on landings of raw fish.

Note that tax policies are subject to change. The existing set of fish taxes levied by the state of Alaska and fishing localities have been constant during recent years and the analysts have no reason to predict that taxation levels or revenue sharing policies will change in the near future. Nevertheless, the reader could consider that a community might choose to offset any reduction in revenue sharing from the state's Fisheries Business Tax by implementing or increasing local taxes.

[20] Source: http://www.tax.alaska.gov/programs/programs/index.aspx?60620

5.5.5 Safety Considerations

After consulting with NMFS Office of Law Enforcement, the analysts have not identified any effects of the considered alternatives that would affect the safety of human life at sea (Magnuson-Stevens Act National Standard 10). The safety of fishery participants, observers, and processing workers is not directly related to the fee. Unless potential effects on human safety are identified by stakeholders or the Council while considering this Initial Review draft, this section will be removed and a summary statement will be included in Section 6.1 of the document in the subsequent draft.

5.6 Analysis of Impacts

The Council and NMFS have identified that reliable and scientifically valid observer and EM information is critical to the conservation and management objectives for the Federal fisheries off Alaska. NMFS collects high quality and unbiased data under the current program. While the Agency has determined that there is no static definition of an observer coverage level below which the fisheries cannot be managed, the likelihood of encountering data gaps does correlate with coverage in some cases. Those gaps could mean that there is an increased risk of non-representative data, or that the ability to obtain biological samples for stock assessments is reduced. At lower levels of coverage there is risk that observer data become less useful for achieving random, gear-specific, or area-specific, species-specific sampling. Under those circumstances, fishery managers may take more conservative or precautionary approaches towards management decisions. On the other hand, operating the monitoring plan is costly, is funded by participant stakeholders, and – to the present – has partially relied on supplementary Federal funds to achieve the desired coverage level. As a result the Council and NMFS strive to deploy monitoring at levels that are expected to provide a positive return for stakeholders, including both those who do and do not actively participate in harvesting and processing the fish.

The information benefits derived from levying a fee on participants and monitoring the fishery are described in Section 3.3. Broadly, those benefits include accounting for catch, bycatch, and discards, as well as biological stock assessment data needs. Because those benefits are achieved at a programmatic level it is not possible to assign a marginal information value to an additional observer-day (or EM equivalent) and weigh it against a per-day cost. In this section, the analysts consider benefits and costs qualitatively and in the frame of the relative extent to which the alternatives increase the likelihood that the program as a whole will continue to achieve its goals in the future. Consideration of those goals is guided by the eight "policy objectives" described in Section 5.4 and listed below:

- Minimizing a "monitoring effect" so data from observed vessels are representative of unobserved vessels
- Improving discard estimates for fishery species, including minimizing variability and reducing gaps in coverage in all strata/reporting areas
- Priority for monitoring PSC
- Detecting species decline or rare events
- Design the program with flexibility to respond to evolving data and management needs in individual fisheries
- Provide for equitable distribution of the burdens of monitoring among fishery participants
- Design the program, to the extent practical, so that the requirement for monitoring does not impact operational choices of vessel operators
- Foster and maintain positive public perception/stakeholder support

The Council's purpose and need statement for this action (Section 5.2) recognizes that additional funding for monitoring may be necessary not only to enhance the program's achievement of objectives, but also to maintain the ability to do so in an ever-changing revenue/cost landscape. In one sense, the purpose of this action is to consider the financial stability of the monitoring program and to take a limited action to promote that stability within the regulatory bound of the 2% fee maximum and with recognition of how

levying additional fees impact stakeholders. This document highlights the fact that annual fee revenues are unpredictable and the set of possible outcomes in future years includes stagnation or decline (in either nominal or real dollar terms). While the monitoring plan's ADP process is designed to be adaptable under a variety of revenue and cost scenarios, the analysts cannot discount the possibility that altering the fee percentage will not ensure status quo deployment capabilities, much less "continue to improve the Observer Program, [and] maintain and enhance the Council's ability to meet policy objectives," as stated in the purpose and need.

The analysts note that observer coverage – measured in days at sea for human observers or vessel days for EM – could produce diminishing marginal returns in terms of the gathering of necessary information, so one should avoid the simplistic conclusion that higher fees generate more funds to purchase more days and, thus, create a better program. For example, Figure 10 through Figure 13 in Section 4.2.2.7 illustrate that moving up to higher fee percentages does not always create a *linear* increase in the number or proportion of trips where fishing activity is directly observed or can be estimated with a nearest-match observed trip. The rate at which coverage increases can sometimes slow at higher fee percentages, though the point at which this occurs varies be fishery (gear and target species). Also, for a variety of reasons including the variable cost of coverage from year to year and changes in annual fishing effort, additional fee revenues do not translate at a constant scale into additional observer-days or a higher trip selection percentage. These notes are included so that the reader will not only consider how to achieve more observer-days or higher selection rates, but also consider what is the value of an additional (theoretical) observer-day relative to the program's cost to participants.

5.6.1 Alternative 1 – No Action

Selecting the No Action alternative would maintain an equal 1.25% ex-vessel based fee that is applied equally across harvesting and processing participants in the partial coverage fisheries, irrespective of gear type, vessel size, or the probability of being randomly selected to carry an observer on a fishing trip. When the Council established the current observer program, an equal fee amount was selected in order to meet the Council's definition of fairness and equity across all participants as judged at that time, noting that all participants benefit from the data that allow sustainable management of the fishery. The existing program design allows NMFS and the Council to allocate observer effort towards its multiple objectives within an established budget. Under the restructured program, NMFS reports to the Council through the Annual Report and Annual Deployment Plan processes. These rigorous, iteratively evolving reports as well as the establishment of monitoring advisory committees creates transparency with respect to the sample design and financial aspects of the program. NMFS and the Council have used the flexibility of the restructured process to make continuous improvements towards optimizing coverage across fisheries under a constrained budget and evolving fishery effort and participation patterns.

The Council's purpose and need acknowledges that the observer and EM monitoring program is potentially entering a period of lower budgets owing to the loss of supplementary Federal funds, reduced quotas for key partial coverage species such as Pacific cod and halibut, and ex-vessel price outlooks that appear flat to moderately positive – a continuation of the relatively lower-value period from 2013 through 2017 compared to the pre-implementation years (Section 5.5.2.1). While ex-vessel values could increase and positive abundance trends in the other partial coverage species (sablefish and pollock) could mitigate the reduction in the traditional fee revenue streams, the program's ability to fund coverage at historical levels also runs against the headwind of observer-day and broader labor/capital costs that are expected to increase with time. The growth potential of ex-vessel value for whitefish is constrained by competition on a global commodity market, unfavorable currency exchange rates, and potential tariffs on exports. Fish prices might also have a fundamental ceiling in "real dollar" terms (inflation adjusted) due to their substitutability as a consumer good and the observed phenomenon of price fatigue towards the higher-priced products like halibut that are so central to the fee base.

On the other hand, the cost of monitoring is expected to grow steadily at around the broader economy's rate of inflation, driven by factors like wages and travel. On a per-day basis, observer costs might also

increase at a quickening rate due to the existing Federal contract structure if the total number of days afforded decreases (Figure 9).[21] The fact that per-day costs increase as the fee budget shrinks can create a non-virtuous cycle. The program's ability to fund deployment at rates in line with historical levels or to meet the "hurdles" identified in the 2015 Supplemental EA (NMFS 2015) depend not on fee revenue growth but on growth relative to inflation ("real dollar" growth) and relative to costs.

Table 17 summarized the amount of revenue brought in through the fee from 2013 through 2017 as well as the number of observer days purchased and deployed. The table also indicates that supplementary Federal funds from NMFS have made up a significant portion of the partial coverage budget since its inception, but those funds will not be reliable available in future years. At the same time that the program is expecting to operate without Federal funds, the Council also looks ahead to the funding integration of EM deployment and operation under the fee budget. While the advent of the EM stratum removes some vessels from the pool of effort that needs observer sampling, it does not obviate the need for representative sampling and tasks that EM cannot accomplish. Moreover, the relative cost efficiency of the fixed-gear EM program is not yet quantified.

Figure 7 and Figure 8 (Section 4.2.1.6) show a range of risks (probability) of not realizing certain revenue amounts for a given fee percentage, including the 1.25% level of Alternative 1. This range is indicative of variability in ex-vessel prices and changes in allowable catch. This is particularly evident when comparing a full time series (2009-2017), with recent low revenue trends (2013- 2017). Based on ex-vessel values observed in the more recent set of five years (Figure 8) the status quo fee percentage resulted in revenues of at least $3 million in all years, of $3.5 million in four of five years, of $4 million in one of five years, but never exceeded $4.5 million. Note that the gap analysis presented in Section 4.2.2 found that meeting a 15% deployment hurdle required a budget of $4,676,133. The ability to spend extra "optimizable" days to meet certain policy objectives would, under the current ADP, only kick in after that hurdle is met.[22]

The fee revenue analysis cited above does not account for the cost of EM coming off the top of the fee budget, meaning that the required budget to reach that hurdle amount should be adjusted upwards by whatever amount is the assumed cost of EM. This document considers a range of annual EM costs from $250,000 to $2 million. Given reports made available by the current fixed-gear EM provider and the actual spending levels observed during the ramp-up pre-implementation years, the analysts would focus on the lower-to-moderate band of that range. However, the ongoing EM contract is currently out for bid so the true cost of operating and maintaining an EM program similar to the one currently on the water remains unknown. Note that the Council will have annual input into how monies are spent on EM through the ADP process. The reader can refer to Table 12 and Table 13 in Section 4.2.2.7 to see "effective fee rates" after each assumed annual EM cost is taken off the top of the budget. For example, if the fee remains at 1.25% and EM costs are assumed to be $500,000, the average annual revenue for 2013 through 2017 minus the EM cost yields the revenues available to purchase observer days that would be equivalent to a 1.09% fee with no EM program (Table 13).

5.6.1.1 Impact on stakeholder groups

So far, this section has addressed the specifics of the existing 1.25% observer fee and potential funding issues given the current state of values, harvest levels, and monitoring costs. Below, the analysts discuss the observer fee's impact on stakeholders on a more generalized conceptual level. Some of the potential impacts of a user fee, like fleet consolidation on the margins, are things that *might* have happened when

[21] An important feature of the observer provider contract is guaranteed days versus optional days. Guaranteed days are a certain number of days that NMFS must fund, whereas optional days can be purchased when revenue is available. Guaranteed days are likely invoiced at a higher rate so that the provider can recoup its overhead, meaning that the ability to purchase more low-cost optional days lowers the average per-day cost on an annual basis. There is a break-even funding level where revenue raised is equal to the cost of guaranteed days. The exact revenue point for these guaranteed days is confidential and not available to the analysts.

[22] The gap analysis does employ the cost curves in Figure 9 to account for the fact that observer-days start out more expensive (guaranteed days) and become less expensive per unit as more are purchased.

the fee was imposed but would likely have been realized by this point in the restructured program's six-year span. Nevertheless, identifying these impacts helps the reader understand what types of effects might be exacerbated by a fee increase under either of the action alternatives.

The primary stakeholder groups that are directly impacted by the fee amount are the **harvesters and processors** who pay the fee. The fee functions as an access fee imposed on private entities that seek profit from commercial use of the public resource. A fee based on gross revenues does not account for the profitability of individual harvesters or processors. Due to the relative value of money, such a fee is an inherently regressive taxation structure that has a higher marginal impact on less profitable fisheries or operations within a fishery that are less profitable or less well capitalized. In other words, firms with low profit margins face higher marginal impact than firms with higher profit margins, all else equal. The information necessary to determine the profitability of individual vessel owners or processors is not available.

In terms of vessels in the partial coverage category, one example of an operation that would seem to be less profitable or less well capitalized is an IFQ operation that is leasing quota from another entity (initial issue who can hire a master, or a person who brings their quota onto another's vessel), or is paying on a financed purchase of QS made on the open market. In theory, the existence of a user fee could push the marginal operation below the point of profitability and cause it to exit the fishery. However, harvesters and processors face many cumulative costs and it is unlikely that many operate so close to their margin that a small additional fee – or, from the other side, a small downturn in catch/product value on the market – would cause them to abandon their substantial investment in fishing. Also, it would be difficult to take the case of an operation that does exit the fishery and attribute the decision solely to the fee. Vessels and processors pay a variety of taxes (see Section 5.5.4); the fee is just one in the portfolio of operating costs.

The effect of an IFQ vessel exiting the fishery could be fleet consolidation. An owner might sell his or her quota and tie up the boat (reducing crew jobs) or employ it in another fishery. Because the partial coverage fisheries encompass a suite of fisheries that are often prosecuted by the same operation, it is unlikely that the fee has spillover effects in terms of effort from partial coverage to other Federal fisheries. However, state-managed fisheries that do not have observer fees might seem relatively more attractive, all else equal. The imposition of the fee effectively reduces the earning capacity of a unit of IFQ; in that sense, the fee could have a marginal negative effect on the market price for QS. Assuming a vessel that exits the IFQ fishery sells the quota, such a response is not expected to reduce total catch capacity. By contrast, a vessel that exits an open access fishery (or a limited access fishery with latent permits) might reduce total aggregate catch, at least in the short run.

The Council's intent has always been for harvesters and processors to share the cost burden equally (50:50), and on the surface that is reportedly the proportion in which the fee is remitted by the processor who collects or deducts payment from the harvester. However, the relative distribution of the fee burden might not be so equal. Theory suggests that in fisheries like the ones in the partial coverage category the existence of a shared tax on landings lowers the dockside value of the fish and shifts more of the tax's cost to the harvester. Figure 26 is a diagram of theoretical dockside supply and demand for a fish (e.g. halibut).[23] The figure illustrates that a fee – though paid in equal shares – reduces the ex-vessel price from P1 to P2. The figure is said to represent halibut because supply is inelastic, meaning that a fisherman will not supply any less halibut just because the dock price is marginally reduced. Inelastic supply means that the quantity supplied does not respond to a change in price (the vertical portion of the supply curve).

[23] Demand represents the first-buyer (i.e., processor), and is downward sloping from left to right. The slope indicates that a buyer will purchase less fish at a higher dockside price. Supply represents the harvester who is selling to the processor. For a species like halibut, supply is said to be inelastic (vertical slope) because the fishermen has every incentive to catch and sell all of his or her quota at most ex-vessel price levels. The fisherman would only supply less fish (leave IFQ in the water) if the ex-vessel price was so low as to not cover the cost of fishing (lower left-hand tail of the supply curve). With no observer fee, the market clearing ex-vessel price is P1. The imposition of the fee reduces the profitability of the fish, and thus the first-buyer demands less, shifting the demand curve to the point where the market clears at a lower price (P2).

Inelastic goods are goods without substitutes. For the halibut fisherman (supplier) there is no substitute because he or she cannot use their IFQ to catch another species. The fisherman has no incentive to leave IFQ in the water unless the price is low enough that the fish does not cover the cost of operation (the non-vertical portion of the supply curve). The figure shows that the reduction in ex-vessel price only reduced welfare (revenue, or price times quantity) for the supplier. Welfare for the fisherman (supplier) is represented in the figure by the area above the supply curve and below the horizontal line emanating from the market price (P1 or P2); this area was reduced by the observer fee. Welfare for the processor is represented by the triangular area below the demand curve and above the horizontal line; the imposition of the fee shifted the triangle but did not decrease its area. For vertically integrated operations where the same entity owns the harvesting vessel and the processor, that entity would experience the entire welfare reduction linked to the fee.

In theory, if an observer fee or some other form of taxation were so large (or cumulatively large) that the place where supply meets demand falls on the elastic portion of the supply curve (not vertical) then it would be rational to harvest less fish and the welfare for all stakeholders would be reduced – less ex-vessel revenue for the fisherman, less wholesale revenue for the processor, and fewer fee revenues for the observer program. In reality, the fee would probably have to be extraordinarily high to reach that point, but that would depend on knowing operations' profitability margins, which are not available. It is assumed that most or all fishing that occurs under partial coverage is supplied on an inelastic curve once the harvester and processor enter an arms-length relationship where it is mutually understood that the fish will have a buyer after the vessel leaves port to fish.

While this discussion has centered around who bears the negative impact of the user fee, it should also be noted that harvesters and processors benefit from the sustainable and responsive management that is enabled by the monitoring activities funded by the fee.

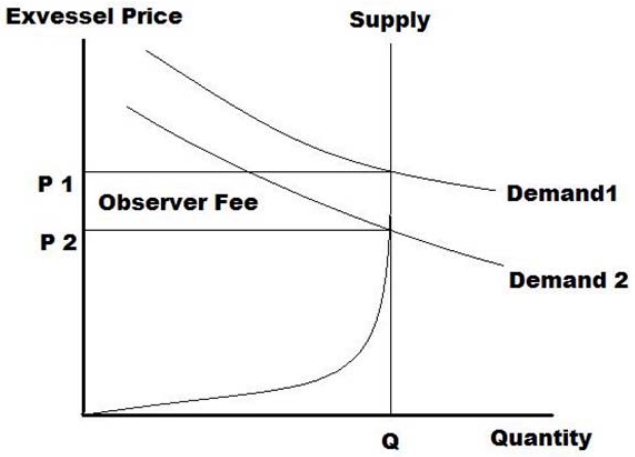


Figure 26 Conceptual diagram of ex-vessel supply and demand for a fully harvested, valuable fish (e.g., halibut)

In a competitive market, the welfare impact of the fee tends to flow back to the factors of production, one of which is **harvesting crew**. Crew are compensated on shares of revenue. The cost burden to crew depends partly on whether their contract with the vessel calls for fees and taxes to be taken off the top before crew shares are calculated or if they are borne proportionally by both the crew and the vessel-share. Of the partial coverage fisheries, crew working on IFQ vessels that are paying lease fees or financing purchased, non-initially issued quota ("quota fees") would face a greater cumulative effect on their income from the observer fee on top of other fish taxes and expenses deducted prior to determining shares.

Effects on **communities** related to the fee would be tied to any changes to where fishing, processing, or observer deployment occurs. The amount of total fish harvested is not expected to be affected by the

presence of an observer fee, so any impacts would be distributional in nature. As noted above, the analysts do not conclude that the fee, in and of itself, would be responsible for a vessel exiting the fishery or changing the location of its deliveries. As a result, the fee is not likely to shift income from one community to another. However, to the extent that the fee is income-reducing, participants who reside or spend money in fishing communities would have a marginal reduction in income and spending that could reverberate to some degree. The reduction in income and spending for fishery participants could be offset to some extent by the income and spending on lodging and consumption by observers stationed in those same communities. The distributional nature of where observers work and spend could vary from year to year depending on how the ADP assigns monitoring to a certain gear sector that might be more or less represented in a given community. Communities that see only vessels less than 40' LOA would likely not host any observers, but their local participants would still be subject to the fee. Finally, to the extent that the fee reduces ex-vessel values, it could be responsible for a marginally lower basis on which some raw fish taxes are assessed.

The effect of the observer fee on **observer providers** and **observers** is generally positive, as it supports their business. The breadth of that effect depends on the number of providers working under the Federal contract. That number will likely be two, going forward – one observer provider and one EM provider. Providers would only experience a negative impact if the existence of the fee combined with other factors make the fishery less appealing and effort – and thus demand for observer days – declines. This is unlikely, and if a large shift in effort were to occur it is unlikely to be attributed to the observer fee aspect of the fishery.

The preceding survey of the impact of a fee on various stakeholders focused on whether and how the existence of a fee imposes direct or indirect costs. The analysts also note that the fee serves the purpose of providing reliable and unbiased data for fishery management, which is crucial to the stakeholders' ability to continue benefitting from the resource. One could also view Alternative 1 as the absence of a fee increase. If it turns out that a fee increase is necessary to achieve monitoring objectives under future effort, value, and cost scenarios then Alternative 1 results in a situation where NMFS manages the fishery with a lower resolution in its data. The effect of this is illustrated in the figures in Section 4.2.2.7 where low fee rates are simulated and result in catch and bycatch estimation that are based less on direct observation and more on extrapolation from other vessels in the fishery. As NMFS is forced to rely on less granular levels of estimation, the Agency would likely take more precautionary management steps that could marginally reduce fishing opportunities in some cases.

5.6.1.2 Impacts in relation to monitoring objectives

Minimize the monitoring effect

The monitoring effect (also called "observer effect") is closely related to the policy goal for accurate PSC accounting, and for equitability among participants in bearing the burdens of monitoring. The observer effect also impacts NMFS's representative sampling goal, as the phenomenon results in data from observed vessels that are not representative of unobserved vessels. Therefore, minimizing or eliminating the potential for an observer effect is both a sampling goal and a policy goal. In 2017, currently the most recent year for which data is available, there were no metrics with low enough p-values to examine whether observed trips were similar to unobserved trips in the POT or TRW Tender strata (2017 Annual Report, p.52). The restructured program has given NMFS the ability to analyze representative observer data to detect potential monitoring effects, and the Agency has done so since 2013. That task was not possible under the previous observer structure. The fact that NMFS is able to scan for this effect objectively represents an improvement in fishery management.

Maintaining or expanding coverage would be expected to have a positive impact on minimizing or eliminating the potential to detect an observer effect, while decreasing coverage would be expected to have no impact or a negative impact on that ability. Given the headwinds of increasing costs and the absence of supplementary Federal funds it is possible that simply maintaining the annual level of fee revenues collected under the program to date will not result in maintaining coverage levels for all

fisheries. Expanding coverage would likely require increased capacity in the form of more observer-days or broader EM implementation, both of which cost money. Therefore, this alternative may be expected to have no impact or a negative impact on the ability to detect and address a "monitoring effect."

Improving discard estimates, minimizing variability, and reducing coverage gaps in all strata/reporting areas

Improving data reliability was one of the primary drivers for restructuring the Observer Program (see Section 4.4.1). The current program expanded observer coverage to fill scientific data gaps, reduce bias in the data, and equitably distributes costs. The 2011 EA/RIR identified three types of scientific benefits from the restructured Observer Program (NMFS 2011): reducing sources of bias, reducing data gaps, and targeting observer coverage to address data needs. The restructured program achieves these benefits at the realized coverage rates and with the deployment methods that have been implemented since 2013. Additionally, due to the implementation of a statistically reliable sampling design and estimation procedures in the CAS, NMFS expects to realize these benefits within a range of coverage levels resulting from variable fee revenues, effort levels, and costs (NMFS 2015).

Considering once again the trends in fee revenues and costs, this alternative may be expected to have either no impact or some negative impact on improving discard estimates, including minimizing variability and reducing gaps.

Priority for monitoring PSC

The final 2019 ADP optimized trips above the hurdle based on the Council's policy recommendation, resulting in the higher relative weightings for sampling strata that are PSC constrained (0.70 for trawl and 0.27 for hook-and-line), compared to other strata (0.01 for pot and tender trawl, and <0.01 for tender pot; Table 4 in ADP 2019).[24] The draft 2019 ADP did not anticipate sufficient funding to cover *any* amount of optimized coverage above the 15% hurdle. The final 2019 ADP was only able to include optimization because fishing effort is expected to be lower than originally anticipated in October 2018, when the draft 2019 ADP was presented. If the Council chooses this alternative, it could be challenging to achieve optimization above a 15% hurdle for coverage in future years.

Detecting species decline or rare events

NMFS's multi-faceted approach to detecting species decline and rare events would not be directly impacted by this action. All else equal, this alternative is expected to have no impact or some negative impact on the achievement of this policy objective.

Design the program with flexibility to respond to evolving data and management needs in individual fisheries

Program design would not be directly impacted by this action. All else equal, this alternative is expected to have no impact or some negative impact on the ability for the program to be flexible in responding to evolving data and management needs in individual fisheries.

Provide for equitable distribution of the burdens of monitoring among fishery participants

This alternative would maintain the current system of equal fee collection across all fishery types set at 1.25%. The Council's intent in setting the original observer fee at 1.25% was to balance the need for revenue to support the observer program while minimizing impacts on the industry sectors included in the restructured program. During the 2013 restructure, the Council was considering a fee of less than 2

[24] From section 4.1.2: the 2019 draft ADP evaluated two sets of optimization metrics: 1) discards of groundfish, halibut PSC and Chinook salmon PSC; 2) discards of crab PSC in addition to discards of groundfish, halibut PSC, and Chinook salmon PSC. In their review of the draft ADP in October 2018, both the SSC and the Council recommended that the optimization be based on Chinook and halibut PSC, rather than optimization that included crab, reflecting a policy priority to optimize on certain PSC species.

percent on vessels less than 60 ft. LOA to minimize the costs to the smallest operations. However, to develop a fee program that would be fair and equitable across all sectors in the restructured program, the Council determined, at that time, that the same fee percentage should apply to all restructured sectors as they all benefit from resulting observer data that are essential for conservation and management of the fisheries in which they participate.

During the restructuring process, the Council identified that there would be a need to reevaluate the observer fee percentage after the first few years of the restructured Observer Program with actual information about program revenues, costs, and achieved coverage levels. If the Council chooses Alternative 1, the implication would be that the Council has determined an equal fee across fisheries is synonymous with equitability.

In terms of how the fee is shared between the harvesting and processing sectors, the analysts noted above that the true welfare impact of the fee is probably not exactly in the 50:50 nominal proportions by which fee payments are remitted. This concept was presented to the Council when it first considered the restructure (NMFS 2011), so the analysts presume that the Council determined at the time that nominal cost sharing was the best and closest way to achieve cost equitability given the mechanisms that need to exist in order to actually collect fees in a timely and transparent manner.

Design the program so that the requirement for monitoring does not impact vessels' operational choices

The Observer Program design would not be directly affected by this action. While the number of vessel participating in partial coverage has decreased since the restructure implementation in 2013, the analysts do not presume a causal link to the observer fee. Participation in the diverse suite of species/gear fisheries is driven by a range of factors, among which the observer fee is not likely to be the lead.

Aside from exiting the fisheries, one way to detect an operational impact would be the presence of a monitoring effect. As noted above, NMFS conducts annual analyses to scan for this effect and has not conclusively identified one. The Council and NMFS are developing actions to address changes in behavior related to the use of tender vessels that may or may not be related to observer coverage requirements.

The Council and NMFS developed the fixed-gear EM program as a direct response to stakeholder feedback that observer coverage requirements were, in some cases, affecting crew size and/or crew accommodation. EM is now an option for the portion of the fleet that was most likely to be affected by the requirement to carry an observer when randomly selected (i.e., fixed-gear vessels between 40' and 57.5' LOA).

If it were the case that the program restructure and the observer fee have affected operational choices, Alternative 1 would have no additional impact relative to the status quo.

Foster and maintain positive public perception and stakeholder support

The development and ongoing administration of the Observer Program and EM have included stakeholder involvement through the normal public commenting channels as well as multiple stakeholder advisory groups. While support for the program is subjective in nature, the Council's lengthy list of ongoing regulatory and analytical projects are driven by this input. Some projects are focused on expanding or improving the representativeness of coverage to achieve certain policy objectives; some are focused on reducing the operational burden of participating in monitoring; others, including this one, are responsive to concern about the ongoing stability of the program. This alternative might foster positive public perception from stakeholders who want to minimize their tax, fee, and cost recovery burden, but it might not foster positive perception from those who request increased monitoring on all (or certain) fisheries or sectors.

Risk tolerance

Compared to the action alternatives, Alternative 1 would increase the relative risk by an unknown magnitude that fee revenues (real dollar terms) and the resultant coverage levels may decline below 2013 through 2018 levels.

5.6.2 Alternative 2 – Adjust the Fee Equally Among Sectors

Alternative 2 would allow the Council to change the observer fee percentage by the same amount for all four partial coverage fisheries (i.e., gear sectors). Given the purpose and need for this action, the analysts presume that the Council is mainly considering *increasing* the fee to some level between 1.25% and 2% (inclusive). The reader should bear in mind that increasing the fee percentage does not strictly mean that fee revenues will increase, since actual revenues are a function of the fee percentage, harvest, and standard ex-vessel prices. Under certain circumstances, a higher fee percentage might yield similar revenues to what has been historically collected under the restructured program; revenues could also go higher or lower depending on the biological and market status of the target species. It is likely that a higher fee percentage will result in more revenues, at which point the reader should bear in mind that collecting a larger amount of fee dollars does not translate directly to more observer days (costs can increase), nor to higher selection percentages across all fisheries (determined annually via the ADP process). Despite these caveats, Alternative 2 undoubtedly raises the *likelihood* that the monitoring program (observers and EM) will have additional funds at its disposal relative to what would have been available under the No Action alternative. For example, this analysis cannot point to any fee level up to 2% and say with certainty that in a given future year the ADP will have days available for optimization beyond the gear-specific hurdle selection rates. A simplistic way to consider this alternative relative to No Action is that, at worst, it slows the rate at which fee revenues slip behind monitoring costs should those costs continue to rise as expected.

Section 4.2 in the EA examines the fee revenues that would have been expected under the range of Alternative 2 fee percentages if they had been in place during the 2009-2017 or 2013-2017 periods (see Table 7 and Figure 7, and Table 8 and Figure 8). The Gap Analysis applies mean revenues from that retrospective study to the exploration of how a higher fee percentage could achieve the hurdle threshold, granting some assumptions about the distribution of fishing effort. In other words, the Gap Analysis looks at how often funds and monitoring resources would be available to fill gaps or achieve other monitoring objectives by adding weight to the selection probability for certain fisheries (optimization). Note also that the results in the Gap Analysis differ depending on assumptions about ex-vessel prices and harvest, as expected nominal fee revenues were lower in the period since the restructure (2013 and on) compared to the prior years. Section 4.2 essentially provides the reader a look-up tool to search the likelihood of reaching a certain revenue level at a given fee percentage, and then simulates how that amount of funding would translate into coverage of trips and the proportion of unobserved trips where catch, discards, and bycatch have to be estimated with varying degrees of nearest-match data. Note that the simulation in the Gap Analysis does not account for the unknown cost of EM coming off the top of the fee budget. This document handles that problem by providing tables that show an "effective" fee rate and available fee revenues after EM costs have been deducted (Table 12 and Table 13 in Section 4.2.2.7).

To the extent that a goal of this alternative is to have additional fee revenues relative to No Action, and that those funds and resultant observer days can be "optimized" to achieve policy objectives, Table 10 (Section 4.2.2.7) provides a useful example of how monitoring resources are currently translated into policy objectives. The optimization weights for each observer strata reflect that strata's need for additional monitoring based on the Council's priorities. In this case, resources are indirectly directed towards strata that need more monitoring for at-sea discards and Chinook salmon or halibut PSC. Table 10 shows that the Gap Analysis simulation dedicated 72% of optimizable monitoring (that which is available after meeting the hurdles) to the trawl stratum, 23% to the hook-and-line stratum, and 3% or less to each of the tender-trawl, pot, and tender-pot strata.

5.6.2.1 Impact on stakeholder groups

Similar to the imposition of a fee, as described under Alternative 1, the analysts do not predict that raising the fee by up to 0.75% would cause a contraction in the Alaska fishing industry in and of itself. A fee increase constitutes a cumulative impact that combines with other taxes, fees, and costs, as well as the larger ebbs and flows of the industry and the region-wide business cycle.

The cost impacts on **vessel operators** and **crew** under Alternative 2 are similar in nature to those described for Alternative 1, albeit potentially exacerbated as the fee consumes a larger proportion of total gross revenues. As noted under Alternative 1, the information necessary to assess the marginal impact on profitability for an individual operation or firm is not available. As with any tax or fee that is applied to all parties at the same rate regardless of profitability or financial resources, a use charge like the observer fee is regressive in nature. In other words, the same fee rate has a greater effect on entities with thin margins or low revenues relative to their fixed costs. An example from outside the fisheries context would be a sales tax on a consumer good. The marginal cost of the tax might not be noticeable to a wealthy consumer but could deter certain individuals from making a purchase. While the harvest sector bears at least half of the direct cost of the fee, that set of stakeholders also derives the benefits of improved monitoring described in Section 3.1. As noted in Section 3.6.3, spatial and temporal bias in fishery observer data was much reduced when selection rates reached the threshold selection rate that currently constitutes the 15% "hurdle."

The likely cost impact of increasing the fee on **processors** is similar in nature to those described under Alternative 1, then factoring in the additional direct cost of the higher rate. To the extent that maintaining or enhancing the functionality of the observer program in the face of funding challenges allows managers to keep fisheries open in-season, track PSC in near-real time, and account for incidental catch of marketable species, processors benefit where better management tools (data) result in higher TAC and more product delivered. Alternative 2 would not alter the manner in which the fee is collected from processors by NMFS, so no significant additional administrative costs are expected.

The potential impacts of raising the fee on Alaska fishing **communities** is also an extension of the effects described under Alternative 1. Table 29 and Table 30 (Appendix E, and summarized in Section 5.5.3 of the RIR) show that roughly 17% of ex-vessel revenues for communities where a partial coverage vessel's owner lists residence are derived from partial coverage fisheries. That figure is around 11% for Washington, 32% for Oregon, and 26% for Alaska. Within Alaska, the proportion of revenues derived from partial coverage fisheries varies widely by community – from less than 10% to over 95%.

Relative to No Action, the impact of Alternative 2 on **observers** and **observer providers** appears to be a straight-forward benefit. Increasing the fee would increase the likelihood that the program has the ongoing wherewithal to meet or exceed contractually guaranteed purchases of sea-days or EM services.

5.6.2.2 Impacts in relation to monitoring objectives

Minimize the monitoring effect

The monitoring effect is closely related to the policy goal for accurate discard and PSC accounting, and for equitability among participants in bearing the operational burden of monitoring. The monitoring effect also impacts NMFS's representative sampling goal. Therefore, minimizing the potential for an effect is both a sampling goal and a policy goal. Maintaining or expanding coverage is expected to have a positive impact on minimizing or eliminating the potential for a monitoring effect, whereas lower rates of coverage are expected to have no impact or a negative impact. Expanding coverage would likely require increased capacity in the form of more observer days or broader EM implementation, both of which require additional funding. Relative to No Action, this alternative is expected to have some positive

impact on the ability to minimize a monitoring effect so data from observed vessels are representative of unobserved vessels.[25]

Improving discard estimates, minimizing variability, and reducing coverage gaps in all strata/reporting areas

Improving data reliability was one of the primary drivers for restructuring the Observer Program (see Section 4.4.1). The restructuring of the Observer Program expanded observer coverage to fill scientific data gaps, reduce bias in the data, and equitably distribute costs. The restructured program achieved the benefits predicted in the 2011 EA/RIR at the realized coverage rates and with the deployment methods implemented through the ADP since 2013. Due to the implementation of a statistically reliable sampling design and estimation procedures in the CAS, NMFS expects to realize these benefits within a range of coverage levels resulting from variable fee revenues, effort levels, and costs (NMFS 2015). Relative to No Action, this alternative is expected to have a positive impact on improving discard estimates, including minimizing variability and reducing gaps. The extent to which variance estimates are improved is contingent on a number of factors that are not related to the fee percentage (e.g., fee revenues, monitoring costs).

Priority for monitoring PSC

The final 2019 ADP optimized trips above the hurdle based on the Council's recommendation, resulting in the higher relative weightings for sampling strata that are PSC constrained (of 0.70 for trawl and 0.27 for hook-and-line), compared to other strata (0.01 for pot and tender trawl, and <0.01 for tender pot).[26] The draft 2019 ADP did not anticipate sufficient funding to cover any amount of optimizable coverage above the 15% hurdle. The final 2019 ADP did ultimately include optimization days because fishing effort was projected to be lower than what was originally anticipated in October 2018 when the draft 2019 ADP was presented. If the Council chooses this alternative, it could potentially alleviate some funding challenges and increase the likelihood that optimization above a 15% hurdle is feasible in a given year. Recent decisions to use optimization to weight monitoring toward the trawl sector reflects the Council's policy choice to dedicate observer effort to trawl fisheries that are constrained by Chinook salmon and halibut PSC.

Detecting species decline or rare events

NMFS's multi-faceted approach to detecting species decline and rare events would not be directly impacted by this action. All else equal, this alternative is expected to have no impact or a positive impact on the achievement of this objective depending on the status of revenues relative to costs.

Design the program with flexibility to respond to evolving data and management needs in individual fisheries

Program design would not be directly impacted by this action. Relative to No Action, this alternative is expected to have no impact or a positive impact on the ability for the program to be flexible in responding to evolving data and management needs in individual fisheries. This alternative could also buffer the already-strained observer budget as the monitoring program brings the cost of EM under the fee umbrella; the fixed-gear EM program was, in large part, implemented as a tool to increase flexibility of how monitoring is executed.

Provide for equitable distribution of the burdens of monitoring among fishery participants

[25] In 2017, the most recent year for which data is available, there were no metrics with low enough p-values to examine whether observed trips were similar to unobserved trips in the pot or trawl_tender strata (2017 Annual Report, p.52). Determining what coverage is needed to evaluate the observer effect at the post-stratified gear/target fishery level was removed from this fee analysis in February of 2018 due to timing and staffing capacity constraints. That evaluation remains on the list of monitoring-related analytical tasks to be scheduled.
[26] See also Table 10 for how optimization weights are applied in the Gap Analysis.

Noting the fact that Alternative 2 increases the fee uniformly across fisheries, the distribution of sector-level impacts should be similar to those described under Alternative 1. When developing the restructured program, the Council determined that the same fee percentage should apply to all sectors as they each benefit from resulting observer data that is essential for conservation and management of the fisheries in which they participate. If the Council chooses Alternative 2, the implication would be that the Council has determined that an equal fee across fisheries meets its definition of equitability.

The analysis provided in Section 5.6.1 notes that the observer fee, and thus any increase to the rate, might have a greater effect on the harvesting sector. That said, the Council's current position as expressed in its decision to recommend the fee (NMFS 2011) is that an equal fee is the most practicable way to achieve equitable monitoring responsibilities among the harvesting and processing sectors.

Design the program so that the requirement for monitoring does not impact vessels' operational choices

Program design would not be directly impacted by this action. This analysis does not assume a causal link between the level of the observer fee and aggregate participation in the fishery. In terms of how vessels operate in the fishery, Alternative 2 could increase observer coverage levels in some cases. To the extent that vessels would behave differently when carrying an observer, this alternative could exacerbate that effect. However, as noted in Section 5.6.1, NMFS conducts annual analyses to scan for a monitoring effect and has not conclusively identified one. Fixed-gear vessels that might be operationally impacted by carrying an observer could choose to opt into the EM pool; increasing the fee percentage might have the effect or maintaining or expanding the Council's ability to fund EM at the current fleet size or a greater size depending on how future fees translate into revenues and EM services under the Federal EM contract that has not yet been issued.

Foster and maintain positive public perception and stakeholder support

Selecting Alternative 2 would be an affirmative action responsive to concern about the ongoing stability of the program.

Risk tolerance

Relative to No Action, Alternative 2 could decrease the risk that revenues from the fee decline below 2013 through 2018 levels. The extent to which actual revenues increase or decrease depends on the combination of future harvest and standard ex-vessel values.

5.6.3 Alternative 3 – Adjust the Fee Variably Among Sectors

Alternative 3 would allow the Council to recommend different observer fee percentages for each of the fisheries (gear sectors) within the partial coverage category. Under the MSA, the Council has the authority to determine the standard that defines fairness and equitability with regard to how the observer fee is applied. While the Council selected an equal fee percentage when the restructured program was implemented in 2013, the Council may reevaluate the program's performance, cost, and best path to continued achievement of objectives with the benefit of six years of experience under the fee and an updated perspective on management priorities and expected revenue outlook. As the Council considers how it applies the fee in terms of its monitoring objectives, it might – for example – weigh how sectors differ in the amount of discards they generate, whether or not they are managed under PSC limits, or whether they participate in the EM program that will soon be funded with fee revenues. If the Council selects Alternative 3 it would be changing its definition of equitability. In doing so, the Council should articulate the metrics by which equitability among sectors should be evaluated in subsequent analyses of this action. Because the existing program is designed on the principle that all partial coverage participants pay into the program, the analysts presume that Council is not necessarily obligated to tie fee percentages to fishing effort, revenue generation, or other measures of direct interaction with observer deployment.

This document provides background information on the relative proportion of ex-vessel values and fee revenues generated by each gear sector since 2013, and dating back to 2009 based on assumptions about

which fishing activity would have fallen under the restructured program's partial coverage category. Figure 6 shows the relative predominance of partial coverage ex-vessel revenues coming from the hook-and-line sector. Trawl gear accounts for the second most revenue, followed by pot gear. The jig sector accounts for a small amount of fee revenues. In Section 4.2.1.6, actual dollar amounts (nominal and inflation-adjusted) are presented in Table 5 and Table 6. Table 7 and Table 8 retrospectively characterize the revenues that would have been generated from each gear sector under the various possible fee percentages for low-revenue years, high-revenue years, and the average year during the analyzed period. This document also reflects the proportion of observer coverage that has been dedicated to each gear sector since the ADP moved to gear-based selection in 2016 (Table 17).

Because Alternative 3 represents a different application of the "fee increase" concept discussed under Alternative 2, this subsection does not repeat the discussion of differential impacts by stakeholder category. However, it should be noted with regard to processors that the analysts reached out to participants and NMFS staff who are involved in the collection of fees and were made to understand that collecting different fee percentages based on gear sector would not impose a significant marginal administrative cost.

5.6.3.1 Impacts in relation to monitoring objectives

Minimize the monitoring effect

The likely impact of this alternative relative to No Action are similar to those described under Alternative 2, though the scale of that impact would depend on the fee percentages under consideration. Under any circumstance, increasing the fee base reduces the likelihood that the program cannot detect a monitoring effect. The possible existence of a monitoring effect has not been identified in, or ascribed to, a particular sector, so it is not possible to say that raising the fee in only one fishery could reduce such an effect in a targeted manner. Moreover, deployment of monitoring resources across fisheries is not directly linked to the fees that are collected in that fishery; rather, deployment is determined through the ADP process in the manner that best achieves objectives, reaches hurdles, and reduces variance estimations given the funding constraint and the cost of the Federal contract(s).

Improving discard estimates, minimizing variability, and reducing coverage gaps in all strata/reporting areas

Meeting this objective is, in a sense, a function of available funds and targeted deployment as determined by the ADP and subject to effort projections that vary annually. The difference in Alternatives 2 and 3 is a matter of degrees and the source of fee revenues does not directly bear on whether this objective is achieved. To the extent that meeting this objective is correlated to the availability of funds – setting relative cost increases aside – Alternative 3 could allow the Council to maximize fee revenues by shifting the burden to higher-value fisheries. The Council would need to articulate how that approach meets its definition of fairness and equitability.

Priority for monitoring PSC

Alternative 3 provides the most targeted approach to linking the observer fee to a monitoring objective because the trawl gear sector is the only partial coverage fishery that is constrained by PSC limits set in regulation. Table 5 and Table 6 show that the trawl sector consistently accounts for the second largest amount of fee revenues, trailing hook-and-line but ahead of pot and jig gears. If the Council wishes to pursue a use-based approach to monitoring fees, it would need to define whether the "use" metric is based on observer-days, program spend (inclusive of EM costs), or the relative interaction with events that are highlighted in the program objectives (e.g., PSC encounter, discards).

Detecting species decline or rare events

NMFS's multi-faceted approach to detecting species decline and rare events would not be directly impacted by this action. All else equal, this alternative is expected to have no impact or a positive impact

on the achievement of this objective depending on the status of revenues relative to costs. Assessing the observer fee on the basis of fishery (gear) would not directly affect the proportion of monitoring on any given species because actual deployment is determined through the ADP once all fees are collected, costs assessed, and coverage optimized. The source of fee revenues does not determine how and where monitoring effort is deployed. As a result, the effect of this alternative compared to Alternative 2 is not apparent.

Design the program with flexibility to respond to evolving data and management needs in individual fisheries

As noted above, the deployment of monitoring effort is not directly related to the source of fee revenues. The analysts presume that any change to the fee percentage would be set in regulation – whether by fishery or equal across all partial coverage participants – so selecting Alternative 3 would not increase flexibility to reassess and adjust fairness and equitability over time relative to Alternative 2.

Provide for equitable distribution of the burdens of monitoring among fishery participants

During the restructuring process, the Council identified that there would be a need to reevaluate the observer fee percentage after the first few years of the restructured Observer Program with actual information about program revenues, costs, and achieved coverage levels. If the Council chooses Alternative 3, the implication would be that the Council has determined an equal fee across fisheries not to be synonymous with equitability.

The ex-vessel-based fee was determined to be fair and equitable at the time of restructure because it is based on a standard measure of the value of the fishery resource harvested or processed by the participants and it applies regardless of whether a vessel or processor is required to carry an observer. Stakeholders (primarily via FMAC) have voiced concern that the current equal fee percentage may not be equitable, as intended. There is interest in seeing the fishery types that use more observer coverage paying for a greater proportion of fee revenues. Alternative 3 has the potential to respond to those stakeholder concerns. It should be noted, however, that funding the monitoring program to the extent that it has operated since 2013 has relied on both supplementary Federal funds and outside foundation grants for EM development. On an accounting level, no gear sector has solely generated an amount of fee revenues that would have independently supported the cost of the days deployed in that sector (based on observer-days multiplied by the average per-day cost given in the Annual Report, as compared to the fee revenues listed in Table 6).

Relative to Alternative 1 or 2, Alternative 3 does not represent a difference in equitability regarding the fee split between harvesters and processors. Alternative 3 also does not represent a difference from the other alternatives in how a revenue-based levy affects individual entities that vary in their profitability and access to financial resources to weather fluctuations in fisheries and markets.

Design the program so that the requirement for monitoring does not impact vessels' operational choices

Alternative 3 has the greatest relative potential to affect vessel operators' choices because differentiated fee rates by gear sector could guide participants' gear choice in some cases. For example, the 2017 implementation of a pot gear fishery for sablefish IFQ has led to an increase in pot sector revenues for that species. A significant difference in the observer fee for those two gear sectors – as perceived by participants – could push vessel operators on the margin to elect one gear versus the other. That choice would be constrained by the capability of the vessel owner's platform and access to the funds necessary to re-gear the operation. That said, decisions about which gear to deploy are not likely to be driven solely by the observer fee. Operators choose their gear based on catch rates, market prices (when differentiated by gear), vessel capabilities, and other factors like bycatch constraints and whale depredation. Alternative 3 is not likely to move a large number of fixed-gear vessels into the trawl sector because access to the trawl fishery is often constrained by the need for an LLP license endorsement. One would not expect operators

to move their business from a higher volume sector to a low-volume sector (e.g., jig gear) based solely on a marginal fee rate difference that would presumably be no more than 0.75%.

Foster and maintain positive public perception and stakeholder support

Selecting Alternative 3 would be an affirmative action responsive to concern about the ongoing stability of the program. As the Council refines and articulates its definition of equitability and metrics to assess it, Alternative 3 could present an avenue to address the concerns of some stakeholders – voiced through public comment and the FMAC – that an equal fee percentage across gear sectors does not represent equitability.

Risk tolerance

Relative to No Action, Alternative 3 could decrease the risk that revenues from the fee decline below 2013 through 2018 levels. The extent to which actual revenues increase or decrease depends on the combination of future harvest and standard ex-vessel values. The effect of Alternative 3 on minimizing the risk of data gaps relative to Alternative 2 depends on the fee percentages recommended by the Council for further analysis.

5.7 Potentially Affected Small Entities

Section 603 of the Regulatory Flexibility Act (RFA) requires that an initial regulatory flexibility analysis (IRFA) be prepared to identify whether a proposed action will result in a disproportionate and/or significant adverse economic impact on the directly regulated small entities, and to consider any alternatives that would lessen this adverse economic impact to those small entities. As of 2017, NMFS Alaska Region will prepare the IRFA in the classification section of the proposed rule for an action. Therefore, the preparation of a separate IRFA is not necessary for the Council to recommend a preferred alternative. This section provides information that NMFS will use to prepare the IRFA for this action, namely an estimate of the number of small, directly regulated entities to which the proposed action will apply.

The harvesting entities that would be directly regulated under this action are catcher vessels that fish in partial coverage fisheries and a small number of catcher/processors that may request to be placed in partial coverage by virtue of falling beneath a maximum production threshold. Section 4.4.3.2 in the EA notes that the number of CPs eligible for partial coverage when fishing off Alaska is currently estimated to be between six and 10. Under the RFA, businesses classified as primarily engaged in commercial fishing are considered small entities if they have combined annual gross receipts not in excess of $11.0 million for all affiliated operations worldwide, regardless of the type of fishing operation – i.e., finfish or shellfish (81 FR 4469; January 26, 2016). If a vessel has a known affiliation with other vessels – through a business ownership or through a cooperative – the vessel's gross receipts are measured against the small entity threshold based on the total gross revenues of all affiliated vessels. Because public information on business ownership is incomplete, this analysis only considers affiliation in the form of membership in a fishing cooperative. AKFIN applies combined gross revenues at the cooperative level for catcher vessels that participate in the CGOA Rockfish Program, the Bering Sea AFA pollock fishery, or a crab cooperative.

In 2017, the most recent year for which ex-vessel revenue data are available, 1,041 vessels participated in partial coverage fisheries. Of those, 942 are classified as small entities (three were CPs and the rest CVs). Of those 942 vessels, by gear type, 844 vessels fished hook-and-line gear, 115 fished pot gear, 30 fished trawl gear, and 32 fished jig gear. As might pertain to Alternative 3, 75 of the 942 small entity vessels fished two gear types in partial coverage fisheries during 2017, while one small entity vessel fished three gear types. Of the 75 small entity vessels that fished two types of gear in 2017, 67 fished hook-and-line and pot gear while the other eight fished hook-and-line and trawl.

Companies that operate shoreside processors or stationary floating processors are also covered by RFA requirements. The threshold for a processing company to be classified as a small entity is whether it employs more than 750 persons in its worldwide operations. Neither NMFS nor AKFIN has the reliable information on ownership affiliations between individual processing operations or the facility-level employment counts that would be necessary to make classifications. For the purpose of an IRFA, NMFS will assume that all of the processors directly regulated by this action *could* be small. Section 5.5.3.2 identifies 61 shorebased processors and 16 floating processors that received partial coverage deliveries in 2017. Twelve catcher/processors processed fish that was caught while subject to the partial coverage fee. Those CPs were not, themselves, small entities due to their activity within full coverage fisheries.

It is worth noting that the analysis prepared for the Observer Program restructuring (NMFS 2011) identified seven AFA processors and seven other shoreside plants known to be owned by AFA processing companies as affiliated and, together, were identified as non-small entities. Though dated, that analysis used 2008 groundfish eLandings data to identify 146 out of 160 shoreside and stationary floating processors as small entities. That count is high compared to the number of processors identified in this document because this analysis mainly considers processors that have taken partial coverage deliveries, which was not a category at the time.

5.8 Management and Enforcement Considerations

The proposed action is not expected to result in changes to NMFS management of the BSAI or GOA groundfish or halibut fisheries. NMFS will continue to use current catch accounting methods to account for target and incidental catch as well as PSC and MRAs. NMFS will continue to use this information to open directed fisheries, monitor and tabulate PSC and MRAs against PSC and MRA limits, and close directed fisheries when a limit has been reached. This action would change the relative amount (measured in percent) of fees collected from landed groundfish and halibut eligible for partial coverage in the Observer Program; however, it does not affect the groundfish or halibut harvest allocation in the BSAI or GOA. Thus, no change in monitoring and management burden is expected other than changing the amount of fees collected.

5.9 Summation of the Alternatives with Respect to Net Benefit to the Nation

This section focuses on the net benefits of the fee program at the broadest level. It will be further developed to distinguish between the various fee levels present within the alternatives once the Council has identified a preliminary preferred alternative.

The purpose of restructuring the Observer Program was to reduce bias in observer data, authorize the collection of observer data in sectors that did not previously have any observer coverage requirements, allow fishery managers to provide observer coverage to respond to the management needs that arise in particular fisheries, and assess a broad-based fee that reflects the value that a vessel or processor extracts from the fishery.

The Council's intent in setting the original observer fee at 1.25% was to balance the need for revenue to support the observer program while minimizing impacts on the fishery participants who would pay the fee under the restructured program. The principles of the ex-vessel value-based fee program set forth by the Council were that all participants pay a share of the fees regardless of whether they accommodate an observer onboard or in their plant, that the fees are fair and equitable, and that user fees not be directly linked to actual coverage levels when coverage is less than 100%. Given that the observer fee cannot be collected twice on the same fish, a 50:50 split in the fee liability for shoreside landings between vessel operators and processors is seen as an equitable arrangement of respective fee liabilities that is not linked to coverage levels. A 50:50 split in the ex-vessel value fee liability allows NMFS to collect up to, but not more than, 2% of the ex-vessel value from all participants and does not charge the processing or

harvesting sector a disproportionate amount of the ex-vessel value fee. The 50:50 ratio represents an equal split that was also deemed equitable by the Council when establishing the program. This action does not explicitly consider a change in the policy that guides the relative cost share between processors and harvesters.

In restructuring the observer program, the Council considered a fee of less than 2 percent for small vessels (i.e. those less than 60 ft. LOA) to minimize the costs to the smallest operations. However, at that time, the Council determined that applying the same fee percentage to all sectors best represented fairness and equity since each benefits from the resulting data that are essential for conservation and management of the fisheries in which they participate. The analysis supporting the implementation of the existing monitoring plan was unequivocal in concluding that the implementation of a fee created a National net benefit that would be experienced by all sectors and fisheries relative to the status quo at that time.

Net benefits at the individual level – i.e., distributional impacts – are more difficult to assess but are discussed qualitatively in Section 5.6. The analysts recognize that while the fee takes the same percentage of gross revenue from each participant, those amounts vary and their absence might be felt more strongly by operations (of any size) that work on thin margins after costs are subtracted from revenue. Individual-level cost information is not available for this analysis. Because the analysts cannot perform a net revenue-impact comparison across participants, there remains an element of subjectivity as to whether or not a participant is deriving a net benefit from paying into the monitoring plan at a given fee rate. Granting that fact, and the fact that this section is concerned with benefits to the Nation as a whole, the final version of this document will accept that adequate monitoring and the ability to focus monitoring on policy objectives is a net benefit to the Nation. As such, the ultimately selected preferred alternative should make it *more likely*, relative to the No Action alternative (Alternative 1), that the monitoring plan is positioned to achieve its goals on an ongoing basis and do so in a manner deemed fair and equitable by the Council.

In the restructure analysis, a 1.25 percent fee was estimated to generate around $4.2 million per year, based on the estimated average of ex-vessel revenues from 2005 through 2008, and fund over 9,000 observer days. In no year since the 2013 implementation has fee revenue reached $4.2 million. Total days funded (i.e., purchased or used) in the partial coverage category has not surpassed 5,500 and has been decreasing each year since 2015 (see Table 2-1 in the 2017 Observer Program Annual Report, or Table 6 and Table 17 in this document). Section 4.2.1 shows that the recent history of landings, ex-vessel prices, and subsequent fee revenues did not reach those levels, and Section 5.5.2 suggests that fee revenues cannot be anticipated to grow at a rate that outpaces the increasing cost of coverage in the near-term. Of note, the "cost of coverage" will soon include both the observer and EM contracts, meaning that monies dedicated to operating the EM program come off the top of the fee-based budget before observer days can be allocated and/or optimized to address policy objectives. Neither Federal contract has been issued at this time; nevertheless, a general understanding of natural cost growth (inflation) in programs that are labor and capital intensive would suggest that monitoring costs are likely to increase year-on-year whereas ex-vessel fee revenues may or may not (see Section 4.3 and **Figure 9** regarding contract uncertainty and observer cost curves). It should be noted that as the EM program matures – with fewer vessels needing installation and a tapering off in technical support required – EM offers the possibility of marginal cost savings. The extent of those savings, should they be realized, depend in part on how the Council chooses to deploy EM efforts and funds vis-à-vis the ADP process.

Improved observer data and monitoring under the restructured Observer Program since 2013 generates better information to make in-season management and policy decisions, facilitating the attainment of optimum yield, and enhances the sustained health of the resource, fishing sectors, and dependent communities. Additionally, due to the implementation of a statistically reliable sampling design, NMFS expects to realize these benefits at a realistic range of coverage levels resulting from variable fee revenues, effort levels, and costs (NMFS 2015). Stipulating that the existing monitoring plan has provided a net benefit to the Nation in the form of less-biased data derived from a fee that is fairly collected, the Council could judge the net benefit of this action on the metric of how likely it is to maintain the

program's quality and adaptability, and whether the fee necessary to do so is administered according to the Council's reasoned definition of equitability. The likelihood that monitoring costs will increase more quickly than fee revenues creates a headwind. This obstacle could exist under the No Action alternative or either of the action alternatives. As such, the Council could consider alternatives relative to the status quo in terms of how likely the program is to meet its objectives in a given year. These likelihoods are best illustrated in Figure 7 and Figure 8 in Section 4.2.1.6.

6 Magnuson-Stevens Act and FMP Considerations

6.1 Magnuson-Stevens Act National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Fishery Conservation and Management Act. In recommending a preferred alternative, the Council must consider how to balance the National Standards. After the Council has identified a preliminary preferred alternative, the analysts will supply a brief discussion of how each alternative is consistent with the National Standards, where applicable. In recommending a preferred alternative, the Council must consider how to balance the National Standards.

National Standard 1 — Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

National Standard 2 — Conservation and management measures shall be based upon the best scientific information available.

National Standard 3 — To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

National Standard 4 — Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be; (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

National Standard 5 — Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

National Standard 6 — Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

National Standard 7 — Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

National Standard 8 — Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of National Standard 2, in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

National Standard 9 — Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

National Standard 10 — Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

6.2 Council's Ecosystem Vision Statement

In February 2014, the Council adopted, as Council policy, the following:

Ecosystem Approach for the North Pacific Fishery Management Council

Value Statement

The Gulf of Alaska, Bering Sea, and Aleutian Islands are some of the most biologically productive and unique marine ecosystems in the world, supporting globally significant populations of marine mammals, seabirds, fish, and shellfish. This region produces over half the nation's seafood and supports robust fishing communities, recreational fisheries, and a subsistence way of life. The Arctic ecosystem is a dynamic environment that is experiencing an unprecedented rate of loss of sea ice and other effects of climate change, resulting in elevated levels of risk and uncertainty. The North Pacific Fishery Management Council has an important stewardship responsibility for these resources, their productivity, and their sustainability for future generations.

Vision Statement

The Council envisions sustainable fisheries that provide benefits for harvesters, processors, recreational and subsistence users, and fishing communities, which (1) are maintained by healthy, productive, biodiverse, resilient marine ecosystems that support a range of services; (2) support robust populations of marine species at all trophic levels, including marine mammals and seabirds; and (3) are managed using a precautionary, transparent, and inclusive process that allows for analyses of tradeoffs, accounts for changing conditions, and mitigates threats.

Implementation Strategy

The Council intends that fishery management explicitly take into account environmental variability and uncertainty, changes and trends in climate and oceanographic conditions, fluctuations in productivity for managed species and associated ecosystem components, such as habitats and non-managed species, and relationships between marine species. Implementation will be responsive to changes in the ecosystem and our understanding of those dynamics, incorporate the best available science (including local and traditional knowledge), and engage scientists, managers, and the public.

The vision statement shall be given effect through all of the Council's work, including long-term planning initiatives, fishery management actions, and science planning to support ecosystem-based fishery management.

In considering this action, the Council should be consistent with its ecosystem approach policy. Once the Council has identified a preliminary preferred alternative, the marginal impacts of the proposed action will be evaluated with respect to this policy.

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9 Appendices

9.1 Appendix A. Council Motions related to the Fee Analysis, 2017-2018

North Pacific Fishery Management Council

Agenda Item C-5

FINAL MOTION: Draft 2018 Annual Deployment Plan

October 6, 2017

Tendering

The Council initiates the following projects. Priorities will be discussed during staff tasking.

1) An analysis to change the definition of a tender trip. This analysis should include options 2a and 2b described in the tendering discussion paper that would either start a new trip with delivery to a tender, or limit the number of deliveries to a tender vessel and evaluate observer deployment from tender vessels.

2) Development of EM for trawl vessels fishing in the GOA pollock fishery to monitor for full retention and allow Chinook salmon monitoring during the offload at the processing plant.

Low Sampling Rates

The Council initiates an analysis to consider increasing the observer fee. The analytical process should follow the OAC recommendation to develop observer coverage reference points, including how changes to the zero selection pool and EM optimization affect current coverage levels.

Council Motion

Agenda Item D2 -- Observer Fee Analysis

February 11, 2018

The Council adopts the following purpose and need statement and alternatives for analysis:

Purpose and need

The North Pacific Observer Program (Observer Program) is widely recognized as successful and essential for the management of the North Pacific groundfish and halibut fisheries. The funding and annual planning and review process for monitoring vessels and processors in the partial coverage category are designed to implement a scientifically reliable sampling plan to collect data necessary to manage the commercial groundfish and halibut fisheries. This system distributes the cost of observer coverage across participants in the partial coverage category, and provides annual flexibility to evaluate the performance of and improve the sampling plan, in consultation with the Council. Through this process, monitoring selection rates are adjusted annually according to the available budget. In addition, the monitoring selection rates may be adjusted in response to fishery management objectives, as funding allows.

The annual process of establishing observer coverage and EM selection rates in the partial coverage category using the Observer Program Annual Report and Draft Annual Deployment Plan is a well-designed, flexible, and legally defensible process. This annual process produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage, and can allow for annual consideration of policy-driven monitoring objectives identified through the Council process.

To continue to improve the program, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems, additional funding for monitoring in the partial coverage category may be necessary.

Alternatives

Alternative 1: Status quo. Observer fee of 1.25% applies equally to all landings in the partial coverage category.

Alternative 2: Increase the observer fee up to 2% (analyze a range), to apply equally to all landings in the partial coverage category.

Alternative 3: Maintain the 1.25% observer fee applying equally to all landings in the partial coverage category, and additionally, raise the fee up to 2% (analyze a range) by gear sector (longline, pot, jig, trawl).

The Council supports the analytical approach as presented in the Analysis update. The analysis should also include a discussion of the relative impact of the alternatives with respect to Council policy objectives for monitoring beyond base thresholds.

C1 June 2018

Council Motion

June 7, 2018

Agenda Item C-1: Observer Program Annual Report & OAC Report

1. The Council supports the NMFS recommendations for the draft 2019 Annual Deployment Plan that are listed in section 7.1 (pg. 102) of the 2017 Annual Report.

2. Based on input from the OAC and AP, the Council also recommends the following:

• In the draft 2019 ADP, include an evaluation of a gear-specific hurdle that reduces the impact of NMFS regulatory areas with low fishing effort in determining the observer coverage rates for the hurdle.

• For the EM selection pool in 2019, the Council recommends:

o If funds are available, expand the EM selection pool up to a maximum of 165 vessels.

o Continue to implement a 30% trip-selection rate, using the pre-trip selection method.

• In the 2018 Annual Report (to be presented in June, 2019), the Council recommends that NMFS:

o Include an evaluation of observer effects at finer resolution than gear-level strata, so that observer effects in pelagic and non-pelagic trawl can be investigated.

o Continue to provide details on EM in Chapter 4 and also include information in the report about the number of EM trips selected, the number monitored, and the number reviewed, for clarification.

o Add an appendix that describes details of cost calculations for EM and observer days over time.

• The Council also recommends that NMFS communicate with the OAC on the results from the proposed ODDS agency subgroup.

3. The Council supports the continued participation of the OAC Subgroup in the development of the fee analysis, including the opportunity for OAC review of the analysis before Initial Review at the Council.

4. The Council appreciates the preliminary survey report from OLE and acknowledges the evidence of disparate work environment for female and male observers. The Council encourages efforts to further understand these work conditions and develop solutions.

D-3 Motion

Observer Coverage on Vessels Delivering to Tenders

Council Motion

Sunday December 9, 2018

The Council takes no further action at this time.

9.2 Appendix B. Excerpt from Federal Fisheries Regulation §679.55

§679.55 Observer fees.

(a) *Responsibility*. The owner of a shoreside processor or stationary floating processor named on a Federal Processing Permit (FPP), a catcher/processor named on a Federal Fisheries Permit (FFP), or a person named on a Registered Buyer permit at the time of the landing subject to the observer fee as specified at §679.55(c) must comply with the requirements of this section. Subsequent non-renewal of an FPP, FFP, or a Registered Buyer permit does not affect the permit holder's liability for noncompliance with this section.

(b) *Observer fee liability determination.* After each fishing year, the Regional Administrator will mail an observer fee liability invoice to each permit holder specified in paragraph (a) of this section for landings of groundfish and halibut subject to the observer fee. The observer fee liability invoice will provide a summary of the round pounds of groundfish and headed-and-gutted weight for halibut landed during the previous fishing year for each permit by species, landing port or port-group, and gear category. The total fee liability for each permit holder will be determined by applying the observer fee percentage in paragraph (f) of this section to the ex-vessel value of the groundfish and halibut landings subject to the observer fee. The method for determining the ex-vessel value of the groundfish and halibut landings subject to the observer fee is provided in paragraph (e) of this section. The fee liability will be assessed on the groundfish round weight and the headed-and-gutted weight for halibut.

(c) *Landings subject to the observer fee.* The observer fee is assessed on landings by vessels not in the full observer coverage category described at §679.51(a)(2) according to the following table:

If fish in the landing by a catcher vessel or production by a catcher/processor is from the following fishery or species:	**Is fish from the landing subject to the observer fee?**	
	If the vessel is not designated on an FFP or required to be designated on an FFP:	**If the vessel is designated on an FFP or required to be designated on an FFP:**
(1) Groundfish listed in Table 2a to this part that are harvested in the EEZ and subtracted from a total allowable catch limit specified under §679.20(a)	Not applicable, an FFP is required to harvest these groundfish in the EEZ	Yes.
(2) Groundfish listed in Table 2a to this part that are harvested in Alaska State waters, including in a parallel groundfish fishery, and subtracted from a total allowable catch limit specified under §679.20(a)	No	Yes.
(3) Sablefish IFQ, regardless of where harvested	Yes	Yes.
(4) Halibut IFQ or halibut CDQ, regardless of where harvested	Yes	Yes.
(5) Groundfish listed in Table 2a to this part that are harvested in Alaska State waters, but are not	No	No.

subtracted from a total allowable catch limit under §679.20(a)		
(6) Any groundfish or other species not listed in Table 2a to part 679, except halibut IFQ or CDQ halibut, regardless of where harvested	No	No.

(d) *Standard ex-vessel prices*—(1) *General.* NMFS will publish the standard ex-vessel prices used to determine the observer fee in the upcoming year in the FEDERAL REGISTER during the last quarter of each calendar year. The standard ex-vessel prices will be described in U.S. dollars per equivalent round pound for groundfish and per equivalent headed-and-gutted weight for halibut.

(2) *Effective duration.* The standard ex-vessel prices will remain in effect until revised by subsequent publication in the FEDERAL REGISTER.

(3) *Standard ex-vessel price determination and use*—(i) *Groundfish standard ex-vessel prices.* Except as described in paragraph (d)(3)(ii) of this section, NMFS will calculate groundfish standard ex-vessel prices based on standardized ex-vessel nominal prices calculated using information submitted in the Commercial Operator's Annual Report described at §679.5(p) and the shoreside processor or stationary floating processor landing report described at §679.5(e)(5), as well as methods established by the State of Alaska's Commercial Fisheries Entry Commission.

(A) Groundfish standard ex-vessel prices will be calculated as a 3-year rolling average of standard prices for each species, port or port-group, and gear.

(B) Gear categories for groundfish standard ex-vessel prices are: Pelagic trawl gear, non-pelagic trawl gear, and non-trawl gear.

(ii) *Halibut and fixed gear sablefish standard ex-vessel prices.* NMFS will use data submitted to NMFS on the IFQ Registered Buyer report under §679.5(l)(7) to calculate the standard ex-vessel prices for each year for halibut and fixed gear sablefish, by port or port group. These standard ex-vessel prices will be applied to landings of:

(A) Halibut;

(B) IFQ sablefish; and

(C) Sablefish accruing against the fixed-gear sablefish CDQ allocation.

(iii) *Confidentiality.* Standard ex-vessel prices will be aggregated among ports if fewer than four processors participate in a price category for any species and gear combination.

(e) *Determining the ex-vessel value of groundfish and halibut.* The ex-vessel value of groundfish and halibut subject to the observer fee will be determined by applying the standard ex-vessel price published in the FEDERAL REGISTER in the year prior to the year in which the landing was made to the round weight of groundfish and the headed-and-gutted weight of halibut landings subject to the observer fee.

(f) *Observer fee percentage.* The observer fee percentage is 1.25 percent.

(g) *Fee collection.* A permit holder specified in paragraph (a) of this section, receiving a groundfish or halibut landing subject to the observer fee under paragraph (c) of this section, is responsible for collecting fees during the calendar year in which the groundfish or halibut is received.

(h) *Payment*—(1) *Payment due date.* A permit holder specified in paragraph (a) of this section must submit his or her observer fee liability payment(s) to NMFS no later than February 15 of the year

following the calendar year in which the groundfish or halibut landings subject to the observer fee were made.

(2) *Payment recipient.* Make electronic payment payable to NMFS.

(3) *Payment address.* Payments must be made electronically through the NMFS Alaska Region Web site at *http://alaskafisheries.noaa.gov.* Instructions for electronic payment will be provided on the payment Web site and on the observer fee liability invoice to be mailed to each permit holder.

(4) *Payment method.* Payment must be made electronically in U.S. dollars by automated clearinghouse, credit card, or electronic check drawn on a U.S. bank account.

(5) *Underpayment of fee liability.* (i) Under §679.4, an applicant will not receive a new or amended FPP or Registered Buyer permit until he or she submits a complete permit application. For the application to be considered complete, all fees required by NMFS must be paid.

(ii) If a permit holder fails to submit full payment for the observer fee liability by the date described in paragraph (h)(1) of this section, the Regional Administrator may:

(A) At any time thereafter send an initial administrative determination to the liable permit holder stating that the permit holder's estimated fee liability, as calculated by the Regional Administrator and sent to the permit holder pursuant to paragraph (b) of this section, is the amount of observer fee due from the permit holder.

(B) Disapprove any issuance of an FPP or Registered Buyer permit to the applicant in accordance with §679.4.

(iii) If payment is not received by the 30th day after the final agency action, the agency may pursue collection of the unpaid fees.

(i) *Overpayment of fee.* Upon issuance of final agency action, any amount submitted to NMFS in excess of the observer fee liability determined to be due by the final agency action will be returned to the permit holder unless the permit holder requests the agency to credit the excess amount against the permit holder's future observer fee liability.

(j) *Appeals.* A permit holder who receives an IAD may either pay the fee liability or appeal the IAD pursuant to §679.43. In any appeal of an IAD made under this section, a permit holder specified in paragraph (a) of this section has the burden of proving his or her claim.

[77 FR 70102, Nov. 21, 2012, as amended at 81 FR 17411, Mar. 29, 2016]

9.3 Appendix C. Factors That Impact Cost per Observer Sea-day[27]

Observers in the North Pacific are procured in one of two ways: through the pay-as-you-go model for observers operating in the full coverage category and those under the federal contract for the partial coverage category. While much of the work associated with these two service delivery models are the same, there are differences which can cause variation in the cost per observer day in each category. These include: the structure of the government contract; travel costs; observer salary structure; the work performed by the observer provider; and the standards which the provider and observers must meet.

Contract Structure

The existing federal contract for the provision of observer services for the partial coverage category is split among guaranteed days, option days, and travel costs. Guaranteed days are set to the minimum number of days that the government will purchase under each year of the contract. Optional days are above and beyond the minimum. Travel costs are those actual costs incurred by the contractor to deploy observers to the ports necessary to complete the contract.

Guaranteed days are typically more expensive than option days. This is a common practice for contracting to ensure that the provider's fixed costs – including those that are mandatory under the contract – are largely covered by the minimum number of purchased units. This contract structure front loads fixed costs, and provides the government with a price break as the number of option days purchased increases. As a result, there is a relationship between the annual budget and the cost per day (Figure E- 1).

The term "observer sea day" is often used as a metric both for performance (e.g,, 2500 observer sea days were covered) and for cost (e.g., for an estimated cost of $1,400 per observer sea day). While this is a common metric, the term may be misleading particularly in regards to programmatic costs as far more than a single day of observer coverage is included in the metric.

Exact breakouts of costs for the current federal contract are proprietary and cannot be released. However, without specificity to the current federal contract, costs associated with the following are often included in the generic term of observer sea day:

- For new observers, salary and associated costs (e.g., lodging, benefits) for the three-week observer training course;
- For experienced observers, salary and associated costs (e.g., lodging, benefits) for the annual and intra-annual briefings conducted by NOAA Fisheries;
- Observer salaries and benefits while they are in a deployed status;
- Federal and State workers' compensation and employer's liability insurance;
- Applicable general liability insurance which may include insurance for bodily injury, property damage, automobile liability, aircraft and passenger liability, and/or vessel liability insurance;
- Costs associated with key personnel requirements including the Project Manager;
- Staffing associated with contractual reporting requirements including invoicing, monthly status reports on financial expenditures and on observer recruitment and retention, and maintaining records, materials, and other evidence for examination, audit, or reproduction for the period stipulated in the contract;
- Overhead and infrastructure costs, including physical infrastructure such as office and apartment leases as well as personnel, and administrative organizational costs;

[27] Excerpt from 2019 ADP (NMFS 2018a).

- Creation and maintenance of a Quality Control Management program to ensure consistent quality of all work products and services;
- Required participation in outreach events with fishermen or their representatives;
- Observer personal gear allowance (e.g., raingear) and costs for mandatory observer equipment including laptop computers for data entry and transmission;
- Travel costs (see below) for all observer deployments; and
- Salary and associated costs (e.g., lodging, benefits) for debriefing and data quality control processes for each observer concluding a set of deployments.

This list is not all inclusive, and some - but not all - costs are also borne by the observer providers under the pay-as-you-go full observer coverage model. This list is meant to demonstrate both the costs that are included in the "observer sea day" metric and those which may be front-loaded into guaranteed days.

Travel Costs

Under the partial coverage category, observers are deployed under a random selection model, requiring the observer provider to send observers to a wide variety of ports across Alaska and to cover trips that tend to be quite short in duration. This is a marked difference from that of the full observer coverage model which tends to deploy observers from a handful of ports and for fairly lengthy periods of time, often for an entire fishing season.

Under the federal contract, the government reimburses the observer provider for travel costs incurred from the time the observer leaves their briefing location until they arrive at their debriefing location. The government does not reimburse the contractor for the cost of lodging, meals, and incidentals incurred during the time an observer or observer candidate is in training, briefing, or debriefing. For example, if an observer briefed in Seattle, deployed out of Kodiak, and debriefed in Anchorage the government would reimburse the contractor for travel costs incurred from the time the observer left Seattle (including the airfare to Kodiak) until the observer arrived in Anchorage (including the airfare to Anchorage).

Travel costs and expenses are reimbursed in accordance with the Federal Travel Regulations at actual costs incurred (without profit, administrative costs, or overhead). Also in accordance with Federal Travel Regulations, specific per diems are paid to observers based on when an observer is deployed to a vessel.

Observer Salary Structure

Under the pay-as-you-go full coverage category, most observers are paid a day rate rather than an hourly rate. Under the government contracted partial coverage category, the contractor must adhere to the requirements of the Service Contract Act (SCA) and applicable Department of Labor (DOL) Wage Rate Determination when calculating and paying salaries and benefits to observers. Overtime is paid to observers in accordance with the Fair Labor Standards Act (FLSA) and other applicable labor laws, whether work is performed inside or outside U.S. territorial waters or seaward of the U.S. Exclusive Economic Zone.

Work Performed by the Observer Provider

Because of the random deployment required under the partial observer coverage model, the contractor must be fully integrated into the Observer Declare and Deploy System (ODDS). Under the contract, the provider is required to serve as a backup to ODDS and receive calls for 16 hours per day, seven days per week, year-round, including all holidays. To provide this support, the contractor must maintain staffing for this requirement to ensure that they can receive and process trip registration information; receive and process trip delays, cancellations, and closings; and receive and process customer support calls.

ODDS support and backup is a requirement and cost borne only by the partial coverage observer provider.

Standards for Observer Provider and Observers

All observer providers and observers in both service delivery models are required to comply with applicable Federal Regulations, Acts, Executive Orders, Special Publications, Guidelines, NOAA Directives and Policies and standards, including those under the Magnuson-Stevens Fishery, Management, and Conservation Act (Magnuson-Stevens Act); Marine Mammal Protection Act (MMPA); Endangered Species Act (ESA); Observer Health and Safety regulations; and Federal, state, and local regulations.

The contracted partial observer coverage provider is also required to abide by the Federal Acquisition Regulations (FAR); the Data Quality Control Act (P.L. 106-514); Information Technology Security Policy; Fair Labor Standards Act (FLSA); Service Contract Act (SCA); Department of Labor Wage Determinations; and applicable Federal and State labor laws.

Finally, there are specific requirements identified in the Performance Work Statement that add requirements. For example, partial coverage observers must possess current Cardio-Pulmonary Resuscitation (CPR) and First Aid certifications in order to be certified. Additionally, the contractor must recruit the most highly qualified candidates, as they are held to a standard of a 95 percent passing rate for the required training course (including safety training) and the physical examination.

9.4 Appendix D. Gap Analysis based on 2013 through 2017 revenue

Introduction

One objective of the Observer Program is to monitor the breadth of fishing activities that occur in the federal waters (EEZ) off Alaska. In order to meet that goal, observer deployment rates should be high enough to result in data that is representative of fishing activities at the scales needed by our data users (stock assessors, in-season quota management, industry groups, and other scientists and researchers). As deployment rates increase, the probability of observed trips occurring in various subsets of fishing activity increases (e.g., defined by NMFS reporting areas or time period). The analyses presented in the 2015 SEA (citation) supported deployment rates of 15% of trips or more in order to minimize the probability of CAS post-strata having no data. In addition, the Observer Program Annual Review (citation) includes an evaluation of the adequacy of the deployment rate (sample size) relative to achieving spatial representation of observer data on an annual basis (i.e., defined by NMFS Reporting Area within each sampling stratum on an annual basis). It is important to note that the spatial resolution assessed in the annual report (annual, NMFS Area) is different from the much higher resolution used by CAS (i.e., weekly or three week periods, NMFS Areas, and target fisheries).

The current analysis evaluates the effect of funding on deployment rates and the resulting resolution of observer data. The scale of post-strata (scale of data resolution) used in this evaluation was intermediate in size between the high resolution post-strata used by CAS and the low resolution post-strata used in the Observer Program Annual Review. In this evaluation, data gaps are defined to be post-strata (area and time blocks) without observer data. Using simulation and a data pooling routine that mimics the CAS, the prevalence of post-strata without data was evaluated for different levels of observer coverage; specifically the frequency of having no observer data within a post-strata and hence having no data for discard rate estimation for in-season management as well as having no biological data available for stock assessments. The results from the sampling simulation were also used to evaluate the extent to which observer deployments (collection of biological data) may be spatially representative of the effort within the EM and no-selection pools (i.e. similar gear, target, and NMFS Area) at varying funding levels.

Observer Fee Rates/Budget Scenarios

Based on the observer fee revenues presented (Section 4.2.1; Table 5), budget scenarios were developed using observer fee rates ranging between 0.75% and 2.25% of the ex-vessel value of catch. This extended range of ex-vessel fee percentages was used to extend the range of funding scenarios available to the simulation routine. The revenues used in the budget scenarios below 1.25% were estimated by scaling the 2013-2017 average revenue of $3,862,872 relative to the current 1.25% observer fee rate. For example, the estimated revenue from an observer fee rate of 0.75% was $3,862,872 * (0.75 / 1.25) = $ 2,317,723. Extended the budge below these scenarios was simply to provide a range of potential revenue outcomes to account for potential uncertainty and EM costs.

This analysis assumed that all of the revenues were used to fund observer coverage and not EM deployments. Although EM will be funded from the observer fee revenues, those costs are currently unavailable. Therefore, the budgets presented here represent the dollars available for observer coverage. The cost per observer day is not constant between budget scenarios (Figure 8); the average cost per-observer-day decreases as more observer days are purchased. The cost per-observer-day for each budget scenario is presented in Table A-1.

Revenues generated from the 0.75% and 1.00% observer fee rates were not sufficient to afford all guaranteed days in the partial coverage observer provider's contract. In such scenarios, NFMS would still be responsible for acquiring the necessary funds to afford all guaranteed days. However, these simulations operated under the assumption that if all guaranteed days could not be afforded, only the days afforded were purchased. Therefore, the simulations do not reflect the contractual obligations that would be relevent in scenarios with insufficient funding levels.

ADP Allocation

The 2019 ADP allocation strategy was used to determine trip-selection rates for each sampling stratum in the observer pool and for each budget scenario. The 15% hurdle + optimization (based on discards, PSC chinook, and PSC halibut) allocation design was used when the budget was sufficient to provide

deployment rates higher than the 15% base rate. If the budget was not sufficient to allow 15% deployment rates in each stratum, the sampling rate was held equal across strata at the maximum affordable rates. Since 2017 is the last full year for which fishing effort data is available, all analyses are based on 2017 effort. When available, a 2018 effort year may be used in an updated analysis. The strata-specific deployment rates within each budget scenario are presented in Table A-1. The optimization weights are presented in Table A-2.

Trip-selection simulation and gap analyses

The 2017 distribution of fishing trips in the partial coverage pool was used in the simulations. Since trips in the no-selection pool also depend on the data collected by observers, so they were included in this analysis. The strata-specific deployment rates from each budget scenario were used to simulate trip selection. The number of both randomly selected trips (observed) and non-selected trips (unobserved) within each post-stratum were counted to determine the expected amount of data available and total amount of effort within the post-stratum. Each budget scenario was simulated 500 times.

Within each iteration of the simulation, all trips within the observer trip-selection pool and no-selection pool, within each deployment strata (gear type for the no-selection pool), were assigned a trip target and NMFS Reporting Area (and FMP). Any trips that occurred in multiple NMFS or trip targets were counted in each post-stratum. Trips could not be assigned to multiple sampling strata. Refer to Figure A-8 for an illustrated walkthrough of the gap analysis routine.

Within the no-selection pool, trips were assigned to a sampling stratum based on the gear types fished (hook-and-line or pot) and did not include tendering activity. Trips within the no-selection pool that fished with hook-and-line or pot gear were compared only to trips selected for observer coverage within the non-tender strata with the same gear types. For example, a trip in the zero-selection pool that fished with pot gear were checked with selected trips in the observer pool that were within the POT strata but not the POT_TENDER strata. Jig gear trips were excluded from the analyses because CAS does not use observer data to estimate discard rates for these trips.

Four levels of post-stratification (data resolution) were used within each sampling stratum (defined by gear type for the zero selection pool) and each trip was assigned to a coverage level. Observed trips were the base coverage level (COVER). Unobserved trips that shared NMFS Reporting Area, trip target, and trip start date within 15 days (30-day window) of a covered trip fell into the AREA coverage level. If an unobserved trip did not share NMFS Area with an observed trip, but did share FMP area, trip target, and had a start date within 45 days (90 day window) of an observed trip, it was classified within the FMP coverage level. Lastly, if a trip could not be assigned to any of the above coverage levels, it was assigned to the year-to-date coverage level (YTD), indicating that any available observer data within the sampling stratum and trip target would potentially be used to estimate a bycatch rate.

The output of each iteration was the total number of trips within each data level for each strata/gear, trip target, and NMFS area. FMP-level totals were obtained by summing across all NMFS areas within each FMP. The final outputs represent the number of trips in a coverage level averaged over all 500 iterations of the simulation routine.

Results

Gap Analysis

Figures A-1 through A-4 show the results of the gap analyses, specific to each strata/gear, FMP, and trip target. These plots combine the counts from both the observer trip and the no-selection pools. In this way, data availability at differing temporal and spatial coverage levels (resolution) can be compared for differing observer fee rates. Within each plot, the x-axis represents the observer fee rate, ranging from 0.75% to 2.25%; for corresponding budget levels, see Table A-1.

The top row of plots depict the average number of trips (from the observer trip-selection pool and no-selection pool combined) within each coverage level (averaged over 500 iterations) that resulted from the deployment rates associated with the seven budget scenarios. The number of trips in COVER equals the number of observed trips within the sampling stratum and trip target while the number of trips within the AREA coverage levels is the number of trips that share (at least partially) the same NMFS Area, trip target, sampling stratum and occurred within 15 days of an observed trip. Similarly for the other two

coverage categories, the number of trips assigned to the FMP and YTD levels are also presented. The total number of trips within the sampling stratum and trip target are also provided at the top of each plot. In interpreting these plots, the COVER category (lowest category in the bar) is analogous to the amount of observer coverage, on average, in that trip target. The size of the AREA category shows the number of closely matched unobserved trips; trips that are close in time (2-week window) and space (same NMFS Area). Data from the COVER category trips is directly applicable to the trips in the AREA category. In estimation processes such as estimation of bycatch, discards, or length distributions, data from these COVER trips will be expanded to the unobserved AREA trips. Trips that fall into the other two categories are not as close in time or space to observed trips (COVER), although data from the observed trips will be expanded to those FMP or YTD trips. The larger the expansion to less similar trips, the greater the potential for bias being introduced to the estimation process. Plots with more COVER and AREA trips represent data collection scenarios that yield higher quality data; the greater the proportion of trips in COVER and AREA, the higher the quality and utility of the data.

The next row of plots shows those proportions; the proportion of the total number of trips within each coverage category (COVER, AREA, FMP, and YTD) where the number of trips in each coverage level (color) divided by the total number of trips within the strata and trip target. The proportion of trips at the Area level (blue) and FMP levels (green) will vary inversely to each other; if more trips are in the Area level, there are fewer in the FMP level. Hence, as the proportion of trips increases at one level (e.g. Area), it must similarly decrease in the others (e.g. FMP); all the proportions must add to one (the total). Again, the quality of higher resolution estimates will increase with increasing proportions of trips in the COVER and AREA categories. The points on the figures represent the proportions that resulted from each of the seven discrete scenarios. The lines represent extrapolations of the points and are therefore estimates for intermediate observer fee rates/budget scenarios. The amount of increase in data utility is shown by the slope of the line; lines that quickly increase are those where the data quality is increasing quickly between funding levels (fee amounts).

The last row of plots show how quickly those proportions change between the different fee levels (available funding). The rate of change of the proportions of trips in each coverage level is plotted for the different fee percentages; again how quickly the proportion of trips changes at one level is tied to how quickly that proportion changes at another level. These rate of change plots are useful for identifying the observer fee rates between which the coverage gaps change most quickly. The scenarios where the COVER and AREA category proportions are increasing quickly (larger positive values) are where data quality is increasing quickly between funding levels. Values closer to zero indicate places where small change in the number of trips in a category occur with the change in fee rate. Positive and negative values represent rates at which the proportions increase or decrease, respectively, and the magnitude of the value shows how quickly the proportions are changing

Several overarching patterns are apparent in these figures. Firstly, as the observer fee rate and resulting funding level increases from left-to-right, a higher proportion of the trips are selected for coverage (increase in COVER), which in turn reduces the total number of gaps and allows more un-observed trips to obtain data from observed trips that are geographically closer and occur in a smaller time span (higher resolution data). Secondly, because the cost per observer day changes with increased number of days observed, these patterns are nonlinear. Recall that these simulations operate under the assumption that NMFS is not required to purchase all guaranteed days and is instead able to purchase only days that can be afforded. The cost per day is constant as additional days are purchased until the number of days guaranteed by the contract has been reached; at that point, additional days are purchased at a lower cost-per-day. This break point is seen in the plots with the rapid increase in the proportion of COVER and AREA trips.

Another break point in the plots occurs at the 15% base observer deployment rate when additional observer days are allocated differentially to the different deployment strata. Below deployment rates of 15%, the number of trips in COVER increases similarly in each deployment stratum (e.g., Trawl, trawl-tender, hook and line, *etc*.). As additional days become available, they are allocated preferentially to the Trawl stratum (Table A-2), hence with increasing funding, deployment rates in trawl increase faster than in the other strata resulting in faster increases in proportion of trips in COVER. This can be seen within

the TRW and TRW_TENDER strata plots where the proportion of covered trips reaches a maximum rate of change after funding becomes available for optimized days. Conversely, the lower sample allocation percentages to the POT and POT_TENDER strata are reflected in the slightly-positive but constant rate of change for the COVER level.

Although the simulation was based on the effort from 2017, the effort in the observer pool is expected to be much lower in 2019 (per 2019 Final ADP). This means that fewer observer days need to be purchased in order to meet the 15% hurdle, making allocation based on optimization possible at lower funding levels.

Additional Supporting Analyses

To further evaluate these trends, additional analyses were conducted. In lieu of simulation methods, a numerical solution was developed where the probability of each coverage category was calculated directly as a function of available funding. Patterns in those results were similar to the simulation results and because they were not linked to the fee scenarios, were of higher resolution. That higher resolution is useful to show the effect of the change in observer cost-per-day and the allocation of sample-days above the 15% base deployment rates, however, due to confidentiality constraints, those results cannot be presented here. An example plot is provided below to more explicitly show the two break points in the rate of change in data resolution (rate of change in COVER and AREA proportions) with increasing funding (Figure A-5). The two breaks occur at the change in observer cost-per-day resulting for reaching the minimal number of days specified in the contract (left-most break) and at the 15% base deployment rate at which allocation to sampling strata changes (right-most break). While these breaks are contained within the simulation results, because simulations were conducted at discrete fee scenarios and lines were fit using a smoothing routine, these breaks are not explicit in the results.

Observer coverage for biological data in regards to EM

With the incorporation of EM into the Observer Program for vessels fishing with longline (2018) and pot (2019) gears, it is important that base observer coverage is sufficient to ensure that data elements not collected by EM systems are available in the observer data (e.g., data to estimate average weights per fish, biological data collections such as lengths and otoliths, and other observer-collected data elements). Similar to the situation in the observer zero selection stratum, these data elements are critical components of stock assessments and discard estimation routines.

Figures A-6 and A-7 compare the expected number of observed trips to the effort within the whole EM pool and no-selection pool, separated by gear/strata, target, and NFMS Area. The colors represent the proportion of observed data (as the expected number of observed trips provided by the observer fee rate) to the total of the expected number of observed trips and EM or no-selection pool trips. Tiles that are black represent scenarios where the EM or no-selection pool effort in the NMFS Area is much higher than the expected number of observed trips, meaning the quantity of area-specific biological data is poor. Purple tiles represent scenarios where some area-specific biological data can be expected, and orange tiles represent scenarios that are rich in area-specific biological data. Cream-colored tiles represent scenarios where there was no EM/no-selection pool effort and only observer-pool effort.

The estimation of at-sea discards which depend on mean weight per fish or catch-at-age distributions used in stock assessments will be based on expansions of observer data to the EM and no-selection pool base-data. In those cases where there are few observed trips relative to the number of trips with EM deployed or trips in the no-selection pool, those expansions will be larger and the resulting estimates will have higher uncertainty (for example, Figure A-6, HAL Halibut fisheries in NMFS Area 521, or Figure A-7, Pot Cod fisheries in NMFS Area 630).

Table A-1. Observer fee rates and resulting budget scenarios, observer daily rates, and deployment rates used in the gap analysis simulations.

Observer Fee Rate	Observer Coverage Budget	Observer Daily Rate	Strata	Deployment Rate
0.75	$2,317,723.00	$1,836.41	HAL	0.061
			POT	0.061
			POT_TENDER	0.061
			TRW	0.061
			TRW_TENDER	0.061
1.00	$3,090,298.00	$1,836.41	HAL	0.081
			POT	0.081
			POT_TENDER	0.081
			TRW	0.081
			TRW_TENDER	0.081
1.25	$3,862,872.00	$1,747.71	HAL	0.107
			POT	0.107
			POT_TENDER	0.107
			TRW	0.107
			TRW_TENDER	0.107
1.50	$4,635,446.00	$1,512.41	HAL	0.148
			POT	0.148
			POT_TENDER	0.148
			TRW	0.148
			TRW_TENDER	0.148
1.75	$5,408,021.00	$1,379.73	HAL	0.174
			POT	0.154
			POT_TENDER	0.155
			TRW	0.227
			TRW_TENDER	0.244
2.00	$6,180,595.00	$1,294.55	HAL	0.199
			POT	0.159
			POT_TENDER	0.161
			TRW	0.307
			TRW_TENDER	0.342
2.25	$6,953,170.00	$1,235.24	HAL	0.225
			POT	0.163
			POT_TENDER	0.166
			TRW	0.388
			TRW_TENDER	0.441

Table A-2. Optimization weightes based on discards, PSC chinook, and PSC halibut.

Strata	Optimization weights
Hook-and-line	0.23349
Pot	0.01654
Tender Pot	0.00177
Trawl	0.72026
Tender Trawl	0.02794

Table A-3. Data levels and definitions that were assigned to each trip (trip X strata/gear X trip target X NFMS Area) in after each iteration of trip selection in the gap analysis.

Data Level	Definition
COVER	Trip was within a trip that was selected for observer or EM coverage
AREA	Trip's start/end date was within 15 days of a trip with same gear type, trip target and NFMS area
FMP	Trip/start date was within 45 days of a trip with the same gear type, trip target, and FMP
YTD	Trip was not within COVER, AREA, or FMP

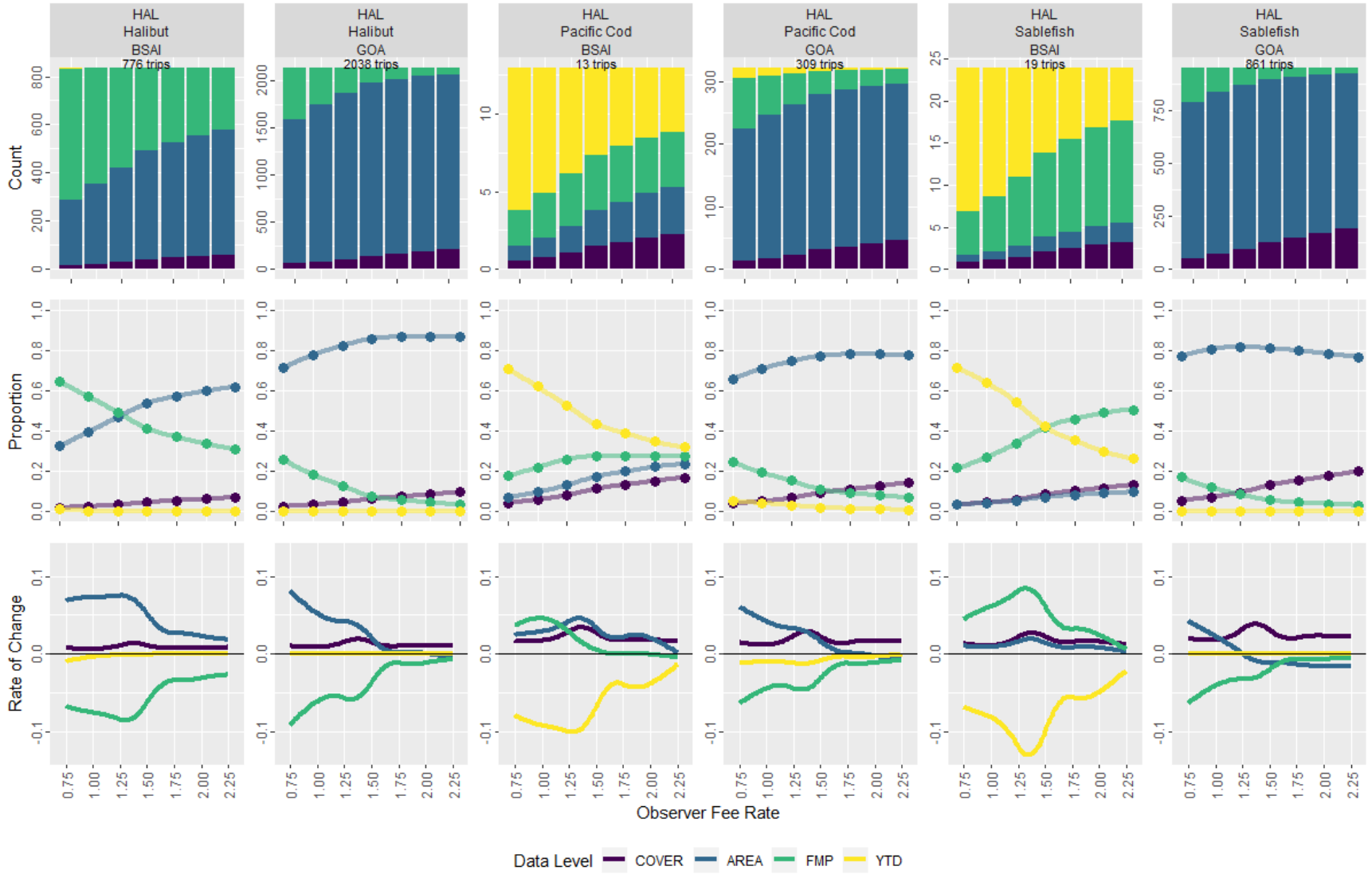


Figure A-1. Gap analysis results for 2017 HAL gear trips within the observer pool's HAL stratum and no-selection pool.

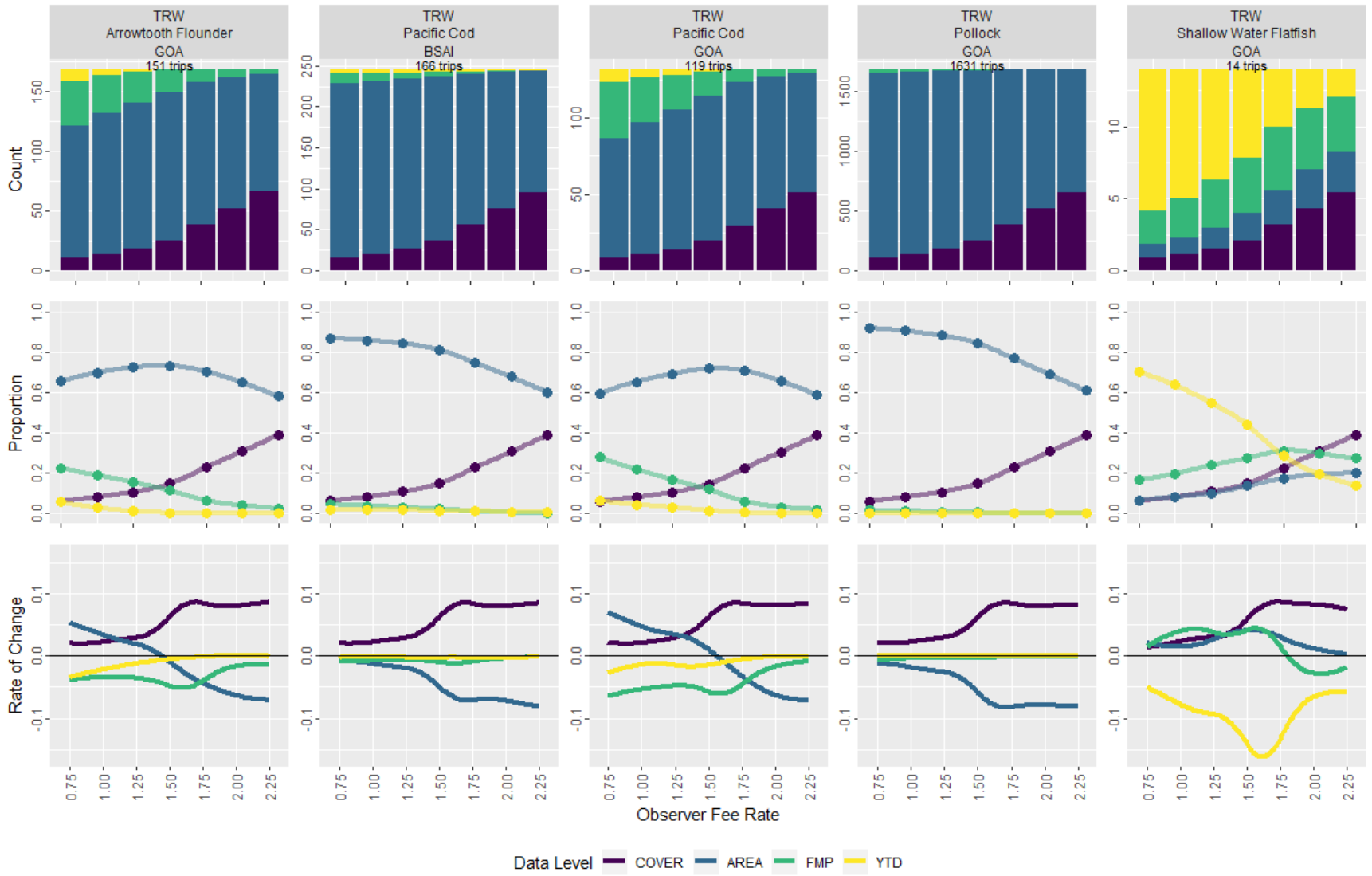


Figure A-2. Gap analysis results for 2017 TRW gear trips within the observer pool's TRW stratum.

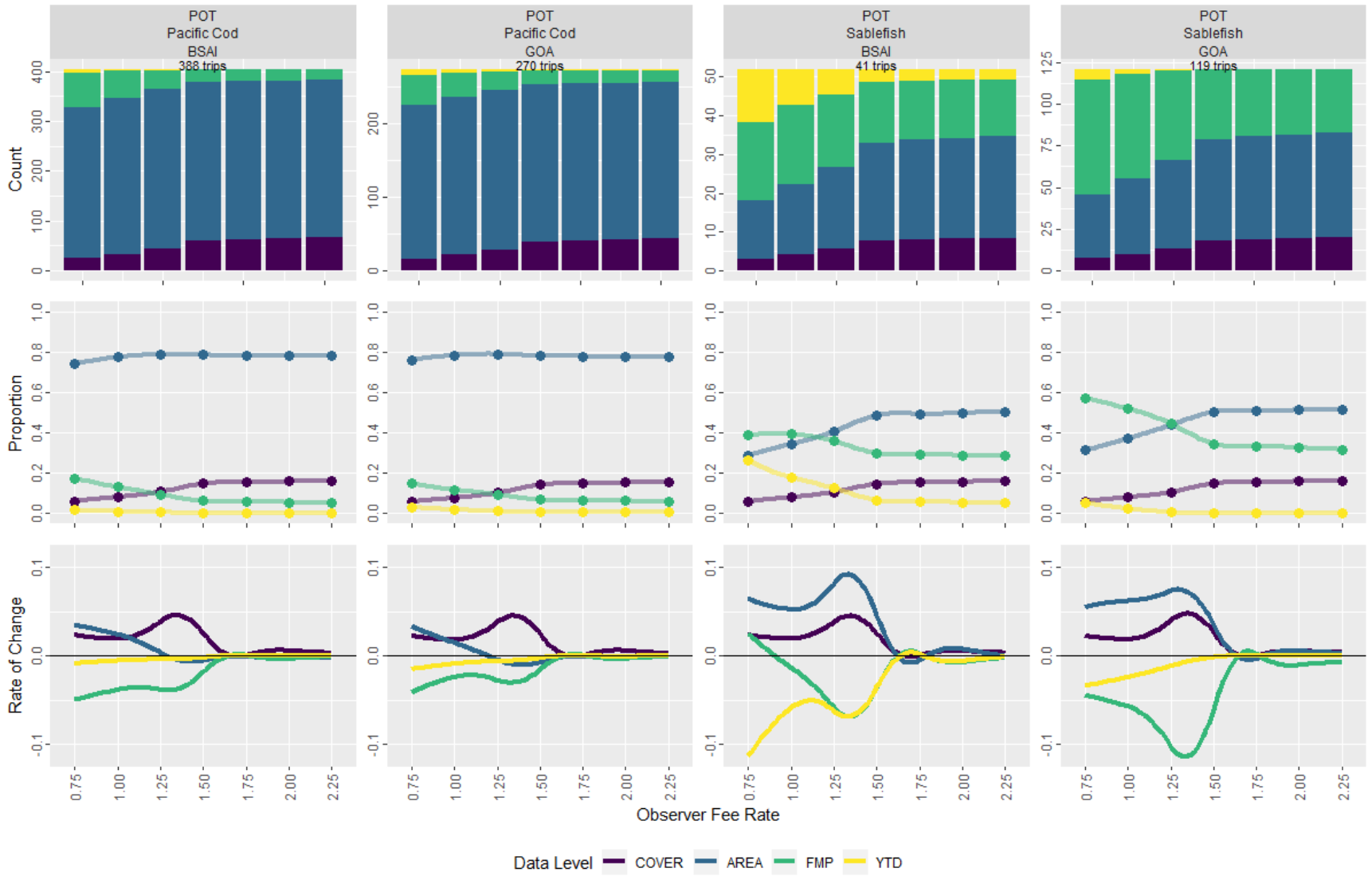


Figure A-3. Gap analysis results for 2017 POT gear trips within the observer pool's POT stratum and no-selection pool.

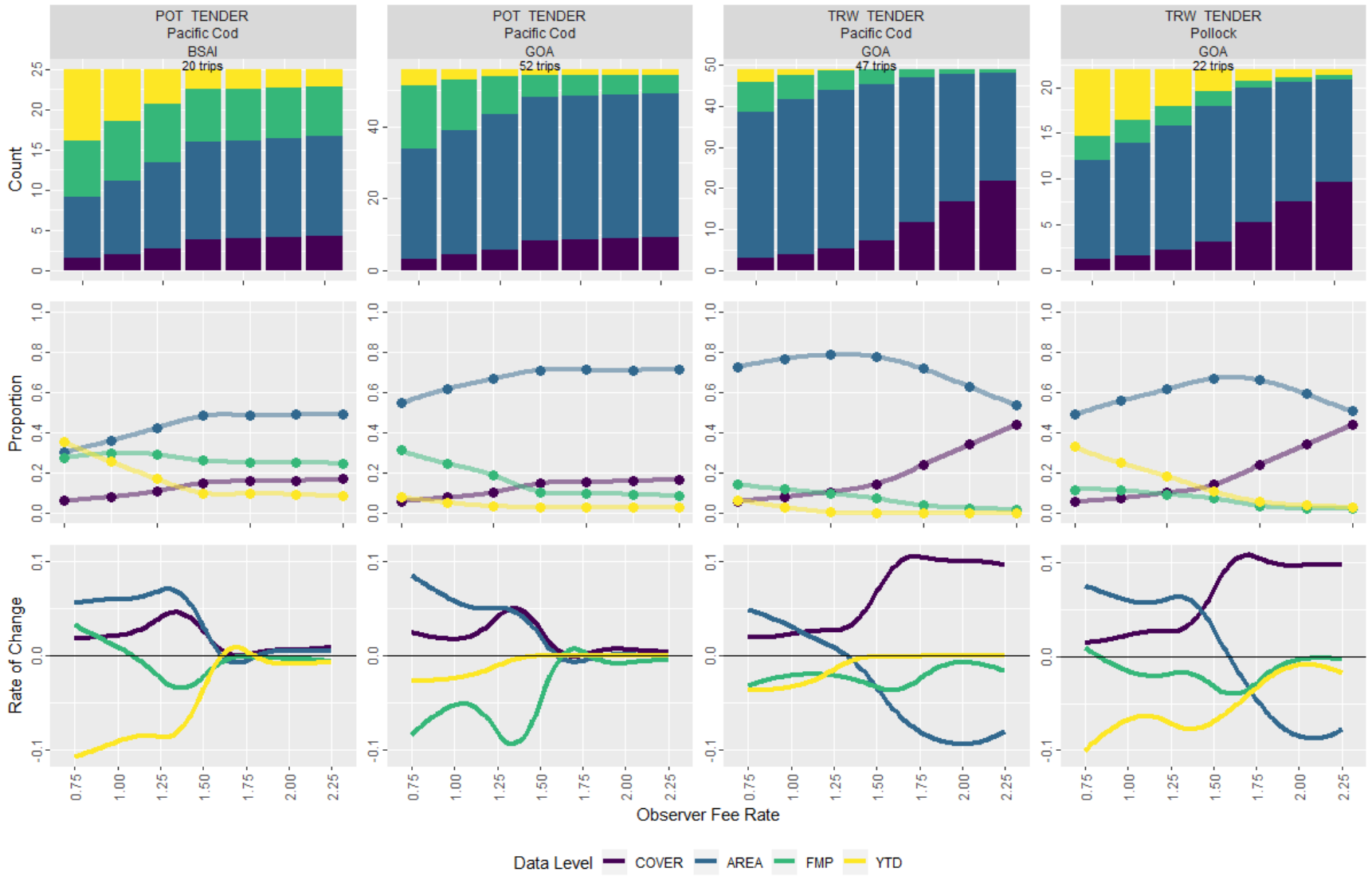


Figure A-4. Gap analysis results for 2017 tender trips within the observer pool's POT_TENDER and TRW_TENDER strata.

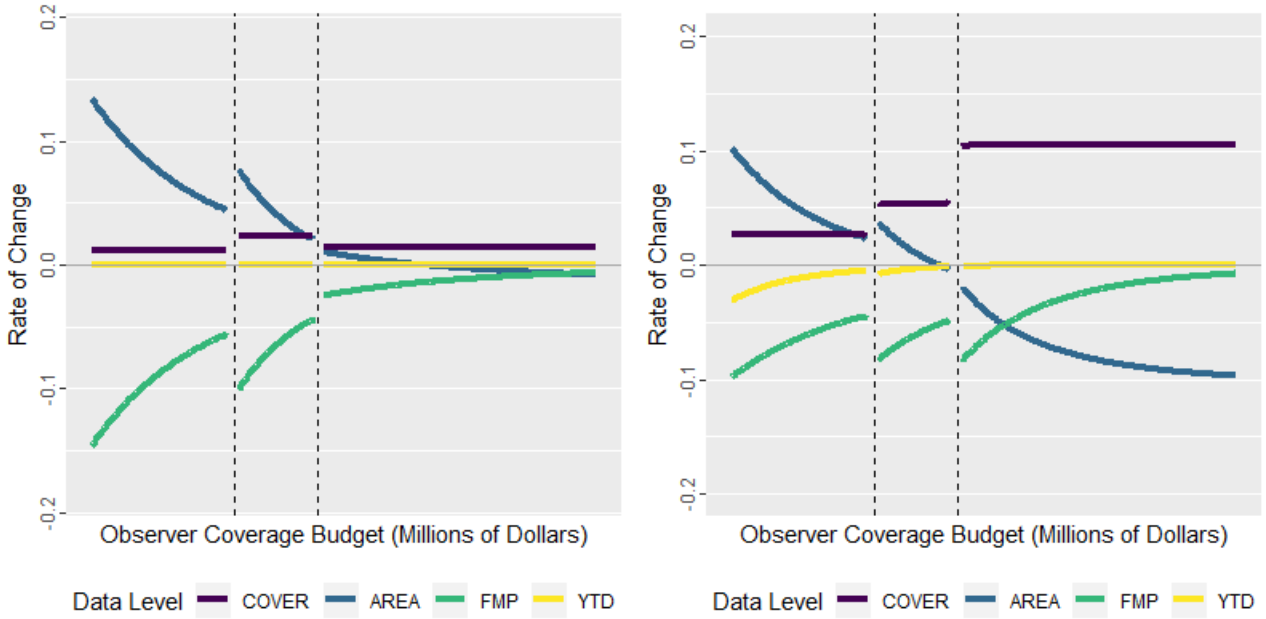


Figure A-5. Example rate of change curves from numerical approach to gap analysis. The two vertical lines highlight breakpoints at which the budget is sufficient to afford all guaranteed days (leftmost) and is sufficient to afford enough optional days to meet the 15% hurdle and allocate based on optimization (rightmost). The example on the left may be representative of the HAL stratum, where budgets that can afford optional days are not as efficient in reducing gaps because the HAL optimization weights are low. In contrast, the example on the right may be representative of the TRW stratum, where the higher deployment rates allocated through high optimization weights result in greater efficiencies in increasing coverage and reducing gaps.

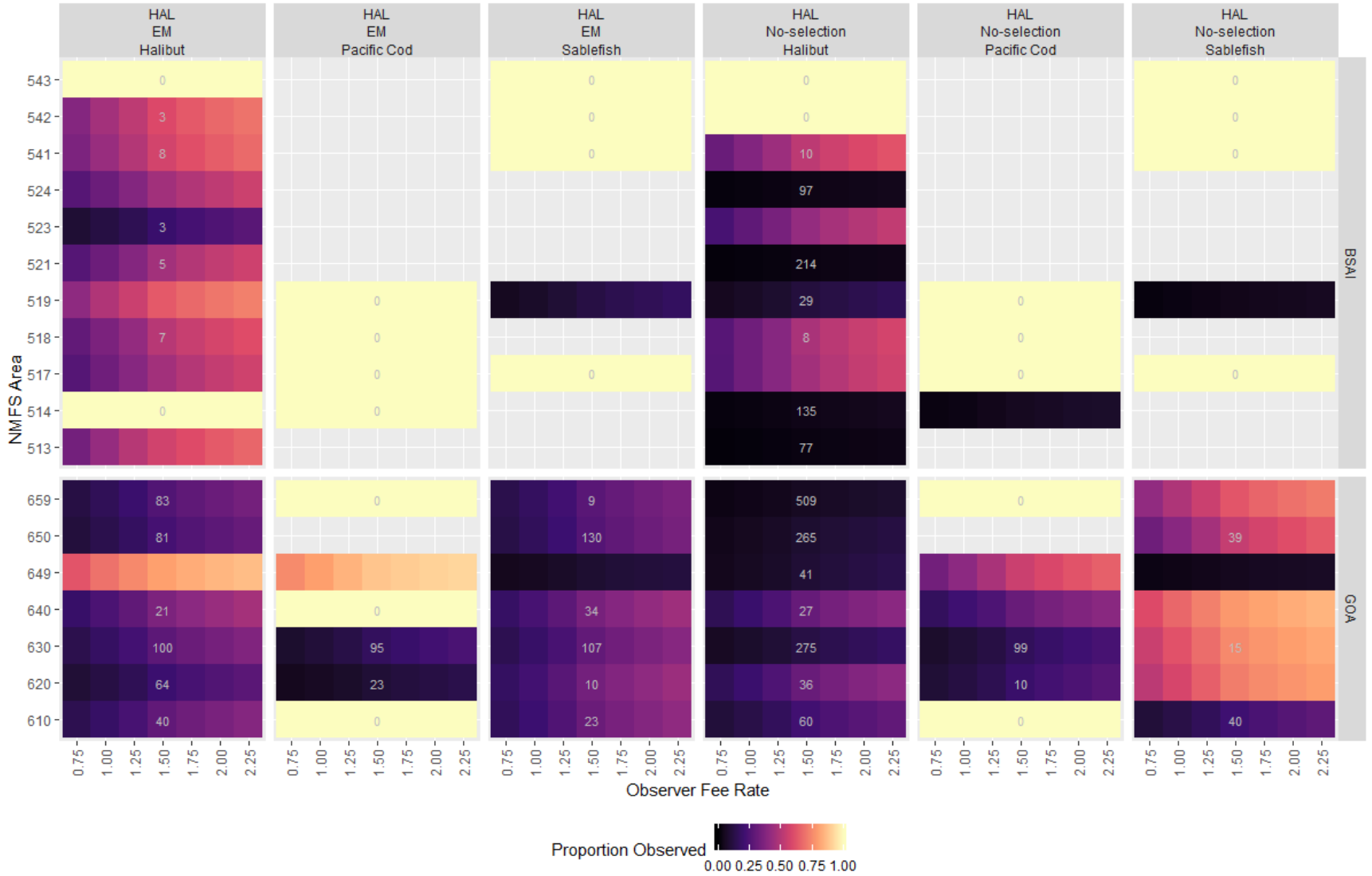


Figure A-6. Proportion of expected number of observed trips versus effort in the EM pool and no-selection pool for trips using HAL gear, separated by NMFS Area and trip target, as a function of the observer fee rate. The EM and no-selection pool effort, as the number of trips in 2017, are shown (except in cases where NMFS Areas are represented by data from fewer than 3 vessels).

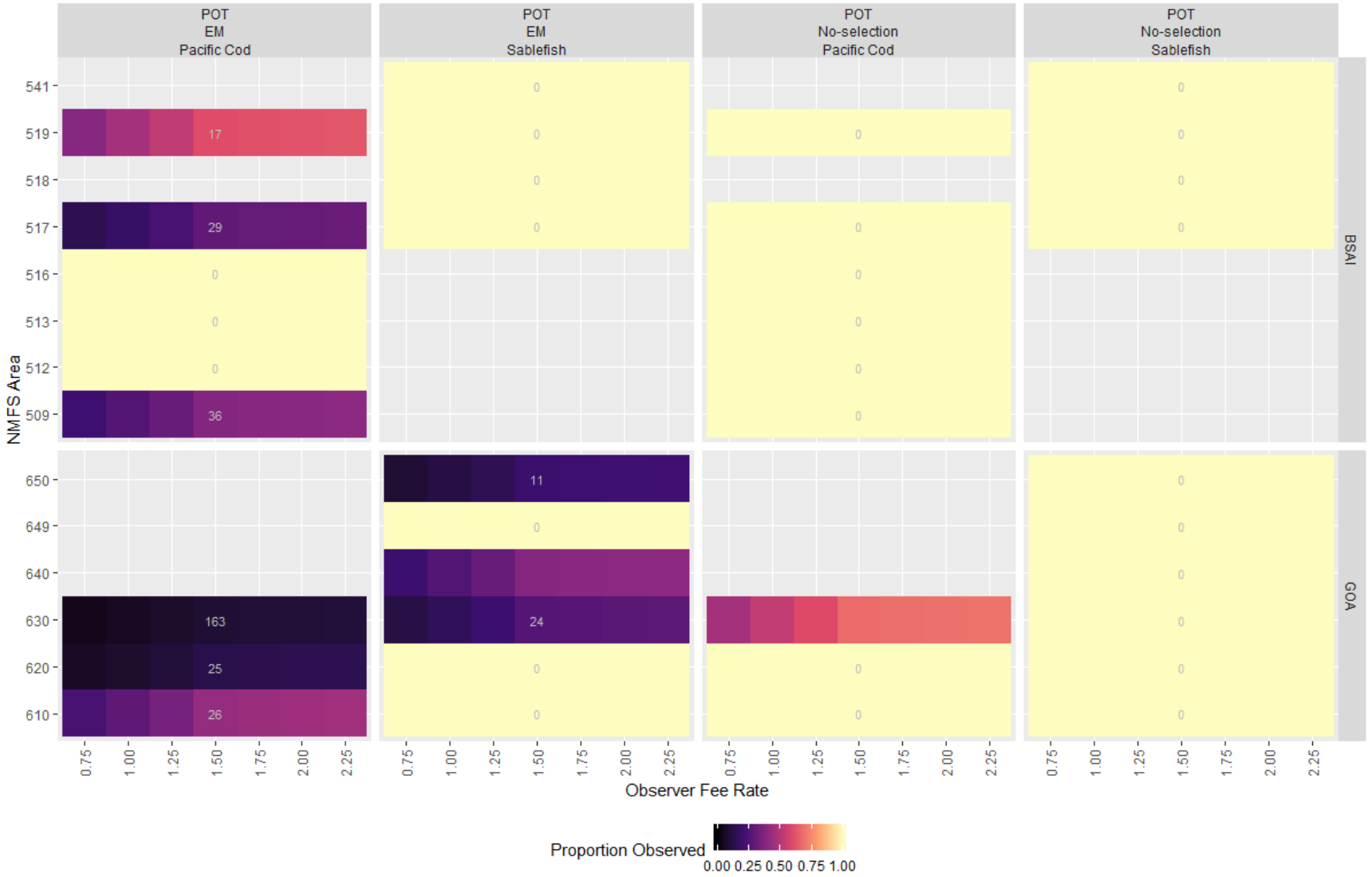
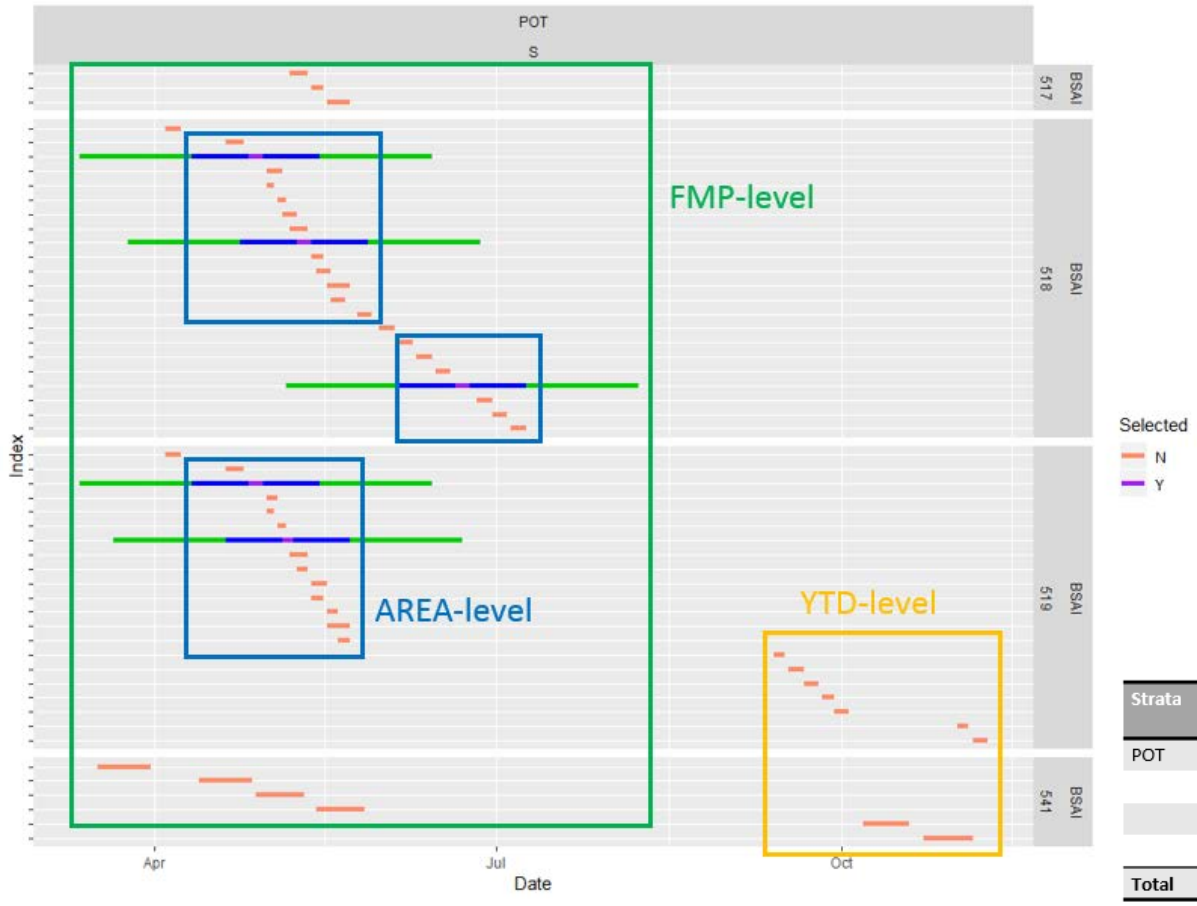


Figure A-7. Proportion of expected number of observed trips versus effort in the EM pool and no-selection pool for trips using POT gear, separated by NMFS Area and trip target, as a function of the observer fee rate. The EM and no-selection pool effort, as the number of trips in 2017, are shown (except in cases where NMFS Areas are represented by data from fewer than 3 vessels).



Strata	FMP	Target	NMFS Area	CC R
POT	BSAI	S	517	0
			518	3
			519	2
			541	0
Total				**5**

Figure A-8. Illustration of an example of a gap check routine. After grouping using the deployment rates resulting from the observer fee rate/budget scenario and selecting trips for observer coverage, all trips were split into separate trips (trip X target X area) and grouped up by strata, FMP, and trip target (in this case, POT strata in the BSAI with sablefish trip target). 4 trips were selected for coverage (in purple, one of which took place in NMFS areas 518/519 and therefore represents two trips). Unobserved trips are presented in pink. The first gap check occurred at the AREA data level - any un-observed trips that occurred within the 15-day extended date range (blue lines) of an observed trip were categorized at the AREA level. Any remaining unobserved trips were then grouped up across the FMP. Unobserved trips that fell within a 45-day extended date range of the observed trips within the FMP were categorized within the FMP data level. Any remaining unobserved trips were categorized in the YTD data level. The number of trips within each data level in each NMFS area were totaled.

9.5 Appendix E. Community-level partial coverage vessel participation, ex-vessel revenue, and dependency on partial coverage fisheries

Table 27 Partial Coverage Vessels by Community of Ownership Address, 2008-2017 (number of vessels)

Geography	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Annual Avg. 2008-2017	Annual Avg. 2008-2017	Total Vessels 2008-2017
ANCHOR POINT	8	9	7	7	3	4	5	5	3	4	5.5	0.43%	11
ANCHORAGE	16	21	24	24	22	17	19	18	18	15	19.4	1.52%	37
AUKE BAY	5	6	8	6	7	6	5	3	2	1	4.9	0.38%	6
CHEFORNAK	0	20	23	21	8	20	2	0	0	0	9.4	0.74%	33
CORDOVA	25	24	23	18	15	15	20	17	18	15	19.0	1.49%	47
CRAIG	24	29	27	25	21	19	19	20	19	20	22.3	1.75%	41
DELTA JUNCTION	6	6	5	6	6	5	5	5	4	6	5.4	0.42%	6
DOUGLAS	12	13	13	12	14	13	12	11	10	10	12.0	0.94%	17
DUTCH HARBOR	7	6	4	5	4	4	3	5	3	3	4.4	0.35%	8
ELFIN COVE	3	4	5	7	4	5	3	4	4	4	4.3	0.34%	7
GUSTAVUS	3	8	7	3	4	3	4	3	3	3	4.1	0.32%	10
HAINES	15	19	19	17	17	15	13	13	12	11	15.1	1.18%	22
HOMER	69	100	101	101	107	99	91	96	101	98	96.3	7.56%	155
HOONAH	6	11	14	11	8	11	9	10	9	16	10.5	0.82%	24
HOOPER BAY	0	10	7	9	9	11	0	0	0	0	4.6	0.36%	16
JUNEAU	47	53	51	48	46	46	48	48	51	47	48.5	3.81%	87
KAKE	3	8	7	8	9	8	7	4	3	3	6.0	0.47%	11
KENAI	5	11	7	7	9	8	5	3	1	4	6.0	0.47%	16
KETCHIKAN	28	31	29	29	23	24	22	24	23	22	25.5	2.00%	54
KING COVE	9	15	16	17	14	12	13	10	10	11	12.7	1.00%	27
KIPNUK	0	23	20	24	20	19	0	0	0	0	10.6	0.83%	39
KODIAK	140	140	149	173	159	135	134	140	148	119	143.7	11.27%	251
MEKORYUK	0	29	28	29	24	25	12	0	0	0	14.7	1.15%	36
NEWTOK	0	6	8	8	8	10	1	0	0	0	4.1	0.32%	15
NOME	3	10	8	8	7	5	5	5	5	7	6.3	0.49%	17
OUZINKIE	4	7	7	8	7	5	4	5	6	5	5.8	0.46%	17
PETERSBURG	90	114	116	102	105	100	98	96	101	97	101.9	7.99%	148
QUINHAGAK	0	6	2	8	9	16	0	0	0	0	4.1	0.32%	18
SAINT GEORGE ISL	0	4	3	6	6	4	6	5	5	4	4.3	0.34%	8
SAINT PAUL ISLAND	1	16	18	18	17	16	16	13	12	14	14.1	1.11%	20
SAND POINT	19	35	41	40	40	28	39	28	23	20	31.3	2.46%	61
SAVOONGA	0	11	11	10	14	13	13	13	10	10	10.5	0.82%	30
SELDOVIA	6	5	6	6	8	6	5	4	6	7	5.9	0.46%	11
SEWARD	12	13	14	14	15	12	9	8	10	9	11.6	0.91%	28
SITKA	125	127	137	135	129	123	132	111	109	99	122.7	9.63%	238
SOLDOTNA	1	4	4	4	6	3	7	5	4	2	4.0	0.31%	12
TOGIAK	0	8	8	12	16	10	13	13	15	14	10.9	0.86%	31
TOKSOOK BAY	0	34	33	39	30	31	8	0	0	0	17.5	1.37%	57
TUNUNAK	0	27	27	29	26	28	2	0	0	0	13.9	1.09%	44
UNALASKA	5	9	10	10	9	7	7	7	6	6	7.6	0.60%	16
WASILLA	10	10	12	14	14	14	14	14	16	14	13.2	1.04%	32
WRANGELL	12	39	38	37	39	34	38	32	35	32	33.6	2.64%	64
YAKUTAT	15	19	17	18	14	18	17	16	18	18	17.0	1.33%	38
OTHER AK	70	112	103	109	114	101	83	78	77	71	91.8	7.20%	219
TOTAL AK	804	1,212	1,217	1,242	1,186	1,108	968	892	900	841	1,037	81.4%	2,085
OREGON	53	51	48	52	48	46	45	37	37	36	45	3.6%	69
WASHINGTON	190	182	173	182	180	164	162	152	149	141	168	13.1%	297
OTHER STATES	18	22	24	27	27	27	23	28	24	28	25	1.9%	61
TOTAL	1,065	1,467	1,462	1,503	1,441	1,345	1,198	1,109	1,110	1,046	1,275	100.00%	2,512

Table 28 Partial Coverage Vessel Ex-Vessel Gross Revenues (from partial coverage activity only) by Community of Vessel Ownership Address, 2008-2017 (nominal millions of dollars)

Geography	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Annual Avg 2008 - 2017	Annual Avg 2008 - 2017
ANCHOR POINT	.81	2.13	3.10	3.53	1.18	1.66	1.03	1.00	.91	.67	1.60	0.53%
ANCHORAGE	.77	2.61	4.87	9.44	6.05	3.95	5.83	4.68	4.99	6.04	4.92	1.62%
AUKE BAY	.27	.50	.60	.79	.65	.57	.62	.48	*	*	.56	0.18%
CHEFORNAK	.00	.07	*	.07	.01	.05	*	.00	.00	.00	.02	0.01%
CORDOVA	1.77	4.45	5.36	5.70	4.69	3.25	3.29	3.15	2.85	3.28	3.78	1.24%
CRAIG	.37	.92	1.20	.95	.92	.73	.99	1.07	1.13	1.13	.94	0.31%
DELTA JUNCTION	1.13	1.66	2.24	2.46	2.02	1.65	1.72	1.83	1.71	1.83	1.82	0.60%
DOUGLAS	.30	1.50	2.47	3.06	2.78	1.91	2.12	2.02	2.27	2.31	2.07	0.68%
DUTCH HARBOR	1.41	1.22	1.42	2.07	1.36	1.24	1.52	1.29	.96	1.09	1.36	0.45%
ELFIN COVE	.09	.26	.30	.59	.51	.50	.49	.55	.57	.54	.44	0.14%
GUSTAVUS	.03	.11	.13	.09	.10	.15	.15	.11	.15	.14	.11	0.04%
HAINES	.54	1.56	2.16	2.28	1.92	1.61	1.87	1.86	1.50	1.13	1.64	0.54%
HOMER	5.68	20.59	30.95	35.77	29.14	20.31	20.83	22.75	23.62	26.67	23.63	7.76%
HOONAH	.25	.47	.80	.72	.60	.69	.51	.49	.61	.70	.58	0.19%
HOOPER BAY	.00	.00	.02	.02	.02	.02	.00	.00	.00	.00	.01	0.00%
JUNEAU	1.47	5.62	6.40	6.62	5.11	4.64	5.91	6.82	7.40	6.25	5.62	1.85%
KAKE	.00	.12	.19	.09	.13	.10	.15	.18	.21	.27	.14	0.05%
KENAI	*	1.75	2.16	2.64	1.90	1.29	.17	.03	*	.22	1.27	0.42%
KETCHIKAN	.47	1.70	2.09	2.11	1.58	1.28	1.48	1.68	1.85	2.39	1.66	0.55%
KING COVE	1.63	.96	2.68	2.59	2.47	1.79	1.91	2.32	2.59	1.95	2.09	0.69%
KIPNUK	.00	.04	.04	.08	.04	.07	.00	.00	.00	.00	.03	0.01%
KODIAK	29.69	43.34	64.40	75.24	58.61	44.04	48.12	49.84	44.68	50.78	50.87	16.70%
MEKORYUK	.00	.31	.39	.55	.27	.28	.06	.00	.00	.00	.19	0.06%
NEWTOK	.00	.01	*	.04	.02	.04	*	.00	.00	.00	.01	0.00%
NOME	.00	.35	.22	.43	.25	.09	.13	.19	.26	.59	.25	0.08%
OUZINKIE	.00	.20	.31	.26	.18	.09	.14	.13	.14	.13	.16	0.05%
PETERSBURG	8.98	19.34	24.46	26.24	22.32	16.93	19.01	19.98	22.67	24.77	20.47	6.72%
QUINHAGAK	.00	.00	*	*	.02	.03	.00	.00	.00	.00	.01	0.00%
SAINT GEORGE ISL	.00	.07	.09	.19	.05	.18	.22	.22	.16	.27	.15	0.05%
SAINT PAUL ISLAND	*	*	2.98	4.03	2.99	2.12	1.89	1.63	1.60	1.84	2.38	0.78%
SAND POINT	5.08	5.32	6.49	5.01	5.77	2.67	3.91	4.11	4.35	2.52	4.52	1.48%
SAVOONGA	.00	.08	.20	.14	.31	.14	.18	.05	.13	.14	.14	0.05%
SELDOVIA	.85	1.46	1.91	2.48	2.07	1.31	1.07	1.00	1.16	1.04	1.44	0.47%
SEWARD	3.24	6.16	8.19	8.90	8.85	6.38	5.57	5.72	5.31	6.08	6.44	2.11%
SITKA	9.15	16.03	21.76	24.01	18.14	13.57	16.58	18.14	18.60	23.31	17.93	5.89%
SOLDOTNA	*	.28	.43	.41	.28	.17	.64	.66	.63	*	.44	0.14%
TOGIAK	.00	.02	.09	.19	.17	.13	.12	.16	.22	.27	.14	0.05%
TOKSOOK BAY	.00	.25	.37	.50	.45	.43	.09	.00	.00	.00	.21	0.07%
TUNUNAK	.00	*	.05	.14	.05	.10	*	.00	.00	.00	.04	0.01%
UNALASKA	1.76	1.19	1.71	2.52	2.04	1.63	1.84	2.10	1.34	1.57	1.77	0.58%
WASILLA	.83	2.39	3.95	6.04	6.51	4.79	4.82	4.11	4.62	4.24	4.23	1.39%
WRANGELL	.25	1.66	2.30	1.95	1.87	1.85	2.41	2.59	2.85	2.92	2.06	0.68%
YAKUTAT	.01	.57	.84	.98	.97	1.17	1.27	1.50	1.40	1.76	1.05	0.34%
OTHER AK	2.41	7.44	10.02	10.99	10.31	7.14	6.16	6.97	8.14	8.22	7.78	2.55%
TOTAL AK	79.23	154.74	220.39	252.90	205.71	152.77	164.84	171.38	171.56	187.09	176.06	57.81%
OREGON	26.54	19.92	30.39	36.50	34.91	29.97	25.96	20.42	17.29	21.77	26.37	8.7%
WASHINGTON	73.56	82.01	99.83	125.87	117.96	84.89	96.58	91.03	84.62	81.59	93.79	30.8%
OTHER STATES	6.16	6.40	8.89	11.97	10.47	8.23	6.50	6.70	8.40	9.50	8.32	2.7%
TOTAL	185.49	263.06	359.50	427.24	369.05	275.86	293.88	289.52	281.87	299.96	304.54	100.00%

Table 29 Partial Coverage Vessels' Ex-Vessel Gross Revenue Diversification by Community of Vessel Ownership Address, All Communities, 2008-2017(nominal millions of dollars)

Geography	Annual Avg. Number of Partial Coverage Vessels	Partial Coverage Vessel Annual Avg. Ex-Vessel Gross Revenues from Partial Coverage Fisheries ($ millions)	Partial Coverage Vessels Annual Avg. Total Ex-Vessel Gross Revenues from All Areas, Gears, and Species Fisheries ($ millions)	Partial Coverage Vessels Partial Coverage Ex-Vessel Value as a % of Total Ex-Vessel Gross Revenue Annual Avg.
ANCHOR POINT	5.5	1.60	2.03	78.84%
ANCHORAGE	19.4	4.92	8.58	57.40%
AUKE BAY	4.9	.54	.76	70.35%
CHEFORNAK	9.4	.03	.03	99.72%
CORDOVA	19	3.78	6.09	62.02%
CRAIG	22.3	.94	2.97	31.67%
DELTA JUNCTION	5.4	1.82	2.33	78.27%
DOUGLAS	12	2.07	3.29	63.07%
DUTCH HARBOR	4.4	1.36	1.71	79.34%
ELFIN COVE	4.3	.44	.66	67.03%
GUSTAVUS	4.1	.11	.25	46.15%
HAINES	15.1	1.64	2.73	60.25%
HOMER	96.3	23.63	40.12	58.90%
HOONAH	10.5	.58	1.32	44.26%
HOOPER BAY	4.6	.01	.01	99.83%
JUNEAU	48.5	5.62	10.51	53.49%
KAKE	6	.14	.71	20.18%
KENAI	6	1.02	1.46	70.13%
KETCHIKAN	25.5	1.66	6.77	24.57%
KING COVE	12.7	2.09	6.78	30.80%
KIPNUK	10.6	.03	.03	93.30%
KODIAK	143.7	50.87	87.98	57.82%
MEKORYUK	14.7	.19	.19	99.97%
NEWTOK	4.1	.01	.01	100.00%
NOME	6.3	.25	.97	26.11%
OUZINKIE	5.8	.16	.39	40.46%
PETERSBURG	101.9	20.47	43.17	47.42%
QUINHAGAK	4.1	.01	.01	67.97%
SAINT GEORGE ISL	4.3	.15	.15	100.00%
SAINT PAUL ISLAND	14.1	2.08	2.21	94.05%
SAND POINT	31.3	4.52	11.78	38.39%
SAVOONGA	10.5	.14	.14	100.00%
SELDOVIA	5.9	1.44	2.13	67.39%
SEWARD	11.6	6.44	9.00	71.60%
SITKA	122.7	17.93	31.66	56.63%
SOLDOTNA	4	.39	.74	53.26%
TOGIAK	10.9	.14	.70	19.58%
TOKSOOK BAY	17.5	.21	.21	99.02%
TUNUNAK	13.9	.04	.04	100.00%
UNALASKA	7.6	1.77	2.59	68.36%
WASILLA	13.2	4.23	6.25	67.70%
WRANGELL	33.6	2.06	4.98	41.44%
YAKUTAT	17	1.05	1.42	73.57%
OTHER AK	91.8	7.78	17.28	45.02%
TOTAL AK	1,037	176.39	323.15	54.58%
OREGON	45	26.37	50.71	52.00%
WASHINGTON	168	93.79	191.19	49.06%
OTHER STATES	25	8.32	13.34	62.40%
TOTAL	1,275	304.87	578.38	52.71%

Table 30 Partial Coverage Vessel and All Catcher Vessel Ex-Vessel Gross Revenue Diversification by Community of Vessel Ownership Address, 2008-2017 (nominal millions of dollars)

Geography	Annual Avg. Number of Partial Coverage Vessels	Annual Avg. Number of All Vessels	Partial Coverage Vessel Annual Avg. Ex-Vessel Gross Revenues from Partial Coverage Fisheries ($ millions)	All Commercial Fishing Vessels Annual Avg. Total Ex-Vessel Gross Revenues from All Areas, Gears, and Species Fisheries ($ millions)	Partial Coverage Vessels Partial Coverage Ex-Vessel Value as a Percentage of Total Ex-Vessel Gross Revenue Annual Avg.
ANCHOR POINT	5.5	20.0	1.60	3.51	45.67%
ANCHORAGE	19.4	202.7	4.92	72.09	6.83%
AUKE BAY	4.9	18.9	.54	1.73	30.95%
CHEFORNAK	9.4	16.8	.03	.31	9.17%
CORDOVA	19	326.8	3.78	39.86	9.48%
CRAIG	22.3	102.1	.94	9.03	10.42%
DELTA JUNCTION	5.4	14.3	1.82	3.17	57.52%
DOUGLAS	12	29.6	2.07	4.32	48.01%
DUTCH HARBOR	4.4	6.7	1.36	1.76	76.98%
ELFIN COVE	4.3	16.0	.44	1.15	38.38%
GUSTAVUS	4.1	19.4	.11	.93	12.40%
HAINES	15.1	77.7	1.64	6.83	24.08%
HOMER	96.3	369.2	23.63	83.16	28.42%
HOONAH	10.5	47.5	.58	2.36	24.82%
HOOPER BAY	4.6	7.6	.01	.01	85.28%
JUNEAU	48.5	181.0	5.62	26.96	20.86%
KAKE	6	17.9	.14	1.22	11.77%
KENAI	6	63.5	1.02	4.50	22.69%
KETCHIKAN	25.5	175.9	1.66	19.57	8.50%
KING COVE	12.7	32.4	2.09	8.99	23.25%
KIPNUK	10.6	18.7	.03	.29	9.15%
KODIAK	143.7	258.2	50.87	122.79	41.43%
MEKORYUK	14.7	25.4	.19	.26	72.45%
NEWTOK	4.1	5.9	.01	.02	54.57%
NOME	6.3	16.0	.25	1.61	15.75%
OUZINKIE	5.8	8.8	.16	.61	25.71%
PETERSBURG	101.9	311.5	20.47	65.34	31.33%
QUINHAGAK	4.1	10.6	.01	.06	11.59%
SAINT GEORGE ISL	4.3	4.7	.15	.17	86.62%
SAINT PAUL ISLAND	14.1	15.8	2.08	2.46	84.34%
SAND POINT	31.3	76.1	4.52	16.06	28.16%
SAVOONGA	10.5	11.1	.14	.14	95.25%
SELDOVIA	5.9	13.0	1.44	2.87	50.05%
SEWARD	11.6	36.0	6.44	12.21	52.77%
SITKA	122.7	399.2	17.93	44.27	40.51%
SOLDOTNA	4	49.9	.39	3.41	11.55%
TOGIAK	10.9	60.7	.14	2.43	5.65%
TOKSOOK BAY	17.5	29.5	.21	.77	27.30%
TUNUNAK	13.9	21.0	.04	.05	77.88%
UNALASKA	7.6	11.1	1.77	3.13	56.59%
WASILLA	13.2	80.2	4.23	13.22	32.01%
WRANGELL	33.6	151.0	2.06	11.65	17.73%
YAKUTAT	17	67.1	1.05	2.36	44.39%
OTHER AK	91.8	858.9	7.78	77.32	10.06%
TOTAL AK	1037	4286	176.39	674.93	26.13%
OREGON	45	207	26.37	83.28	31.66%
WASHINGTON	168	1195	93.79	851.28	11.02%
OTHER STATES	25	430	8.32	156.67	5.31%
TOTAL	1275	6119	304.87	1766.15	17.26%