PUBLIC 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 (EM) 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 ability for the Council and NMFS to meet the Council's monitoring objectives by increasing the available funding for the deployment of observers and EM.

List of Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
ABC	acceptable biological catch
ADF&G	Alaska Department of Fish and Game
ADP	Annual Deployment Plan
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CDQ	Community development quota
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
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
EM	Electronic monitoring
ESA	Endangered Species Act
FMA	Fisheries Monitoring and Analysis
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
ft	foot or feet
GOA	Gulf of Alaska
HAL	Hook and line
IRFA	Initial Regulatory Flexibility Analysis
LAPP	Limited access privilege program
lb(s)	pound(s)
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
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
Observer Program	North Pacific Observer Program
ODDS	Observer Declare and Deploy System
OMB	Office of Management and Budget
PSC	prohibited species catch
PPA	Preliminary preferred alternative
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SBA	Small Business Act
Secretary	Secretary of Commerce
TAC	total allowable catch
TRW	Trawl
U.S.	United States
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system

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. 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 all landing subject to the observer fee, or whether a fee adjustment would be differentially applied by fishery. 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 review and planning process.

Purpose and Need

For more information, see Section 1

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

For more information, see Section 2

The Council's adopted alternatives for analysis were initially identified in February 2018 and revised in April 2019.

Alternative 1: Status quo. The observer fee percentage at 50 CFR 679.55(f) is 1.25 percent.

Alternative 2: Increase the observer fee up to 2 percent.

- Option 1: Set the observer fee percentage at 1.5 percent.
- Option 2: Set the observer fee percentage at 1.75 percent.

Option 3: Set the observer fee percentage at 2 percent.

Alternative 3: Increase the observer fee percentage by fishery sector (hook-and-line, pot, jig, and trawl) up to 2 percent.

Option 1: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 1.75 percent.

Option 2: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 2 percent.

Option 3: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.75 percent and set the observer fee percentage for the trawl fishery at 2 percent.

The options under Alternatives 2 and 3 are intended to focus the analysis on the impacts of specific fee percentage combinations within the possible range. In recommending a preferred alternative, however, the Council may select any fee percentage within the analyzed range under either alternative.

As described above, the scope of this analysis is limited to changes in the observer fee percentage. Through the Council's Fishery Monitoring Advisory Committee (FMAC), the Council is exploring ongoing efforts to improve cost efficiencies, including whether it may be feasible to largely shift the fixed gear partial coverage fisheries to electronic monitoring systems supported by shoreside observers and port sampling. Development work and field testing is underway, but the viability of this design for saving costs is yet to be determined.

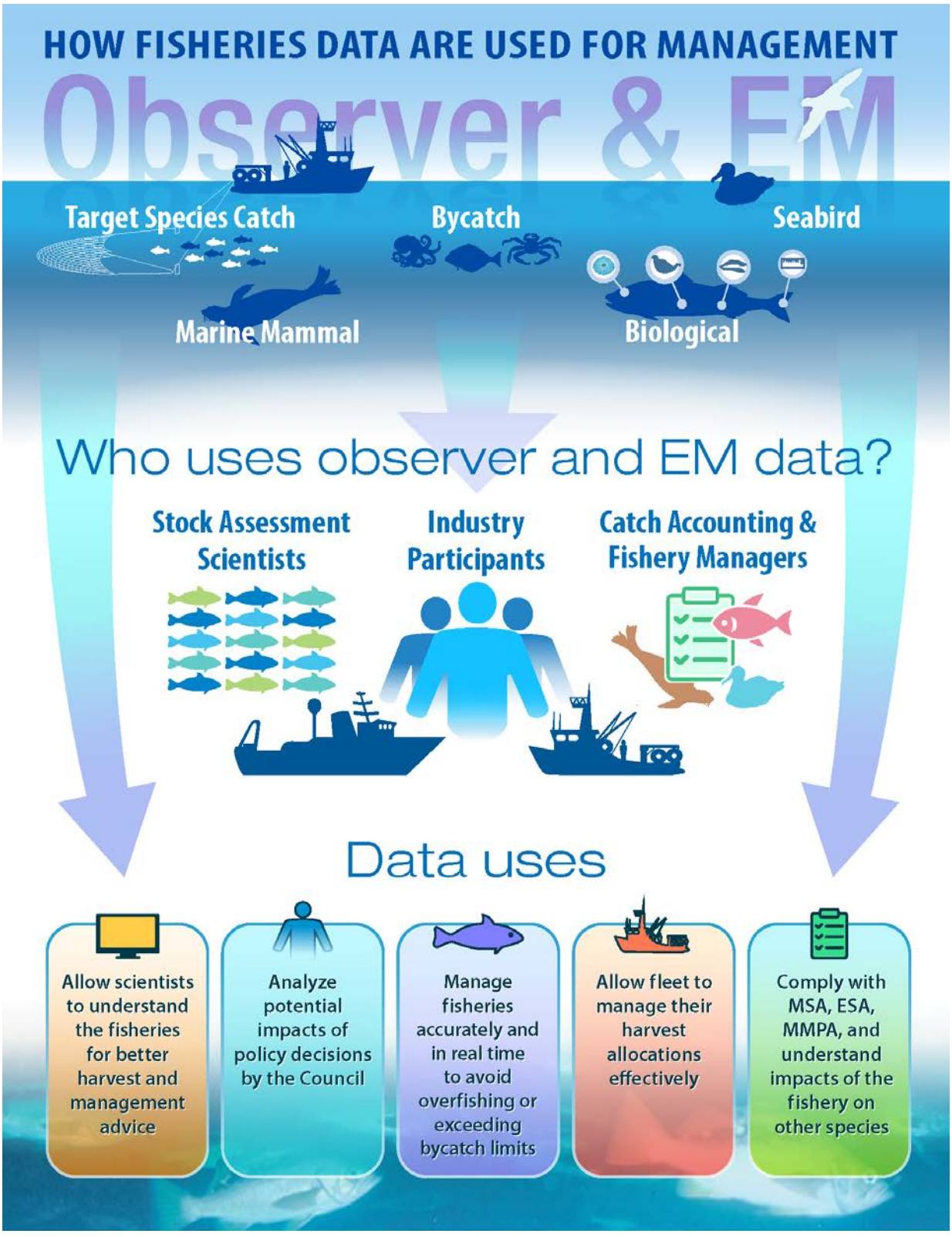
Background on the Observer Program **For more information, see Section 3**

To carry out their responsibility for conserving and managing groundfish resources, the Council and NMFS must have high quality, timely, and cost-efficient data to support management and scientific information needs. The Observer Program was restructured in 2013 to reduce bias in observer data, facilitate collection of observer data in sectors that did not previously have coverage requirements, and allow flexibility through the Annual Deployment Plan model, whereby fishery managers can annually tailor observer coverage in response to management needs (Section 3.1). Implementation of the restructured Observer Program addressed many longstanding issues with data quality concerns related to the previous observer deployment model (NPFMC 2011). The program is funded through a fee-based mechanism that reflects the value a vessel or processor extracts from the fishery, which 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 to collect data necessary to manage the commercial groundfish and halibut fisheries.

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 and EM. A 1.25 percent fee was chosen during the restructure analysis based on the Council's interest in balancing the need for revenue to support the Observer Program with the 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 recommended the same fee percentage be assessed across all fishery participants subject to the fee.

Figure ES- 1 (and Section 3.2) describe how fishery-dependent data from the Observer Program are used to achieve a variety of goals, including catch, bycatch, and biological data for stock and ecosystem assessments, management of the fisheries by NMFS and fishermen, and scientific understanding of the fisheries for management advice and policy decisions. Restructuring the program in 2013 made substantial improvements to the representativeness (quality and utility) of observer data.

Figure ES- 1 Summary of how observer and EM data are used in fisheries management in the North Pacific



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). Once these factors are established, analysts use modeling results to predict the number of observer days required to meet the needs of the fleet in the upcoming year, and set a selection rate for each strata that will ensure that program costs remain within the available budget. Although the observer sampling program will likely continue to evolve, for several years NMFS has employed a selection method based on individual trips, with strata delineated by gear type and delivery pattern. Starting in 2018, the Annual Deployment Plan also established a benchmark expectation for the amount of coverage needed for spatial representativeness using a baseline observer allocation strategy whereby a base level of coverage (15%) is equally allocated among sampling strata (the “hurdle”), and any remaining sea days are allocated differentially among strata by optimizing precision and cost. 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.

Decisions about how to distribute observer coverage consider a range of factors, including changes to improve the statistically reliability of the data as well as balancing the operational impacts on the affected vessels and processors. Through the implementation and modification of the Observer Program, the Council and NMFS have identified a number of monitoring objectives important to successfully monitor the fisheries off Alaska. Figure ES- 2 highlights the eight monitoring objectives identified for the observer program, and how elements of the existing program that are designed to be responsive to and address these objectives (also discussed further in Section 3.3). NMFS and the Council balance this diverse set of monitoring objectives for deployment and data collection. For example, the monitoring objectives for data collection, such as an emphasis on PSC accounting, are complementary to but different from the Magnuson-Stevens Act requirement to achieve a scientifically sound sampling design and achieve random samples and representative data of fishing trip behavior. Meeting diverse monitoring objectives sometimes requires tradeoffs, but NMFS generally strives to achieve sampling goals of obtaining statistically reliable data on fishing trips which also incorporate other monitoring objectives. The current allocation strategy (15 percent baseline threshold plus optimization) may change in the future with new information, but has so far provided a balance between reducing variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce spatial gaps in observer coverage in the partial coverage category (i.e., spatial representativeness).

Figure ES- 2 Summary of Council and NMFS monitoring objectives for the Observer Program, and existing partial coverage program elements that impact these monitoring objectives

1. Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels

- Random deployment in partial coverage category
- Annual deployment performance review
- Annual flexibility to adapt the Annual Deployment Plan to respond to potential biases

2. Improve discard estimates by minimizing variability and reducing data gaps

- 15% hurdle allocation strategy.
- Annual review and evaluation of strata definitions.

3. Monitoring PSC is a priority

- optimization allocation strategy can allocate available observer days above the 15% hurdle according to the PSC levels.

4. Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs

- Annual evaluation of data needs for stock assessment in the Annual Deployment Plan process.

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

- Annual flexibiltiy in the deployment plan (strata definitions, allocation strategy, selection method)

6. Distribute the burden of monitoring fairly and equitably among all fishery participants

- The system of fees distributes the costs of monitoring equitably across all fishery participants
- Annual flexibility allows coverage rates to be adjusted to fairly distribute monitoring (e.g. zero selection pool)
- EM is an option for non-trawl vessels in partial coverage category

7. Minimize the impacts of monitoring on operational choices of fishery participants

- EM is an option for non-trawl vessels in the partial coverage category
- Vessles < 40 ft. LOA are in the zero selection pool
- A separate trip definition was implemented to minimize impacts to vessesl delivering to a tender.

8. Foster and maintain positive public perception and stakeholder support

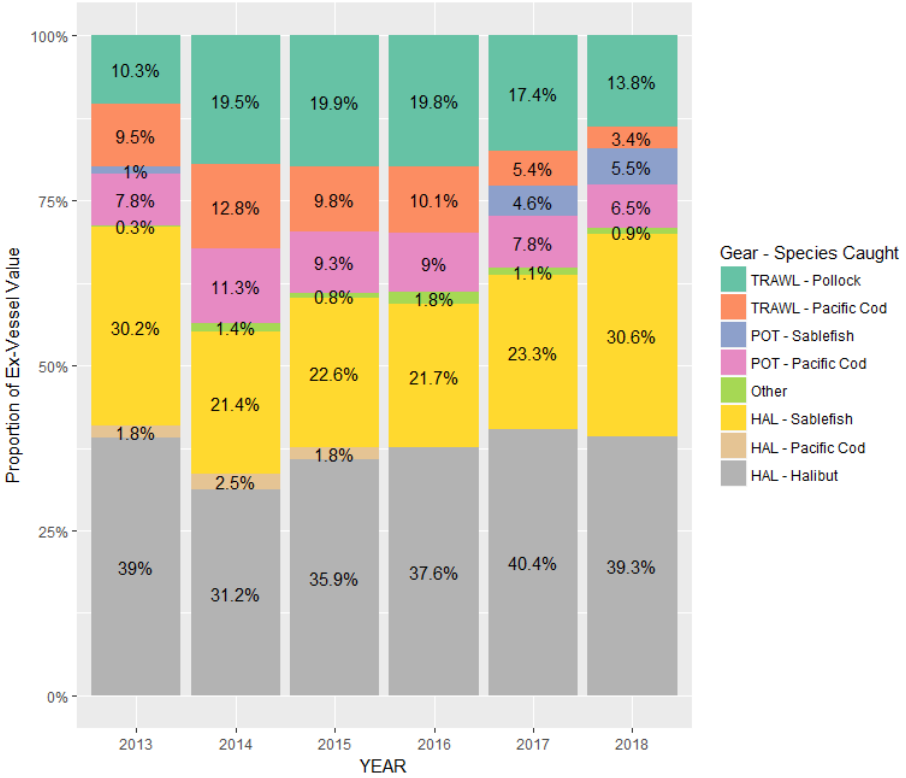
- Public and Council input during annual review and planning process
- Industry costs are limited to the established fee percentage

Observer program funding since 2013 *For more info, see Sections 3.4 and 4.2.1*

NMFS provided $4.5 million in startup funding in 2012 to set up contracts to implement the restructured program in 2013. Lacking Federal start-up funds, industry would have been assessed the 1.25% ex-vessel fee *in addition to* observer expenses under the old program for at least one year, in order to build up the funds necessary to transition to the new system. Since that startup year, the observer fee revenue has provided the majority of funding for the program, however there has continued to be a substantial contribution of Federal funding in most years. Excluding startup funds for observer deployment in 2013, the observer fee revenues funded 68 percent of observer deployment costs ($18.2M) in the partial coverage category, with Federal funding accounting for the remaining 32 percent of observer deployment costs ($8.7M) (Section 3.4). Including startup funds, Federal funding accounts for 42 percent of total deployment costs since 2013 ($13.2M).

The observer fee is based on ex-vessel landings, and the primary species that are harvested within the partial coverage category are 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 bulk of fee revenues have been generated by the hook and line gear sector, specifically with catch of halibut and to a slightly lesser extent sablefish. The two IFQ species, halibut and sablefish, yield a far greater value per pound and thus contribute more in potential observer fee revenues on a per pound basis. Broken out by gear types, trawl gear lands by far the greatest volume of catch, however with the considerably lower price per pound, it contributes a smaller proportion overall to fee revenue. Figure ES- 3 illustrates the relative percentage share of each gear sector and target species' contribution to the total fee revenue.

Figure ES- 3 Proportion of annual ex-vessel value of catch subject to observer fees, by species and gear type, 2013 through 2018.



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)
Note: Fees were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

Analysis of Alternatives

Factors affecting the analysis

Supplemental Federal funding: This analysis assumes that no supplemental funds will be used to fund observer coverage, and EM and at-sea coverage is based solely on observer fee revenues.

EM costs: The analysis also assumes that EM costs would be deducted from the fee budget prior to determining the observer deployment plan. Beginning in 2020, NMFS will begin to contemplate supporting the fixed gear EM program through the observer fee, and apportionment of the total observer fee funding pool between EM and observer coverage will be determined through the Annual Deployment Plan process. One intention of the EM program is to be able to achieve a higher selection rate for less cost than the current cost per observer day, so that in a holistic program including both EM and observers, it may be possible to achieve monitoring goals by reducing the average daily cost of the program as a whole. While the initial cost of installing equipment on EM vessels is relatively high, this cost is only borne by the program when new vessels come into the program or when systems need to be replaced. 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, and a large proportion of small boats in the fixed gear sector are not ideally suited for making EM economically efficient. A simplified approach to EM cost estimation results in a coarse estimate of $1 million to maintain a stable, mature program of 165 EM vessels (Section 3.4.1).

Past scenarios indicative of future reality: This analysis evaluates how a change in the fee would have affected revenue using the years 2013-2018 as a guideline. However, 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.

Fee Revenue under the Alternatives

For more info, see Section 4.2.1

The possible increases associated with each of the specific alternatives and options are illustrated in Figure ES- 4. Any increase of the observer fee percentage would result in an increase to the fee revenues compared to the status quo rate of 1.25%. Options under the alternatives yield an average potential increase to fee revenue ranging from $762,000 to $2.3 million.

Figure ES- 5 identifies the proportion of years between 2013 and 2018 where fee revenues fell below each funding level, for a range of funding levels at each fee percentage or alternative and option. 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 or Alternative 1, observer fee revenues in 5 of the last 6 years (0.83) fell below $4 million. At the 1.5% fee, or Alternative 2 Option 1, no recent years fell below $4 million. This figure also indicates that based on recent years, there are funding levels that are not obtainable ($7.5 million) even if the fee is raised to the cap (2.0%).

Figure ES- 4 Possible Increases to Observer Fee Revenues from the Status Quo Rate in Recent Years for each Alternative and Option, 2013 through 2018, in inflation adjusted dolars

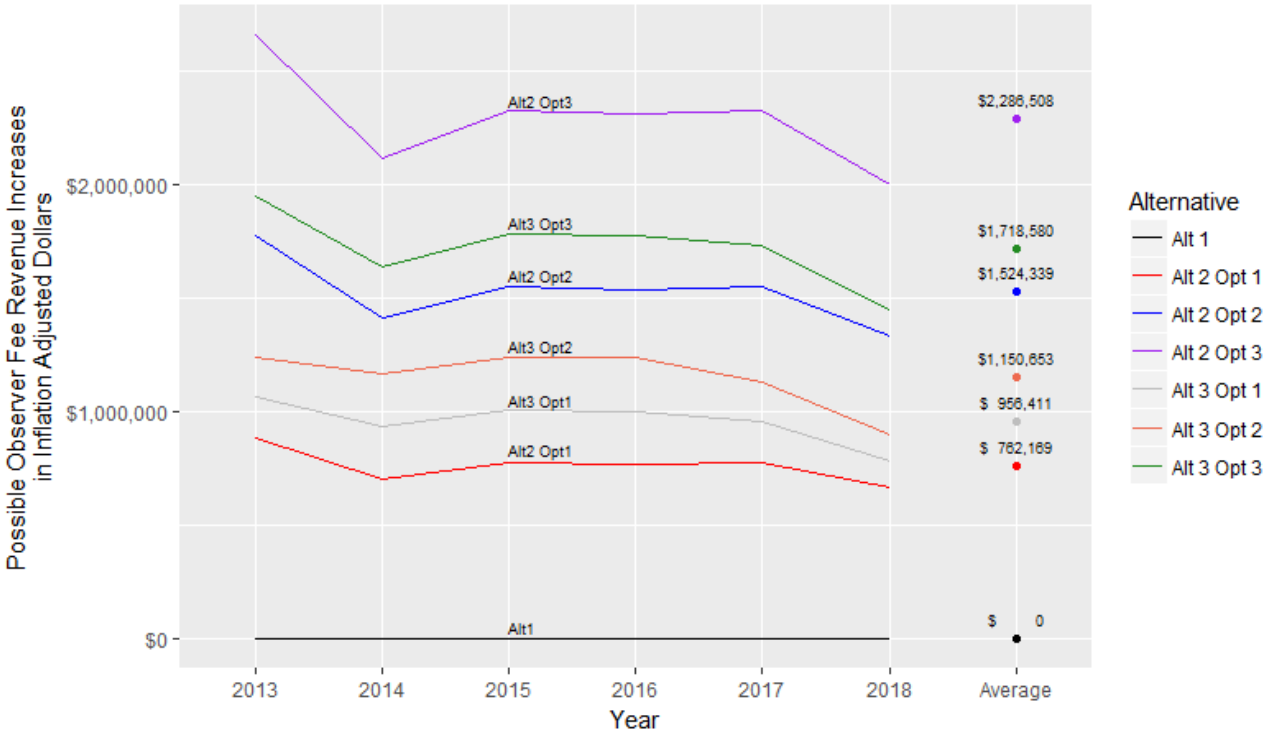
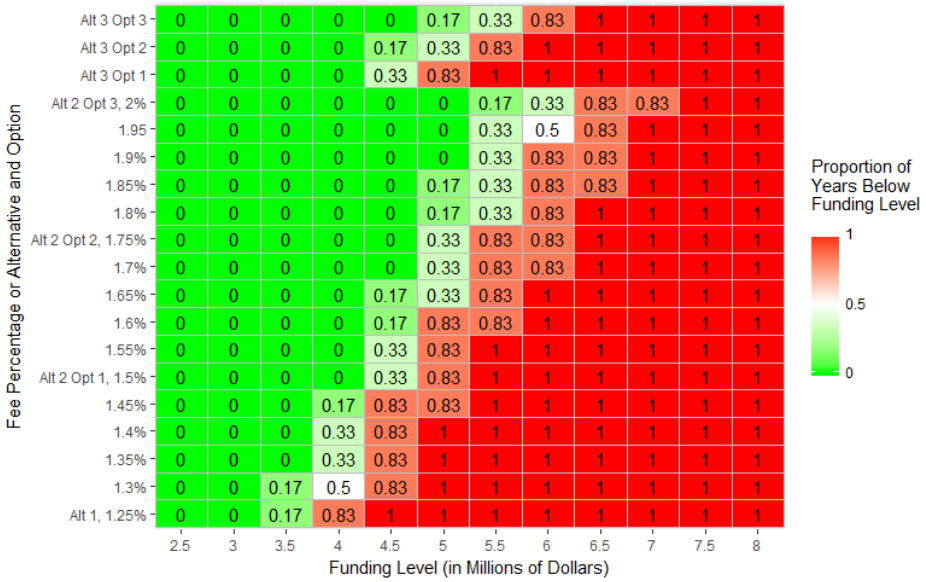


Figure ES- 5 Proportion of Years between 2013 and 2018 that Observer Fee Revenues Fell Below Various Funding Levels (in Millions of Dollars), based on Different Fee Percentages Applied to the Ex-Vessel Value of Halibut, Sablefish, Pacific Cod, and Pollock Catch



Note: Proportions reflect the number of years out of six, between 2013 and 2018, that observer fee revenues fell below a particular funding level. This figure does not take into account funding sources aside from observer fee revenues.
Sources (both figures): 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)
Fee revenue differences in this figure were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

Table ES- 1 provides the possible revenue remaining after deducting EM costs, based on the average fee revenue increase for fee percentage increases applied to all sectors equally ranging from 1.25% to 2%. The estimated cost of a stable, 165 vessel fixed-gear EM program, $1 million, is highlighted in red.

Table ES- 1 Remaining Revenue for Observer Coverage after a Range of Possible EM Costs are Removed from Observer Fee Revenues at Different Fee Percentages, Based on the Average Fee Revenue for All Gears between 2013 and 2018

Fee %	Avg. Fee Revenue for All Gears	Alts and Options	Remaining Fee Revenue after a Range of Possible EM Costs					
			$250,000	$500,000	$1,000,000	$1,500,000	$2,000,000	$2,500,000
1.25	$3,810,846	Alt. 1	$3,560,846	$3,310,846	$2,810,846	$2,310,846	$1,810,846	$1,310,846
1.3	$3,963,280		$3,713,280	$3,463,280	$2,963,280	$2,463,280	$1,963,280	$1,463,280
1.35	$4,115,714		$3,865,714	$3,615,714	$3,115,714	$2,615,714	$2,115,714	$1,615,714
1.4	$4,268,148		$4,018,148	$3,768,148	$3,268,148	$2,768,148	$2,268,148	$1,768,148
1.45	$4,420,582		$4,170,582	$3,920,582	$3,420,582	$2,920,582	$2,420,582	$1,920,582
1.5	$4,573,016	Alt 2. Opt. 1	$4,323,016	$4,073,016	$3,573,016	$3,073,016	$2,573,016	$2,073,016
1.55	$4,725,449		$4,475,449	$4,225,449	$3,725,449	$3,225,449	$2,725,449	$2,225,449
1.6	$4,877,883		$4,627,883	$4,377,883	$3,877,883	$3,377,883	$2,877,883	$2,377,883
1.65	$5,030,317		$4,780,317	$4,530,317	$4,030,317	$3,530,317	$3,030,317	$2,530,317
1.7	$5,182,751		$4,932,751	$4,682,751	$4,182,751	$3,682,751	$3,182,751	$2,682,751
1.75	$5,335,185	Alt. 2 Opt. 2	$5,085,185	$4,835,185	$4,335,185	$3,835,185	$3,335,185	$2,835,185
1.8	$5,487,619		$5,237,619	$4,987,619	$4,487,619	$3,987,619	$3,487,619	$2,987,619
1.85	$5,640,053		$5,390,053	$5,140,053	$4,640,053	$4,140,053	$3,640,053	$3,140,053
1.9	$5,792,486		$5,542,486	$5,292,486	$4,792,486	$4,292,486	$3,792,486	$3,292,486
1.95	$5,944,920		$5,694,920	$5,444,920	$4,944,920	$4,444,920	$3,944,920	$3,444,920
2.0	$6,097,354	Alt. 2 Opt. 3	$5,847,354	$5,597,354	$5,097,354	$4,597,354	$4,097,354	$3,597,354

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, because other groundfish accounted for, on average, 2% 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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

[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 2018 on all gears.

Gap Analysis

For more info, see Section 4.2.2

One objective of the Observer Program is to provide data that is representative of fishing activities at the scales needed by data users (stock assessors, inseason managers, industry groups, and other scientists and researchers). As funding levels increase, a higher proportion of trips are selected for coverage, which in turn reduces the total number of gaps and allows more unobserved trips to obtain data from observed trips that are geographically closer and occur in a smaller time span (resulting in higher resolution data). However, cost per observer day is not constant between budget scenarios – the average cost per-observer-day decreases as more observer days are purchased. Table ES- 2 explores different coverage rates that could be afforded at specific observer budgets, which are based on applying the alternative observer fee percentages to the 2019 budget and calculating the cost per day and days purchased. Resulting strata-

specific selection rates (via the 15% baseline + optimization strategy in the ADP) are then shown for fishing effort in 2018. While the analysis does not include an option to reduce the fee percentage to 1%, the data point is included to provide a range of potential revenue outcomes to account for uncertainty in revenue and EM costs, which are not deducted from this table. The analysis also includes two different sets of cost assumptions, labeled 'Upper and 'Lower', which can be used to represent lower and upper bounds of cost efficiency, respectively. These budget scenarios are used in the gap analysis, and indicate that the increase in data resolution has a non-linear correlation with the increase in budget, due to the change in cost per day (Figure 13 to Figure 16 in Section 4.2.2). Breakpoints are seen in the plots where there is a rapid increase in the proportion of trips for funding levels between $3.7 and $3.3 million, on the old and new cost curves respectively. A second breakpoint is also apparent at budget levels where the 15% base hurdle is met and additional days are optimized differentially among the strata, which in this simulation indicates higher coverage on trawl vessels, at a budget level of between approximately $4.7 and $4.3 million.

Table ES- 2 Observer budgets, observer fee percentage, cost per day, and days purchased under 2019 budget scenarios

Resulting strata-specific selection rates (via the 15% baseline + optimization strategy in the ADP) are also shown for fishing effort in 2018. The table uses two cost curves with different assumptions, which can be used to represent lower and upper bounds of cost efficiency, respectively.

Observer Budget	Fee %	Cost Per Day		Days		Deployment Strata	Selection Rate	
		Upper	Lower	Upper	Lower		Upper	Lower
$3,048,677	1.00	$1,836.41	$1,648.12	1,660	1,850	Hook and Line	9%	10%
						Pot	9%	10%
						Trawl	9%	10%
						Tender Pot	9%	10%
						Tender Trawl	9%	10%
$3,810,846	1.25	$1,770.27	$1,446.59	2,153	2,634	Hook and Line	11.6%	14.3%
						Pot	11.6%	14.3%
						Trawl	11.6%	14.3%
						Tender Pot	11.6%	14.3%
						Tender Trawl	11.6%	14.3%
$4,573,015	1.50	$1,526.44	$1,279.57	2,996	3,574	Hook and Line	15.8%	18%
						Pot	15.1%	15.5%
						Trawl	17.2%	22.9%
						Tender Pot	15.2%	15.8%
						Tender Trawl	17.8%	25.2%
$5,335,184	1.75	$1,389.71	$1,182.08	3,839	4,513	Hook and Line	19%	21.5%
						Pot	15.6%	16%
						Trawl	25.5%	32.1%
						Tender Pot	16.1%	16.7%
						Tender Trawl	28.6%	37.2%
$6,097,354	2.00	$1,302.23	$1,118.18	4,682	5,453	Hook and Line	22.1%	25%
						Pot	16.1%	16.6%
						Trawl	33.8%	41.3%
						Tender Pot	16.9%	17.7%
						Tender Trawl	39.3%	49.2%

Catch Accounting and Inseason Management ***For more info, see Section 4.2.3***

Having area-specific information generally allows inseason managers to manage based on the characteristics of that fishery. For the most part, management is based on area-level information under current coverage levels. When area-level information is unavailable, managers must account for the increased uncertainty associated with estimation that is not similar to the unobserved fishing event. These management decisions in turn influence the fleets ability to fully utilize the resource and operate in an efficient manner. Further, the risk of making a conservative decision is increased when information is unavailable for a fishery, resulting in either closing too early or closure too late based on variable or biased information.

Increasing coverage above the baseline will likely improve inseason estimates by reducing data gaps during the season and increasing the probability of obtaining coverage in the WGOA and BSAI. The analysis in Section 4.2.2 provides information on how changes in the fee amounts would alter expected gaps. Generally, even at higher fee amounts and under the current catch accounting system methodology, some gaps will likely remain in low effort areas such as Prince William Sound, the Western GOA, and the BSAI. Some of these areas likely drive the FMP gaps that persist even at higher fee levels in the gap analysis, whereas areas with a lot of effort will see temporal improvements in the amount of data available within the reporting area throughout the fishing season (i.e., lower effort periods having coverage). Coverage below the baseline is likely to open up more estimation gaps (Section 4.2.2) and require aggregation of observer information.

Probable Environmental Impacts ***For more info, see Section 4.5***

The analysis builds on several recent analyses of the Observer Program to consider potential environmental and cumulative impacts of raising the observer fee percentage on the biological and physical components of the environment. The Observer Program is a monitoring program that 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. The changes considered in this action would not cause adverse impacts to the physical or biological environment. Therefore, all potential impacts on the environment are assumed to be beneficial.

Regulatory Impact Review – Economic Impacts ***For more info, see Section 5***

The Regulatory Impact Review (RIR) 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 Council's fisheries research plan for monitoring in the partial coverage groundfish and halibut fisheries of the GOA and BSAI. In particular, this analysis builds off of the assessment conducted and presented in Chapter 4 of this document, including the Revenue and Gap analysis in Section 4.2 and the Analysis of Catch Accounting and Inseason Management impacts (Section 4.3). This information provided in Chapter 4 is woven into the RIR to bolster the background context on the status quo conditions of the partial observer coverage fisheries as well as contributing to the assessment of social costs and benefits, and distributional impacts of adjusting the fee for stakeholders. The RIR concludes with a qualitative assessment of the proposed action's net benefits to the Nation.

As required of an RIR, this assessment of marginal effects is done by comparing the marginal costs and benefits of the action alternatives (Alternative 2 and 3) relative to the no action alternative (Alternative 1). It is necessary for this analysis to use past conditions to inform potential future impacts; however, the RIR highlights two caveats about the relationship between the fee collected and observer coverage rates able to be achieved. The analysis first notes that increasing the fee percentage does not strictly mean that fee revenues will increase relative to previous years. Gross revenues are also a function of the harvest and standard ex-vessel prices, which may be independent of fee percentage charged against gross ex vessel revenue. For example, some of the primary species which are harvested within the partial coverage

category, have seen a decline in harvestable catch limits in recent years (e.g. Pacific cod), which in turn affects the total gross revenue generated in those fisheries.

In addition, the relationship between fee revenues generated and monitoring capabilities is not always direct or necessarily linear. In the recent past industry-paid fees have generally been supplemented by Federal funding; an additional factor that may has been suggested will change in the near future (see Section 2.5) further decreasing the amount of coverage available relative to previous years. 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. The potential for an increase in observer cost-per-day and the addition of EM costs into the Observer budget can also influence the level of monitoring that can be available to accomplish sampling and monitoring objectives.

Despite these caveats about the relationship between fee revenue, overall deployment budgets, and resulting coverage rates, the analysis in the RIR (as well as in the EA) demonstrates the fee revenues that may be achieved through the action alternatives relative to no action. For instance, Table 11 and Table 12 demonstrate the amount of fee revenue that could be achieved given the range of fee percentages proposed among the alternatives and based on previous conditions of gross ex vessel value in each sector. The Gap Analysis in Section 4.2 applies mean revenues from the Revenue Analysis retrospective study to the exploration of how a higher fee percentage could achieve the baseline threshold, granting some assumptions about the distribution of fishing effort. If fishery conditions shift (e.g. TAC changes, prices change, cost-per-day changes), this also shifts the funding level available or coverage afforded for Observer Program. However, the RIR highlights that the action alternatives would continue to provide greater monitoring opportunity to strive for the 15 percent baseline coverage and a greater potential for the eight additional monitoring objectives to be met relative to the amount of revenue achieved under the 1.25 percent set through the no action alternative. The impact analysis in the RIR (Section 5.6.3 - Section 5.6.5) further breaks out these potential impacts by alternatives and options.

Stakeholders would experience distributional impacts across each alternative. Costs are more easily quantified in this action, as the bulk of the costs are directly experienced by the harvesters and processors who pay the fee. The direct costs under the two action alternatives would be the marginal increase in harvesters' and processors' gross ex vessel revenue paid to the Observer Program relative to the amount required under the 1.25 percent fee. Direct and indirect costs may also be felt by harvesting crew, communities, and associated businesses. Alternative 2 would increase these fees evenly across fishery sectors, while Alternative 3 would increase the fee percentages variably across fishery sectors.

An additional fee would be most disruptive to vessels in any years where they are operating nearest their profit margin. Partial coverage fisheries in the North Pacific represent a wide range of operation types, with varying private costs, and associated taxes and fees. While this analysis does not have information on firm-level or sector-level net revenue in considering the distributional impacts of increasing the observer fee variably by sector, it is important to take under consideration the previous existence of varying net revenues for these operations, in addition to the sector-based distributional impacts that would inherently be imposed under the options considered in Alternative 3. Alternative 3 could either compound or moderate the negative distributional effects of the fee across harvesters, harvesting crews, processors, and associated communities, depending on the net revenue of operators associated with partial coverage fisheries.

Quantifying the incremental benefits stakeholders experience from the use of at-sea data is difficult; particularly in regard to how a specific fee percentage increase relates to a dollar value of benefits due to the indirect relationship and the suite of independent factors that influence how that fee percentage translates into area and gear-specific data. Sampling from larger scales of time and space may not be as representative and can produce higher levels of uncertainty. This can affect the participating stakeholder (harvesters, processors and associated communities) through fisheries management decisions that are

made and the ability to achieve monitoring objectives that may align with some of the priorities of stakeholders.

For instance, Section 4.3.6 and Table 18 describe examples of data-rich or data-poor situations that resulted in NMFS Inseason Management action, which in turn affected the fleet. For instance, when there is low observer coverage in an area and one trip results in a high PSC estimate, that rate has more influence. When catch is used that is less spatially or time-specific, this can result in information being used that is not as specific to a fishery (e.g. using the FMP-level). Lower levels of information for a specific strata can mean more conservative closures based on PSC or TAC management, sometimes marginally reducing fishing opportunity due to directed species or PSC. Uncertainty and inefficiency in management (e.g. it requires lead-up time for NMFS to publish an opener/ closure notice) can also make it more difficult for the fleet to manage their PSC. NMFS Inseason Management's decisions play a critical role and can impact the fleet's ability to fully utilize the resource and reduce catch of unwanted species. Thus, having a high level of area-specific information can diminish inefficiencies and improve the certainty in management, ultimately benefiting harvesters and harvesting crew.

If 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 and communities benefit where better management tools (data) result in greater availability of the TAC and more product delivered.

Moreover, the additional funding able to be achieved in Alternative 2 and 3 relative to Alternative 1 may create a higher likelihood that baseline coverage may be met, and improve the likelihood of achieving the monitoring objectives. To the extent these monitoring objectives align with the interests of stakeholders (including the broader National level as analyzed in Section 5.9), additional benefits may manifest as monitoring can better achieve policy goals.

In recommending an observer fee percentage, the Council will need to consider 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 data gaps that could impact the collection of biological samples for stock assessments or Inseason management decisions. At lower levels of coverage there is risk that observer data become less useful for achieving random, gear-specific, area-specific, or species-specific sampling. At lower levels of observer coverage, fishery managers may take more conservative or precautionary approaches towards management decisions.

Comparison of Alternatives for Decision Making ***For more info, see Section 5.6***

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 monitoring objectives and fund deployment of electronic monitoring systems, and do so in an ever-changing revenue/cost landscape.

The two action alternatives are meant to address this objective, relative to the no action alternative, by increasing the observer fee percentage. The no action alternative, Alternative 1, would maintain the current level of the fee at 1.25 percent of the gross ex vessel revenue for participants of partial coverage fisheries. Alternative 2 would raise the fee to some amount up to 2 percent, equally across all fisheries (i.e., gear types). Alternative 3 would raise the fee up to 2 percent, but be implemented differentially across the fisheries (i.e., gear types).

Given trends of decreasing TACs in some fisheries (i.e., Pacific cod) 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.

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 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 awarded a new observer contract in August 2019, 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. NMFS does not provide a “hard line” 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 monitoring objectives are accomplished.

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 observer coverage rates in the partial coverage category due to the expected decrease in availability of supplementary Federal and grant funding to support observer and EM deployment as well as potentially decreasing fee revenues under the status quo.. Alternative 2 would increase the fee percentage, 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.

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).

Summary of economic effects related to the alternatives to adjust the observer fee percentage

	Alternative 1 No action	**Alternative 2** Increase the observer fee up to 2% to all sectors subject to partial coverage fee	**Alternative 3** Increase the fee up to 2% for individual gear sectors subject to partial coverage fee
Proposed fee as a percent of gross ex vessel revenue	1.25%	1.25 – 2.0 %	HAL: 1.25% - 2% Pot: 1.25% - 2% Trawl: 1.25% - 2% Jig: 1.25% - 2%
Types of benefits and positive distributional impacts, relative to no action			
Benefits to stakeholders associated with partial coverage fisheries	No change	• Incremental improvements in management certainty, which can reduce inefficiency in management (multiple opening/ closures) and decrease the level of conservative management actions. This can in turn improve the fleet's ability to fully utilize the resource and reduce catch of unwanted species. • Relative increase in revenue available for monitoring can increase the likelihood of addressing monitoring objectives, which may align with the interests of some stakeholders in partial coverage	
Benefits to those associated with other types of commercial fishing	No change	• Incremental improvements in spatio-temporal data on bycatch and PSC use can indirectly benefits the primary users of those species • Relative increase in revenue available for monitoring can increase the likelihood of addressing monitoring objectives, which may align with the interests of some stakeholders outside of partial coverage	
Benefits to the Nation	No change	• Decrease in data gaps and area/ gear-specific information allows in incremental improvements to the benefits of robust observer data • Greater information on seabirds and marine mammals that allow for more informed ecosystem assessments benefiting a wide range of stakeholders • Increased assurance that the public receives unbiased information about the use of a public resource	
Types of cost and negative distributional impacts, relative to no action			
Direct costs to harvesters and processors that pay the fee	No change	• An increase in fees paid up to 0.75% of the gross ex vessel revenue • Fee is split between the processors and harvesters • The level of impact depends on the extent to which harvesters/processors are operating near their profit margins and their ability to pass along some of the burden of cost • Increasing **evenly** across sectors	• Increasing **variably** across sectors • **Variable fee may either compound or moderate the negative distributional effects of the fee, depending on the net revenue of the partial coverage sectors**
Direct/ indirect costs to harvesting crew	No change	• If fees are deducted from revenue prior to establishing crew shares, crew wages would decline • If an increased fee results in fleet consolidation, crews could be negatively impacted by loss of opportunity	
Direct/ indirect costs to communities	No change	• Limited indirect impacts expected from incremental increase in the fee • Communities would be affected if there are any changes in where fishing, processing, or observer deployment occurs. • Possible induced effects from a slight reduction in income and spending from those associated with partial coverage fisheries	• Possible induced effects from a slight reduction in income and spending from those associated with partial coverage fisheries, **which could vary by gear sector**

Changes from the Initial Review Draft to the Public Review Draft

Throughout this document, the text has been revised for consistency and clarity and updates to the analysis and data have been made. The following list is a summary of these changes.

Chapters 1, 2, and 3

- Alternatives and options revised based on April 2019 Council motion.
- Revised section 2.5 to better identify ongoing activities to address cost efficiencies in the partial coverage category.
- Revised Chapter 3 to add more background on Observer Program Restructuring, Improve the description of Council and NMFS' monitoring objectives, and add additional summary information in Section 3.4 about observer and EM funding, coverage levels achieved, and realized costs since 2013.

Chapter 4 - Environmental Assessment

In Section 4.2.1 - Fee Revenue Analysis:

- 2018 data added to the figures and tables.
- The fee revenue tables were updated to identify the revised Alternatives and options identified in April 2019.
- Per the Council's direction, the revenue time period used includes the years 2013-2018, or the "low revenue" period presented in the Initial Review Draft which corresponds with the years following the Observer Program restructure.
- The time-series of annual catch subject to Observer Fees (Figure 6) includes summaries by gear and an overall summary.
- The time-series of ex-vessel value (by species and by gear) were consolidated into a single figure (Figure 8).
- The possible Observer Fee revenues at different fee percentages were split into two tables: one with summaries by gear type and a second with summaries for all gears combined (Table 11 and Table 12).
- A figure was added that shows the possible increase in revenues compared to the status quo rate (Figure 10).
- In addition to rows reflecting a single fee percentage, additional rows were added to the revenue risk figure (Figure 11) reflecting Alternative 3 with different rates depending on the gear sector.
- An updated value was used to adjust for inflation.

In Section 4.2.2 - Trip Level Data Gap Analysis:

- The trip level gap analysis was updated to use 2018 fishing effort (2017 fishing effort was used in the April 2019, Initial Review Draft).
- The methods used to estimate observer cost per day were updated. The updated cost curve is less conservative than the previous cost curve, and the gap analysis presents the results using both methods as a range.
- The computational methods for the gap analysis was also updated - it now uses a deterministic simulation (opposed to the stochastic simulation in the Initial Review Draft) which allows for higher resolution results.
- Finally, coverage rates and the gap analysis are now presented as a function of the budget available for observer deployment rather than the fee percentage used in the Initial review Draft. This allows a more direct interpretation of the potential impacts to coverage rates and data gaps at different funding levels expected under the different Alternatives.

- Instead of a table showing effective fee percentages, the amount of fee revenue remaining after EM costs are "taken off the top" is provided (Table 16).

A new analysis of catch accounting and Inseason management in Section 4.3

- This section provides an overview of the Catch Accounting System estimation of discards, Inseason Management activity, and fishery complexity and
- Minor revisions in Section 4.5 to clarify probable environmental impacts.
- Minor revisions in Section 4.5.3 to clarify expected cumulative impacts of reasonably foreseeable future actions to currently being considered by the Council.
- Added Section 4.6 NEPA Summary.

Chapter 5 - Regulatory Impact Review

- Revised alternatives to reflect the Council's April 2019 changes (Section 5.3)
- Revised Table 22 (Section 5.5.1.1) to demonstrate estimated purchasing power of industry-paid observer fees versus what is estimated to be afforded under additional supplementary Federal funding, based on the pre-season ADP's estimated budget.
- Updated/ revised the "Description of Partial Observer Coverage Fisheries" (Section 5.5):
    - To represent updated and augmented information on fee revenue, EM costs, catch and value from the EA as well as new information on market trends.
    - Switched Figure 35 (Section 5.5.1.2) to gear types rather than species types to see the break-out of fee revenue that may be relevant to Alternative 3.
    - Updated Figure 36 and Figure 37 (Section 5.5.2.2) with data from 2018.
    - Added new Figure 38 and Figure 39 (Section 5.5.3.1) to demonstrate the break-out of gear type by associated community as requested by the SSC. These figures allow for a greater understanding of the potential distributional community impacts of Alternative 3.
    - Provided slightly more clarity in sections on "Other Fees and Taxes in the Partial Observer Coverage Category" and "Safety Considerations" (Section 5.5.4 and 5.5.5).
- Revised "Analysis of Impacts" in the RIR (Section 5.6):
    - Separated, consolidated, and amended the description of "Impacts to Stakeholder Groups" (Section 5.6.1). Based on SSC feedback, this includes more clearly articulating potential benefits from the action alternatives, particularly building off of the new section on Inseason Management's use of observer data and how that may translate into fleet effects.
    - Separated, consolidated, and updated the description of the "Impacts in Relation to Monitoring Objectives" (new Section 5.6.2). This section was updated with reference to the new/ updated data provided throughout the document as well as refining the analytical scope of evaluating action alternatives relative to no action (rather than the status quo conditions), as is required in an RIR.
    - Evaluation of the alternatives now includes discussion of and reference to the new options introduced by the Council in April 2019. This includes analysis on community and stakeholder distributional impact under the options for Alternative 3.
- Revised section on net benefits to the Nation (Section 5.9) based on SSC's request to better incorporate a description of benefits.

Additional Changes

- Added MSA National Standards discussion
- Revised Appendix D using updated methods and 2017 fishing effort.
- New Appendix E to describe changes to the methods used to estimate the Observer cost per day
- New appendix F that includes the Gap Analysis as presented in April 2019 Initial Review Draft

Table of Contents

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 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):

> 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

Precipitated by low observer selection rates set in 2017, the Council tasked 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, the Council initiated this analysis to consider raising the fee while also pursuing additional non-regulatory options to improve cost efficiency and increase coverage rates in the partial coverage category. 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 percentage assessed on landings to support deployment of observers and EM 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.

The Council received an Initial Review draft of this analysis in April 2019. At that time, the Council authorized the release of the analysis for public review, after revisions and additions from the Council and its advisory bodies, including the SSC, AP, and the FMAC are addressed by staff, to the extent practicable. Revisions and additions included adopting the updated alternatives and options described in Section 2. This public review draft reflects these revisions.

Due to the Analytical and Federal Rulemaking timeline, any additional funds generated by an increase in the observer fee percentage would not be available to influence observer or EM deployment rates until two years after the Council's recommends a preferred alternative. If the Council recommends a preferred alternative in October 2019, NMFS would begin work on the rulemaking process with the goal of publishing a proposed rule in early 2020 and a final rule to be effective by January 1, 2021. Given this schedule, January 1, 2021 is the earliest that a new fee percentage could start to accrue which would then affect the available budget used to set the selection rates in the 2022 Annual Deployment Plan (ADP).

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).

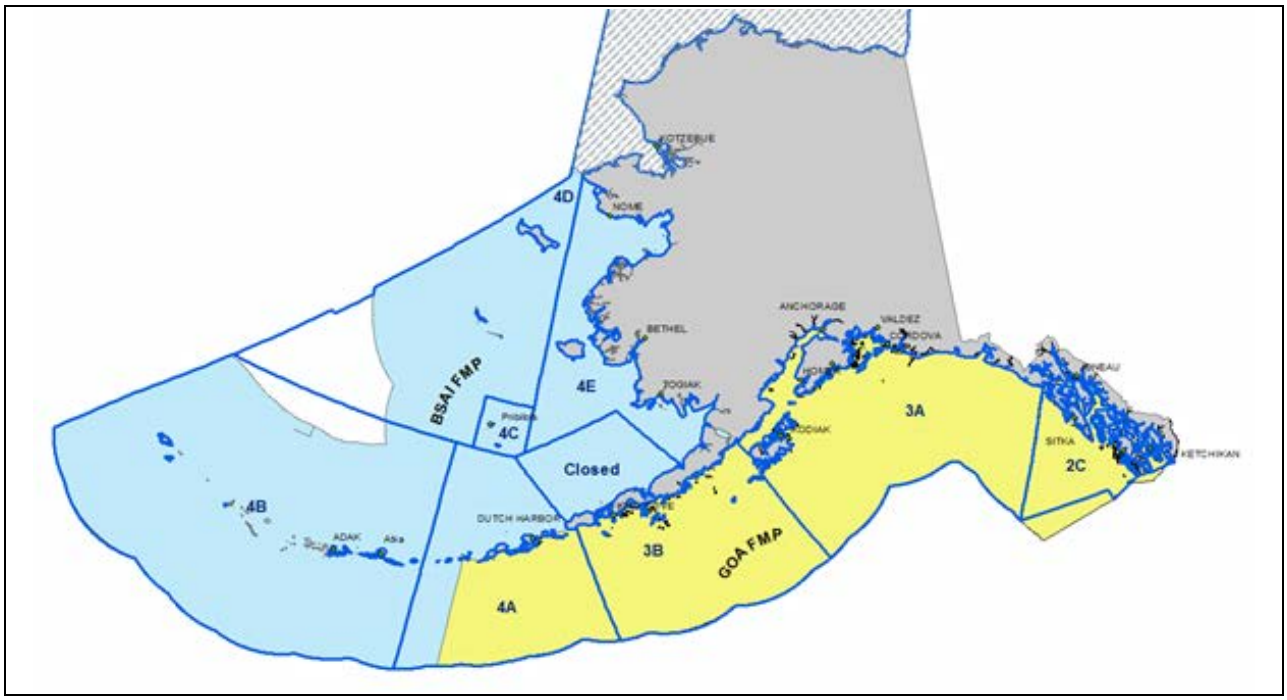


Figure 1 **Regulatory and reporting areas in the BSAI and GOA. Light blue = BSAI Groundfish FMP area, Yellow = GOA Groundfish FMP area, Blue lines delineate IPHC halibut management areas (2C, 3A-B, 4A-E).**

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's adopted alternatives for analysis were initially identified in February 2018 and revised in April 2019.

Alternative 1: Status quo. The observer fee percentage at 50 CFR 679.55(f) is 1.25 percent.

Alternative 2: Increase the observer fee up to 2 percent.

Option 1: Set the observer fee percentage at 1.5 percent.

Option 2: Set the observer fee percentage at 1.75 percent.

Option 3: Set the observer fee percentage at 2 percent.

Alternative 3: Increase the observer fee percentage by fishery sector (hook-and-line, pot, jig, and trawl) up to 2 percent.

Option 1: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 1.75 percent.

Option 2: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 2 percent.

Option 3: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.75 percent and set the observer fee percentage for the trawl fishery at 2 percent.

The options under Alternatives 2 and 3 are intended to focus the analysis on the impacts of specific fee percentage combinations within the possible range. In recommending a preferred alternative, however, the Council may select any fee percentage within the analyzed range under either alternative.

2.1. Alternative 1, No Action

Alternative 1 is the status quo alternative. Status quo refers to the current, 1.25 percent fee 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 Individual Fishing Quota (IFQ) or Community Development Quota (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 (83 FR 65146, December 19, 2018).

Alternative 1 would maintain a consistent and equal financial burden on the fishing fleet (across sectors) based on an unchanged fee percentage over time. Note, however, that stability in the fee percentage does not necessarily equate to stability in the annual revenue raised to fund partial coverage deployment, nor the number of observer days that can be purchased year-to-year with that fee revenue.

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 improve the partial coverage Observer Program, maintain and enhance the Council's ability to meet monitoring objectives, and fund deployment of electronic monitoring (EM) systems, to the extent possible in an ever-changing revenue/cost landscape. Under Alternative 2, the same fee percentage would be applied to all landings subject to the fee. This alternative would thus maintain the existing 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 be set at different percentages. The fee revenue 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 variably across fisheries. The Council and NMFS have prioritized observer coverage deployment to monitor PSC. This has resulted in setting higher observer selection rates for trawl vessels than on hook-and-line, pot, or jig vessels. However, due to its lower average ex-vessel values, the trawl sector pays proportionately less into the overall program than other fishery sectors.

PSC catch by trawl vessels also imposes costs on other sectors, leading to the idea that an equal fee percent is not necessarily as equitable as a fee percentage that varies by fishery. Recognizing that this fee analysis will proceed in considering how to increase observer coverage fees to meet monitoring objectives, the FMAC recommended considering that all sectors should pay a base amount of a 1.25 percent fee, and additional fees could be assessed by fishery gear sector to better align fee revenues with the Council's and NMFS' 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 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) could be internalized by those incurring the costs (i.e., the PSC-limited trawl fleet).

New options from April 2019 under the revised Alternative 3 allow the Council to compare specific fee percentages that would apply to all fixed gear fisheries combined, and a different, higher fee percentage for trawl fisheries. The rationale for this is to examine the relative amounts that would be contributed in fees by fixed gear and trawl sectors, as well as the relative impacts.

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 monitoring objectives and fund deployment of electronic monitoring systems. Distinct from Alternatives 1 or 2, Alternative 3 would vary the distribution of costs across fishery sectors, while maintaining flexibility to distribute the deployment of observers and EM coverage among sectors 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.

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. Current regulations relevant to the observer fee are included in Appendix B.

Table 1 Summary of alternatives and expected results.

	Alternative 1 Status quo. No action.	**Alternative 2** Increase the observer fee equally to all landings subject to observer fees	**Alternative 3** Maintain a minimum 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. Additional Alternatives Considered

This section describes the options considered for increasing observer selection rates in partial coverage, including options that have been considered and rejected as well as options that the Council determined are outside of the scope that is considered in this analysis but constitutes ongoing work by the Council's Fishery Monitoring Advisory Committee (FMAC) since 2017.

In April 2017, the Council directed the FMAC[1] to consider options for increasing partial coverage selection rates. To address this, the FMAC created a subgroup to work over the summer of 2017 to assess whether there are viable options that could increase selection rates without simply raising the observer

[1] At the time, the FMAC was called the Observer Advisory Committee (OAC)

fee. The subgroup's task was to consider whether there are short-term options that could be addressed through changes to the Annual Deployment Plan or the Catch Accounting System, and longer-term solutions that may involve regulatory change. A discussion paper was reviewed by the FMAC and the Council in September and October 2017[2]. That discussion paper summarized the scoping work conducted by the subgroup for eight different options including raising the observer fee. The Council determined that considering the options discussed in that discussion paper, initiating an analysis of raising the observer fee was prudent at that time and that continued work on non-regulatory options would also continue.

At the October 2017 meeting, the Council heard from the NMFS Assistant Administrator, Chris Oliver, that Federal funding to support the deployment of observers for 2018-2019 would be available, but that the Agency position was that Federal funding was not intended to be a long-term solution to coverage rates in the North Pacific Observer Program which is designed to be industry funded. The Council also heard from staff about the implementation timeline and that as a best case, initiating an analysis to raise the fee in October 2017 could potentially increase funding available when setting the selection rates in 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. The following sections describe the options considered for increasing observer selection rates in partial coverage and ongoing work since 2017.

A partial coverage Subgroup of the FMAC was first formed in 2017 to inform discussions about how to increase coverage in the partial coverage category. Since that time, the Subgroup has continued to be tasked with developing strategies to increase coverage, including through lowering costs. To date, Subgroup work has addressed all of the issues listed in this Section 2.5.1 and Section 2.5.2.

2.5.1. Federal Funding

Since the implementation of the Restructured Observer Program, Federal funding has been used to supplement revenues from the observer fee for the purpose of deploying observers in the partial coverage category.[3] Federal funds were necessary for the first year of the program to ensure the award of the partial coverage contract during the period of time between fee collection and availably of those funds to NMFS. The Council continued to request Federal funding to support observer deployment under the partial coverage contract as a way to increase selection rates in the partial coverage category. 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. This supplemental funding was not intended to continue long-term, as the North

[2] NPFMC Agenda item C5, October 2017. Available at: https://meetings.npfmc.org/Meeting/Details/405
[3] NMFS letter to NPFMC, Dec 23, 2014: https://www.npfmc.org/wp-content/PDFdocuments/CM/010915/cm010915corresp.pdf, page 18; NPFMC letter to NMFS, October 28, 2014: https://www.npfmc.org/wp-content/PDFdocuments/CM/102914/cm102914corresp.pdf, page 8-9; NMFS Letter to NPFMC, Aug 16, 2016: https://www.npfmc.org/wp-content/PDFdocuments/CM/2016/090816/08Aug_EMSmallBoatFixedGear.pdf; NPFMC Request , June 20, 2017: https://www.npfmc.org/wp-content/PDFdocuments/CM/2017/071017/0620_SupplementalObserverFunding.pdf; NMFS Response, Dec 15, 2017: https://www.npfmc.org/wp-content/PDFdocuments/CM/2018/010918/1215_NOAA_ObserverCoverageFunding.pdf; NPFMC Request, October 18, 2018: https://www.npfmc.org/wp-content/PDFdocuments/CM/2018/102318/101818_NMFS_obs_funding.pdf; NMFS Response, Dec 19, 2018: https://www.npfmc.org/wp-content/PDFdocuments/CM/2019/010219/Funding_PartialObserverCoverage.pdf

Pacific has the unique fee authority and prior to restructuring observer costa had been entirely borne by industry. With Federal funding for monitoring programs under increased demand nationally, NMFS reverted to a non-supplemented cost model for Federal fisheries off Alaska. This decision resulted in the low 2017 coverage levels that precipitated this Analysis.

Federal funding for observer deployment must be solicited by the Council and/or the Alaska Region in each budget cycle. Because there is no guarantee that these requests will be granted based on a number of factors including budgetary uncertainty and the fact that the North Pacific is the only Regional Observer Program with the unique authority to establish a fee system for the purpose of funding observer deployment, this option is not a long-term solution to increasing coverage rates in the partial coverage category.

Additional Federal funding may increase observer coverage rates in a single year, which could 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 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.

The Council requested additional funding in 2018, and stakeholders have requested additional funding in 2019. Table 4 summarizes the fees and Federal funding received for deployment of observers in the partial coverage category from 2013 through 2018. The funding used to deploy EM in the partial coverage category during pre-implementation and the first year of the regulated program are summarized in Section 3.4.1.

2.5.2. 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. In May and September 2017, AGO Representatives met with the OAC to answer questions about the contract renewal process, timeline, and opportunities for public input into the contract development process.[4] Since 2017, NFMS has been engaged in the contracting process to issue a new contract upon the expiration of the current observer contract that has been in place since 2014. The new contract was awarded in August 2019 for observer services in the partial coverage category for up to 5-years. In 2017, NMFS FMA and AGO staff solicited input and feedback on a draft performance work statement for observer and EM services in the partial coverage category. Efforts included attending the October 2017 meeting of the NPFMC, and hosting an "industry week". The NPFMC provided comments on the draft documents on October 13, 2017.[5]

The resulting performance work statement for the new contract included the following criteria for cost efficiencies:

[4] May 2017 OAC Report is available under agenda item C1: https://meetings.npfmc.org/Meeting/Details/459. September 2017 OAC report is available under agenda item C6: https://meetings.npfmc.org/Meeting/Details/405.
[5] NPFMC letter to AGO, October 13, 2017: https://www.npfmc.org/wp-content/PDFdocuments/CM/2017/112717/10Oct_AGOobserverEM.pdf

- NMFS separated work statements for observers and EM so as to broaden the potential pools of potential offers. This approach was in response to concerns that very few companies were known to have both observer and EM expertise.
- In accordance with § 301-11.18 of the Federal Travel Regulation, when an observer is deployed to a vessel for part of a day, the daily per diem will be reduced to only cover those meals for which they were deployed.
- When at sea, observers work an average of twelve (12) hours per day as the sole Contractor employee aboard privately owned commercial fishing vessels. One-half (1/2) the fixed price daily rate will be paid for each partial observed sea day completed by the contractor. A partial observed sea day is one in which the vessel leaves port after 12:00 PM or returns to port before 12:00 PM.
- Shoreside Plant coverage was not included in the daily sea day rate and was bid on separately. This daily rate came in lower than the Observer Sea Day costs.

Cost efficiencies for reducing travel costs incurred the Observer Program were presented within each offerors proposal. They will be incorporated with the award of the new contract. The Government will 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.

2.5.3. 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. The Alaska Fisheries Science Center's (AFSC) Fisheries Monitoring and Analysis (FMA) Division cannot manage multiple separate contracts with different providers, but the current Performance Work Statement for the Federal contract does not preclude more than one provider from working together. . Any further steps toward developing and analyzing a voucher system will require buy-in from stakeholders, 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.

Legal considerations for this potential option were considered by the Council in October 2017 and are discussed in the October 2017 discussion paper. NOAA General Counsel (GC) provided guidance regarding relevant MSA considerations in developing an observer program funding alternative that would use fees collected under the MSA observer fee authority to fund a contract or grant (e.g. with PSMFC) that would provide a fixed reimbursement (voucher) to a NMFS-certified observer provider to apply toward the observer coverage cost for a selected vessel. Legal considerations included: potential limitations for what types of expenses could be covered by the fees; limitation of when a grant can be used in lieu of a contract; and potential equity issues if a vessel was selected for observer coverage and

there was a shortfall of fees to fund observer deployment for the trip, resulting in the vessel being required to pay for additional observer costs that could arise for the trip.

Both the discussion of economic incentives and NOAA GC's comments in the October 2017 discussion paper highlighted the question of whether a voucher system might create inequitable outcomes, and whether fishermen's expected response would be to behave in a way that biases the random sampling model (altering or canceling trip plans). Resolving inequity and collecting statistically reliable data were central to the restructuring of the observer program and shift to a fee-supported contract in 2013. A change to the system, such as allowing payments over and above the fee, would need a supporting rationale that demonstrates that the original purpose of the fee is not undercut.

2.5.4. 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.

2.5.5. Ongoing Efforts to Improve Cost Efficiency

The FMAC and FMAC Subgroup, and NMFS staff continue to work on improving cost efficiencies within the partial coverage category. Each year NMFS staff evaluate alternative sampling designs in the draft Annual Deployment Plan for implementation in the next fishing year. The sampling designs included in the draft Annual Deployment Plan are developed by NMFS in consultation with the Council at the June Council meeting and include recommendations stemming from the previous year's Annual Report and known changes that would influence fishing effort in the partial coverage category in the upcoming year. Since 2014, NMFS has tracked and prioritized analytical projects related to the Observer Program and requested by the Council.[6]

To complete this analysis, it would involve the same AFSC and AKRO staff that work on many of the other analytical projects and priorities 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. The FMAC continues to develop proposals for deployment design modifications with agency staff during regular meetings each May and September.

The current status of ongoing projects currently being pursued outside the scope of this analysis, are available in the most recent version of the Status of Analytical projects related to the Observer Program.

In February of 2018, NMFS 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

[6] The Observer Analytical Task List is available on Council Meeting Agendas under item E1 and each FMAC meeting Agenda. https://meetings.npfmc.org/

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. Time and staffing constraints resulted in the following considerations being removed from this analysis, noting that these issues will be evaluated as independent projects as 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.

Most recently, at their October 2018 meeting, the Council tasked the partial coverage Subgroup to:

> *develop additional recommendations for how to potentially lower costs and increase observer coverage rates in the partial coverage category while maintaining: the data sufficient for managing the fisheries; randomized deployment; and cost equity considerations among participants. The subgroup should also continue to provide input on differential deployment base levels by gear type.*

The FMAC Subgroup met to discuss the task in November 2018, January 2019, and March 2019.[7] Topics identified for further work by the Subgroup consistent with Council direction include:

1. What would a monitoring cooperative look like with a non Federal contract?
2. **How to best integrate the different monitoring tools, such as dockside monitoring, EM, and cooperatives to meet overall monitoring objectives for a management area or fishery?**
3. Metrics for determining the baseline coverage rate.
4. Methods of determining bias in the annual report – 6 trip metrics.
5. Changes to Observer Declare and Deploy System (ODDS) to keep cancellation/inherited trips issue at the forefront.

At meetings in November 2018 and January 2019, the subgroup detailed next steps for possible monitoring cooperatives to replace the Federal contracts for observers (Topic 1). At their meeting in March 2019, subgroup members agreed they would prefer a first step to be to leverage current efforts on developing EM at the Trawl EM Committee to focus on Topic 2—how to best integrate monitoring tools the Council currently has to meet overall management objectives for partial observer coverage and EM. Specifically, the subgroup would like to explore whether it may be feasible to shift the fixed gear partial coverage fisheries into a mostly EM system supported by shoreside observers/port sampling.

In April 2019, the Council tasked the Subgroup to continue to flesh out their ideas and requested that ongoing Subgroup work be reported to the FMAC and subsequently to the Council during its standard meeting schedule (prior to the June and October meetings).

[7] The FMAC subgroup report is available at: http://meetings.npfmc.org/CommentReview/DownloadFile?p=4021f416-64d4-4f8b-a297-5217c3b808d6.pdf&fileName=FMACSubgroupREPORT0319_withcomment.pdf

2.5.5.1. 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 and hook and line and pot vessels under 40 ft and jig vessel regardless of length, are in zero selection. 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.

2.5.5.2. 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.

2018 was the first year of the implemented EM option under regulations within the partial coverage category. EM costs and deployment of EM on hook and line vessels were evaluated in the 2018 Annual Report (NMFS 2019). EM deployment on pot vessels was still in pre-implementation phase in 2018 as the data were not used for catch accounting in this first year of the regulated program. EM deployment in 2018 was fully funded by through alternate funding sources and no observer fees were used to pay for EM deployment in 2018. EM deployment in 2019 continues to be funded outside the observer fee (NMFS 2018a).

3. Background

The Observer Program has existed in some capacity since 1973 when observers initially were placed on foreign fishing vessels operating off the Pacific Northwest and Alaska upon invitation by host countries. This occurred under the North Pacific Foreign Fisheries Observer Program, then coverage was greatly expanded with the implementation of mandatory observer coverage under the MSA in 1976. In the early years, the primary objective of observer coverage was to monitor incidental catch rates of Pacific halibut in groundfish catches and to verify catch statistics in the crab fishery. Observer data collection and compliance monitoring duties have continued to expand including data on the incidence of king crab, Tanner crab, and Pacific salmon, and biological data on other important species. The "interim" domestic observer program was authorized in 1989 with the implementation of Amendments 13 and 18 to the groundfish FMPs for the BSAI and GOA (54 FR 50386, December 6, 1989).

The interim Observer Plan implemented in 1990 included coverage levels based on vessel length and processing volume for catcher vessels and processors of BSAI and GOA groundfish fisheries. These requirements remained largely unchanged, with the exception of requirements put in place to implement certain limited access programs with increased monitoring needs, such as the Western Alaska Community Development Quota (CDQ) Program, the American Fisheries Act (AFA) pollock fishery, the GOA Rockfish Program, and Amendments 79 and 80 to the BSAI FMP. The interim Observer Program remained in place until the implementation of the restructured Observer Program under Amendments 86 and 76 to the groundfish FMPs for the BSAI and GOA.

Data collected by well-trained, independent observers are a cornerstone of management in the Federal fisheries off Alaska, and increasingly EM programs are being used to meet some of this need. These data are needed 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 a suite of biological 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 data for stock assessments and marine ecosystem research and are looking toward incorporating EM data for these purposes. Observer data is expeditiously available (e.g., daily or at the end of a trip, depending on the type of vessel) to ensure effective management.

3.1. Observer Program Restructure

In 2013, the restructured Observer Program was implemented. 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 longstanding 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 recommended the same fee percentage be assessed across all fishery participants.

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.

The flexible and statistically reliable random sampling plan developed and implemented with the restructured Observer Program in 2013 addressed these concerns and greatly increased NMFS' ability to estimate total catch in all Federal fisheries off Alaska. Since 2013, NMFS has annually reviewed the performance of observer deployment in the partial coverage category and made adjustment for observer deployment in the next year to improve data quality and in response to changing data needs. The annual flexibility of the annual review and deployment planning process addresses all 8 monitoring objectives of the Observer Program (Section 3.3) within the limitations of the available budget.

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 how to distribute observer coverage. 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 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.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 fund the deployment of observers or EM equipment on board fishing vessels and U.S. fish processors and inputting collected data.

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 statistically 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.

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 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.

3.1.1. Integrating Electronic Monitoring

After the implementation of the restructured Observer Program in 2013, the Council worked to develop and integrate an electronic monitoring (EM) option into the partial coverage category 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 an 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 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 developing EM as an option was to preserve and increase the flexibility to adapt monitoring needs in the partial coverage category and balance the need for high quality data with the costs of monitoring particularly for small vessels.

The development and expansion of EM for fixed gear vessels was funded through a combination of Federal funding and grants from external sources such as the National Fish and Wildlife Foundation. Under a fully implemented program, the Council intended that the costs of the fixed gear EM would be funded by observer fee revenues.

3.1.2. Current Observer Program Structure

Figure 2 shows the current structure of the Observer Program and Table 2 compares the elements of the funding models for the partial coverage category and the full coverage category.

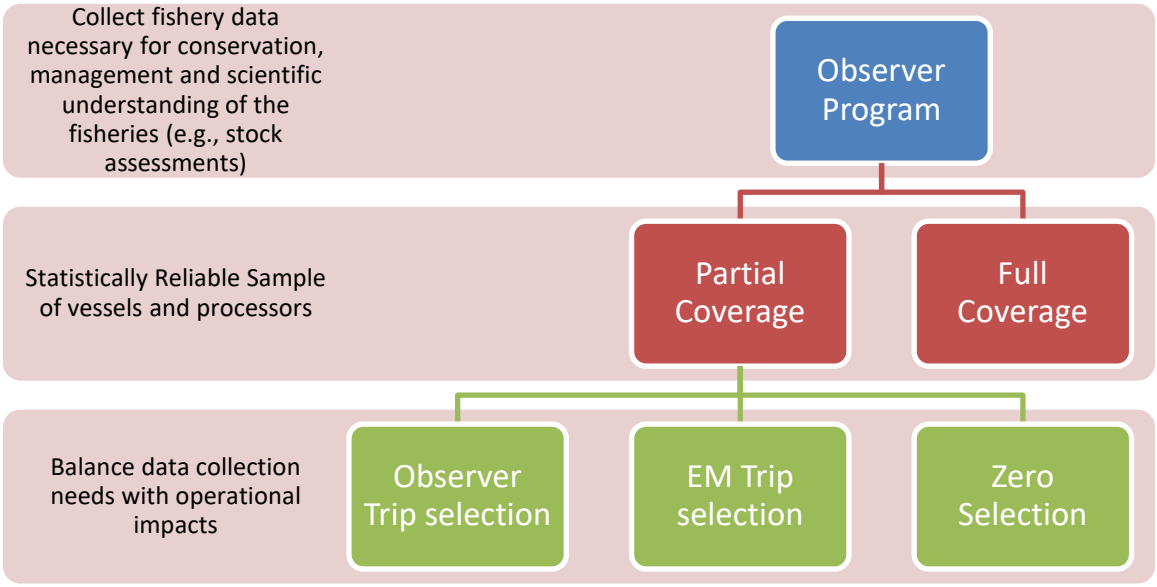


Figure 2 Diagram of the North Pacific Observer program.

Table 2 Comparison of funding elements for partial coverage and full coverage categories.

	Partial Coverage	Full Coverage
Funding Source	• Combination of Industry and Federal funds if available	• Exclusively Industry Funded
Funding Mechanism	• Observer fee assessed on all landings in partial coverage category independent of individual vessel monitoring requirements; Fee assessed as a percentage of landed ex-vessel value	• Pay-as-you-go; individual vessels and processors pay the full cost of monitoring requirements
Procurement of Monitoring Services	• Federal Contract (Observers) or Grant (EM)	• Direct contract between industry participants and permitted observer providers
Coverage Requirements	• Annually established in ADP • Fixed gear EM option • Limited by available budget	• Established in Regulation

3.2. Use of Fishery-Dependent Data

This section describes the use of fishery-dependent data in managing the fisheries off Alaska. Figure 3 summarizes the main users and uses of observer and EM data.

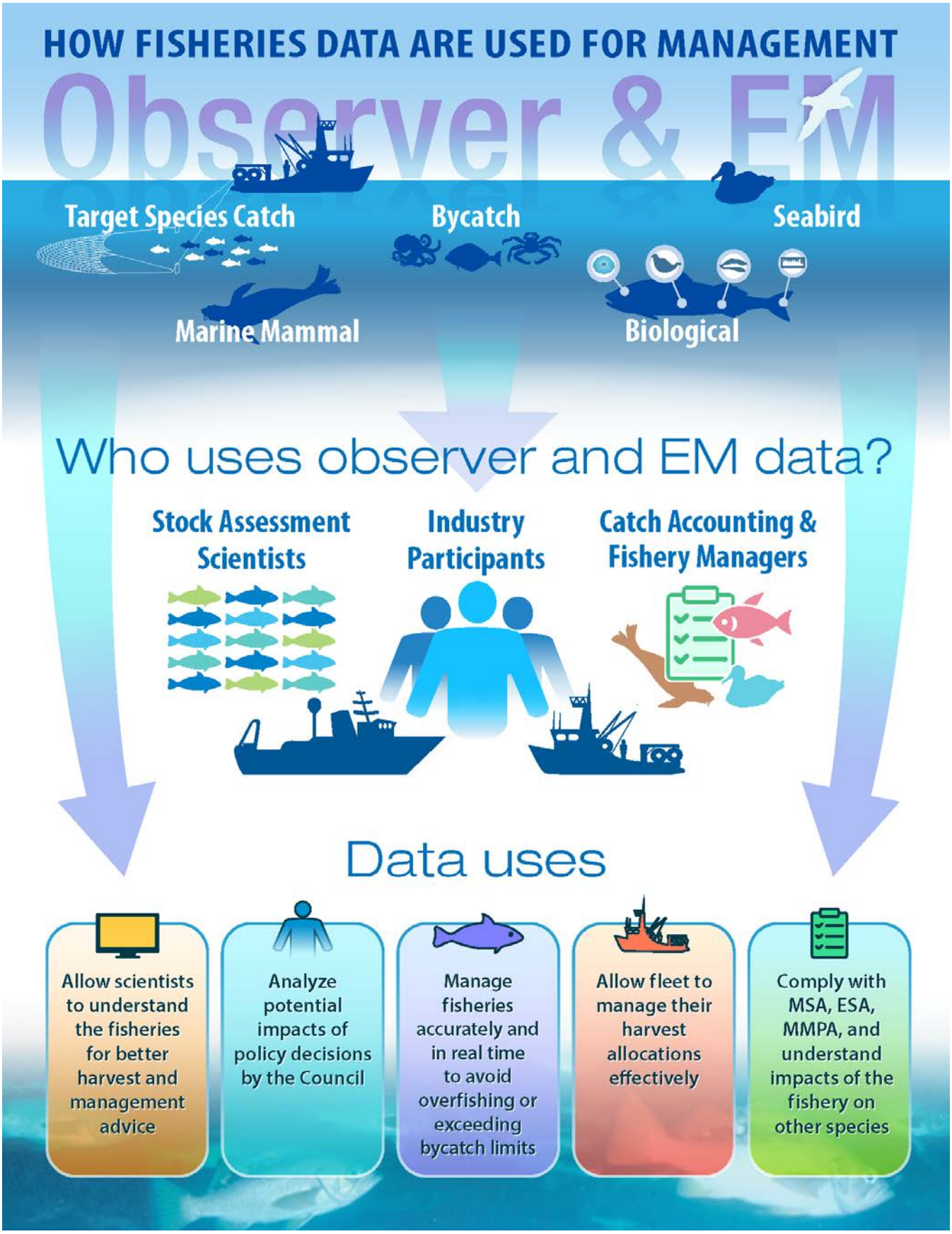


Figure 3 Summary of how observer and EM data are used in fisheries management in the North Pacific.

3.2.1. 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 2012.

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.

3.2.2. Use of data in Stock Assessment

While fishing mortality information is often the focus of observer data, and is used in stock assessments, observers also collect a suite of biological samples from 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. This is not an issue that is unique to Alaska, as EM programs increase across the nation and Federal funds available for monitoring programs are placed under greater pressure. Across NMFS, alternative sampling opportunities such as very low at-sea observer coverage rates, reference fleets, data collection by cooperating fisherman, and shoreside sampling programs are being explored to help fill data gaps.

3.3. Monitoring Objectives

This chapter summarizes the monitoring objectives related to the Observer Program and identifies various elements of the Observer Program that are related to or support these objectives. The degree that the alternatives considered in this Analysis may impact these objectives are evaluated in Section 5.6. Figure 4 summarizes these monitoring objectives and the major program elements that support each objective.

The Magnuson Stevens Act specifies that a fishery research plan shall be reasonably calculated to gather reliable data by stationing observers on all or a statistical reliable sample of vessels included in the plan. The Annual Deployment Plans provide the methodology for deployment of observers (including EM) onto vessels such that a reliable sample is obtained (e.g., scientifically proven random sampling methods having an expectation for coverage levels, taking into consideration operational requirements). Under certain circumstances, the plan can accommodate reliable data collection methods (e.g., stratification, sampling rates, use of technology, sample selection units) that meet a sampling and policy-based objectives.

The Annual Deployment Plans have been designed such that NMFS allocates deployment among sampling strata, while policy choices of the Council may influence the stratification scheme (e.g., small/large vessel strata, gear-specific strata, scientific evaluation of sampling alternatives). The Council's monitoring objectives for data collection, such as PSC accounting, are complementary to but different from goals of attempting to achieve representative data of fishing trip behavior. Meeting both sampling objectives and monitoring objectives sometimes requires tradeoffs, but NMFS generally strives to achieve sampling goals of obtaining statistically reliable data of fishing trips that also incorporate policy objectives.

For example, starting in 2018 the Annual Deployment Plan established a benchmark expectation for the amount of coverage needed for spatial representative. This benchmark may change in the future with new information, but it provided a method to balance reasonable sampling needs (part of which is a policy decision) with specific policy objectives. This approach, (the15 percent plus optimization allocation strategy) provided a balance between reducing variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce spatial gaps in observer coverage in the partial coverage category (i.e., spatial representativeness). This is an example of balancing a diverse set of sampling and policy goals in a deployment strategy.

The 15 percent plus optimization allocation strategy 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 (See Section 4.2-4.3).

To carry out their responsibility for conserving and managing groundfish resources, the Council and NMFS must have high quality, timely, and cost-efficient data to support management and scientific information needs. Through the implementation and modification of the Observer Program, the Council

and NMFS have identified a number of monitoring objectives important to successfully monitor the fisheries off Alaska. These monitoring objectives include:

1. Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels
2. Improve discard estimates by minimizing variability and reducing data gaps
3. Monitoring PSC is a priority
4. Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs
5. Design the program with flexibility to respond to evolving data and management needs in individual fisheries
6. Distribute the burden of monitoring fairly and equitably among all fishery participants
7. Minimize the impacts of monitoring on operational choices of fishery participants
8. Foster and maintain positive public perception and stakeholder support

3.3.1. Description of the Monitoring Objectives

Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels

MSA Section 313 requires that the North Pacific monitoring program must be reasonably calculated to gather reliable data by deploying observers or EM on all or a statistically reliable sample of the fishing vessels and processors. The current structure of the Observer Program places all vessels and processors into either the full coverage category or the partial coverage category.

The random sampling established under the restructured Observer Program was designed to address potential sampling bias that existed under the previous program that was caused by vessels and processors self-selecting when to carry an observer to comply with coverage quarterly rates set in regulation. A goal of the restructured program was to randomize the deployment of observers on vessels in the partial coverage category 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.

Realized or achieved observer and EM deployment may differ from the sampling plan established in the Annual Deployment Plan for a variety of reasons. The performance of the Observer Deploy and Declare System (ODDS), operational choices made by individual vessels, as well as logistical constraints may impact resulting observer and EM deployment.

Each year, NMFS reviews the deployment of observers relative to the intended sampling plan and goals in the Annual Deployment Plan. In this review, NMFS identifies where possible biases exist and provides recommendations for further evaluation, including potential improvements to the observer deployment process that should be considered during the development of the next Annual Deployment Plan. This annual evaluation focuses on the randomization of observer and EM deployments into primary sampling units (vessels or trips), and how departures from a random sample affect data quality.

Each June since 2013, NMFS has presented the Annual Report to the Council to review the performance of observer deployment in the previous years. Several potential sources of bias have been identified through this annual process including a potential observer effect among catcher vessels delivering to a tender. As a result of these annual reviews, the Council and NMFS have made recommendations for

changes to the sampling plan in the next year's Annual Deployment Plan to address the potential sources of bias identified in the Annual Reports.

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, 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, 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).

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 have associated costs.

Improve discard estimates by minimizing variability and reducing data gaps

As discussed in Section 4.3.2, 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 for a fishery , then estimation of discarded catch must be made using information from outside a specific fishery. For example, if observer information is unavailable in a Federal reporting area with a certain time period then estimation looks for information outside of the time area and time period which the fishery occurred. This increases uncertainty in management. 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.

One of the most important data quality gains with restructuring was coverage on halibut IFQ vessels (Gasper et al. 2019). Vessels fishing IFQ comprise a large component of the hook-and-line fishing fleet, and prior to restructuring, they had no coverage requirements. Coverage has resulted in large improvements in discard estimation (since estimates were not made for this fleet prior to restructuring), provided information on seabird mortality not previously available, and provided data on marine mammal interaction. Further, this fleet has been instrumental in developing EM programs, which allows for the collection of high quality information that is available for managers.

Finally randomization (i.e., statistically reliable sampling methodology) has allowed for variance estimation at the fishery level. Preliminary estimates have been presented to the SSC and are currently being formalized into CAS. Section 4.2.3 provides an overview of how variance and sample size interact. In general, the largest gains in variance occur when sample size is increased from a very small sample size, with only small gains after the initial large reduction (see section 4.2.3). Preliminary analysis have generally shown variance to be low for many species under current coverage levels, with higher variance expected for rare and patchy species. Sample bias is a primary concern since this will create biased point and variance estimates. Thus, the ADP has prioritized obtaining a representative sample, then optimizing for variance above the 15% benchmark threshold.

Monitoring PSC is a priority

Since the first observers were deployed on foreign fishing vessels in the 1970's, monitoring PSC has been a top priority for the deployment of observers under the Observer Program. 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).

Today, many groundfish fisheries in the North Pacific are limited by prohibited species catcher of crab, salmon, halibut, and herring, as much, if not more so, than by the harvest of target species. Observers, and increasingly the use of EM, are the only reliable method through which prohibited species catch data can be collected in most North Pacific fisheries. Without observers, PSC could not be managed in an effective manner.

Under the restructured Observer Program, nearly all catcher/processors and motherships were placed in the full coverage category[8], 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.

While NMFS does not identify a specific level below which observer data cease to be statistically reliable (NMFS 2015), the Council has made recommendations to NMFS through the annual review and planning process to place a high priority on monitoring PSC in the partial coverage category fisheries.

This priority is evident by the recommendations starting in 2015 to move away from equal coverage rates for all partial coverage vessels to change how the strata are defined in the Annual Deployment Plan and prioritize allocating available observer days to strata with higher discards of groundfish and PSC. These recommendations are illustrated in Table 9 with the evolution of the strata definitions and allocation strategies and resulting coverage rates through time. 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.

[8] Exceptions exist for catcher processors that process only a very small amount of product onboard annually.

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.

Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs

Observer data are an important data source for stock assessment scientists (see Section 3.2.2). In the Supplemental EA analysis (NMFS 2015), NMFS 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 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

Through the implementation of the annual process for reviewing program performance and planning for the next year's deployment in the Annual Deployment Plan, the Council and NMFS have considerable flexibility to adapt and make changes to observer and EM deployment each year. This flexibility includes selecting the selection method (trip or vessel selection), identifying the stratification scheme and allocation strategy for observers in partial coverage, defining which vessels are in the zero selection pool, and establishing priorities for placing vessels in the EM pool. All of these flexibilities allow the Council and NMFS to make changes to observer and EM deployment to adapt to evolving data needs all within the available budget. This limits the cost of monitoring to the established fee percentage set in regulation. The Council has affirmed the importance of this objective through the subsequent changes to the Observer Program that have been implemented since 2013 to increase the flexibility of the Observer Program and are described in more detail in Section 4.5.3. Since 2013, the Council recommended and NMFS implemented various mechanisms to the Observer Program that allow vessels to select or request approval for placement in a specific monitoring category or pool. Monitoring options are available to specific catcher/processors and catcher vessels to request placement in the full coverage category or partial coverage category, and vessels using fixed gear in the partial coverage category may request placement in the EM selection pool instead of the observer selection pool.

The ability to change the deployment strategy from year to year, however, also creates a lack of stability across years making it difficult to compare performance of the program through time and evaluate the effectiveness of annual adjustments in the deployment strategy. 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.

Distribute the burden of monitoring fairly and equitably among all fishery participants

The Council designed the restructured Observer Program to be industry funded and fairly distribute the costs burden of monitoring through the implementation of different funding mechanisms in the full coverage and partial coverage categories.

The development of the Observer Fee as the mechanism to fund monitoring in the partial coverage category was intended to address the disproportionately high costs of monitoring for vessels relative to their gross earnings. Additionally, the Council's prioritized development of EM as an option for fixed gear vessels to address the disproportionate, and newly realized, burden experienced by small vessels when required to accommodate an observer onboard, which could come at the expense of leaving a crewmember behind.

The design of the sampling plan in the Annual Deployment Plan also addresses how the burden of monitoring is distributed across the partial coverage fleet by the annual recommendations from the Council and NMFS of which vessels to place in the zero selection pool, the selection method (vessel selection or trip selection), strata definitions, and the criteria for placing vessels in the EM selection pool.

Minimize the impacts of monitoring on operational choices of fishery participants

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 objective was a significant driver in the Council's design of the fixed gear EM option of the partial coverage category; it also works in concert with the intention of monitoring objective 1, which values minimizing the monitoring effect so that data from observers is representative of unobserved vessels. The implementation of the EM option for this program is the first time that EM has been used to generate independent catch estimates without deploying an observer. This option balanced the data collection needs with the 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).

Other components of the Observer Program consider this objective including the conditional release policy; the separate trip definition for vessels delivering to tenders, the options for small C/Ps to request placement in the partial coverage category and for BSAI trawl catcher vessels to request placement in the full coverage category. During the first few years of the restructured Observer Program, NMFS used the conditional release policy to temporarily release a vessel from observer coverage in the partial coverage category. The use of this policy was phased out after the development and widespread availability of EM as an alternative to observer coverage. The implementation of various options to request placement in a specific monitoring category or pool are described in more detail in Section 4.5.3.

Foster and maintain positive public perception and 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, and minimizing the monitoring effect. This objective also requires stakeholder buy-in about the value of Observer Program, and its appropriate management and use of data by the agency.

With the restructuring of the Observer Program in 2013, the Council and NMFS moved to a monitoring program that extended coverage to a large number of previously unmonitored vessels, and changed the

funding structure to be more equitably distributed among participants in the fisheries. However, because of the change in cost of an observer day under the Federal contract, as well as reductions in the value of partial coverage fish that leading to lower revenue than predicted, coverage rates for some sectors were seemingly reduced under the new program. Despite the fact that restructuring the program and especially randomizing coverage made substantial improvements to the representativeness (quality and utility) of observer data across all sectors and vessels, the Council and the agency had to make considerable outreach efforts and secure additional Federal funding to ensure continued stakeholder confidence in the estimates of bycatch under reduced selection levels during the transition period.

Having stakeholder buy in and a positive perception of the program builds goodwill and trust between the agency and fishermen. Particularly on smaller vessels, having an observer onboard can be intrusive, and the more the public supports the value of observing and the benefits of at-sea data, the less likely the program is to have to address safety and harassment concerns for observers at sea. Additionally, stakeholders who understand that observer data contributes to sustainably managed fisheries are less likely to 'game the system' to avoid taking an observer, or to make a token trip that does not represent their normal fishing patterns.

Finally, under the restructured program, industry members feel that they have a direct stake in the management of the program because they are funding it through the fee revenue. The Council acknowledges the demand for increased accountability for the efficient use of funds when every fisherman landing partial coverage fish in Alaska has a stake in paying for the program.

3.3.2. Summary

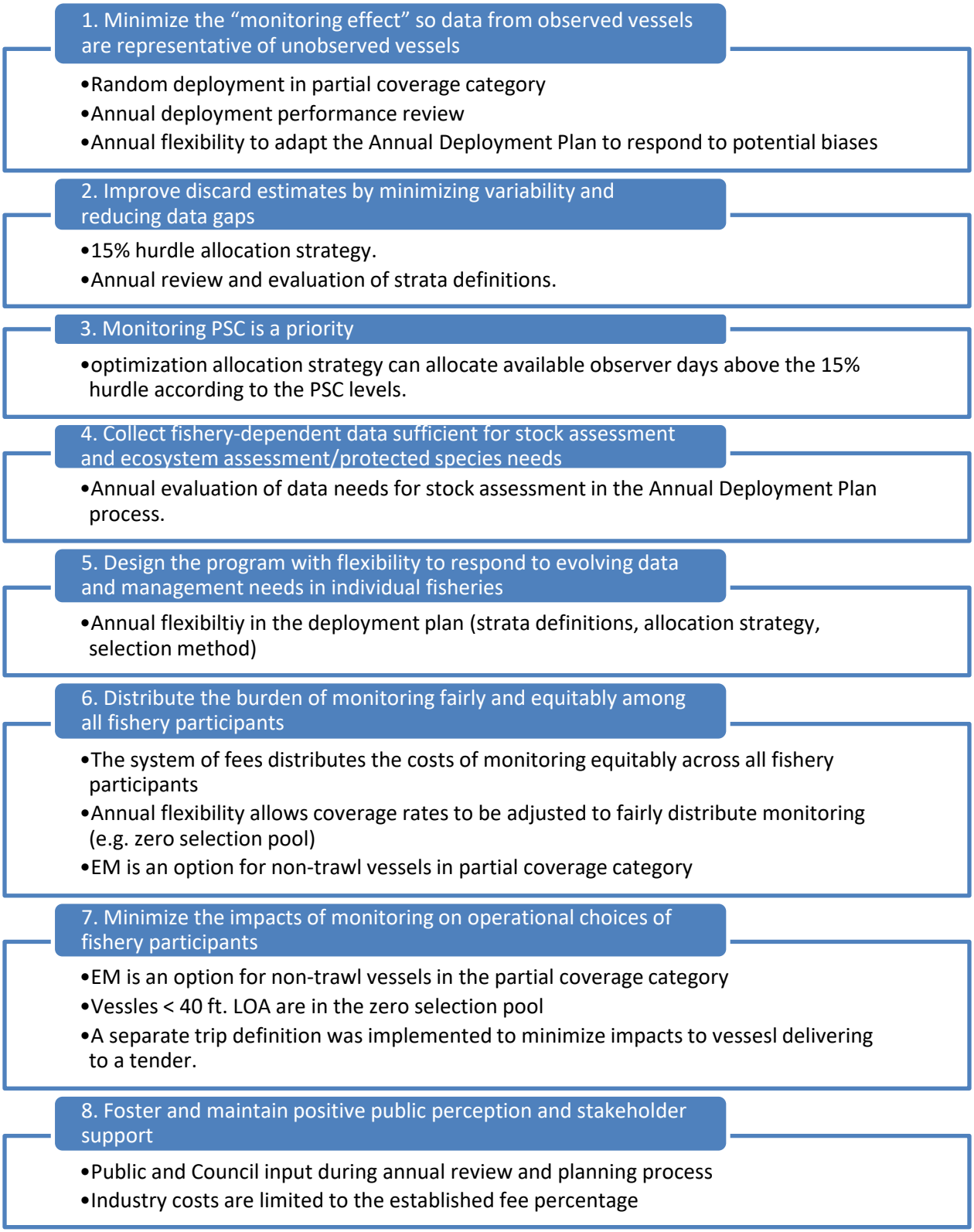


Figure 4 **Summary of Observer Program monitoring objectives and partial coverage program elements that impact these monitoring objectives.**

3.4. Funding and Coverage Levels Since 2013

This section summarizes the funding sources and resulting observer coverage rates in the partial coverage category since the implementation of the current Observer Program.

Figure 5 show the fishing year, Federal fiscal year, and observer contract year align. The ADP and Observer Program annual reports focus on planning and evaluating observer deployment for a single calendar year. The timing of when Federal funding may be available is dependent on the Federal fiscal year which begins each September. Since 2014, the observer contracting year has begun in June each year.

Table 3 summarizes the annual budget for observer deployment in the partial coverage category, the amount of fees assessed in the previous calendar year and the resulting observer days deployed and coverage rates achieved each year from 2013 through 2018. The information included in Table 3 for 2019 includes the coverage rates set in the 2019 ADP.

Table 4 summarizes the amount of observer fees and Federal funding spent on observer coverage from 2012 through 2019. Excluding startup funds for observer deployment in 2013, the observer fee revenues funded 68 percent of observer deployment costs ($18.2M) in the partial coverage category, with Federal funding accounting for the remaining 32 percent of observer deployment costs ($8.7M) (Section 3.4). Including startup funds, Federal funding accounts for 42 percent of total deployment costs since 2013 ($13.2M).Table 5 summarizes the average cost per day for observer coverage 2014 through 2018.

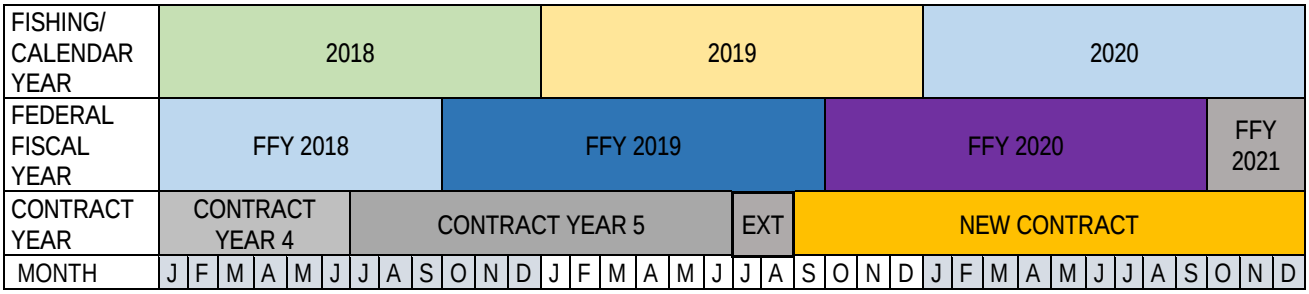


Figure 5 Partial Coverage Contract and Federal fiscal year schedule.

Table 3 Summary of partial coverage budget, strata and coverage allocation scheme 2013 through 2019 and fees collected and realized observer coverage rates for the years 2013 through 2018.

Year	Partial Coverage Budget (Millions)	Fees from Previous Year	Realized Costs (Millions)	# Observer Days Realized	Allocation Scheme	Strata	Effort (# of Trips)	# of Trips Monitored (Observer or EM)	Coverage rates Achieved[1]
2013	$4.5	0	$3.8	3,538	Equal allocation	Trip Selection	3,977	590	14.8%
						Vessel Selection	2,249	154	10.6%
						Zero Coverage	3,040	0	0.0%
2014	$4.8	$4.2	$4.9	4,573	Equal Allocation	Trip Selection	4,390	662	15.1%
						Vessel Selection	2,079	324	15.6%
						Zero Coverage	2,320	0	0.0%
2015	$5.5	$3.4	$5.8	5,318	Small vessel 12% and remaining available days on large vessels	Large Vessel (≥57.5 ft)	4,676	1,094	23.4%
						Small Vessel (40-57.5 ft)	2,148	241	11.2%
						EM Pre-Implementation	92	2	2.2%
						Zero Coverage	2,001	0	0.0%
2016	$4.5	$3.7	$4.2	4,677	Optimized allocation (retained and discarded groundfish)	Trawl	2,738	767	28.0%
						Hook and Line	2,655	398	15.0%
						Pot	1,261	185	14.7%
						Zero Coverage	2,109	0	0.0%
						EM Pre-Implementation	227	76	57.1%
2017	$3.6	$3.7	$3.1	2,749	Optimized allocation (discarded groundfish)	Trawl	2,090	433	20.7%
						Tender Trawl	69	13	18.8%
						Hook and Line	2,298	279	12.0%
						Tender Hook and Line	4	0	0.0%
						Pot	932	72	7.7%
						Tender pot	75	4	5.3%
						Zero Coverage	2,058	0	0.0%
						EM Pre-Implementation	683	142	20.8%
2018	$5.5	$3.8	$4.4	3,207	15% Hurdle plus Optimized (discarded groundfish, Chinook and halibut PSC)	Trawl	1,864	378	20.3%
						Tender Trawl	40	14	35.0%
						Hook and Line	1,990	309	15.5%
						Pot	626	97	12.7%
						Tender Pot	31	9	29.0%
						EM Hook and Line	767	174	22.7%
						EM Pot	164	42	25.2%
						Zero Coverage	1,748	0	0.0%
2019	$4.5	$3.2	n/a	n/a	15% Hurdle plus Optimized (discarded groundfish, Chinook and halibut PSC	Trawl			24%
						Tender Trawl			27%
						Hook and Line			18%
						Pot			15%
						Tender Pot			16%
						EM Hook and Line			30%
						Zero Coverage			0%

Source: Observer Program Annual Reports 2013 through 2018 and 2013 through 2019 Annual Deployment Plan.

[1] Vessel selection coverage rates in 2013 and 2014 are expressed as a percentage of vessels monitored rather than a percentage of trips monitored. 2019 coverage rates are the estimated rates set in the 2019 Annual Deployment Plan.

[2] This total includes years after the initial implementation year funded by Federal start-up money.

Table 4 Summary of the fees and Federal funding for partial coverage observer sea days from 2013 to 2019.

Calendar Year	Funding category	Funds sequestered (% of fees received)	Observer fees received	Observer fee collections received late	Prior year sequester funds received	Funds obligated to contract	Observer sea days at the start of the year	Observer sea days purchased during the year	Total observer sea days used during the year
2012	Fees						0	4,535	0
	Federal Funds					$4,484,962			
2013	Fees						4,535	1,913	3,533
	Federal Funds					$1,885,166			
2014	Fees	$306,047 (7.2%)	$4,251,451			$3,044,606	2,915	4,368	4,573
	Federal Funds					$1,892,808			
2015	Fees	$350,400 (10.2%)	$3,456,458		$306,047	$3,058,036	2,710	5,330	5,318
	Federal Funds					$2,700,000			
2016	Fees	$231,200 (6.8%)	$3,897,938	$370,915	$350,400	$5,144,983	2,722	5,277	4,749[1]
	Federal Funds					$ 390,800			
2017	Fees	$273,930 (7.9%)	$3,592,750	$151,606	$231,200	$3,542,196	3,322	5,285	2,591
	Federal Funds					$1,398,531			
2018	Fees	$304,356 (7.9%)	$3,468,580		$273,930	$2,396,040[2]	5,858	2,350	3,207
	Federal Funds								
2019[3]	Fees					$997,845	5,001		
	Federal Funds					$412,307			
Total 2012-2019	Fees					$18,183,706			
	Federal Funds					$13,164,574			

Source: 2018 Annual Report (NMFS 2019) and 2014 Annual Report (NMFS 2015).
[1] This is a correction to the 2018 Annual Report. The calculation of "sea days used" in 2017 did not account for 157 option days.
[2] The difference in funds obligated against the contract for the 2018-2019 calendar years were held to obligate against a new observer contract expected to be awarded in the summer of 2019.
[3] Although 2019 was still ongoing at the time the 2018 annual report was complete, this was included to show the carryover funds from 2018 being used in the 2019 fishing year.

Table 5 Average annual observer coverage sea day costs from 2014 to 2018.

Year	Funds expended	Number of observer sea days realized	Average sea day cost
2014	$4,937,414	4,573	$1,080
2015	$5,758,268	5,318	$1,083
2016	$4,186,303	4,677	$895
2017	$3,146,111	2,749	$1,144
2018	$4,425,144	3,207	$1,380
5-year	$22,453,240	20,524	$1,094

Source: 2018 Annual Report

3.4.1. 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, this cost is only borne by the program when new vessels come into the program or when systems need to be replaced. EM vessels that remain in the program (EM stratum) are expected to produce data for multiple years incurring only the ongoing monitoring costs (primarily maintenance, licensing, and data review). The intention of the EM program is 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 a holistic monitoring program including both EM and observers, it may be possible to achieve the monitoring goals by reducing the average daily cost of 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 monitored trip of the year, improving with feedback from the EM reviewers to the EM provider and vessel operator. 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. Similarly, if a vessel carries EM, but has low participation in monitored fisheries, the EM systems may not generate any data for several years. Finally, at least some portions of the EM program are expected to transition from a grant model to a Federal contract beginning in 2020 or 2021, 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 depending on the coverage rates determined in the Annual Deployment Plan; the number of vessels carrying EM systems which continue participation; how many new vessels volunteer, are accepted, and require new EM hardware; the amount of ongoing field maintenance needed by the existing EM fleet; and the EM review rate and image storage requirements. 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 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; uncertainties surrounding the future of Federal contracts, data storage, and video review; and technological advances which could reduce recurring costs such as data review and storage. More importantly, a detailed model developed by staff would preempt 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 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.

Table 6, originally presented in the 2018 Annual Report reflects the costs of the fixed gear EM program in 2018. Much of the cost structure was designed by the EM Workgroup and categorizes one-time, amortized (for infrastructure, equipment, and capacity building, where the benefit extends over several years and the cost is proportioned among each of those years), and recurring costs (NMFS 2019).

Table 6 Costs of the 2018 Fixed Gear EM Program

Cost Category	One time	Recurring	Amortized	2018 Total	Prior year amortized	Adjusted annual cost
Project Coordination	$70,483	$246,439		$316,922		$ 246,440
Data Review, Processing, and Analysis	$294	$191,961		$192,255		$192,255
EM Equipment Services		$36,019	$684,853	$720,872	$171,553	$344,542
Field Technical Services		$118,690	$186,391	$305,081	$21,926	$177,894
Project Totals	$70,777	$593,109	$871,244	$1,535,130	$193,479	$961,131

Source: 2018 Annual Report

The Council's Fixed Gear EM Workgroup used an "amortization" schedule for hardware and installation costs to more accurately represent the fact that these costs could be spread over the life of the equipment. While this approach helps annualize the costs of a longer-term EM program, it does not represent the

actual costs that could be incurred against the observer fee in any one year should the EM program grow. Under growth years, the full annual costs, not the adjusted cost, would be expended from the observer fee and therefore affect the amount of funding left available for observer sea days.

To estimate the annual costs of a mature, stable EM fixed gear program we use a target of 165 vessels, and an average lifespan of the hardware of 5 years. Under a lifecycle replacement schedule, a more stable annual budget estimate would include the replacement of 33 units each year. The current cost for a new EM system is estimated at approximately $10,000. If this approach was applied to the 2018 cost above, using $330,000 as lifecycle replacement recurring costs instead of the amortization approach, the annual cost of the program would have been similar at $923,109. The full costs of data review were not included in the above 2018 cost estimates because pot vessel information was not used for management in 2018, and NMFS underestimated the workload on Pacific States, so there were trips that were not reviewed. Based on this, a reasonable cost estimate to maintain an EM program the size and scope of that in 2018 is closer to $1M.

Much of the recurring annual cost is driven by data review and data storage. Review cost are influenced by the review rate (currently equal to coverage rate), the catch handling procedures of the monitored vessels, and the data needing to be captured to meet monitoring objectives. More complex catch events take more time for video review as do increases of data points needed to meet monitoring objectives. For example, the annual costs for 2018 do not include pot vessel data review, which takes more time than catch events from longline gear because each pot retrieval is a more complex event than the retrieval of individual hooks. The NMFS is investing resources toward reducing associated review costs through automation, but no automation solutions have been operationalized yet so it is too early to estimate potential cost savings.

Table 7 summarizes the EM pool size and pre-implementation costs beginning in 2015. In 2014, the Council appointed the EM Workgroup as a means to allow commercial fishing industry, agencies, and EM service providers, to cooperatively and collaboratively develop and refine an EM program for integration into the Observer Program.

Table 7 Summary of EM pool size and Pre-Implementation Costs

Year	EM Pool size (ADP)	Number of EM vessels (V)	Number Sampled Vessels (v)	EM Sea Days	Funds Expended	Cost per day
2015	10	13	1	259	$286,454	$1,106
2016	58	42	24	357	$493,044	$1,381
2017	96	80	51	706	$622,550	$882
2018	141	120 H&L 18 Pot	81 H&L 13 Pot	1005	$1,535,130[1]	$1,527
2019	172	n/a	n/a	n/a	n/a	n/a

Source: Observer Program Annual report 2015-2018 and Annual Deployment Plans 2015-2019.
[1] Data from pot vessels were not reviewed and data were not used for management in 2018 so no review costs for the 13 pot vessels is included here

Table 8 summarizes NFWF grants used to fund the development of EM for use on fixed gear vessels in the partial coverage category. The Council's EM Working Group provided a forum for all stakeholders, including commercial fishing industry, agencies, and EM Service providers, to cooperatively and collaboratively design, test, and developing EM systems. Additional detail about the budgets and funding

sources for EM are provided in the NPFMC's EM cooperative Research and Implementation plans from 2015 through 2017[9].

Table 8 NFWF EM Grant Award Summary 2012-2018

Year Awarded	Grant Recipient	Award Amount	Matching Funds	Total
2013	NPFA	$ 127,400	$ 304,000	$ 431,400
2014	ALFA	$ 135,000	$ 547,268	$ 682,268
2015	ALFA	$ 492,553	$ 1,482,299	$ 2,380,852
	NPFA	$ 68,000	$ 338,000	
2016	SWI	$ 620,036	$ 1,428,197	$ 2,048,233
2017	ALFA	$ 577,941	$ 1,530,000	$ 4,162,799
	SWI	$ 554,858	$ 1,500,000	
2018	ALFA	$ 206,280	$ 457,000	$ 973,792
	SWI	$ 95,512	$ 215,000	
	Total	$2,877,580	$ 7,801,764	$ 10,679,344

Source: www.NFWF.org accessed on 7/15/2019.
[1] Annual total includes grant award and matching funds.

[9] NPFMC 2015 EM Cooperative Research and Implementation Program is available at: https://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/EMCRPDraft1-7-15.pdf
NPFMC Final 2016 EM Pre-Implementation Plan is available at: https://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/2016EMPre-impPlanFinal0116.pdf
NPFMC Final 2017 EM Pre-Implementation Plan is available at: https://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/Final2017EMPre-impPlan.pdf

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 social and 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 social and economic 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 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; 2013-2018). 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 monitoring objectives (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. The sampling design elements and coverage rates achieved are summarized in Table 3 in Section 3.4. 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.[10] The selection method and definition of the sampling strata for each year are summarized in Table 9, 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

[10] 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" – or baseline coverage – approach (Annual Deployment Plans 2018 and 2019).

The baseline 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 baseline 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 baseline, 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 estimates 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 baseline 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 baseline in response to 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 9 in Annual Deployment Plan 2019). These weightings are used in the allocation strategy for sea days above the 15% baseline and results in deployment rates that reflect the priorities associated with optimization metrics (e.g. trawl 24%; Table 9).

A strength of the Annual Deployment Plan process is that strata definitions, risk thresholds, baseline 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 9), the observer sampling program will likely continue to evolve; however, the current allocation approach of baseline plus opimization allows some stability in terms of meeting sample collection priorities, while also allowing for specific monitoring objectives.

Table 9 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.

Year	Partial coverage category									
	Observer trip selection pool Observer coverage required on all randomly selected trips					EM trip selection pool EM required on randomly selected trips		Observer vessel selection pool[1]	Zero selection pool Observer coverage not required	
2019	Trawl: 24%	Trawl Tender: 27%	H&L: 17%	Pot: 16%	Tender Pot: 17%	Fixed gear EM trip selection pool: 30%		n/a	Vessels <40' LOA and Jig gear	EM Innovation Research
2018	Trawl: 20% (20.3)	Trawl Tender: 17% (35.0)	H&L: 17% (15.5)	Pot: 16% (12.7)	Tender Pot: 17% (29.0)	H&L EM: 30% (22.7)	Pot Pre-Impl: 30% (25.2)	n/a	Vessels <40' LOA and Jig gear	EM Innovation Research
2017	Trawl: 18% (20.7)	Trawl Tender: 14% (18.8)	H&L: 11% (12.0)	H&L Tender: 25% (0)	Pot: 4% (7.7)	Pot Tender: 4% (5.3)	n/a	n/a	Vessels <40' LOA and Jig gear	Voluntary EM Pre-implementation ~90 vessels
2016	Trawl: 28% (28.0)		H&L: 15% (15.0)		Pot: 15% (14.7)	n/a		n/a	Vessels <40' LOA and Jig gear	Voluntary EM Pre-implementation 60 vessels
2015	Large Vessel (Trawl CVs, Small CPs, H&L/Pot CVs ≥ 57.5'): 24% (23.4)		Small Vessel (H&L/Pot CVs 40'-57.5'): 12% (11.2)			n/a		n/a	Vessels <40' LOA and Jig gear	Voluntary EM Pre-implementation 12 vessels
2014	All Trawl CVs and H&L/Pot vessels ≥ 57.5': 16% (15.1)					n/a		H&L/Pot CVs 40'-57.5': 12% (15.6)	Vessels <40' LOA and Jig gear	Voluntary EM
2013	All Trawl CVs and H&L/Pot vessels ≥ 57.5': 14.5% (14.8)					n/a		H&L/Pot CVs 40'-57.5': 11% (10.6)	Vessels <40' LOA and Jig gear	n/a

[1] Observer coverage required on selected vessels for duration of time period.

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 (Section 4.1.1) 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 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 2018 Annual Deployment Plan (current sampling strata and allocation strategy) is used in the simulation; a 15% baseline is included and the deployment allocations above the baseline represent current optimization priorities made by NMFS with Council input. The simulation was performed on 2018 partial coverage fishing effort.
- Cost per observer sea-day is modeled and incorporated into the simulation, reflecting past contract performance where larger budgets for observer coverage provide more total sea-days and 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 4.2.1 are comparable to the evaluation of gaps in Section 4.2.2 and discussion on variance scaling in Section 4.2.3. The Revenue Analysis section provides a description of the economic components associated with calculating the observer fees and provides a hindcast of revenues post-restructure. 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 4.2.1 can be directly mapped to Section 4.2.2 by comparing Table 13 with the mean estimated revenues for a given fee percentage across all gears in Table 12.

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 fully realized EM program are unknown at this point because the program has expanded each year and has not yet stabalized (see Section 4.2.2.7 on EM) For example, if EM costs $500k, and $5.7M revenue is generated, then $5.2M is remaining for observer coverage. The remaining revenue can be used to moderate expectations for observer coverage levels in the gap analysis. So far EM costs have been supported by a combination of Federal funding and external grants (see Section 3.4.1. for more detail on past EM funding). However, in the future, fee revenues may be used to fund EM programs.

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. Halibut, sablefish, Pacific cod, and Pollock accounted for 98% (on average) of the observer fees collected between 2013 and 2018. 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 in order to simplify this analysis. Therefore the dataset for this analysis includes 2013-2018 landings, standard prices, and the ex-vessel value of catch of halibut, sablefish, Pacific cod, and Pollock that fell under the partial coverage category.

In Section 4.2 of the NMFS 2015 and the Initial Review Draft of this EA (NPFMC 2019), a longer time-period of catch, ex-vessel standard prices, and ex-vessel values were examined. Because the most recent six years under the restructured Observer Program reflect the low revenue period in which we find ourselves, the fee revenue analysis in this version of the report focuses on the six complete years under the restructured Observer Program, 2013 through 2018.

4.2.1.1. Analytical Scope

The fee revenue analysis includes several caveats that distinguish the analytical scope. The first caveat is that the analysis assumes past scenarios are indicative of future reality. However, 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 caveat in the scope of 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 caveat in the scope of 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). In practice, 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.

Figure 6 illustrates the amount of catch that was subject to observer fees between 2013 and 2018. The top panel (a) summarizes catch for all four species that are the focus of this analysis on any of the four gear types (hook and line, jig, pot, and trawl). The middle panel (b) summarizes catch of each species irrespective of gear type. The bottom panel (c) summarizes catch by gear type for any of the four species. 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, catch subject to observer fees

increased until 2016 and has declined since. Halibut, sablefish, and Pacific cod have shown overall declines over this time-period whereas Pollock is the only species to show an overall increase between 2013 and 2018. Hook and line, jig, and pot gears have all shown an overall decline in catch subject to observer fees, but trawl gear mirrors the all gears trend and increases until 2016 and then declines.

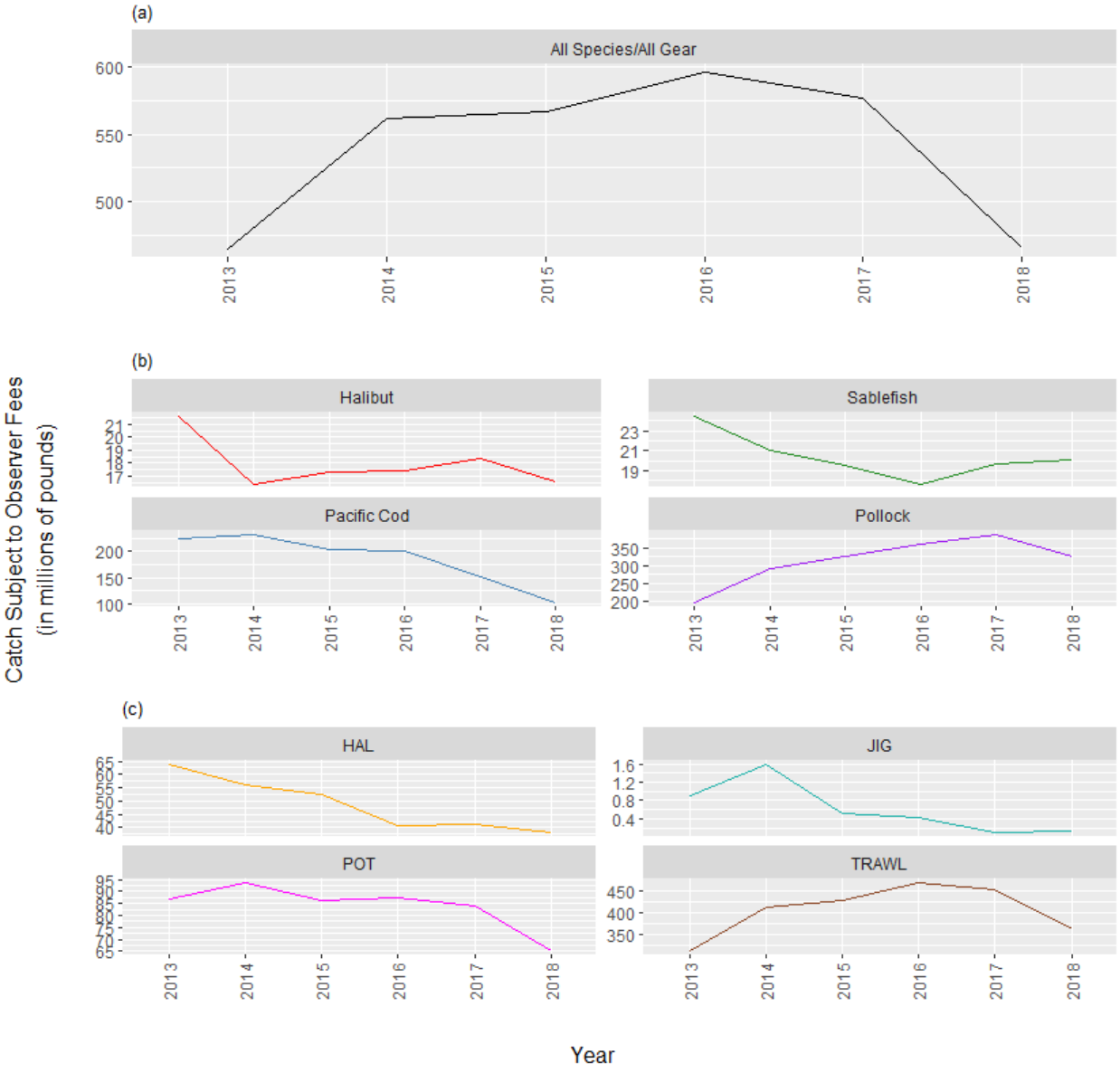


Figure 6 Annual Catch of Halibut[1], Sablefish, Pacific Cod, and Pollock, Subject to Observer Fees, 2013 through 2018, in millions of pounds, by (a) all species and gear types, (b) by species, and (c) by gear.

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

[1] 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.

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 reduce 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.[11] 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 allow 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 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).

The standard prices used to assess observer program fees between 2013 and 2018 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 7 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 7. The standard deviation was also weighted by the amount of catch that would have had each standard price applied to it in the calculation of observer fees. All of the prices have been adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index. Over the time-period examined, the average standard ex-vessel price for halibut has ranged from $5.37 in 2014 to $6.82 in 2017; sablefish from $3.02 in 2014 to $4.81 in 2018; Pacific cod from $0.28 in 2018 to $0.32 in 2014; and pollock from $0.19 in 2014 to $0.11 in 2018.

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

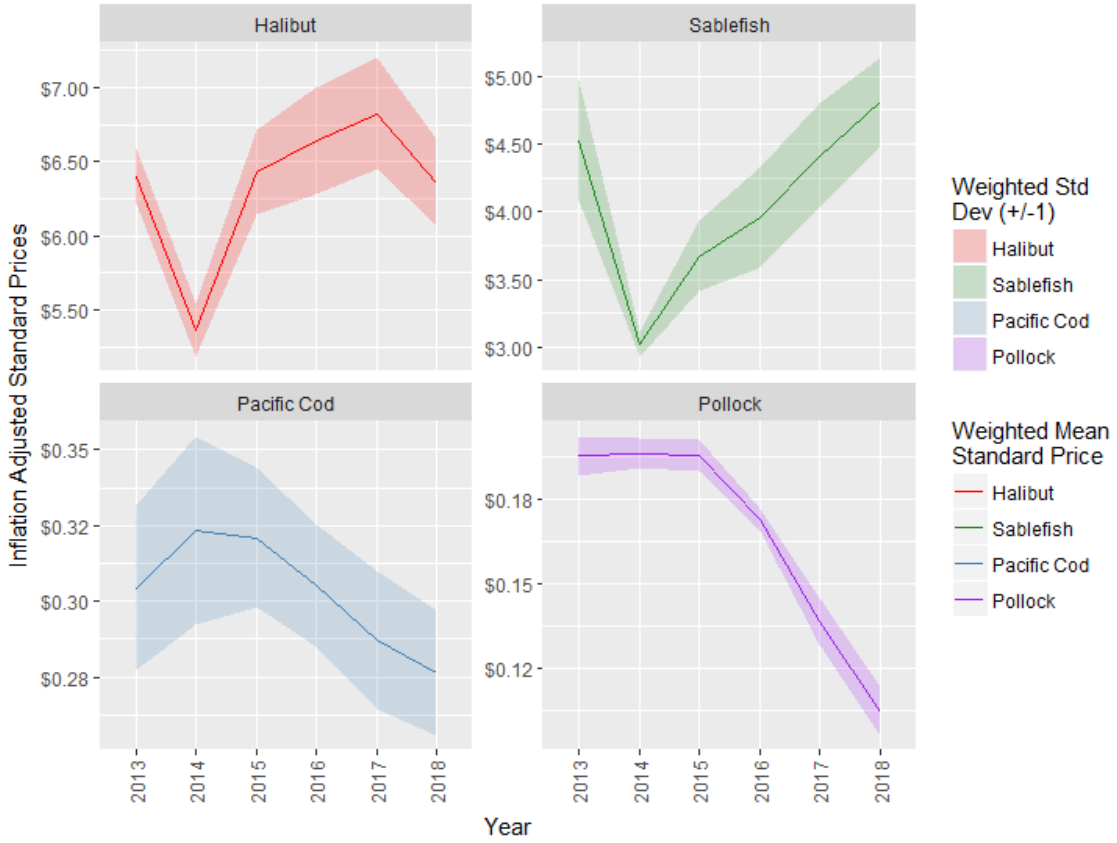


Figure 7 Observer Fee Standard Prices[1] for Halibut, Sablefish, Pacific Cod, and Pollock, 2013 through 2018, as the Inflation Adjusted Weighted Mean Standard Price[2] (Line) and Plus or Minus One Weighted Standard Deviation[3] (Color Shading).

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] 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.

[2] Standard prices were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

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

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 ex-vessel values that were the basis of observer program fees between 2013 and 2018 were examined. Again, all of the ex-vessel values have been adjusted for inflation using the using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index.

Figure 8 illustrates the ex-vessel value of catch that was subject to observer fees between 2013 and 2018. The top panel (a) summarizes the ex-vessel value for all four of the species that are the focus of this analysis on any of the four gear types, combined. The middle panel (b) summarizes the ex-vessel value

by species and the bottom panel (c) summarizes ex-vessel value by gear type. Over the time-period examined, the ex-vessel value of partial coverage landings ranged from $354.1 million dollars in 2013 to $266.7 million dollars in 2018. The highest overall ex-vessel value in 2013 coincides with the highest halibut ex-vessel value ($138.5 million), the 2nd highest Pacific cod ex-vessel value ($68.2 million), and highest sablefish ex-vessel value ($110.8 million) over this time-period. The trend in ex-vessel value for all species and 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 2013 and lowest overall ex-vessel value in 2018 coincide with the highest and lowest hook and line values.

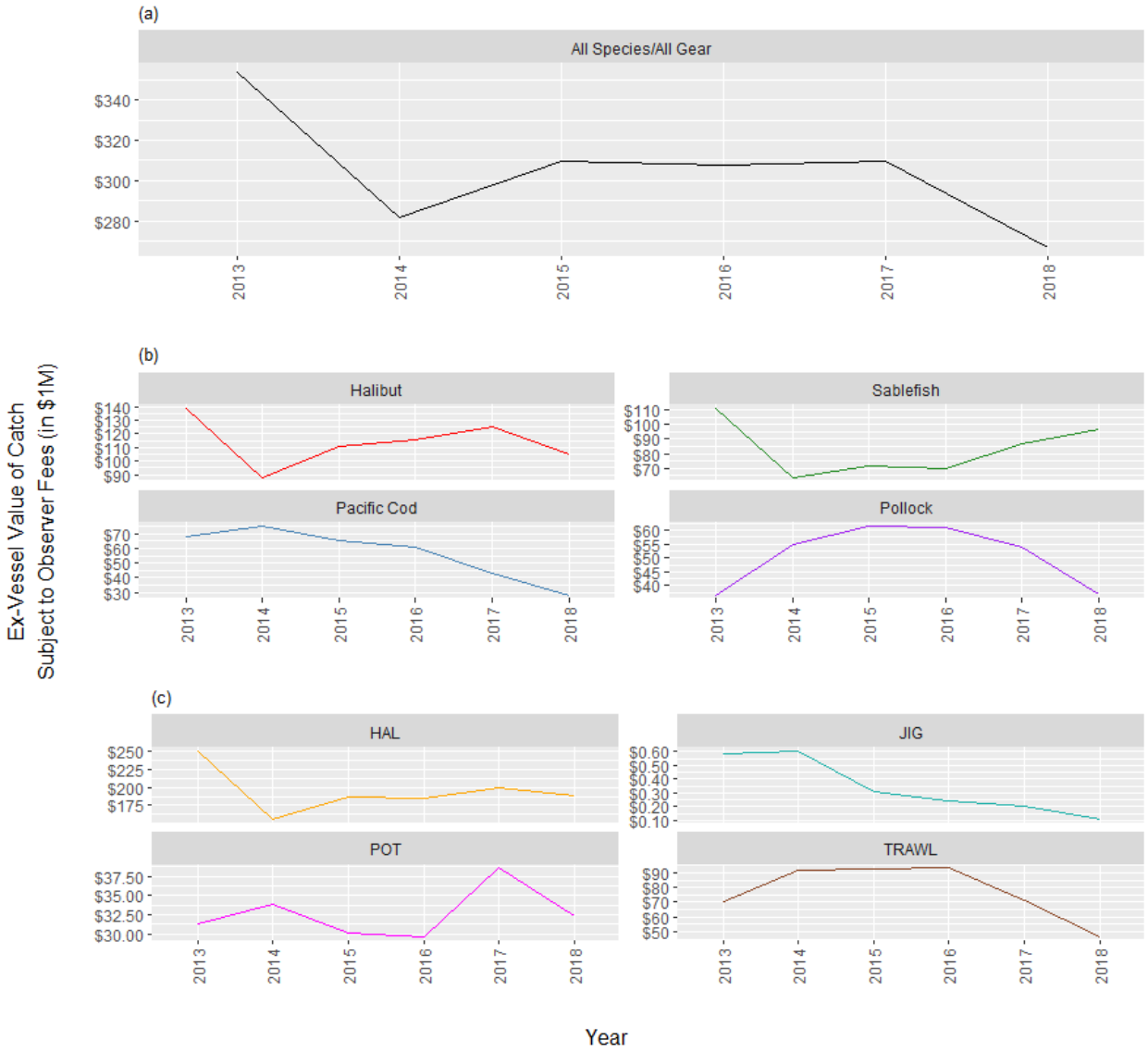


Figure 8 Annual Ex-Vessel Values of Catch Subject to Observer Fees, 2013 through 2018, in Millions of Inflation Adjusted Dollars[1], by (a) all species[2] and gear types, (b) by species, and (c) by gear.

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

[1] Ex-vessel values were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

[2]The All Species ex-vessel values in this figure only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded. Between 2013 and 2018, other groundfish accounted for, on average, 2% of the ex-vessel value subject to observer fees.

Figure 9 illustrates the proportion of the ex-vessel value of catch subject to observer fees generated by each gear type and species combination between 2013 and 2018. Gear and species combinations that

accounted for less than 1% of the ex-vessel value in a year were aggregated into the 'Other' category.[12] In each year since 2013, hook and line halibut catch comprises the largest proportion of ex-vessel value subject to observer fees, ranging from 31.2 to 40.4%. HAL sablefish catch comprises the second largest proportion of ex-vessel value subject to observer fees in each year (21.4 to 30.6%). On trawl gear, pollock landings constitute a larger proportion of the ex-vessel value than Pacific cod landings. Landings of Pacific cod or sablefish on pot gear have contributed between 6.5% to 11.3% and 0% to 5.5% annually, respectively. The proportions in Figure 9 also reflect the relative share of the observer fees generated by each gear type and species combination between 2013 and 2018.

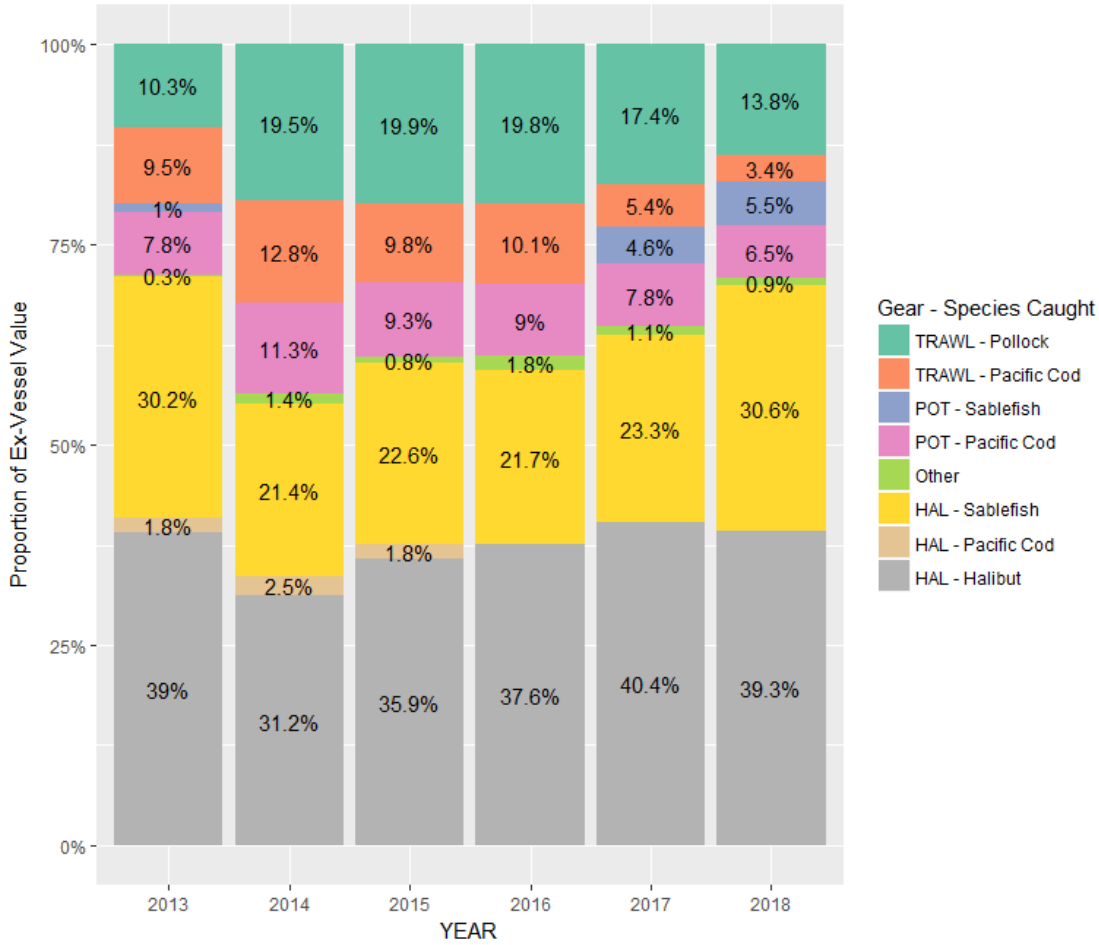


Figure 9 The Proportion of Annual Ex-Vessel Value of Catch Subject to Observer Fees[1], by Species and Gear Type[2], 2013 through 2018.

Sources: NMFS Alaska Region Catch Accounting System (CAS) and Restricted Access Management (RAM) IFQ Landing Data
[1] The ex-vessel values in this figure only reflect halibut, sablefish, Pacific cod, and Pollock. Other groundfish have been excluded. Between 2013 and 2018, other groundfish accounted for, on average, 2% of the ex-vessel value subject to observer fees.
[2] Gear and species combinations that account for less than 1% of the ex-vessel value in a year are aggregated into 'Other'.

[12] In Observer Program Annual Reports, the 'All Other Groundfish' species caught by vessels in the partial coverage category refers to any species besides halibut, sablefish, Pacific cod, or Pollock (such as flatfish). These 'All Other Groundfish' species are not included in this analysis. The 'Other' category in Figure 9 reflects any gear and species combination amongst the four species that are the focus of this analysis but that account for less than 1% of the ex-vessel value in a year (such as landings of halibut and Pacific cod on jig gear; or the incidental catch of Pollock on hook and line or pot gear.).

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 and options considered under this action. The actual fee revenues that were generated between 2013 and 2018 under the restructured program at 1.25 percent are identified. Table 10 indicates 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. 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. These species are not included in this table. 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. These species are not included in this table. Fee revenues are listed in nominal dollars as well as the inflation adjusted amounts.

Under section 313 of the Magnuson-Stevens Act, observer fees can be expressed as a percentage of unprocessed ex-vessel value of the fish harvested (not to exceed two percent). Table 11 identifies a range of possible observer fee revenues based on ex-vessel values between 2013 and 2018 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 2013 and 2018 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 11 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 $155.3 million in 2014 (Figure 8). At the 1.25% observer fee that equates to $1.94 million in fee revenues, at the 1.75% fee $2.72 million, and at the 2.0% fee $3.11 million. In another example, the lowest ex-vessel value for trawl gear was $46.3 million in 2018. At the 1.5% fee level, this would have resulted in $0.69 million in fee revenues. The mean ex-vessel value between 2013 and 2018 was $77.7 million and it would have resulted in $1.17 million in fee revenues at the 1.5% fee. The highest ex-vessel value for trawl gear was $93.1 million in 2016 and it would have resulted in $1.40 million in fee revenues at the 1.5% fee. The fee percentages for each alternative and option are also identified in Table 11.

Table 11 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. This is relevant to Alternative 3. 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 $4,170,929 based on the average ex-vessel value for each gear type in recent years.

Table 12 contains a summary of possible fee revenues at a range of fee percentages based on the recent annual ex-vessel values for all gears combined. In order to calculate fee revenues at each of the possible fee percentages, the lowest, highest, and average annual ex-vessel value over the last six years were identified. 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. Possible fee revenues range from a low of $3.3 million dollars to a high of $7.1 million dollars.

While any change to the observer fee percentage would result in an increase to the fee revenues compared to Alternative 1 and the status quo rate of 1.25%, the possible increases associated with each of the specific alternatives and options are illustrated in Figure 10. Of the specific alternatives and options, Alternative 2 Option 1 (1.5% fee) would afford the smallest increase in fee revenues based on recent years' ex-vessel value ($0.76 million, on average) and Alternative 2 Option 3 (2.0%) would result in the largest ($2.29 million, on average).

Table 10 A Comparison of Observer Fee Revenues at the 1.25% Fee between 2013 and 2018 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 Species	Nominal Fee	Inflation Adjusted	Nominal Fee	Inflation Adjusted	Nominal Fee	Inflation Adjusted	Nominal Fee	Inflation Adjusted	Nominal Fee	Inflation Adjusted
2013										
Halibut	$1,626,914	$1,727,398	$3,798	$4,032					$1,630,712	$1,731,430
Sablefish	$1,257,740	$1,334,923			$ 43,559	$ 46,247	$ 3,561	$ 3,778	$1,304,860	$1,384,948
Pacific Cod	$ 75,547	$ 80,204	$3,022	$3,231	$324,464	$345,981	$ 393,038	$ 422,541	$ 796,071	$ 851,957
Pollock	$ 263	$ 287	$ 4	$ 4	$ 31	$ 34	$ 432,729	$ 457,056	$ 433,027	$ 457,382
All	$2,960,464	$3,142,812	$6,824	$7,267	$368,055	$392,262	$ 829,328	$ 883,375	$4,164,670	$4,425,716
2014										
Halibut	$1,050,014	$1,097,508	$1,298	$1,357					$1,051,312	$1,098,865
Sablefish	$ 722,970	$ 755,571			$ 25,721	$ 26,882	$ 13,211	$ 13,798	$ 761,901	$ 796,251
Pacific Cod	$ 82,571	$ 87,333	$5,967	$6,223	$378,683	$396,799	$ 434,814	$ 449,672	$ 902,034	$ 940,026
Pollock	$ 400	$ 431	$ 24	$ 26	$ 113	$ 122	$ 650,363	$ 686,780	$ 650,901	$ 687,359
All	$1,855,955	$1,940,843	$7,289	$7,606	$404,517	$423,802	$1,098,387	$1,150,250	$3,366,149	$3,522,500
2015										
Halibut	$1,333,853	$1,386,821	$1,782	$1,852					$1,335,635	$1,388,673
Sablefish	$ 839,257	$ 872,909			$ 14,584	$ 15,163	$ 9,761	$ 10,159	$ 863,601	$ 898,232
Pacific Cod	$ 67,791	$ 69,796	$1,918	$1,975	$350,328	$361,101	$ 366,585	$ 379,059	$ 786,623	$ 811,931
Pollock	$ 261	$ 279	$ 41	$ 44	$ 133	$ 143	$ 727,194	$ 768,081	$ 727,630	$ 768,547
All	$2,241,162	$2,329,806	$3,741	$3,872	$365,045	$376,407	$1,103,541	$1,157,299	$3,713,488	$3,867,383
2016										
Halibut	$1,394,656	$1,443,946	$1,350	$1,397					$1,396,006	$1,445,343
Sablefish	$ 806,145	$ 834,389	$ 33	$ 34	$ 22,778	$ 23,606	$ 14,186	$ 14,704	$ 843,142	$ 872,733
Pacific Cod	$ 27,309	$ 28,126	$1,475	$1,521	$335,526	$346,373	$ 375,736	$ 389,079	$ 740,046	$ 765,099
Pollock	$ 154	$ 154	$ 79	$ 79	$ 73	$ 73	$ 715,495	$ 760,483	$ 715,801	$ 760,789
All	$2,228,264	$2,306,615	$2,936	$3,030	$358,377	$370,052	$1,105,417	$1,164,267	$3,694,995	$3,843,963
2017										
Halibut	$1,518,485	$1,564,499	$2,237	$2,306	$ 2,581	$ 2,659			$1,523,303	$1,569,464
Sablefish	$ 874,246	$ 900,929			$171,667	$176,966	$ 8,415	$ 8,670	$1,054,328	$1,086,565
Pacific Cod	$ 26,506	$ 27,328	$ 249	$ 258	$292,459	$302,580	$ 202,939	$ 210,819	$ 522,152	$ 540,984
Pollock	$ 131	$ 131	$ 2	$ 2	$ 33	$ 33	$ 674,250	$ 674,250	$ 674,416	$ 674,416
All	$2,419,368	$2,492,887	$2,488	$2,566	$466,739	$482,238	$ 885,603	$ 893,738	$3,774,200	$3,871,430
2018										
Halibut	$1,309,616	$1,309,616	$ 893	$ 893	$ 4,027	$ 4,027			$1,314,536	$1,314,536
Sablefish	$1,021,237	$1,021,237			$182,672	$182,672	$ 5,326	$ 5,326	$1,209,235	$1,209,235
Pacific Cod	$ 19,165	$ 19,165	$ 448	$ 448	$217,641	$217,641	$ 114,321	$ 114,321	$ 351,575	$ 351,575
Pollock	$ 57	$ 57	$ 0	$ 0	$ 5	$ 5	$ 458,675	$ 458,675	$ 458,738	$ 458,738
All	$2,350,075	$2,350,075	$1,341	$1,341	$404,347	$404,347	$ 578,322	$ 578,322	$3,334,085	$3,334,085

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] Fees were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

Table 11 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 between 2013 and 2018 for Halibut, Sablefish, Pacific Cod, and Pollock.

	Alternatives and Options			Hook and Line			Jig			Pot			Trawl		
Fee %	1	2	3	Min (2014)	Mean	Max (2013)	Min (2018)	Mean	Max (2014)	Min (2016)	Mean	Max (2017)	Min (2018)	Mean	Max (2016)
1.25	Fixed, Trawl			$1,940,843	$2,427,173	$3,142,812	$1,341	$4,280	$ 7,606	$370,052	$408,185	$482,238	$578,322	$ 971,208	$1,164,267
1.3				$2,018,476	$2,524,260	$3,268,525	$1,395	$4,451	$ 7,910	$384,854	$424,512	$501,528	$601,454	$1,010,057	$1,210,838
1.35				$2,096,110	$2,621,347	$3,394,237	$1,449	$4,623	$ 8,214	$399,656	$440,839	$520,817	$624,587	$1,048,905	$1,257,408
1.4				$2,173,744	$2,718,434	$3,519,950	$1,502	$4,794	$ 8,519	$414,458	$457,167	$540,107	$647,720	$1,087,753	$1,303,979
1.45				$2,251,378	$2,815,521	$3,645,662	$1,556	$4,965	$ 8,823	$429,260	$473,494	$559,396	$670,853	$1,126,602	$1,350,550
1.5		Opt 1	Fixed: Opt 1,2	$2,329,011	$2,912,608	$3,771,375	$1,610	$5,136	$ 9,127	$444,062	$489,822	$578,686	$693,986	$1,165,450	$1,397,120
1.55				$2,406,645	$3,009,695	$3,897,087	$1,663	$5,308	$ 9,431	$458,864	$506,149	$597,975	$717,119	$1,204,298	$1,443,691
1.6				$2,484,279	$3,106,781	$4,022,800	$1,717	$5,479	$ 9,736	$473,666	$522,476	$617,265	$740,252	$1,243,147	$1,490,262
1.65				$2,561,912	$3,203,868	$4,148,512	$1,771	$5,650	$10,040	$488,468	$538,804	$636,554	$763,384	$1,281,995	$1,536,832
1.7				$2,639,546	$3,300,955	$4,274,224	$1,824	$5,821	$10,344	$503,270	$555,131	$655,844	$786,517	$1,320,843	$1,583,403
1.75		Opt 2	Trawl: Opt 1 Fixed: Opt 3	$2,717,180	$3,398,042	$4,399,937	$1,878	$5,992	$10,648	$518,072	$571,458	$675,134	$809,650	$1,359,692	$1,629,974
1.8				$2,794,814	$3,495,129	$4,525,649	$1,931	$6,164	$10,953	$532,874	$587,786	$694,423	$832,783	$1,398,540	$1,676,544
1.85				$2,872,447	$3,592,216	$4,651,362	$1,985	$6,335	$11,257	$547,676	$604,113	$713,713	$855,916	$1,437,388	$1,723,115
1.9				$2,950,081	$3,689,303	$4,777,074	$2,039	$6,506	$11,561	$562,479	$620,441	$733,002	$879,049	$1,476,237	$1,769,686
1.95				$3,027,715	$3,786,390	$4,902,787	$2,092	$6,677	$11,865	$577,281	$636,768	$752,292	$902,182	$1,515,085	$1,816,256
2		Opt 3	Trawl: Opt 2, 3	$3,105,348	$3,883,477	$5,028,499	$2,146	$6,848	$12,170	$592,083	$653,095	$771,581	$925,315	$1,553,933	$1,862,827

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 2018, other groundfish accounted for, on average, 2% 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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

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

Table 12 A Comparison of Possible Observer Fee Revenues at Different Fee Percentages, based on the Minimum, Mean, and Maximum Annual Ex-Vessel Value for All Gears between 2013 and 2018 for Halibut, Sablefish, Pacific Cod, and Pollock.

		All Gears		
Fee %	Alternatives and Options	Min (2018)	Mean	Max (2013)
1.25	Alt. 1	$3,334,085	$3,810,846	$4,425,716
1.3		$3,467,448	$3,963,280	$4,602,745
1.35		$3,600,812	$4,115,714	$4,779,773
1.4		$3,734,175	$4,268,148	$4,956,802
1.45		$3,867,538	$4,420,582	$5,133,831
1.5	Alt. 2 Opt. 1	$4,000,902	$4,573,016	$5,310,859
1.55		$4,134,265	$4,725,449	$5,487,888
1.6		$4,267,629	$4,877,883	$5,664,917
1.65		$4,400,992	$5,030,317	$5,841,945
1.7		$4,534,355	$5,182,751	$6,018,974
1.75	Alt. 2 Opt. 2	$4,667,719	$5,335,185	$6,196,003
1.8		$4,801,082	$5,487,619	$6,373,031
1.85		$4,934,446	$5,640,053	$6,550,060
1.9		$5,067,809	$5,792,486	$6,727,089
1.95		$5,201,172	$5,944,920	$6,904,117
2	Alt. 2 Opt. 3	$5,334,536	$6,097,354	$7,081,146

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 2018, other groundfish accounted for, on average, 2% 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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index(http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

[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 in Table 11 are not expected to add up to the fee revenue for all gears at that fee percentage in Table 12. For example, the minimum ex-vessel value for hook and line, jig, pot, and trawl occurred in 2014, 2018, 2016, and 2018, 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 2018, so the 2018 ex-vessel value is the basis for the minimum all gears fee revenues at each fee percentage.

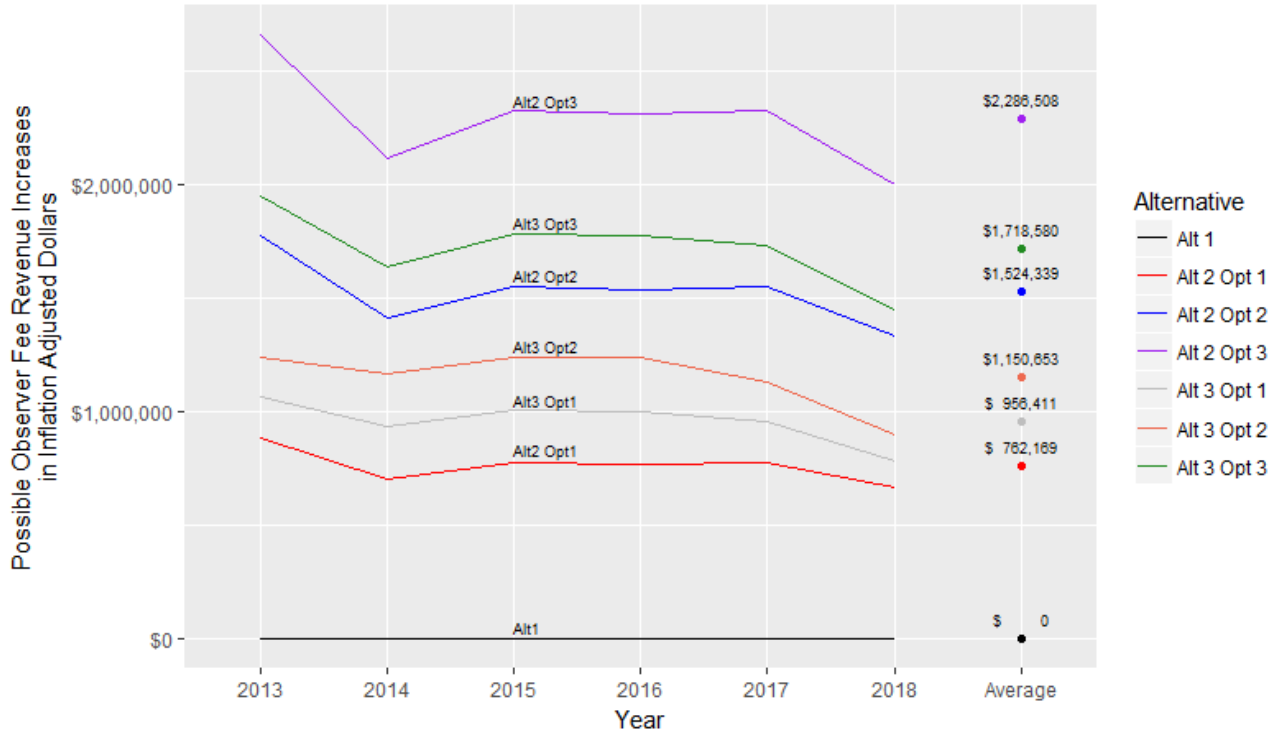


Figure 10 Possible Increases to Observer Fee Revenues from the Status Quo Rate in Recent Years for Each Alternative and Option, 2013 through 2018, in inflation adjusted dolars.

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 revenue differences in this figure were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

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 ex-vessel values between 2013 and 2018, fee revenues were calculated for each fee percentage in 0.05% increments between 1.25% and 2.0%. These fee revenues as well as the specific alternatives and options were compared to a range of theoretical funding levels for the observer program between $2.5 and $8 million. Figure 11 identifies the proportion of years between 2013 and 2018 where fee revenues fell below each funding level for a range of funding levels at each fee percentage or alternative and option. 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 or Alternative 1, observer fee revenues in 5 of the last 6 years (0.83) fell below $4 million. At the 1.5% fee, or Alternative 2 Option 1, no recent years fell below $4 million. This figure also indicates that based on recent years, there are funding levels that are not obtainable ($7.5 million) even if the fee is raised to the cap (2.0%). Figure 11 also allows a range of revenue to 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). A slightly wider range of fee revenues are possible when considering the higher fee percentage alternatives.

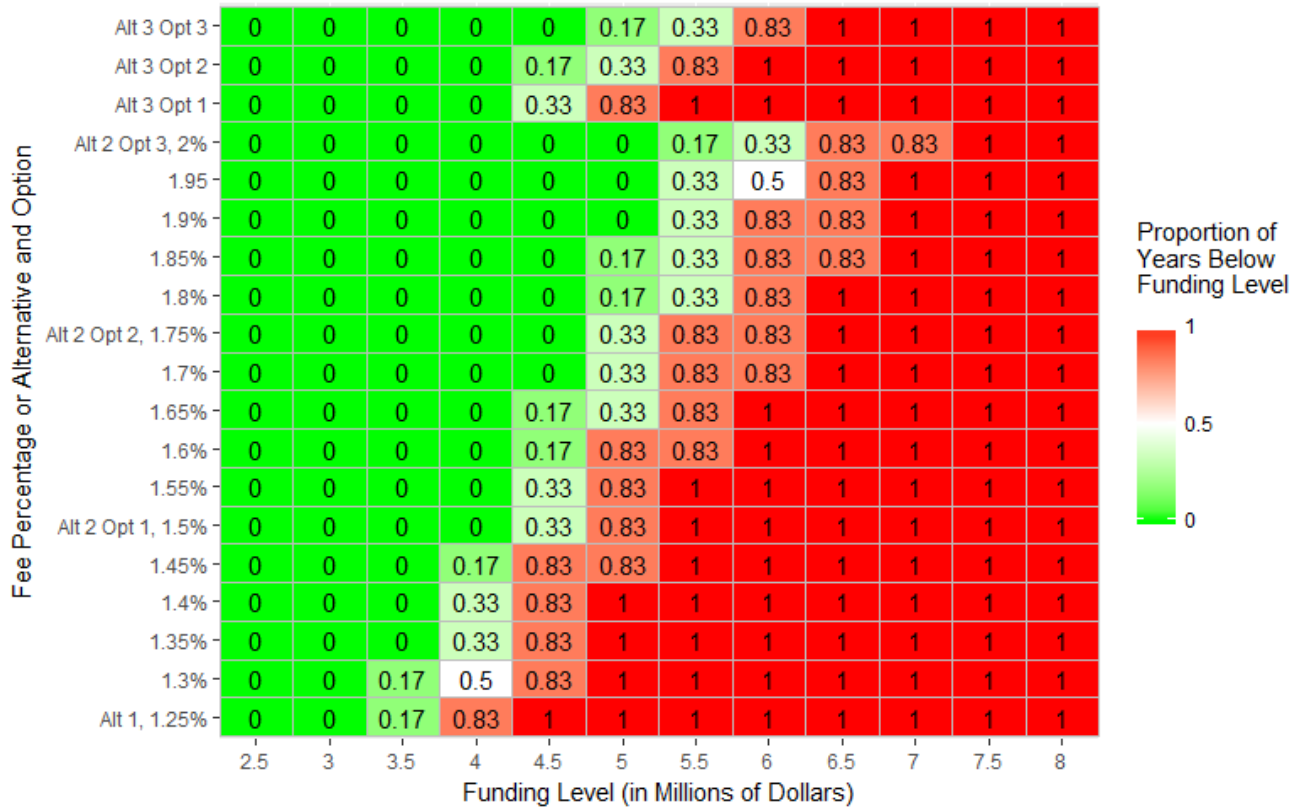


Figure 11 The Proportion of Years between 2013 and 2018 that Observer Fee Revenues Fell Below Various Funding Levels (in Millions of Dollars) based on Different Fee Percentages Applied to the Ex-Vessel Value of Halibut, Sablefish, Pacific Cod, and Pollock Catch.

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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

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

[3] Proportions reflect the number of years out of six, between 2013 and 2018, that observer fee revenues fell below a particular funding level.

4.2.2. Trip Level Data 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 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 2019) 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. Using a data pooling routine that mimics CAS, data gaps in this analysis are defined as the probabilities that trips will not be selected for observer coverage and require discard estimates generated from observed trips with similar target, temporal, and spatial attributes. These probabilities are further separated to represent the likelihoods that discard estimates may be calculated at different spatiotemporal scales. Therefore, this analysis captures how coverage rates increase with budget availability and how those higher coverage rates increase the probability that CAS will be able to calculate discard estimates at finer spatiotemporal scales.

Biological data collected by observers is not used in the same way that the CAS uses observer data to generate discard estimates for unobserved trips. Although there is ongoing work to determine the how low observer coverage and a growing EM pool leads to fewer biological samples as well as the potential impacts on stock assessments, a coarse analysis is included to evaluate the extent to which observer deployments and the resulting biological data (e.g. otoliths and average lengths) 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 11 and Table 12), budget scenarios were developed using the average revenues resulting from observer fee rates ranging between 1.25% and 2.0% (using 0.05% increments and assuming equal fee percentages across all gear types) of the ex-vessel value of catch (Table 12). This extended range of ex-vessel fee percentages was used to extend the range of funding scenarios available to the gap analysis simulation routine. The revenues used in the budget scenarios below 1.25% were estimated by scaling the 2013-2018 average revenue of $3,810,846 relative to the current 1.25% observer fee rate. For example, the estimated revenue from an observer fee rate of 1.00% was $3,810,846* (1.00 / 1.25) = $3,048,677. 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. Note that in contrast to the previous version of this analysis (April 2019), the gap analysis results here are presented over a range of budgets for observer coverage opposed to a range of observer fee rates. This aids in interpretation of coverage gaps when fee rates vary under Alternative 3 and allows the reader to select an observer budget that is appropriate and subsequently select an Alternative/Option combination that provides adequate revenue, accounting for costs of EM.

The cost per observer day is not constant between budget scenarios (Figure 12)-- the average cost per-observer-day decreases as more observer days are purchased. This non-linear relationship can be estimated from actual costs, but it must be noted that the offset between the contract and calendar years as well as limited cost data complicates these estimates. Since the previous (April 2019) version of this analysis, a newer cost curve was built using additional cost data and an updated set of assumptions on how cost per day is affected by economy of scale. Although the newer cost curves may be considered more accurate, this analysis will provide results of the gap analysis as a range using both the ‘old’ and new cost curves. Results based on the old cost curve serve as a conservative estimate of cost-efficiency and those from the ‘new’ cost curve serves as an upper-limit. The cost per-observer-day for several budget scenarios and both cost curves is presented in Table 13. Note that meeting the 15% baseline for fishing effort in 2018 required an estimated budget of $4,442,581 based on the old cost curve and $3,978,523 based on the new cost curve.

In low budget scenarios, funds 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, this analysis operated under the assumption that if all guaranteed days could not be afforded, only the days afforded were purchased. Therefore, this

analysis does not reflect the contractual obligations that would be relevant in scenarios with insufficient funding levels.

4.2.2.3. Annual Deployment Plan Allocation

A simplified version of 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% baseline + 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. The methodology used in this analysis was simplified to by not including the risk of going over budget. 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 2018 is the last full year for which fishing effort data is available, all analyses are based on 2018 effort. The strata-specific deployment rates within each budget scenario are presented in Table 13. The optimization weights are presented in Table 14.

4.2.2.4. Gap Analysis

This gap analysis uses a deterministic simulation built on concepts similar to those that govern the Catch Accounting System (CAS) in order to quantify the probabilities that a given trip will either be selected for observer coverage or will have a discard estimate generated from data pooled from different spatiotemporal scales. Within the partial coverage sector, CAS relies on landing information and observer data to generate estimates of total catch and at-sea discards for unobserved trips, including those within the zero-selection pool. This near real-time data is necessary for informing inseason management decisions. The CAS generates discard estimates for unobserved trips by pooling observer data from hauls of similar strata and post-strata defined by target species, space, and time. This routine generally occurs at the smallest scales of time and space possible that provides a pooled dataset that is large enough from which to generate estimates. However, when the CAS must pool data from larger scales of time and space, these estimates may not be as representative and contain higher uncertainty.

'Data gaps' here are not only defined as the probability that a trip will not be selected for observer coverage, but gaps can be further separated into distinct probabilities that trips will require discard estimates using data pooled at small, intermediate, or large scales of time and space. By repeating this simulation with the deployment rates provided by the range of budget scenarios, the quantity and quality of data gaps within post-strata can be compared. As larger budgets allow for higher deployment rates that result in more covered trips, unobserved trips are also more likely to be able to have discard estimates generated at smaller scales of time and space. It should be noted that the CAS generates discard estimates at the haul level, but for the sake of simplicity, this analysis assumes estimates are generated at the trip-level and that only one neighboring observed trip is needed to generate discard estimates. Additionally, CAS uses observer data from the hook-and-line (HAL) selection stratum to generate estimates for vessels that fish with hook-and-line gear within the zero-selection pool, and likewise uses observer data from the POT selection stratum for zero-selection pool vessels fishing with pot gear (i.e. POT-TENDER data is not used). This gap analysis follows the same logic. Jig gear was not considered in this analysis because CAS does not use observer data to generate discards estimates for those vessels. Finally, although CAS also generates discard estimates for trips within the EM pool, data is not aggregated across the EM and observer strata (i.e. kept separate), and therefore EM trips were excluded from this analysis.

Four levels of data resolution are used to represent the data quality that a trip may have, and each trip may have a different probability based on the deployment rate afforded by the budget and each trip's position in time in space relative to other trips in the same deployment strata and species target (Table 15). The first data level, hereafter defined as COVER, is simply each trip's selection rate for observer coverage. Trips in the zero-selection pool therefore have a 0.0 probability for COVER. The three levels that represent data gaps are defined using different scales of time and space similar to those used by CAS. The second data level, AREA, is the probability that a trip is not selected for observer coverage and that at

least one other observer pool trip within the same NMFS reporting area is selected for observer coverage and fished within a 15-day span (30-day window). The third data level, FMP, is the probability that a trip is neither selected for observer coverage nor obtains an AREA-level discard estimate, but had at least one observed trip within the same FMP that was selected for observer coverage and fished within a 45-day span (90-day window). The last data level, YTD (short for year-to-date), is simply the remaining probability that a trip is not selected and does not have a discard estimated generated at either the AREA or FMP data levels, and implies that observer data must be aggregated at temporal scales larger than a 45-day span. The results of the coverage gaps for each funding scenario are the sum of the probabilities and represent the expected count of trips within each data level for each post-stratum.

Several key concepts must be highlighted to further describe how the probabilities for each data level was calculated. The probability that a trip will be able to have a discard generated at the AREA level is dependent on the number of trips in the observer pool that fished in the same NMFS reporting area within a 15-day span as well as strata-specific deployment rate afforded by the budget. This same idea applies to the probabilities calculated for the FMP data level. Therefore, if fishing effort is highly concentrated in space and time, then trips are much more likely to have discard estimates generated at the AREA level opposed to the FMP or YTD levels. By counting the number of observer pool trips within the 15-day or 45-day spans at both the NMFS reporting area and FMP spatial scales, the probabilities for the data levels are calculated as a function of the afforded strata-specific trip selection rates and the number of neighboring AREA- and FMP-level trips. See Figure 21 for a walkthrough of the routine used by the gap analysis to calculate the probabilities.

A second concept that must be highlighted is that these simulation methods rely entirely on start and end dates of the trips that occurred in the past. The fishing effort in 2018 within the partial coverage sector, specifically within the observer and zero-selection pools, was used in this analysis. For comparison, the appendix contains the same analysis but with 2017 effort used as the reference. The results here represent a hindcast of the patterns of coverage gaps that would be expected given the costs for observer coverage in 2019 and a range of potential budgets.

4.2.2.5. Results

Figure 13, Figure 14, Figure 15, and Figure 16 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 budgets. Within each plot, the x-axis represents the budget available for observer coverage; for corresponding Alternative 2 fee rates and cost per day estimates, see Table 13. The results from old and new cost curves are represented by dashed and solid lines, respectively, and each data level is color-coded.

The top row of plots depicts the expected number of trips (from the observer trip-selection pool and no-selection pool combined) within each coverage level as a function of the budget available for observer deployment. The counts are stacked so that the proportion of trips within each data level category are visualized as shaded regions. The number of distinct fishing trips within the sampling stratum and trip target are also provided at the top of each plot, separated by observer pool (left) and no-selection pool (right and in brackets). However, the trip counts at the top of the plots may not match the trip counts along the y-axis because the gap analysis defined trips that fished in multiple NMFS reporting areas as distinct trips. Budget scenarios with more COVER (purple) and AREA (blue) 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. Conversely, post-strata and budget scenarios with a greater number of FMP (green) and YTD-level (yellow) trips have data expansion to fewer similar trips, implying a greater potential for imprecision and possible bias being introduced to the estimation process.

The next row of plots shows the proportions 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 proportions that result from the different cost curves are presented by dashed (old) and solid (new) lines, and the region between the two are shaded to represent a likely range of outcomes. The proportion of trips at the AREA level and FMP levels will generally 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 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 funding levels. Again, the results are presented as ranges bounded by the results based on the old and new cost curves. 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 funding levels at which the coverage gaps change most quickly. Funding levels where the COVER and AREA category proportions are increasing quickly (larger positive values) are where data quality is increasing. Values closer to zero indicate funding levels where small change in the number of trips in a category. Positive and negative rate values represent funding levels at which the proportions increase or decrease, respectively, and the magnitude of the value shows how quickly the proportions of data levels are changing. Note that the rate of change curves presented here are smoothed to simplify interpretation by obscuring asymptotic behavior at funding breakpoints where all guaranteed days are purchased and the 15% baseline is met.

Several overarching patterns are apparent in these figures. Firstly, as 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. These break points are seen in the plots with the rapid increase in the proportion of COVER and AREA trips at funding levels ~$3.7 based on the old cost curve and ~$3.3 million with the new cost curve.

A second break point in the plots occurs when the 15% base observer deployment rate is met and 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 strata according to the weighting in Table 14, 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.

4.2.2.6. Additional Supporting Analyses

Observer coverage for biological data in regards to EM and no-selection pools

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. However, stock assessments vary in how biological data are used, so a coarse analysis is provided to determine the extent to which differing levels of funding for observer coverage may provide area-specific biological data with respect to the amount of fishing effort within the EM and no-selection pools.

Figure 17, Figure 18, Figure 19, and Figure 20 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 2018 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). Trip targets are separated by row and the number of fishing trips within each NMFS reporting area are shown along the y-axes.

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 20, Pot Cod fisheries in NMFS Area 630 and 620, or Figure 17, HAL Halibut fisheries in NMFS Areas 513, 514, and 521).

4.2.2.7. Remaining Fee Revenue 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.

Table 16 estimates 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 16 range from $250,000 to $2,500,000. This range was used in an attempt to bracket 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, a low-end cost of $250,000 was used in Table 16. With the increase in the number of EM vessels since 2016, it is unlikely the program in its current size could be operated for this amount, however. This low end of costs was included to allow for the possible variability in factors that can impact EM program costs and to provide a very low end to the bracket of possible costs. Based on the information provided in Section 3.4.1, NMFS estimates that to maintain an

EM program the size and scope of that in 2018 is closer to $1M. The 2018 Annual Report indicates $1,535,130 was expended for EM coverage in 2018 (NMFS 2019). This cost estimate included an expansion of the EM pool with the addition of 45 new vessels from 2017 to 2018. Another 31 vessels were added to the EM selection pool in 2019 and the Council expressed interest in increasing the pool again in 2020 by adding 30 more vessels. Because of the expansion of the EM pool in 2019 and anticipated expansion in 2020, $2,500,000 was used as the high end of the range of EM costs in Table 16.

Table 16 is based on annual ex-vessel values between 2013 and 2018 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 1.5%, mean fee revenues are estimated at $4,573,016. If $1,500,000 of the fee revenues are used for EM deployment, $3,073,016 remains 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 16 provides a translation from the observer fee revenue collected to the revenue available for observer coverage, given different EM costs. The remaining revenue 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 1.5% and EM costs of $1,500,000, instead of a daily observer rate of $1,280 based on the new cost curves, and fees amounting to $4,573,016, a daily observer rate closer to $1,648 can be expected for the remaining $3,073,016 fees (Table 13).

Comparison: Higher effort Scenarios

Appendix D contains a similar evaluation as in Section 4.2.2, but uses effort from 2017 instead of 2018 as a reference for how the observer budget translates to deployment rates and gap coverage. Because the number of trips in 2017 was generally greater than in 2018, several important trends are noted in the appendix and brought forward. An increase in effort would result in a lower rate of coverage, and thus would have similar responses in terms of gaps as a decrease in revenue/observer budget (i.e., increase probability of data gaps). However, an increase in effort may also a signal an increase in revenue (greater effort and landings), which would offset some of the loss in terms of a decreased deployment rate, noting that revenue from fees crosses a calendar year, thus delaying its effects on cost-per-day and available days.

- The observer budget required (and associated revenue) to meet the 15% deployment baseline and subsequent cost-per day reductions occur at higher funding levels (gap rates of change are shifted right).
- In both analysis, trawl receives most of the allocated days above the baseline (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 baseline 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 baseline 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 baseline), and changes in costs per day are small.

Table 13 **Observer budgets, observer fee percentage, cost per day, and days purchased under 2019 budget scenarios.** Resulting strata-specific selection rates (via the 15% baseline + optimization strategy in the ADP) are also shown for fishing effort in 2018. 'Old' and 'New' refer to the cost curves and can be used to represent lower and upper bounds of cost efficiency, respectively.

Observer Budget	Alt. 2 Fee %	Cost Per Day		Days		Deployment Strata	Selection Rate	
		Old	New	Old	New		Old	New
$3,048,677	1.00	$1,836.41	$1,648.12	1,660	1,850	HAL	0.090	0.100
						POT	0.090	0.100
						TRW	0.090	0.100
						TenP	0.090	0.100
						TenTR	0.090	0.100
$3,810,846	1.25	$1,770.27	$1,446.59	2,153	2,634	HAL	0.116	0.143
						POT	0.116	0.143
						TRW	0.116	0.143
						TenP	0.116	0.143
						TenTR	0.116	0.143
$4,573,015	1.50	$1,526.44	$1,279.57	2,996	3,574	HAL	0.158	0.180
						POT	0.151	0.155
						TRW	0.172	0.229
						TenP	0.152	0.158
						TenTR	0.178	0.252
$5,335,184	1.75	$1,389.71	$1,182.08	3,839	4,513	HAL	0.190	0.215
						POT	0.156	0.160
						TRW	0.255	0.321
						TenP	0.161	0.167
						TenTR	0.286	0.372
$6,097,354	2.00	$1,302.23	$1,118.18	4,682	5,453	HAL	0.221	0.250
						POT	0.161	0.166
						TRW	0.338	0.413
						TenP	0.169	0.177
						TenTR	0.393	0.492

Table 14 **Optimization weights based on discards, PSC chinook, and PSC halibut for 2018 effort with 2019 strata definitions.**

Strata	Optimization Weights
HAL	0.2792
POT	0.0144
TENDER_POT	0.0012
TRW	0.6871
TENDER_TRW	0.0181

Table 15 **Data levels and definitions used in the gap analysis. Date range were approximated to roughly imitate the post-strata used by the Catch Accounting System to generate discard estimates for unobserved trips.**

Data Level	Definition
COVER	Trip selected for observer coverage
AREA	Trip's start/end date within 15 days of at least one observed trip with the same gear type, trip target, and NMFS reporting area
FMP	Trip's start/end date within 45 days of at least one observed trip with the same gear type, trip target, and FMP
YTD	Trip not within COVER, AREA, or FMP

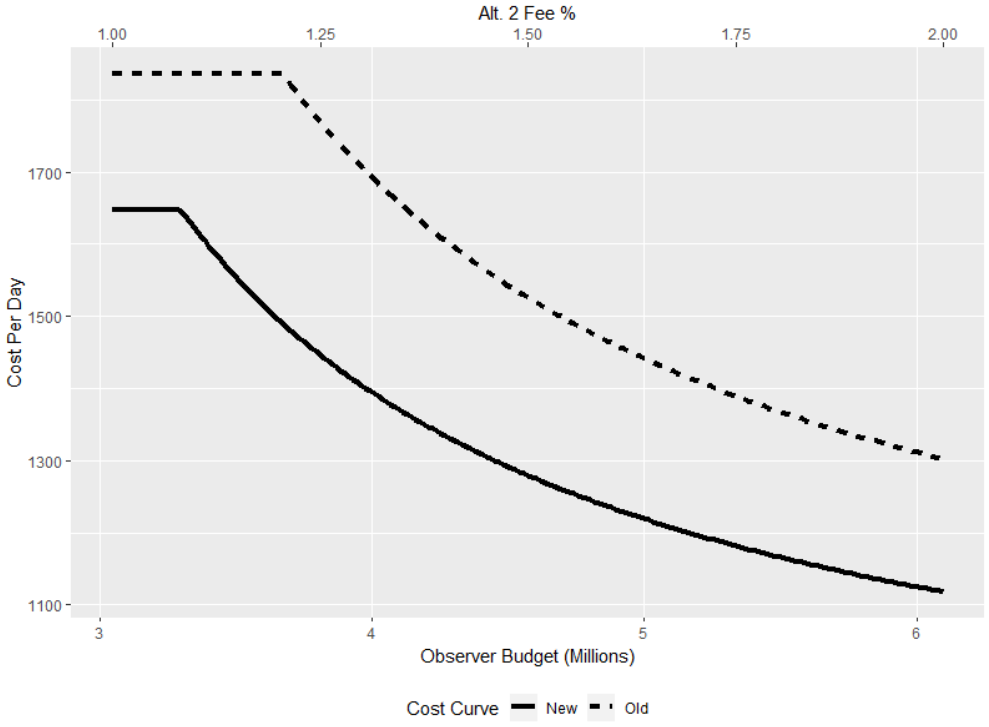


Figure 12 **Cost curves used to estimate cost per day as a function of the observer budget.**
The 'old' cost curve refers to the relationship employed in the April 2019 analysis. The 'new' cost curve is an updated estimate based on updated cost data and assumptions regarding efficiencies provided by economy of scale. Equivalent Alternative 2 observer fee rates (assuming all revenues fund observer coverage) are provided at the top.

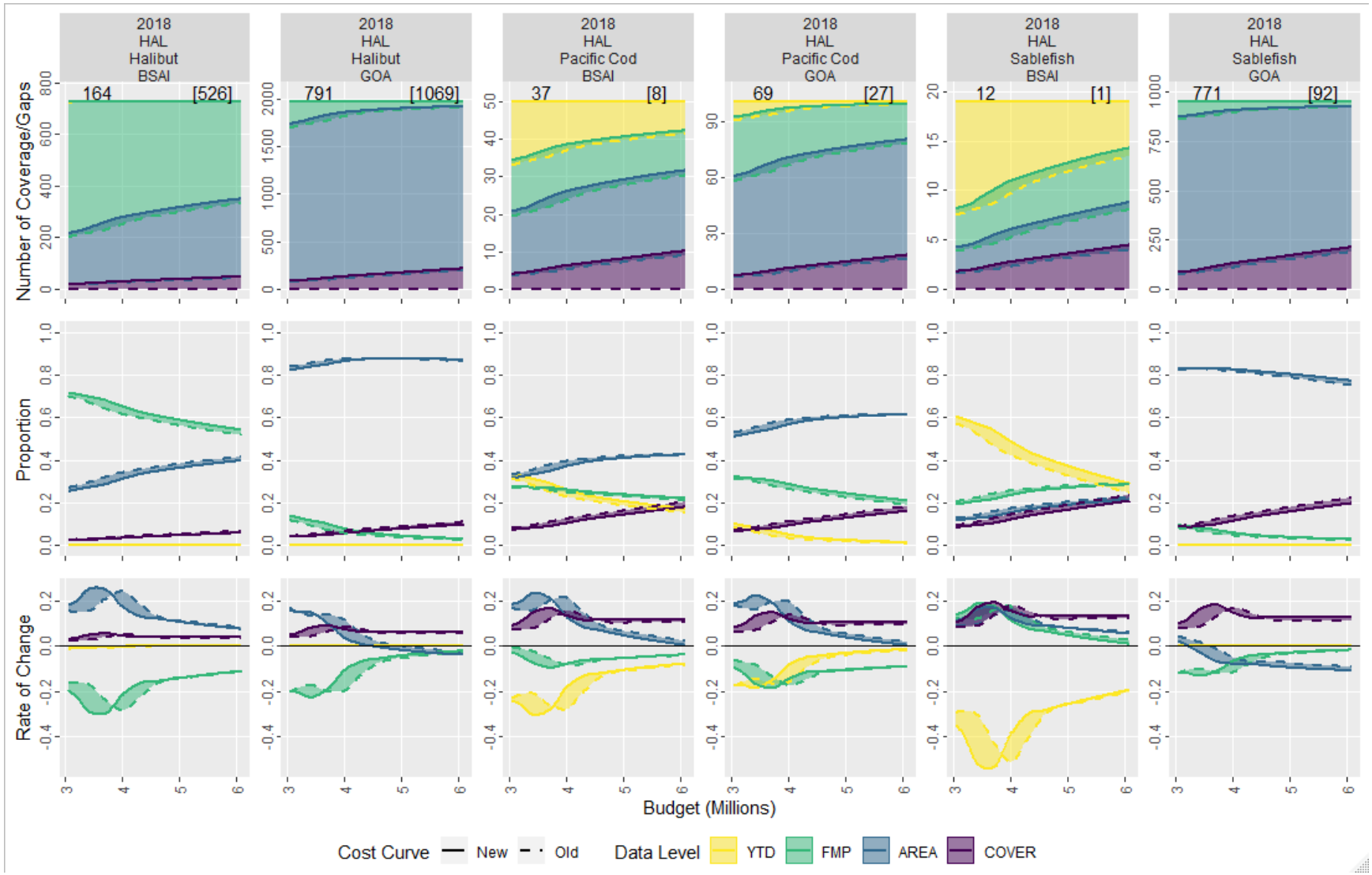


Figure 13 Gap analysis results for 2018 hook-and-line gear trips within the observer pool's HAL stratum and no-selection pool.

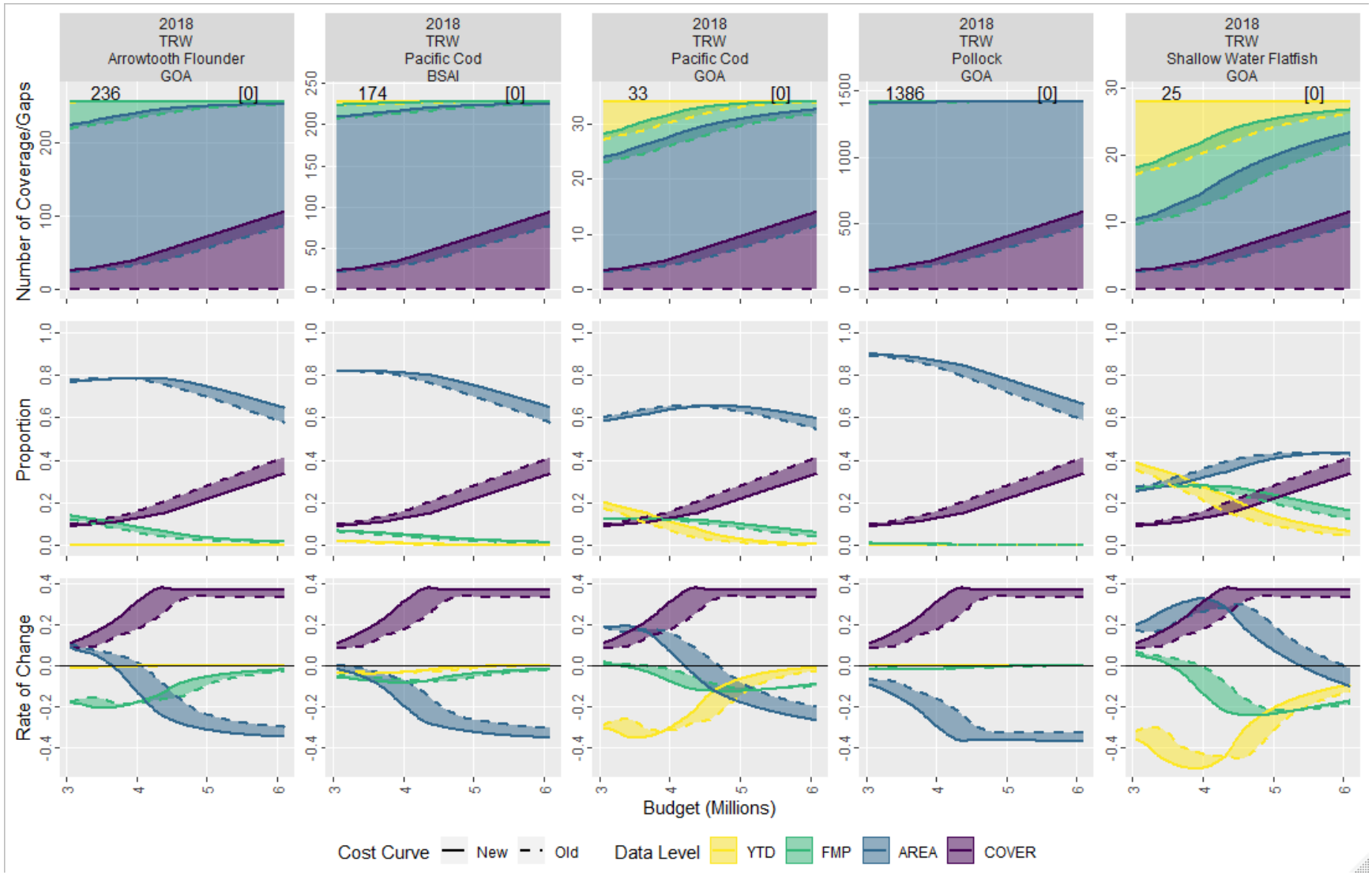


Figure 14 Gap analysis results for 2018 trawl gear trips within the observer pool's TRW stratum.

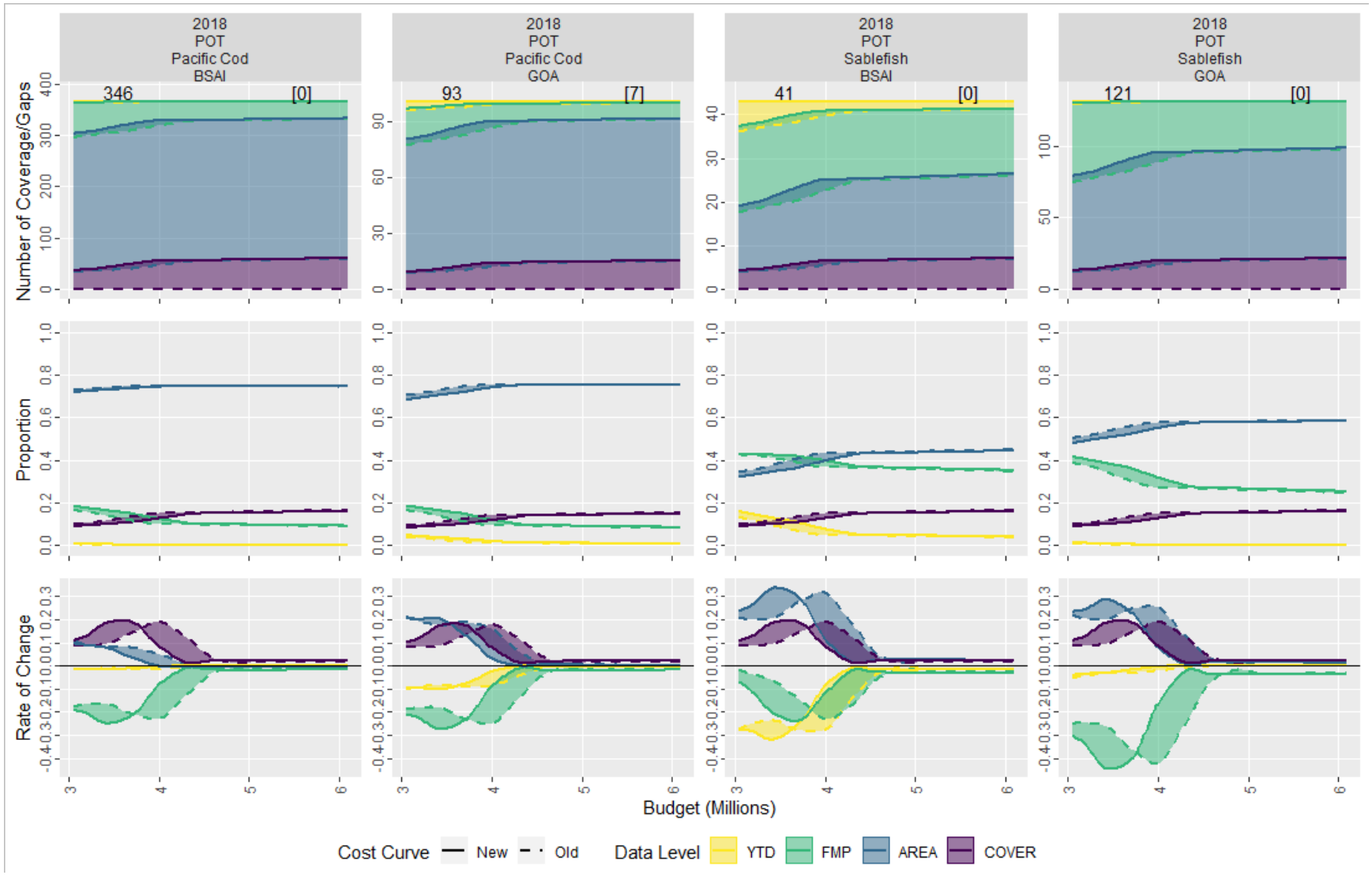


Figure 15 Gap analysis results for 2018 pot gear trips within the observer pool's POT stratum and no-selection pool.

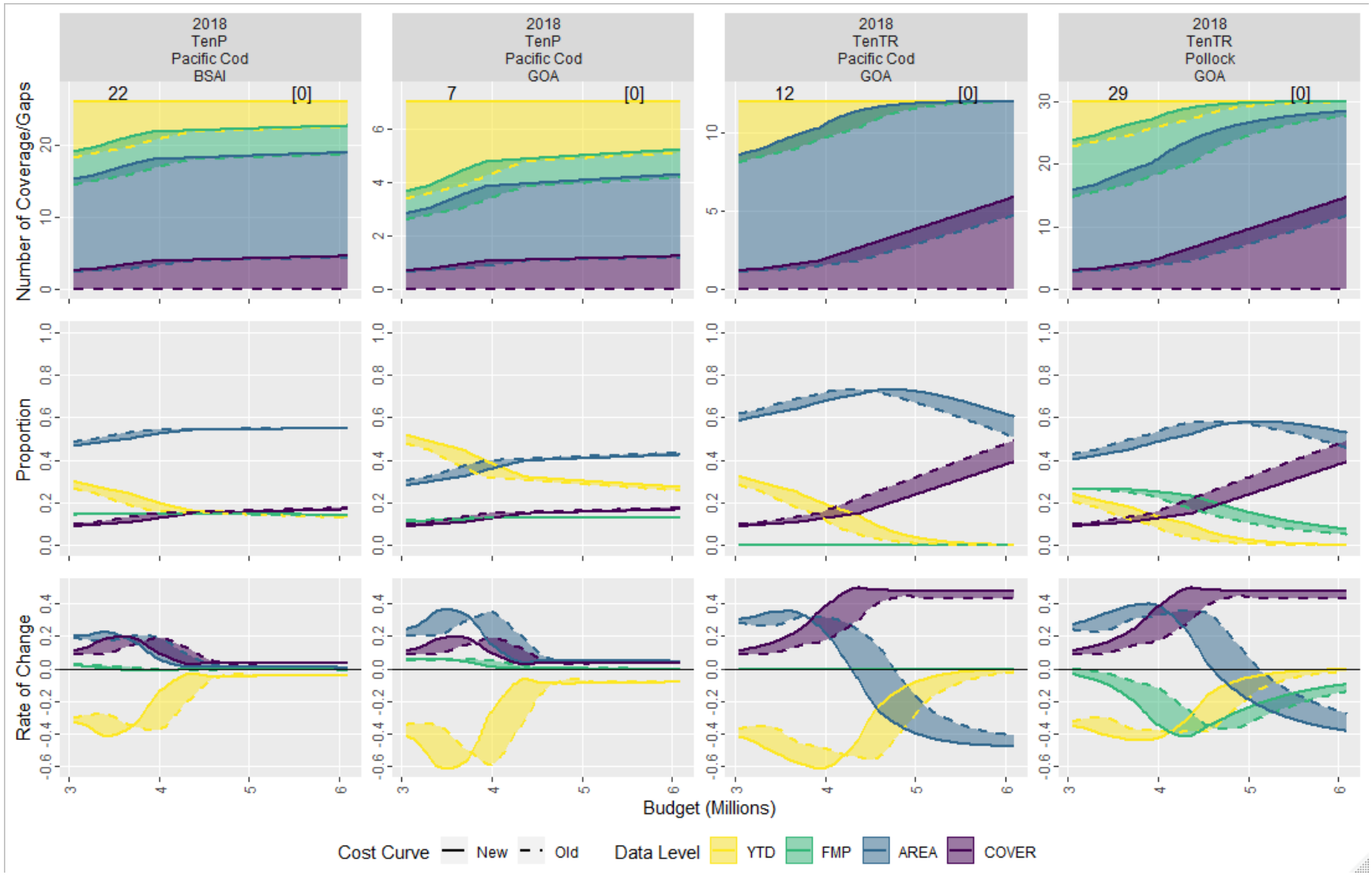


Figure 16 Gap analysis results for 2018 tender trips within the observer pool's POT_TENDER and TRW_TENDER strata.

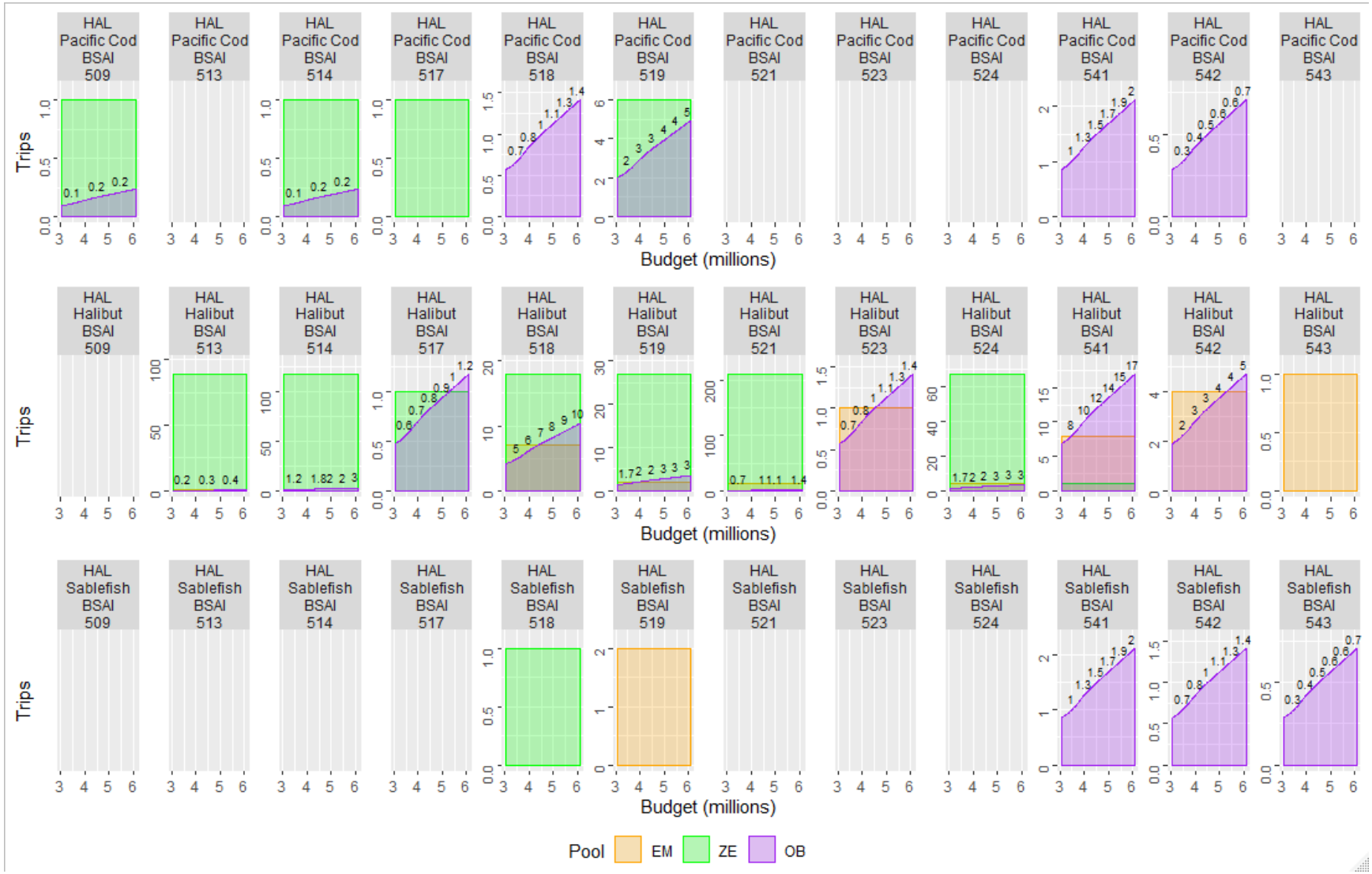


Figure 17 EM pool effort, no-selection pool effort, and expected number of observed trips in 2018 with HAL gear in the BSAI, separated by NMFS reporting area and trip target.

The numbers represent the expected number of observed trips at the given observer budget.

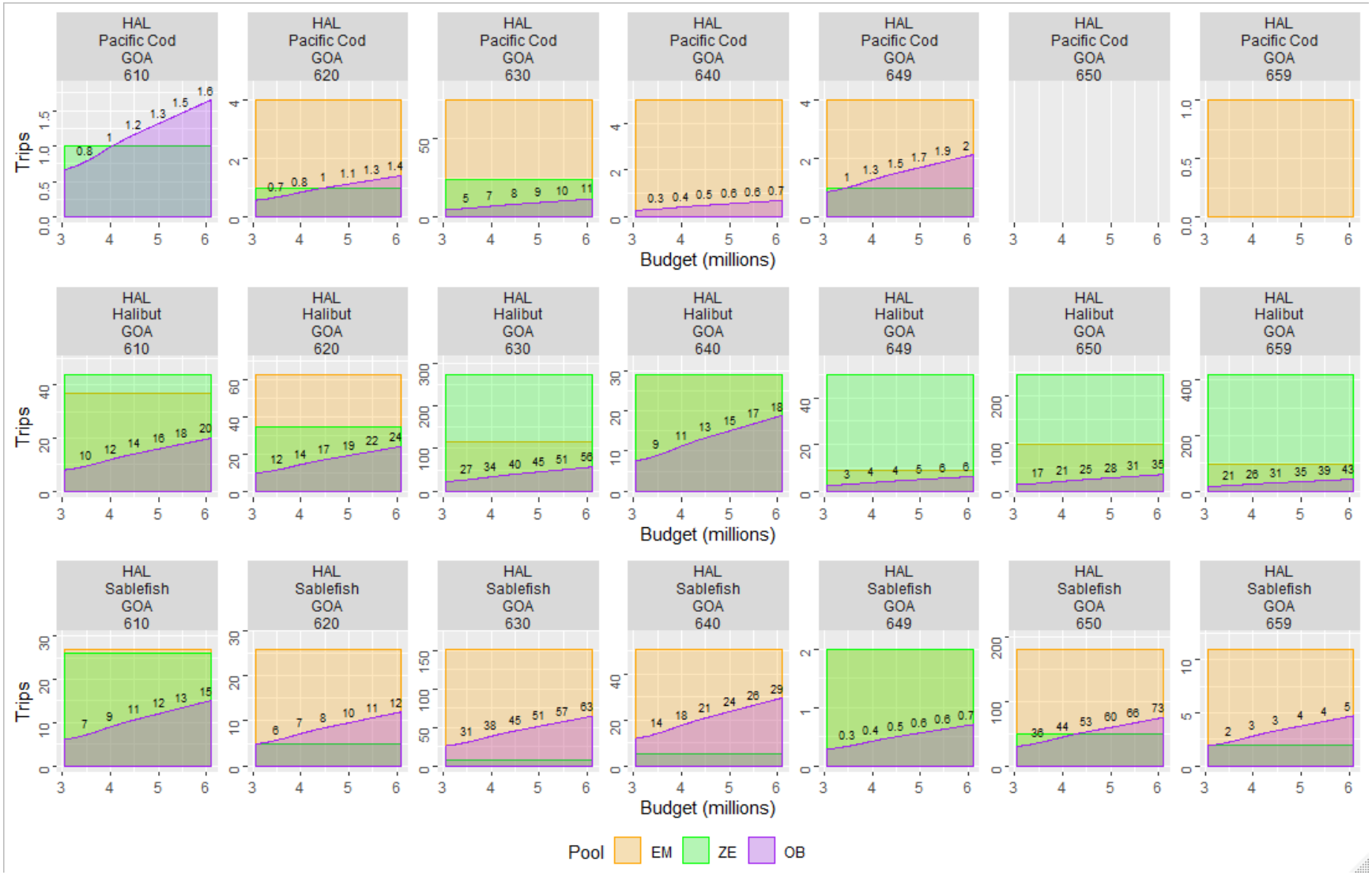


Figure 18 EM pool effort, no-selection pool effort, and expected number of observed trips in 2018 with HAL gear in the GOA, separated by NMFS reporting area and trip target.

The numbers represent the expected number of observed trips at the given observer budget.

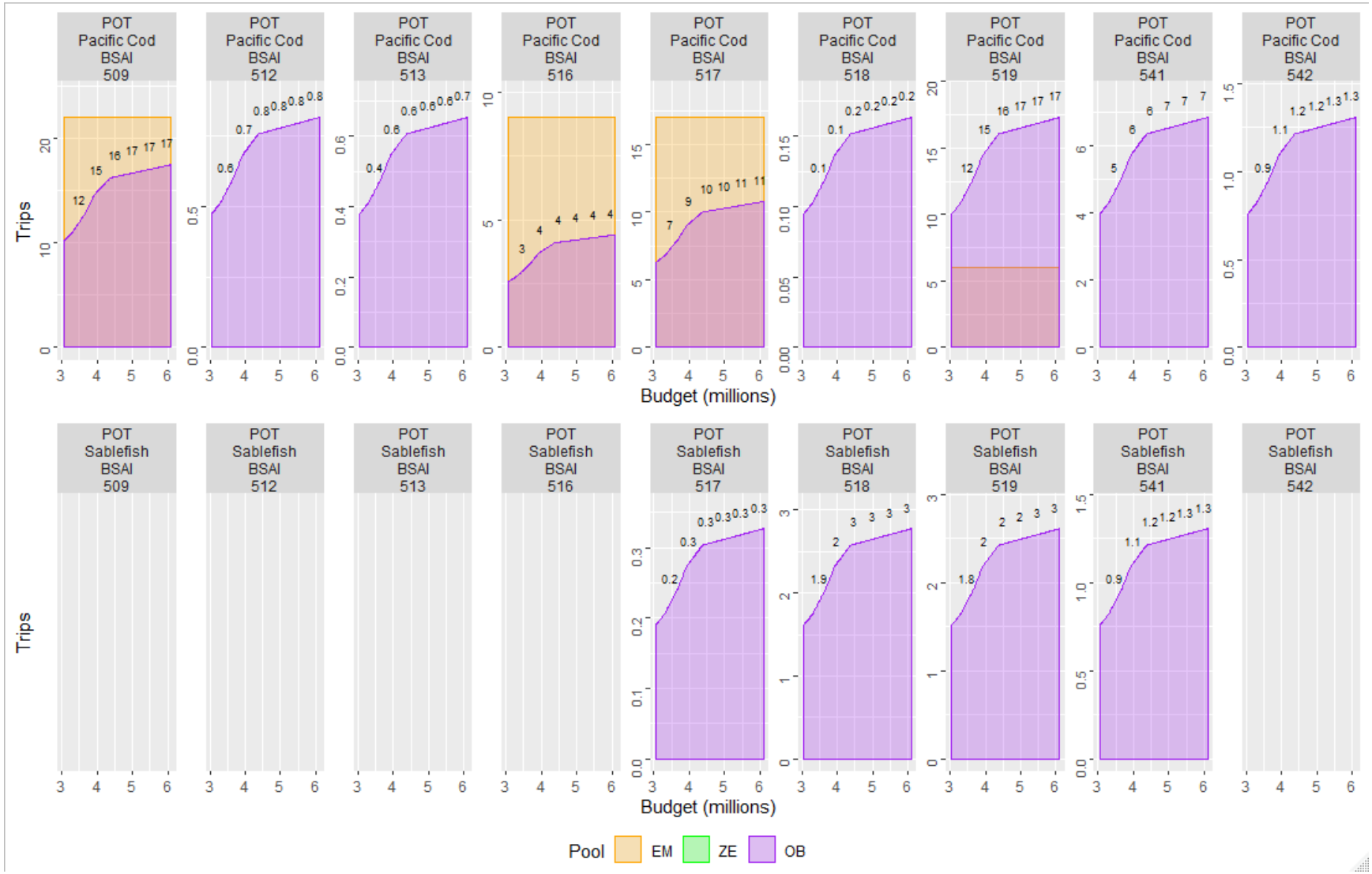


Figure 19 EM pool effort, no-selection pool effort, and expected number of observed trips in 2018 with POT gear in the BSAI, separated by NMFS reporting area and trip target.

The numbers represent the expected number of observed trips at the given observer budget.

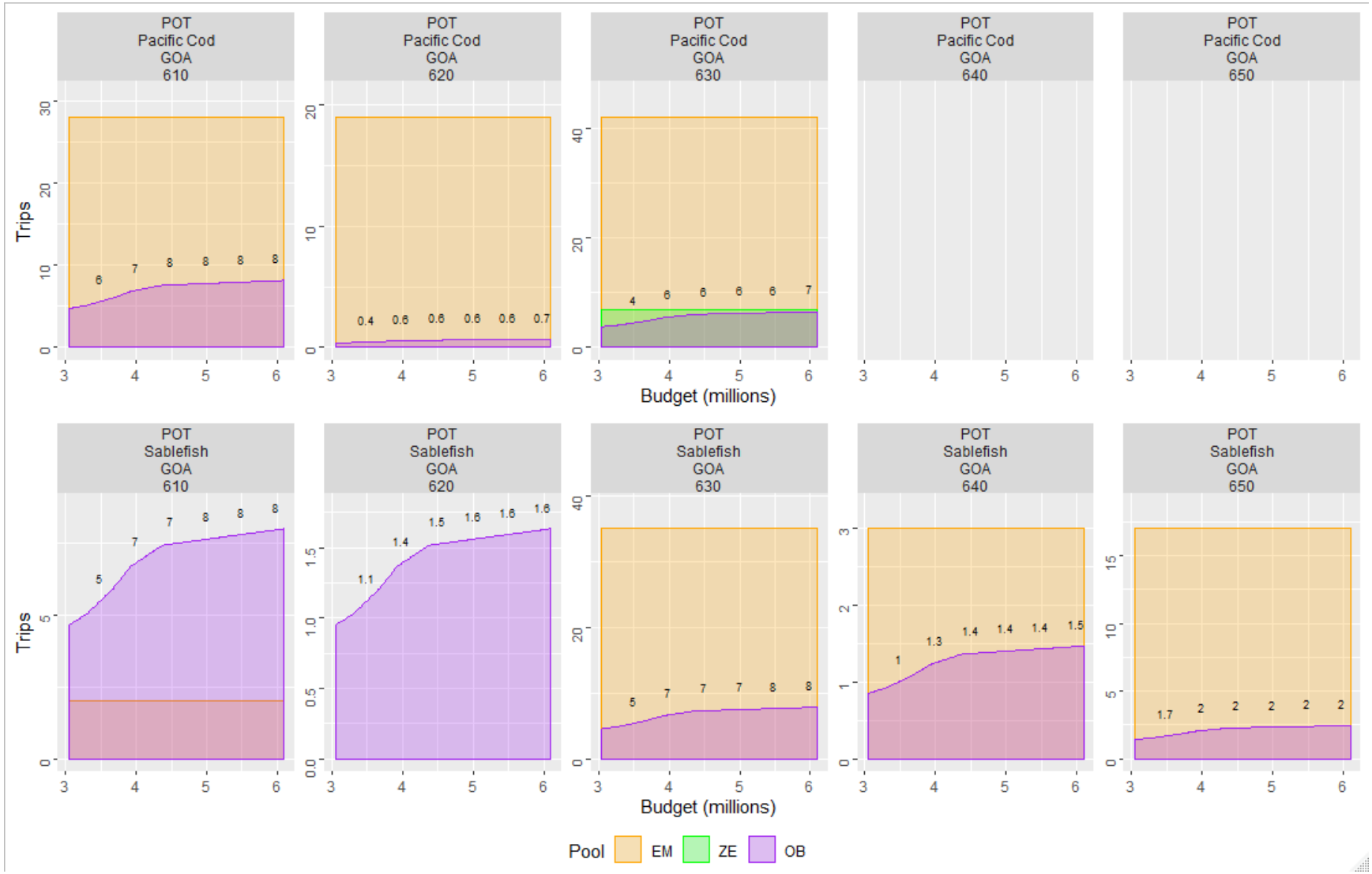
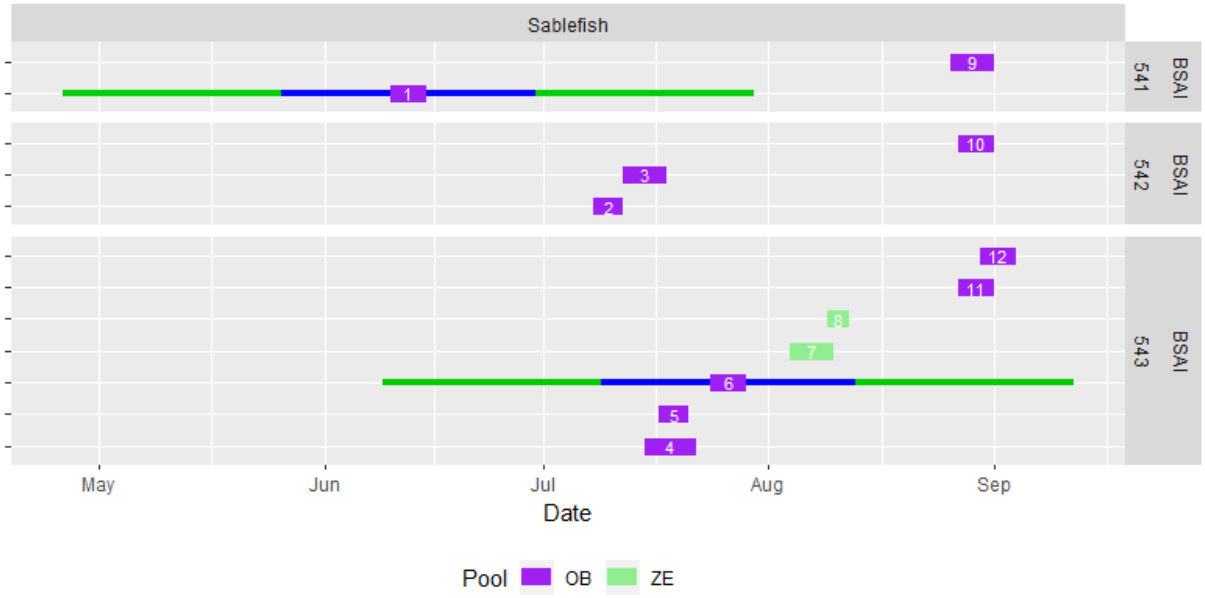


Figure 20 EM pool effort, no-selection pool effort, and expected number of observed trips in 2018 with POT gear in the GOA, separated by NMFS reporting area and trip target.

The numbers represent the expected number of observed trips at the given observer budget.

Gap Analysis Example



Trip ID	NMFS Area	Pool	Area Overlap	FMP Overlap	pCOVER	pAREA	pFMP	pYTD
1	541	OB	0	5	0.15	0.00	0.47	0.38
2	542	OB	1	5	0.15	0.13	0.41	0.31
3	542	OB	1	8	0.15	0.13	0.54	0.18
4	543	OB	2	7	0.15	0.24	0.44	0.17
5	543	OB	2	7	0.15	0.24	0.44	0.17
6	543	OB	2	7	0.15	0.24	0.44	0.17
7	543	ZE	3	6	0.00	0.39	0.38	0.23
8	543	ZE	2	7	0.00	0.28	0.49	0.23
9	541	OB	0	8	0.15	0.00	0.62	0.23
10	542	OB	0	7	0.15	0.00	0.58	0.27
11	543	OB	1	6	0.15	0.13	0.46	0.26
12	543	OB	1	6	0.15	0.13	0.46	0.26
					1.50	1.88	5.74	2.88

Figure 21 **Example gap analysis routine with fictitious data. Each trip's duration (start to end) is drawn in purple for observer pool trips or light green for zero-selection pool trips.**
Notes: For illustrative purposes, trips 1 and 6 are drawn with extended trip start and end dates to depict the temporal range at the AREA data level in blue (start/end date extended by 15 days) and at the FMP data level in dark green (start/end date extended by 45 days). 'Area Overlap' is the number of observer pool trips in the same area that occurred within 15 days. 'FMP Overlap' is the number of observer pool trips within the FMP that occurred within 45 days, excluding those counted within 'Area Overlap'. The probability that each trip will either be selected for observer coverage or will require discard estimates by pooling data at progressively larger spatiotemporal scales can be estimated as a function of the strata-specific selection rate and number of overlaps. The probabilities above assume a strata-specific trip selection rate of 0.15 for observer pool trips. The total expected number of trips within each data level can be estimated by summing the probabilities within post-strata.

Assuming the strata-specific trip selection rate is 0.15, the probability that trip 6 is not selected for observer coverage and at least one of the two AREA-level trips is selected for observer coverage is:

Trip 6 pAREA = (1 - 0.15) * (1 - ((1 - 0.15)^2)) = 0.24

Looking at Trip 1, because there are no other observer-pool trips within the same NMFS Area within a 15-day span, there is no chance that the trip will get an AREA-level discard estimate if it is not selected for coverage. However, there are five trips that may be able to provide FMP-level discard estimates for Trip 1. The probability that trip 1 is not selected for observer coverage, none of the AREA-level trips are selected for observer coverage, and at least one of the five FMP-level trips is selected for observer coverage is:

Trip 1 pFMP = (1 - 0.15) * (1 - 0.00) * (1 - ((1 - 0.15)^5)) = 0.47

Likewise, the probability that trip 6 is not selected for observer coverage, none of the AREA-level trips are selected for observer coverage, and at least one of the seven FMP-level trips is selected for observer coverage is:

Trip 6 pFMP = (1 - 0.15) * (1 - 0.24) * (1 - ((1 - 0.15)^7)) = 0.44

Note that although Trip 6 had more FMP-level overlaps than Trip 1, Trip 6 has a lower probability that it will require an FMP-level discard estimate because it is more likely to first get an estimate by pooling at the AREA-level.

pYTD is calculated as the remaining probability:

Trip 1 pYTD = 1 - (0.15 + 0.00 + 0.47) = 0.38

Trip 6 pYTD = 1 - (0.15 + 0.24 + 0.44) = 0.1

Table 16 Remaining Revenue for Observer Coverage after a Range of Possible EM Costs are Removed from Observer Fee Revenues at Different Fee Percentages, Based on the Average Fee Revenue for All Gears between 2013 and 2018

Fee %	Avg. Fee Revenue for All Gears (Table 12)	Alternatives and Options	Remaining Fee Revenue after a Range of Possible EM Costs					
			$250,000	$500,000	$1,000,000	$1,500,000	$2,000,000	$2,500,000
1.25	$3,810,846	Alt. 1	$3,560,846	$3,310,846	$2,810,846	$2,310,846	$1,810,846	$1,310,846
1.3	$3,963,280		$3,713,280	$3,463,280	$2,963,280	$2,463,280	$1,963,280	$1,463,280
1.35	$4,115,714		$3,865,714	$3,615,714	$3,115,714	$2,615,714	$2,115,714	$1,615,714
1.4	$4,268,148		$4,018,148	$3,768,148	$3,268,148	$2,768,148	$2,268,148	$1,768,148
1.45	$4,420,582		$4,170,582	$3,920,582	$3,420,582	$2,920,582	$2,420,582	$1,920,582
1.5	$4,573,016	Alt 2. Opt. 1	$4,323,016	$4,073,016	$3,573,016	$3,073,016	$2,573,016	$2,073,016
1.55	$4,725,449		$4,475,449	$4,225,449	$3,725,449	$3,225,449	$2,725,449	$2,225,449
1.6	$4,877,883		$4,627,883	$4,377,883	$3,877,883	$3,377,883	$2,877,883	$2,377,883
1.65	$5,030,317		$4,780,317	$4,530,317	$4,030,317	$3,530,317	$3,030,317	$2,530,317
1.7	$5,182,751		$4,932,751	$4,682,751	$4,182,751	$3,682,751	$3,182,751	$2,682,751
1.75	$5,335,185	Alt. 2 Opt. 2	$5,085,185	$4,835,185	$4,335,185	$3,835,185	$3,335,185	$2,835,185
1.8	$5,487,619		$5,237,619	$4,987,619	$4,487,619	$3,987,619	$3,487,619	$2,987,619
1.85	$5,640,053		$5,390,053	$5,140,053	$4,640,053	$4,140,053	$3,640,053	$3,140,053
1.9	$5,792,486		$5,542,486	$5,292,486	$4,792,486	$4,292,486	$3,792,486	$3,292,486
1.95	$5,944,920		$5,694,920	$5,444,920	$4,944,920	$4,444,920	$3,944,920	$3,444,920
2.0	$6,097,354	Alt. 2 Opt. 3	$5,847,354	$5,597,354	$5,097,354	$4,597,354	$4,097,354	$3,597,354

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, because other groundfish accounted for, on average, 2% 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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

[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 2018 on all gears.

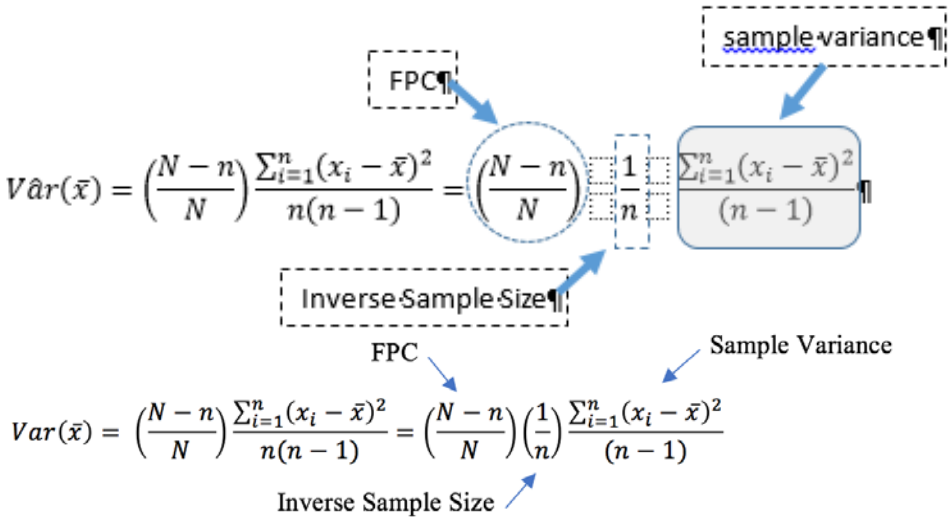
4.2.3. Variance and Sample Size

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 22 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 22 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

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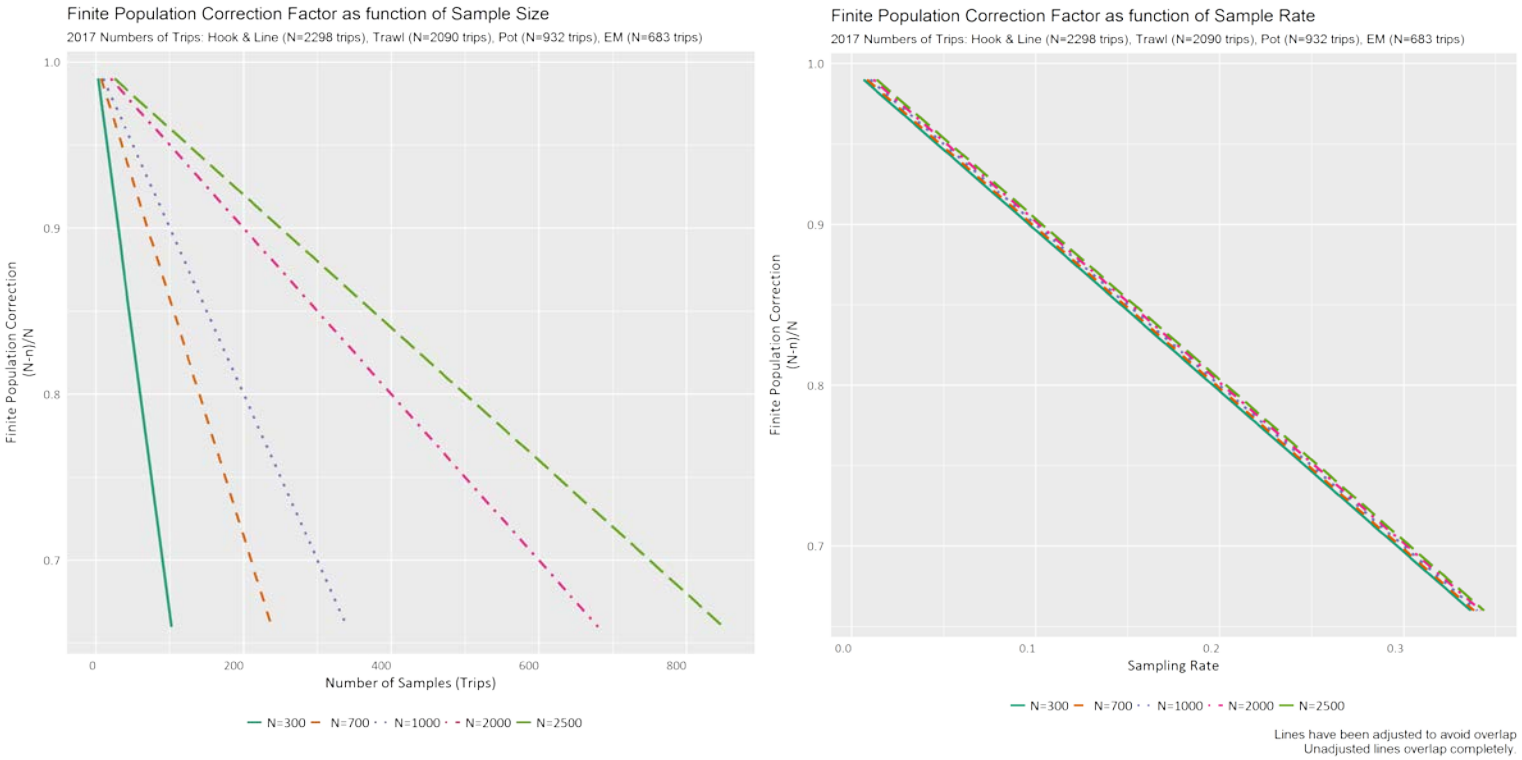


Figure 22 Finite population correction as a function of sample size and rate.
For reference, the realized number of trips in 2017 were as follows: hook-and-line = 2,298, trawl = 2,090, pot=932, and EM=683.

In contrast, the denominator of the estimated variance (1/*n*) is the same for all population sizes, but varies with different sample rates (Figure 23 right panel). Again, the impacts are greatest for the smaller populations (Figure 23).

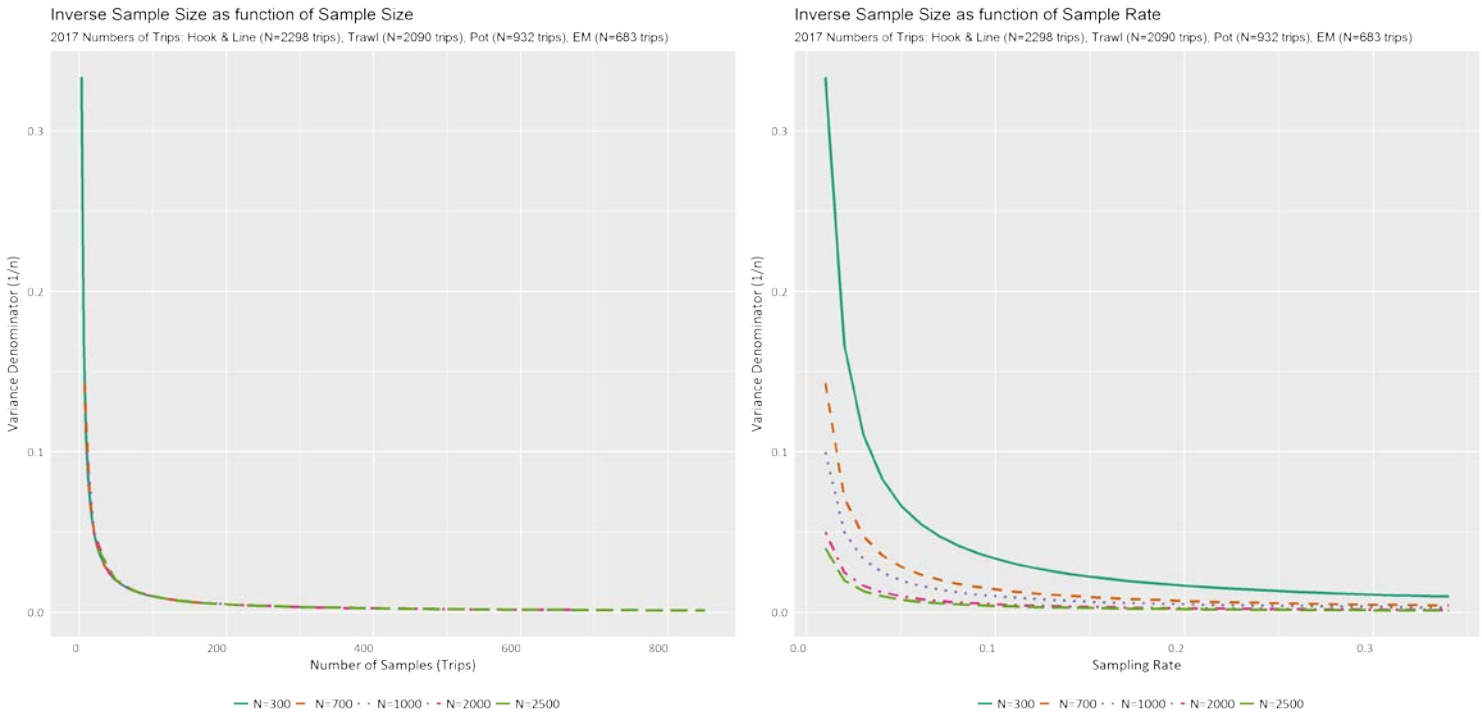


Figure 23 Inverse sample size (1/n) as a function of sample size (left panel) and sampling rate (right panel) across several population sizes(N), including reference to the realized number of trips in 2017 (hook-and-line = 2,298, trawl = 2,090, pot=932, and EM=683).

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 24 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 24 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.

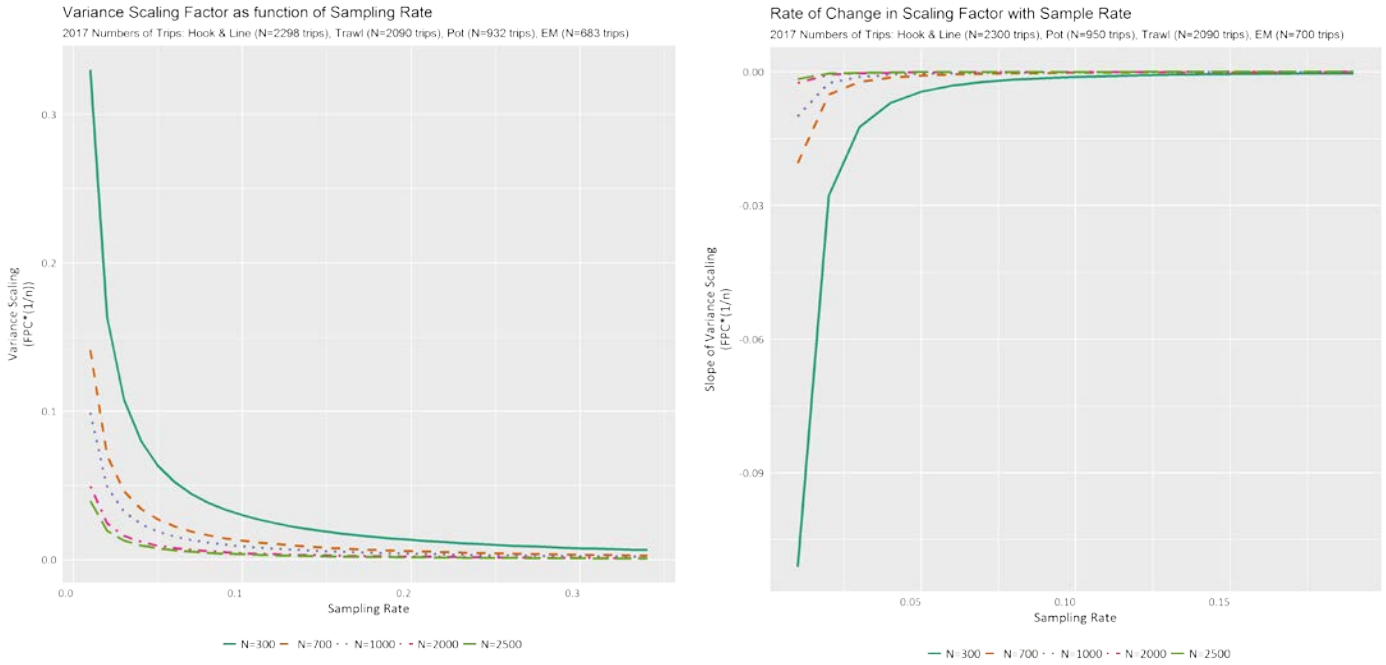


Figure 24 Variance scaling function as a function of sampling rate.

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 25 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.

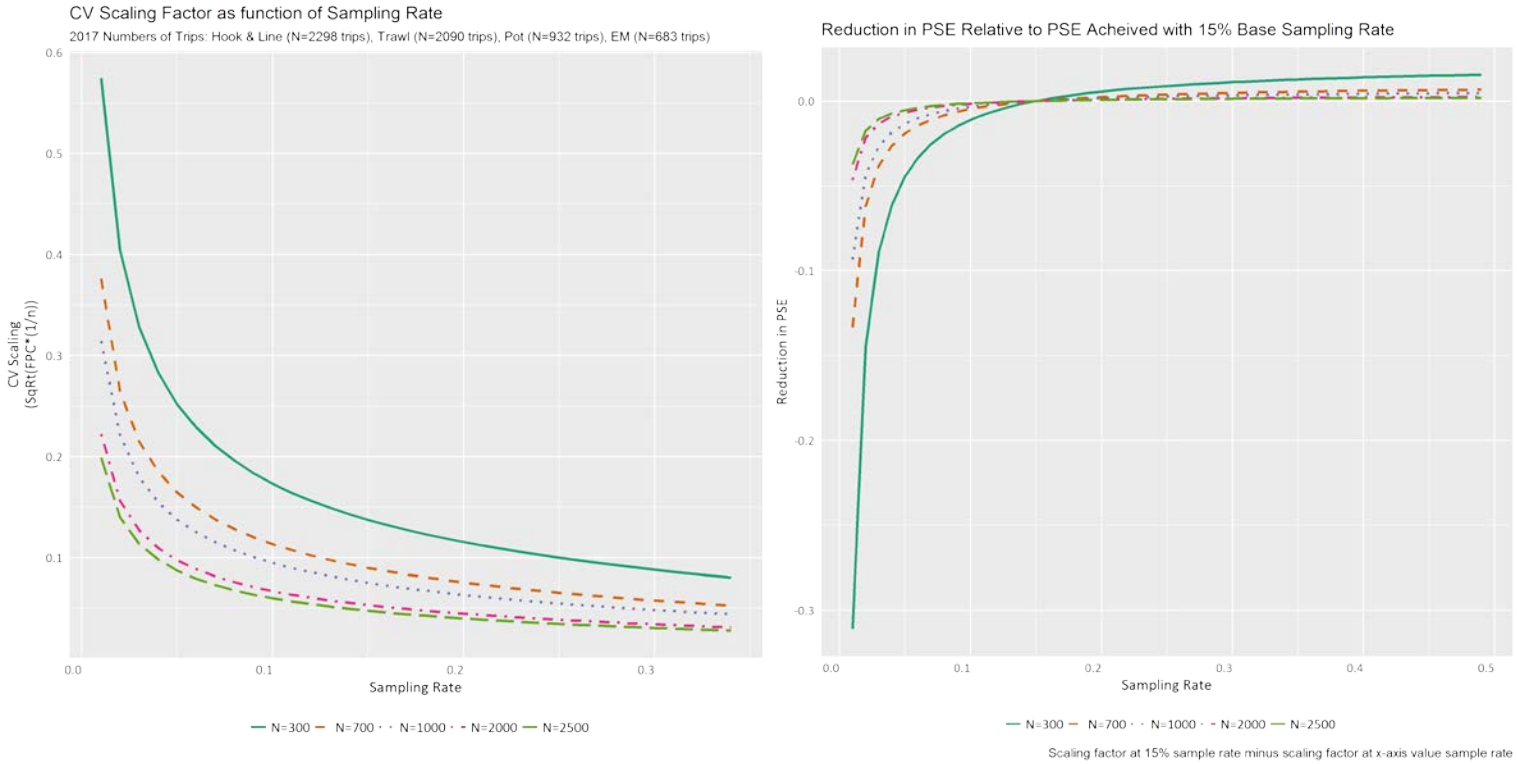


Figure 25 Percent Standard Error scaling function as a function of sampling rate.

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 25 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[13] 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.

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

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

variability and bias are introduced through the choice of estimator, definition of post-strata, and sample size. Each Annual Report[14] 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. Analysis of Catch Accounting and Inseason Management

4.3.1. CAS Estimation and Discards

The Catch Accounting System (CAS) is designed to estimate total catch and provide an accounting structure that allows NMFS Inseason Managers to track species-specific catch against quotas and limits set forth in regulation. The CAS structure reflects the harvest specification categories, seasonal and sector allocations, PSC limits, and annual accounting of non-quota species (e.g., ecosystem components). These accounts are hierarchal such that the most aggregated level generally corresponds to a species and area (often associated with a TAC/harvest specification), and within the highest hierarchical level, accounts maybe subdivided into allocations (sector and seasonal) that reflect regulations. CAS contains logic that determines the assignment of fish to an account that is monitored by mangers. For example, regulations may define an allocation that managers must monitor that is specific to a sector (e.g., hook and line catcher vessel), fishery (e.g., Pacific cod), and season. CAS is designed such that mangers can track catch in way that follows Federal regulations, and reports can be posted online to inform industry.

For vessels in the partial coverage category, fishery-level estimate of at-sea discards and retained catch are generally derived from a combination of landings information and estimates of discard from observed hauls (EM and at-sea observer information). Industry production reports are used for vessels with missing observer data (e.g., deleted data) and for CPs in the partial coverage category. Note that CAS creates discard estimates based on groupings of hauls after they have been randomly selected. This procedure is called post-stratification. Post-strata are defined using information that is known after a sample unit (i.e., haul) has been selected, rather than a sample strata that is based on information known prior to selection of the haul (i.e., ADP sampling strata). Details on these CAS methodologies are found in Cahalan et al. (2014) and Gasper et al. (2019), and are briefly described in the following paragraphs.

For trips without an observer onboard, the catch estimation process (catch accounting system, CAS) produces catch and bycatch estimates by multiplying a discard rate by the amount of groundfish and halibut landed for a trip. The discard rate for estimation is derived from observer data and is calculated as the amount of species-specific discarded fish divided by the total retained groundfish and halibut caught on observed hauls. The rate is computed for each post-strata using the estimates of at-sea discard for each haul (i.e., estimated from sampled hauls). The ratio is applied to the retained groundfish weight within the same post-strata for which the rate was calculated. Retained groundfish and halibut weights are generally obtained from landings information contained in eLanding reports.

While CAS post-strata methodologies differ depending on whether PSC or groundfish is being estimated, both methods attempt to estimate discards using at-sea data that best captures of the characteristics of the fishing event. In estimating discards, CAS prioritizes estimation observer data is available for the same reporting area that fishing occurred before using at-sea information from outside the reporting area. There

[14] Annual Reports available at: https://alaskafisheries.noaa.go https://www.fisheries.noaa.gov/tags/north-pacific-observer-program?title=annual%20report&field_species_vocab_target_id=&sort_by=created v/fisheries/observer-program.

are a few reasons for this CAS design feature: Federal reporting areas represent the highest level of reliable information available on landing reports; many quota categories correspond to groupings of Federal reporting areas; and the premise that reporting area is an important spatial scale for capturing fishing activity. However, reporting area is not the only criteria considered in estimating discard, post-strata definitions also include (in addition to area) species target (predominant species retained), gear fished, time, and the sampling strata established in the Annual Deployment Plan. Thus, reporting area-level gaps in discard estimation occur even when hauls are available because not all hauls within a reporting area will match the fishing activity defined by the post-strata aggregation definitions. These gaps result in discard estimates being made using hauls from outside of the reporting area that fishing occurred.

The 15% baseline specified in the Annual Deployment Plans represent a benchmark at which many (but not all) Federal reporting area have a greater than 50% chance of having at least three observed trips during the course of a year (See section 4.1.2). The 15% benchmark does not guarantee that all areas will have at least three observed trips in a year, and the benchmark is not intended to insure that data is always available at highest level of post-stratification detail in CAS (i.e., gear, area, target, and time). Therefore, CAS estimation will rely on information from outside an area in many situations.

4.3.2. Inseason Management Branch Activities

A key question regarding estimation gaps is the degree to which these gaps influence NMFS Inseason Management Branch's tasks of managing Federal fisheries in real-time. Inseason management decisions can result in direct impacts to fishing fleets (e.g., seasonal closures and rollover decisions) and to the sustainability of fish stocks (e.g., insuring harvest levels do not exceed the OFL). The following sections provide an overview of the inseason management functions to later highlight how data limited or data poor situations can influence inseason management's decision-making process.

The Inseason Management Branch prepares the proposed and final harvest specification documents for publication in the Federal Register. The branch also supports the Regional Administrator in the day-to-day operations of the fisheries using the harvest specifications and current regulations. The Data Quality and Catch Accounting Branch compiles catch and production data from at-sea catcher/processor vessels, motherships, shore plants, and groundfish observers, which is used by the Inseason Management Branch to monitor the catch and allocations. The Inseason Management Branch announces openings and closures using Information Bulletins and publications in the Federal Register. In order for fishery management actions to be filed with the Federal Register, management decisions must be made at least one business day prior to the action. Weekends and holidays require management decisions be made as many as 5 days prior to the effective date. Processors, vessel operators, and other businesses servicing the fishing industry, and the media, are notified by email of any actions through Information Bulletins posted on the Alaska Region web site.

The Inseason Management Branch determines the amount of an individual TAC necessary as the incidental catch allowance (ICA) in other target fisheries. For example, Pacific cod caught incidentally in other target fisheries contribute to the Pacific cod ICA. After deducting the ICA, the remaining TAC is the directed fishing allowance, which allows vessels full retention of the target species or species group. The directed fishery closes once the directed fishing allowance is reached. A fishery closure limits retention of that species to a percentage of the retained catch of other species open to directed fishing. This portion is called the Maximum Retainable Amount (MRA), which is a percentage of an alternate open target fishery. Once an MRA is reached for a species or species group, additional catch of that species must be discarded. Observer information is used to monitor discards, which may increase once an MRA is taken since these discard still accrue towards annual catch limits.

If the total TAC of a species is caught before the end of the year then retention of that species is prohibited. Prohibiting retention removes any incentive to increase incidental catch. If the ABC is reached

and the incidental catch indicates the OFL may be approached, additional closures are imposed. Inseason managers work closely with the fleet using available fishery information on discards (e.g., observer data) to prevent the need for additional closures. However, to prevent reaching the OFL, specific fisheries identified by gear and area that incur the greatest incidental catch maybe closed if other measures are insufficient. If the rate of catch is not sufficiently slowed, then closures expand to other fisheries. Overfishing level closures are rare.

The Inseason Management Branch also closes a fishery if a PSC limit of halibut, crab, salmon, or herring is taken. Prohibited species may not be retained in the groundfish fisheries other than for scientific purposes or certain donation programs. Observer data are the primary source for this information.

An important feature of Alaska groundfish fisheries is the concept of directed fishing, since this controls some aspects of short-term decisions by operations as to when, where, and how to fish. For non-IFQ groundfish species, an important management distinction is made regarding whether a species is open for directed fishing, or is in prohibited status. Directed fishing implies there is adequate quota available to allow the retention of a species while also providing for the "incidental" catch of species that may occur in fisheries for which directed fishing is closed. A species closed to directed fishing (but not in prohibited status) may generally be retained up to the MRA specified in Federal regulations. A species in prohibited status means it cannot be retained.

The Inseason Management Branch determines the amount of an individual TAC necessary to support incidental catch needs in other fisheries. For some species, like Pacific cod in the BSAI, an Incidental Catch Allowance (ICA) is established through the harvest specifications. In most fisheries, incidental catch needs are assessed throughout the year and incorporated into management. After deducting the amount needed to support incidental catch in other fisheries, the remaining TAC is the directed fishing allowance, which allows vessels full retention of a species or species group. The directed fishery for a species closes once the directed fishing allowance is reached.

NMFS closes a species or species group to directed fishing when the (specified or unspecified) directed fishing allowance for that species has been reached or is small. This closure is intended to leave sufficient portions of the TAC to provide for incidental catch in other fisheries. However, if the TAC is reached, retention of that species becomes prohibited and all catch of the species must be discarded. However, operations will still discard the species while pursuing other species, and thus observer data and EM (hook and line and pot vessels) is used for estimation of that discard. A species or species group may be closed to directed fishing, in which case amounts of the species may be retained up to the MRA for that species, or placed on prohibited status (no retention) if TAC is insufficient to support management under MRAs. Directed fishing is defined in regulations as "any fishing activity that results in the retention of an amount of a species or species group on board a vessel that is greater than the MRA for that species or species group."

Finally, in the rare situations where catch rates for a species are still high after a directed fishing closure and prohibition on retention, and catch is anticipated to approach the OFL, inseason managers have the authority to use manage actions (such as area closures) to avoid an OFL overage. Specific fisheries identified by gear and area that incur the greatest incidental catch are closed. If the rate of catch is not sufficiently slowed, then these closures can expand to other fisheries.

4.3.3. Fishery Complexity

Alaska fisheries are diverse and operate within a complex regulatory framework that drives a wide-variety of fishing behaviors. Fishing operations differentially target species by changing fishing methods (e.g., timing, locations, targets) in response to economic incentives, non-regulatory or economic choices, and regulatory requirements. A mission-critical use of observer information is the management of these fisheries via quotas and limits (groundfish and PSC) that both fulfill policy objectives and meet regulatory

requirements. A key component to this is having observer information that represents fishery diversity, particularly at the geographical level needed for management. The ADPs address this fishery and geographical complexity through sample designs that are anticipated to collect a representative sample of trips across the broad geographic expanse of Alaska fisheries.

Figure 26 illustrates the complexity and regional diversity of trawl operations governed under partial coverage regulations. For example, when pollock is open to directed fishing, other economically important species maybe retained on those trips, including Pacific cod and POP. The CGOA has a high level of complexity in that many species are complimentary retained, with likely linkages to MRA management. Thus, a "type" of fishing is difficult to capture under a single target based on a predominant species. Rather, these operations are regional, with directed fisheries occurring during specific times and reporting areas, and involving species retained in proportion to species open for directed fishing (e.g., "top-off" fisheries). For example, Figure 26 shows a strong clustering for trawl fisheries that occur in the CGOA versus fisheries in the WGOA, and the BSAI, with little overlap between areas.

Hook and Line fisheries have the greatest geographic distribution of all the Federal fisheries. These fisheries are focused on Pacific cod, halibut and sablefish IFQ, and catch many species in addition to these target fisheries (Figure 28). They operate in the core western and central GOA areas, but also operate in nearshore waters in the eastern GOA, southeastern Alaska, and Prince William Sound, with effort overlapping between many of these areas.

As with trawl gear, hook-and-line vessels are also retaining a diversity of species. However, the dynamics are different since the IFQ halibut and sablefish program accounts for a large proportion of the fishing effort. The IFQ program is controlled by season dates rather than inseason actions. The directed fishing regulations apply to non IFQ groundfish species (i.e., excluding sablefish) incidentally caught, however, halibut and sablefish under the IFQ program are not governed under the same inseason regulations, meaning that those fisheries occur during the majority of the year based on available IFQ. Certain rockfish species are required to be retained in this fishery as well.

An important point of this discussion is to illustrate the diversity of fishing activity that an observer program must monitor. Innovation has been an important component in improving our ability to monitor these fisheries. EM is an important monitoring tool that can complement onboard observers and contribute to data collection in a way that compliments the complexity and diversity of Alaska fisheries. EM has been used on hook-and-line boats and is currently being considered for compliance monitoring on some vessels that capture difficult to estimate species such as Chinook salmon. Starting in 2018, EM for hook-and-line and pot gear has been incorporated into CAS and is being used for inseason management. The ADP allows flexibility to continue to develop these tools and programs.

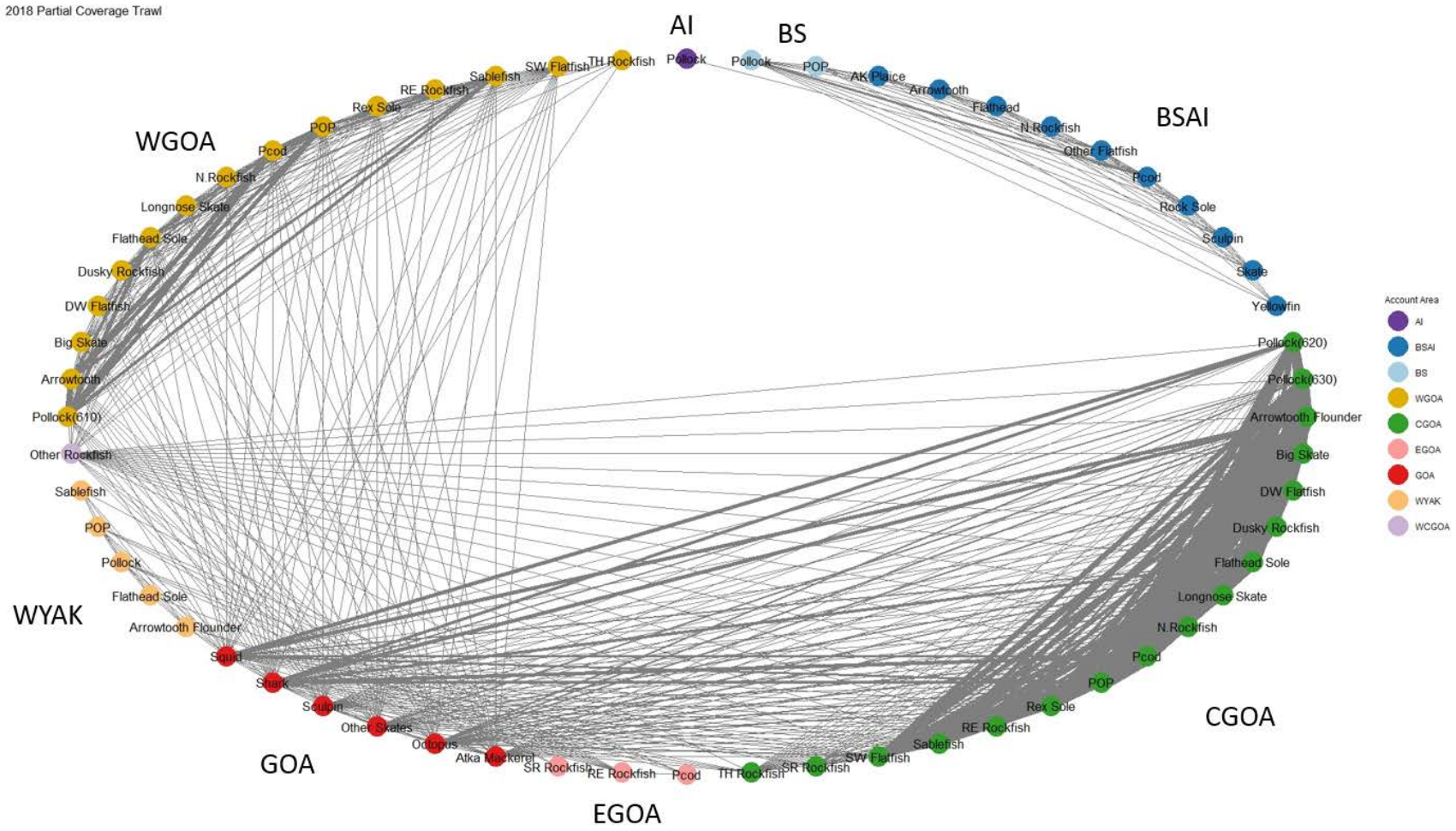


Figure 26 **Network of shared trips by CVs operating in the 2018 partial coverage trawl fishery. Managed quota categories (colored circles) include landed species only. Grey lines represent shared trips between managed quota categories (colored circles), with the width of the line indicating the relative number of shared trips, noting that each line has at least 3 shared trips. Colors reflect the management areas associated with each account. Abbreviations are included in the appendix. Note Prince William Sound pollock fishery not shown.**

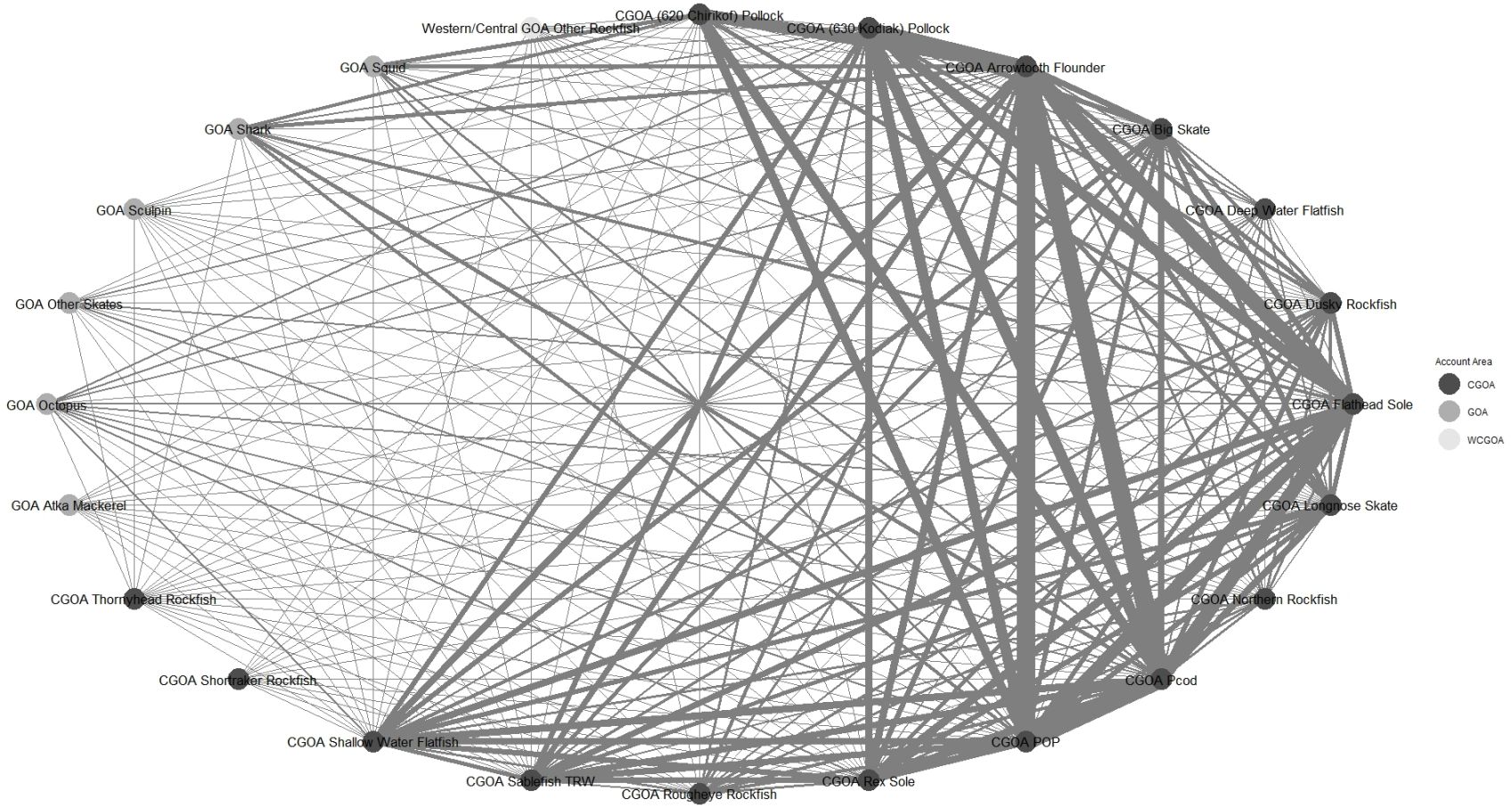


Figure 27 Detail from Figure 26 on shared trips for CVs operating in the CGOA. Managed quota categories shown in the graph only reflect landed species, and there had to be at least 3 landings in an account.

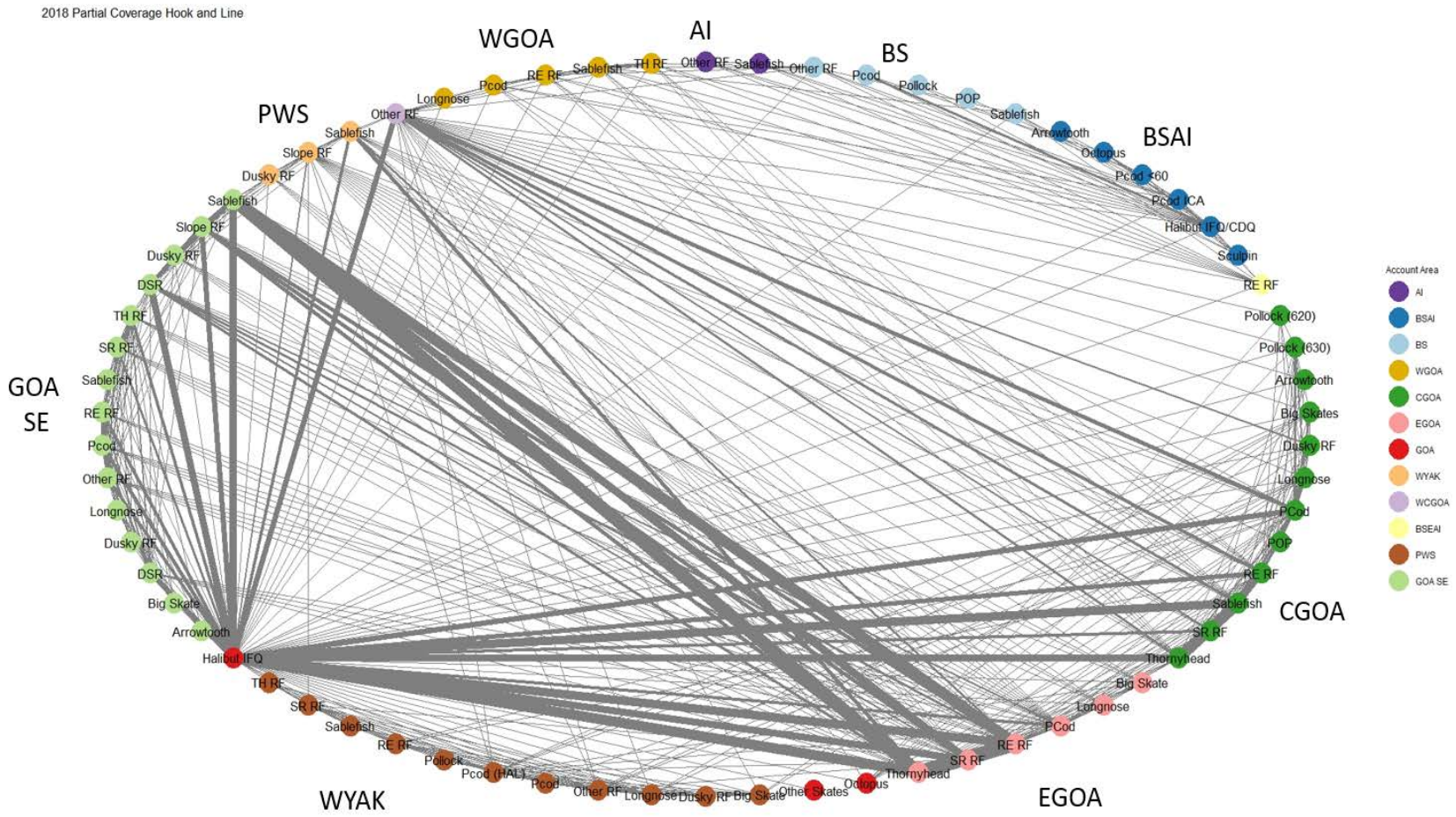


Figure 28 **Network of trips by CVs operating in the 2018 partial coverage HAL fishery. Managed quota categories include landed species only. Grey lines represent shared trips between managed quota categories (colored circles), with the width of the line indicating the relative number of shared trips, noting that each line has at least 3 shared trips. The nodes (circles) are at the scale for which groundfish is managed for total catch with the exception of halibut IFQ that is managed based on IFQ areas. Colors reflect the management areas associated with each account. Abbreviations are included in the appendix.**

The quality of at-sea information is especially important for inseason management of species that are closed to directed fishing since discard amounts can increase due to regulatory requirements. The information is continually updated on the AKRO website[15]. The information includes detail on when a species or species group was open for directed fishing or put on prohibition status, the dates of the status change, and the reason for the status change. In addition, closures for directed fishing or a prohibition on retention due to a seasonal closure specified in regulation are also reported on this website (but not in Table 17 given the large number of closures).

Table 17 provides a summary of species closed to any retention due to concerns about TAC overages since these species are fully utilized. Since 2016, species closed to retention include skates, other rockfish, sablefish, and shortraker rockfish (in the Central and Western GOA). Not listed in the table are the many situations where species or species groups are in prohibited status for a regulatory reasons such as a season closure (i.e., directed fishing is closed, and there is not enough incidental catch allowance for MRA fishing). Many of these species are closed at the beginning of the year due to small TAC levels and TAC is needed to other support target fisheries. While these species are closed to directed fishing, both retention and discard occurs under MRA regulations, and discard estimation is particularly important for management. Further, the small ABC/TAC for rockfish and skates reflect the sensitivity of the species to overfishing.

[15] https://alaskafisheries.noaa.gov/status-of-fisheries

Table 17 Species and species groups put on prohibited status (retention prohibited) to avoid a TAC overage.

Note this list does not include prohibited status triggered by a regulatory closure related to a season date.

	Status Type	Area	Species	Effective Date
BSAI	Hook and Line Gear	Aleutian Islands	Other Rockfish	27-Sep-18
	Hook and Line Gear	Bering Sea and Aleutian Islands	Other Flatfish	13-Sep-18
	Trawl Gear	Bering Sea and Aleutian Islands	Other Flatfish	13-Sep-18
	Trawl Gear	Aleutian Islands	Other Rockfish	27-Sep-18
	Hook and Line Gear	Aleutian Islands	Other Rockfish	6-Oct-17
	Trawl Gear	Aleutian Islands	Other Rockfish	6-Oct-17
	Trawl Gear	Aleutian Islands	Sculpin	6-Oct-17
	Hook and Line Gear	Aleutian Islands	Sculpin	6-Oct-17
	Trawl Gear	Bering Sea	Sablefish	7-Jul-17
	Trawl Gear	Bering Sea	Sablefish	5-Apr-18
	Hook and Line Gear	Bering Sea	Sculpin	6-Oct-17
	Trawl Gear	Bering Sea	Sculpin	6-Oct-17
GOA	Hook and Line Gear	GOA - Central 620/630	Big Skate	29-Sep-16
	Trawl Gear	GOA - Central 620/630	Big Skate	29-Sep-16
	Trawl Gear	GOA - Central 620/630	Pacific Cod	19-Nov-18
	Hook and Line Gear	GOA - Central 620/630	Pacific Ocean Perch	29-Aug-17
	Trawl Gear	GOA - Central 620/630	Pacific Ocean Perch	29-Aug-17
	Trawl Gear	GOA - Central 620/630	Pacific Ocean Perch	14-Oct-16
	Hook and Line Gear	GOA - Central 620/630	Pacific Ocean Perch	14-Oct-16
	Trawl Gear	GOA - Central 620/630	Sablefish	14-Oct-16
	Trawl Gear	GOA - Central 620/630	Sablefish	12-Oct-17
	Trawl Gear	GOA - Central 620/630	Sablefish	9-Apr-18
	Hook and Line Gear	GOA - Central 620/630	Shortraker Rockfish	19-Sep-16
	Trawl Gear	GOA - Central 620/630	Shortraker Rockfish	19-Sep-16
	Hook and Line Gear	GOA - Central 620/630	Shortraker Rockfish	9-Nov-18
	Trawl Gear	GOA - Central 620/630	Shortraker Rockfish	9-Nov-18
	Hook and Line Gear	GOA - Western 610	Longnose Skate	26-Apr-16
	Hook and Line Gear	GOA - Western 610	Longnose Skate	20-Sep-17
	Trawl Gear	GOA - Western 610	Longnose Skate	20-Sep-17
	Trawl Gear	GOA - Western 610	Longnose Skate	26-Apr-16
	Hook and Line Gear	GOA - Western 610	Shortraker Rockfish	16-Oct-17
	Trawl Gear	GOA - Western 610	Shortraker Rockfish	15-Sep-16
	Trawl Gear	GOA - Western 610	Shortraker Rockfish	16-Oct-17
	Hook and Line Gear	GOA - Western 610	Shortraker Rockfish	15-Sep-16
	Trawl Gear	West Yakutat - 640	Sablefish	14-Aug-18
	Trawl Gear	West Yakutat - 640	Sablefish	8-Aug-17

4.3.4. Trawl Fisheries and Management

Managing these fisheries requires the NMFS Inseason Management Branch to project how an entire regions worth of information is accruing to a quota category (e.g, CGOA Sablefish), including what

observer information is available for management, anticipated fishing effort, and how new observer and landing information changes catch projections relative to quota limits. Situations arise where certain hauls used to estimate discard have high influence (leverage) on the final discard estimates. These hauls will influence estimation even as new information becomes available. Thus, inseason mangers must consider how future information will change the relationship of a highly leveraged haul with all discard information available for the fishery. For example, if a small set of hauls are responsible for most of the discard information in a fishery, then inseason managers must consider the following:

- Whether more effort is expected in that fishery,
- If the haul is related to an FMP rate, whether new observer information is expected that would allow area level estimation and a new rate to be calculated
- Whether additional observer data are anticipated that would change the rate
- Whether adequate room for additional catch is available in fully utilized quotas

These elements are fluid for inseason managers as they determine when to take inseason actions and publish fishery status changes. Further, since single hauls can interact with estimates for multiple species, additional information that reduces discard for one species may change the situation for another species by updating associated estimates. Monitoring this dynamic requires managers to maintain close communication with the fishing fleet to help anticipate management actions and mitigate impacts (such as high PSC catch rates).

A real word example of a highly leveraged trip (6 hauls) occurred in 2016. In this example, six hauls were observed during a single trip in area 610 (in the tender strata and using NPT gear). Observer information in the tender trawl strata was unavailable for a small amount of activity using NPT gear in other reporting areas (e.g., 620), so the six hauls that were available in 610 were used to estimate catch for 16 different management accounts in CGOA and WGOA (using FMP-rate). This type of situation can create problems for management if the observed vessel happens to encounter high levels of bycatch.

A different way to view the impacts of FMP wide estimation is to look at the estimated discard weight attributed to an FMP versus reporting area rate as used in CAS. Figure 29 provides an overview of the proportion of discard weight attributed to an inseason account and by FMP or reporting area estimation method. Generally, in 2018 most of the estimated discard originated from rates using reporting area level information, but in cases where effort is low (e.g., WGOA and under certain targets), and very small fisheries (PWS), CAS relies on an FMP area rate.

An important downside to FMP level estimation is that estimated discard represents GOA-wide fishing, not necessarily the fishery for which the estimation is being made. For example, species that are not ubiquitous across the GOA maybe estimated for an area where they do not commonly occur, and for species that are fully utilized (i.e., Table 17) or PSC, this additional uncertainty may result in earlier closure than would have otherwise occurred had reporting-area specific information been available. The opposite scenario can also occur if data are unavailable for a species that is common to an area. In this situation, the FMP rate is lower than would otherwise have occurred had reporting area information been available.

Fisheries that operate in a single reporting area and have a high number of trips generally are data rich and inseason mangers can rely on area-specific information for estimation of discards. For example, CGOA trawl fisheries (in the trawl fishery sampling strata) generally have large number of hauls available for discard estimation specific to that area. The management areas with a high number of trips are identifiable in Figure 29 because the estimated discard weight for a species (quota account) is predominantly based on reporting area information and there is a large number of landing reports associated with the category.

In summary, having area specific information allows inseason management to focus on fishery-specific activity, rather than activity not necessarily related to that fishery. This generally improves quota management by improving the timing of inseason actions, and reducing the risk of a conservative decision because information was used that is not specific to a fishery. Risks include closing directed fishing too early, or not changing a fishery status when it should have been changed. For the most part, inseason actions are being made based on reporting level information, and this is likely due to the Annual Deployment Plan prioritizing a risk assessment on reporting area gaps and addressing gaps through the baseline approach.

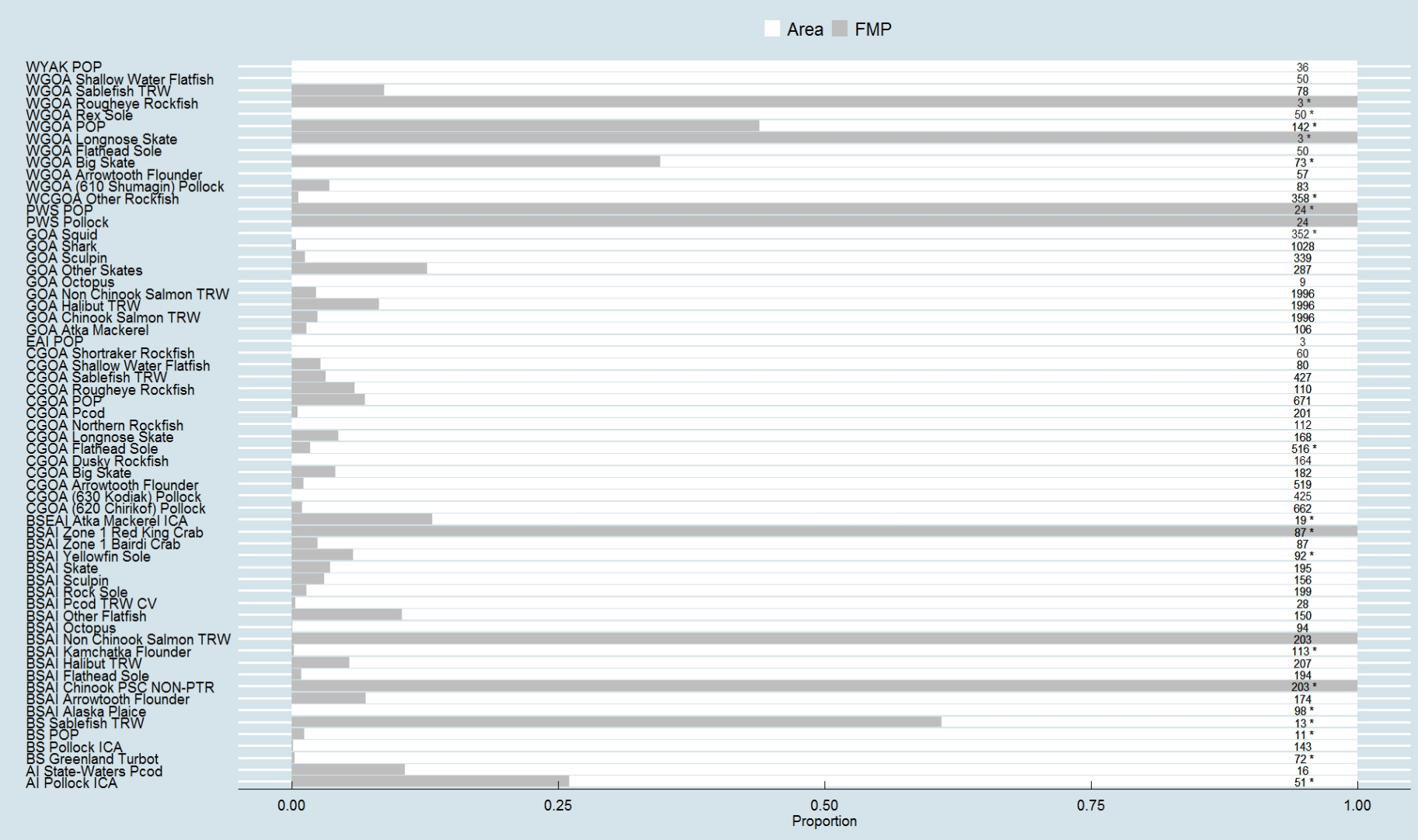


Figure 29 Proportion of the total discard weight (our count) estimated for trawl gear using either an FMP or area-level CAS discard method in 2018. Row numbers indicate the number of transactions (reports) that had an associated discard estimate >0. The asterisk indicates very small volume accounts (<5 metric tons or 5 fish for salmon and crab).

4.3.5. Hook and Line Fisheries and Inseason Management

In comparison to the previously described trawl fisheries, the partial coverage hook-and-line fisheries present a different set of challenges for discard estimation. Hook-and-line fisheries have a large number of vessels with no coverage requirements (<40 feet); fisheries operate continuously throughout most of a year (quota share program), and in pulses that correspond to seasonal openings for Pacific cod (that may also be vessel-size specific). The hook-and-line fisheries also catch a large diversity of species, with some of these species having region-specific abundance levels (e.g., rockfish).

As with trawl, the number of quota accounts leveraged by a haul depends on the amount of available observer data during a fishery. Each haul in the hook-and line fishery is shared among many more inseason quota accounts than trawl (on average 67 specie/area accounts), and this is largely due to diversity of species caught in that fishery and a higher reliance on FMP rates used for discard estimation.

A general pattern with hook-and-line fisheries is that reporting area level estimation is generally achieved for the core fishery areas, but the high diversity of fishing activities result in more situations where reporting-area level information is unavailable (Figure 30 and Figure 31). The year-round nature of the IFQ fishery results in periods when data are sparse. This is particularly true in low effort areas such as PWS, the WGOA, and the BS; or during summer months when fewer vessels are IFQ fishing. The Bering Sea fisheries also have a high proportion of vessels <40 feet that are not subject to at-sea coverage, causing the likelihood for coverage in that area to be low for the entire year.

The hook-and-line fishery catches a large diversity of species and operates inshore. Many of the species have abundances that are geographically specific. This creates estimation challenges because, even with the 15% baseline approach used in the ADP, geographically specific information will not always be available during post-strata periods defined in CAS. Geographic differences are particularly relevant for certain species (e.g., rockfish and dogfish). For example, an FMP discard rate that is based on information from a reporting area where the species is commonly caught maybe used to estimate discard in an area where the species is less common. One example is SE Inside shortraker rockfish where FMP rates account for most of the weight discarded, but the rate is derived from observer information in the EGOA/CGOA where the species is commonly caught (Figure 31). Some estimation biases could be addressed through changes to the post-stratification procedures in CAS; however, that does not negate that area-specific information was unavailable for certain periods during the small SE Inside fishery. The direct management impacts are negligible in the shortraker example given the small amount of catch in SE inside (~10 tons), and the fact that catch is not counted against a Federal TAC limit since it is in State waters. However, it exemplifies the unique challenge with estimating discard in hook-and-line fisheries.

Another challenge unique to hook-and-line fisheries are that a subset of vessels <40 LOA are unobserved. In areas where a large proportion of the fleet is comprised of small vessels, CAS uses available observer information from larger vessels to estimate discard for the small vessels. Thus, for certain reporting areas where the fleet is predominantly small vessels (primarily BSAI), CAS has a higher likelihood of using FMP-level information to estimate discard given a large proportion of the fleet cannot be observed.

Vessels in the EM pool present both an opportunity and challenge for estimation. EM vessels require some onboard observer information for estimation (e.g., average weights). In situations where the EM pool is sufficiently large such that the number of non-EM trips are low, getting onboard observer coverage on the non-EM trips is difficult. In these situations, CAS will likely rely more on information that is not in the same area and time for estimation for the non-EM vessels.

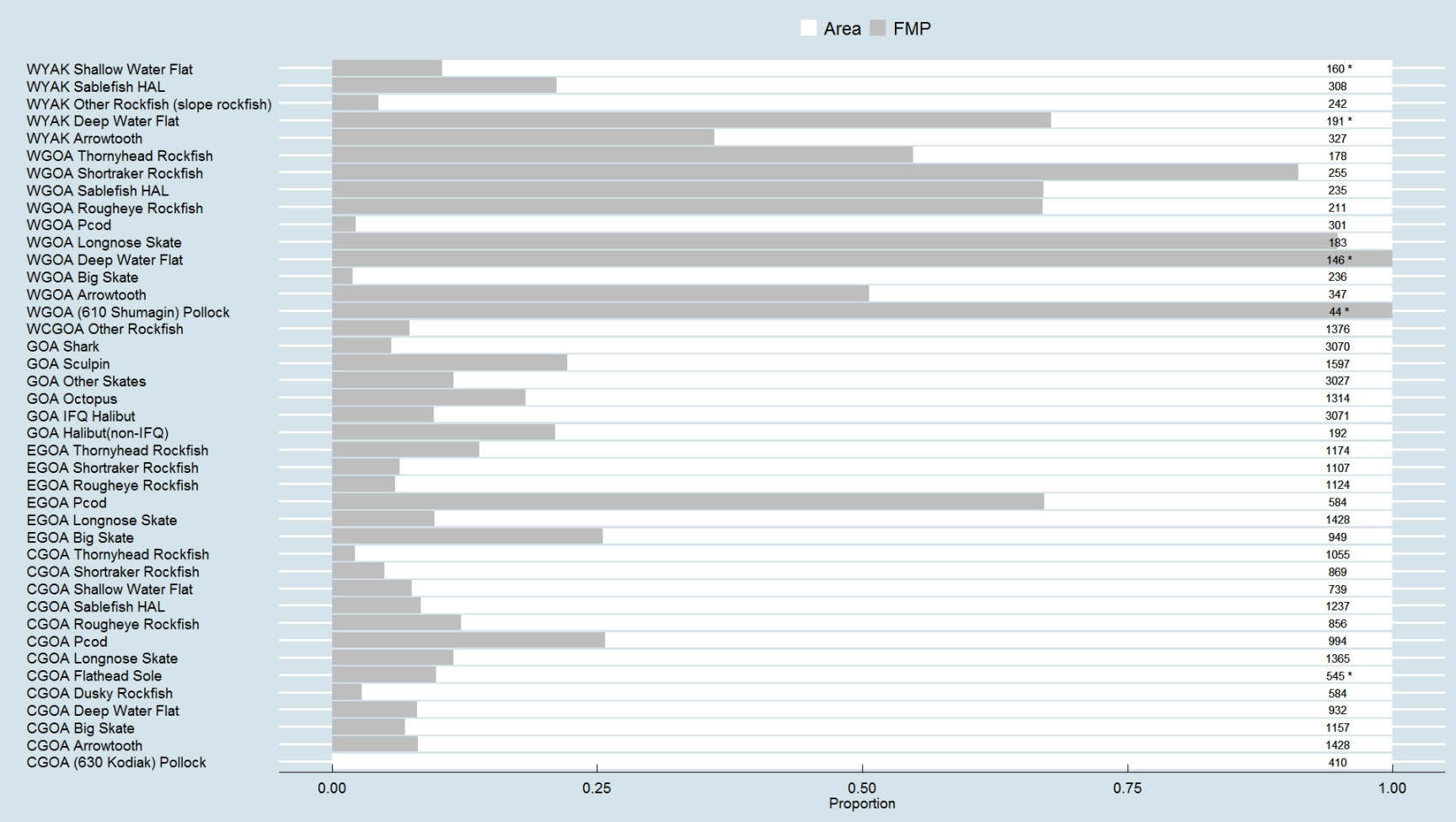


Figure 30 Proportion of total weight (our count) estimated for HAL gear using either an FMP or area-level CAS discard method in 2018. Row numbers indicate the number of transactions (reports) that had an associated discard estimate >0. The asterisk indicates very small volume accounts (<5 tons or 5 fish for salmon and crab).

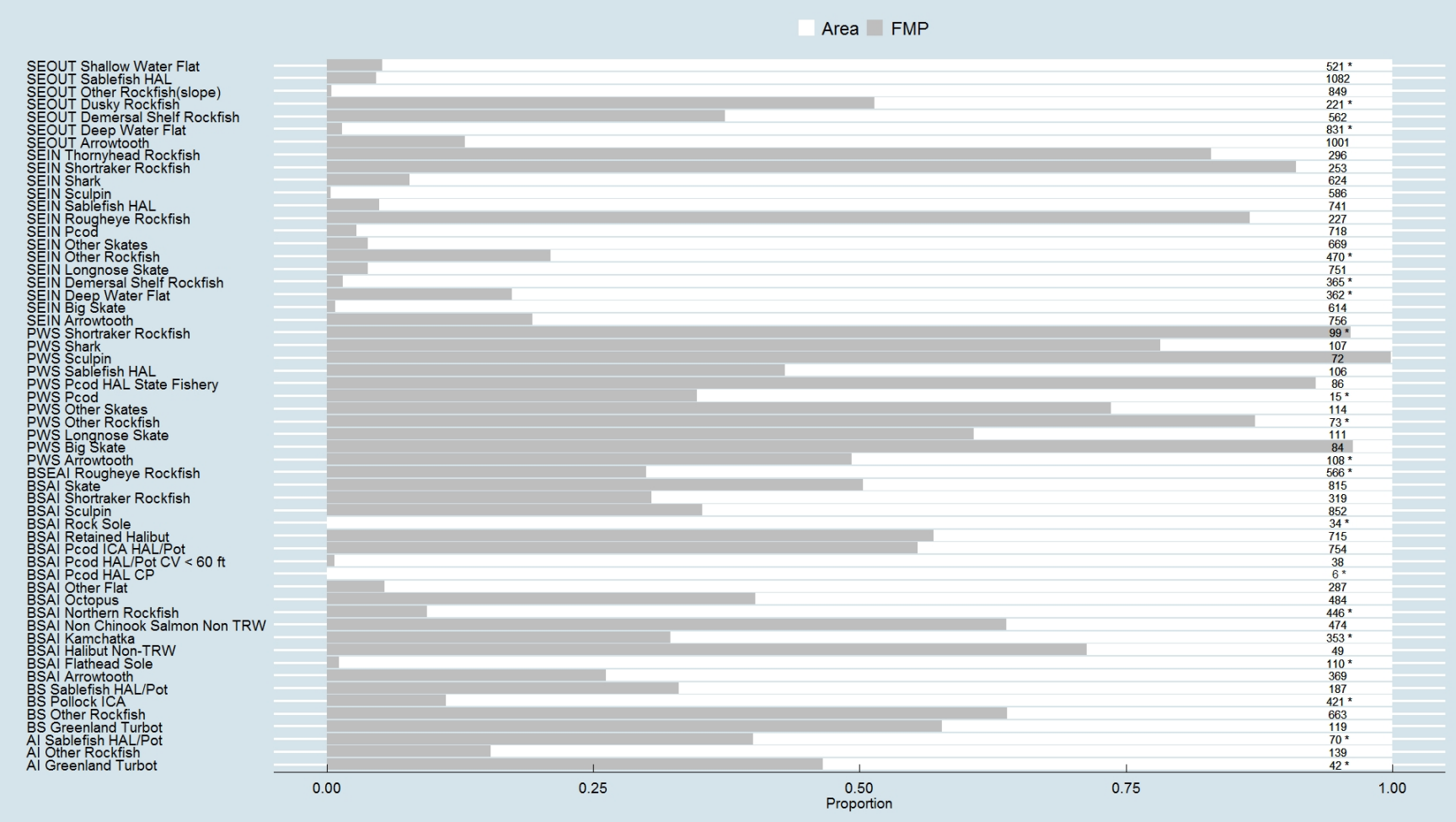


Figure 31 Proportion of total weight (our count) estimated for HAL gear using either an FMP or area-level CAS discard method in 2018. Row numbers indicate the number of transactions (reports) that had an associated discard estimate >0. The asterisk indicates very small volume accounts (<5 tons or 5 fish for salmon and crab). SE Inside and Prince William Sound (PWS) only include discard estimates that are associated with halibut IFQ trips.

4.3.6. Inseason Management Examples

The previously described complexity of Alaska fisheries and near-real time nature of observer and landings information create challenges for inseason managers that can influence the decisions they make. For context, a few real world examples are provided below to illustrate NMFS Inseason Management's response to data rich versus data poor situations. In addition, a summary of the types of risks associated with low coverage as it relates inseason management are provided in Table 18 that follows.

PSC Management

Halibut example: Inseason managers can have a difficult time precisely managing PSC quota when observer data are sparse in the area for which fishing occured. For example, in March 2016 the hook-and-line Pacific cod fishery was closed due to reaching the halibut PSC allowance. The halibut PSC limit accrues to a single GOA-wide account, so inseason management decisions are influenced by observer and landings data originating from the entire GOA. In this situation, observed trips were spread out over multiple weeks and data was not available for all areas. This made management challenging due to the variability of the estimates as new data became available and inseason estimates of PSC catch were updated. NMFS announced a decision to close all HAL CV Pacific cod in the GOA on March 11 using the best available information. After the closure, an estimate of bycatch in an area with low overall observer coverage resulted in halibut PSC estimates increasing after the closure. These data were not available until after the fishery was closed, but continued to influence estimates over a three-week period. As a result, the 1st seasonal allocation of halibut to the HAL CVs was exceeded by 48% and this overage prevented a fall HAL CV Pacific cod fishery.

Chinook example: Inseason managers informally work with the fleet to help reduce PSC catch. An example of this occurred in April of 2019. Observer data from a vessel fishing in the reporting area 620 flatfish fishery data showed a high rate of Chinook salmon discard. At the same time, fishing was occurring in the flatfish fisheries in reporting areas 610 and 630, but without observer data from which to create area-specific estimate of discards. CAS created an FMP rate based on the available information in 620 that was used to calculate estimates in reporting areas 610 and 630. This single observed trip was an important driver for salmon bycatch estimation in the entire GOA for a short period of time. Inseason mangers projected that the quota would be exceeded in a few days and a closure would be required.

However, managers identified that estimates were based on a sparse amount of data. The closure would have likely remained in effect for the entire year since new data for that fishery would not be collected. Noting these concerns, managers delayed the closure action after communicating with the fleet. The fleet voluntarily reduced fishing effort such that only observed vessels were fishing after a period in which all vessels ceased fishing. The fleet's stand down allowed area-specific observer information to be included in the CAS estimates, without expansion to unobserved vessels. This allowed the fishery to remain open.

ACL Management

Sablefish example: An example of a closure related to ACL management of discard occurred for sablefish caught in the CGOA trawl fishery in 2018. Unexpected increases in discard amounts are a concern for inseason managers. In response, they evaluate where the landings and observer data originates, and they evaluate the data and estimation to insure high quality information is being used for management. In the sablefish example, inseason management identified that the unexpected increase was originating from high at-sea discard rates. However, evaluation of these data also identified that the estimates were based on many observed trips. The availability of area specific information from multiple trips gave inseason managers confidence in making a timely and precise management decision to place sablefish on PSC status (see Table 18).

Shortraker rockfish example: Mangers often have to anticipate how discard estimates will change when new observer information becomes available. A change that is common occurs when observer information becomes available for a reporting area, resulting in an FMP-rate based estimate being revised

to reflect reporting area-based observer information. These changes complicate inseason projections; especially for species with small TAC limits. An example of this occurred for shortraker rockfish in the western GOA hook and line fishery in 2018. The 2018 western GOA shortraker rockfish TAC was small (44 mt) and requires close monitoring by managers. The weekly discard rate for shortraker rockfish by hook-and-line CVs was consistent for most of the year at approximately 2 mt a week (estimates based on area level information). However, observer data corresponding to the reporting area where fishing occurred was unavailable for a short period. This resulted in temporary estimation of Shortraker discard relying on observer data collected at the FMP area level. In this example, the FMP level discard rate of shortraker rockfish catch in the western GOA was less than 0.1 mt. Inseason managers anticipated that new observer information was being collected in the area where fishing occurred, and made projections based on previously observed area-level discard rates. Management action was not needed in this situation; however, this example illustrates how managers assess the risk of TAC limit overages/underage against the near-real time updating of available observer information, and the importance of having area-level observer data in the CAS estimation process.

Table 18 Qualitative evaluation of observer coverage as it relates to inseason management goals and use by the partial coverage fleet for fleet management.

Management	Criteria	Management considerations in fisheries with low coverage
PSC Management	PSC Closure	• Higher risk of not having area and time specific information, resulting in information being used that is not specific to a fishery (e.g., FMP). • Short term costs to fleet include shorter fishing periods for target species and potentially stranded TAC. Inseason requires lead up-time for publishing a closure notice • Increased need to estimate discard from outside the region where fishing occurred. This may result in higher or lower PSC amounts than what would have occurred had area-level expansion been used. • Areas/fisheries with low effort are unlikely to have area specific data available for estimation.
	Fleets reaction to PSC	• Spatial and temporal coverage variable, resulting in fishing activities from outside a fishery having greater influence on PSC estimation. • This can result in lower rates if the areas outside of the fishery are catching less PSC, but also can work the other direction if bycatch rates are high in areas outside of the fishery. • The fleet may respond to PSC depending on the amount of observer data available in an area. For example, a fleet response maybe to avoid certain targets with high bycatch or only allow observed vessels to fish for a short time period in an effort to get area-specific information.
	Inseason Closure Timing	• Mangers are risk averse to exceeding PSC limits and the timing of closures are impacted by the amount of information available to make a management decision. • Closures based on data-poor area information is likely to result in managers being more precautious in closing a fishery (i.e., closing early). This can result in stranded TAC, or prompt fleet responses to avoid closure based on available information.
ACL	TAC Management	• The issues of risk aversion and discard estimation for PSC also apply to ACL management. • Inseason managers track quota amounts against TACs, ABCs, and OFLs. ACL issues are of particular concern for fully utilized species since these are likely to require inseason action to avoid a TAC overage and, in worst-case scenarios, an overfishing situation. Data poor areas heighten uncertainty for inseason managers. • Species can occur in spatially specific areas and are caught in certain fishery targets. Not having area-specific information can result in highly variable estimates since FMP-wide information is used. Bias can occur if estimates from one area are applied to another area where species are more/less common. This can cause imprecise management, leading to early closures (stranded TAC), or closures that were too late (TAC overage). • Closures based on data-poor area information is likely to result in managers being more precautious in closing a fishery (i.e., closing early). Managers must balance directed fishing against closures for TAC, conservation reasons, and costs to the fleet in terms of unharvested TAC.

4.3.7. Summary of Main Points

The previous sections described the complexity of managing Alaska fisheries and the diversity of fishing activities. The focus of the ADPs to maintain coverage across multiple reporting area has provided inseason managers with high quality information from which to make decisions on fishery actions. While low coverage levels do not prevent Alaska Region from managing catch and assessing bycatch, there are management risks associated with aggregating information across multiple areas and fishery.

Having area-specific information generally allows inseason managers to manage based on the characteristics of that fishery. For the most part, management is based on area-level information under current coverage levels. When area-level information is unavailable, mangers must account for the increased uncertainty associated with estimation that is not similar to the unobserved fishing event. These management decisions in turn influence the fleets ability to fully utilize the resource and operate in an

efficient manner. Further, the risk of making a conservative decision is increased when information is unavailable for a fishery, resulting in either closing too early or closure too late based on variable or biased information.

Increasing coverage above the baseline will likely improve inseason estimates by reducing gaps during the season and increasing the probability of obtaining coverage in the WGOA and BSAI. . The analysis in Section 4.2.2 provides information how changes in the fee amounts will alter expected gaps. Generally, even at higher fee amounts and under the current CAS methodology, some gaps will likely remain in low effort areas such as PWS, WGOA, and BSAI. Some of these areas likely drive the FMP gaps that persist even at higher fee levels in the gap analysis, whereas areas with a lot effort will see temporal improvements in the amount of data available within the reporting area throughout the fishing season (i.e., lower effort periods having coverage). Coverage below the baseline is likely to open up more estimation gaps (Section 4.2.2) and require aggregation of observer information.

4.4. Trends and Conclusions

The sections of this analysis are complementary and when viewed as such show considerable uncertainty in projecting revenue, which translates into uncertainty in gaps and the money available to meet the baseline thresholds and allow for optimization. For example, Figure 11 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. In addition, coverage will be driven by costs, with costs increasing at lower revenue levels (see Figure 12).

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 (Figure 11, Table 11, and Table 12; (2) a range of fee percentages and associated revenue; and (3) EM cost levels. For example, a 1.5% fee or an approximately budget of $4.5 milling would appear to meet the baseline threshold based on mean revenue performance (Table 13); however, when viewed in context with annual revenue performance (Figure 11), we see that a 1.5% fee would fall below the $4.5 million threshold in 33% of the years since 2013. The mean revenue for this is $4.57 million (Table 12 - all gears), with annual revenue falling below $4.5 million 33% of the time and total revenue never falling below $4 million (Figure 11).

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 of $4.57 million (the mean between 2013 and 2018 across all gears at 1.5%), then a fee percentage of 1.7% would be required (Figure 11) based on previous revenues. This fee percentage corresponds to a cell 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 enough remaining revenue would be required to achieve the monitoring objective. Looking at Table 16, an EM budget of $1,000,000 may require a fee of approximately 1.85 percent[16] to accommodate both the time series variability in revenue (risk) and EM costs (example of $1,000,000 annually). A 1.85% fee results in an average expected total fee revenue of approximately $5.6 million.

An important issue not quantitatively evaluated in this analysis (due to its complexity) is annual budgeting for the Annual Deployment Plan. The 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

[16] This can be found by looking up a remaining revenue greater than $4.57 million on the EM costs column of $1,000,000 and comparing that to the fee % column (1st column of table).

(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 being unable to meet baseline 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 baseline level. An analogy would be living pay check-to-check rather than having some savings to ride out periods of low revenue.

NMFS awarded a new observer contract in August 2019, which may result in changes to existing cost curves 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 until the contract could be renegotiated to lower the number of guaranteed days.

4.5. 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 economic and social impacts of this action are described in the Regulatory Impact Review (RIR) (Section 4.6). 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.

This Analysis evaluates the potential environmental and cumulative impacts of raising the observer fee percentage on the biological and physical components of the environment. This analysis builds on the previous analyses developed to implement Amendments 86/76, the Supplemental EA for Restructuring the Observer Program, and Amendments 114/104 to the BSAI and GOA FMPs (NPFMC 2011, NMFS 2015, and NPFMC 2017).

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).

Since the implementation of the restructured Observer Program in 2013, the utility of observer data has been improved because of 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 is a monitoring program that 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 19). 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 assessed 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 of the action alternatives 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 19 Resource components 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.

4.5.1. 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 in the 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 baseline thresholds and allow for optimization.

4.5.1.1. 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 action alternatives, the amount of funding available for deployment of observers and EM could increase, possibly allowing for more trips to be observed.

4.5.1.2. 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.

4.5.1.3. 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).

Under the status quo fee percentage 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. Each year NMFS' ability to address the Council's monitoring priorities identified in the optimized allocation strategy whereby observer days in excess of the 15 percent base selection rate is limited by the available annual budget. As shown in Table 3, in all years except 2017, the annual budget used to set the deployment selection rates and the realized costs have exceeded the fee revenues from the previous year. Because supplemental Federal funding is not guaranteed and the upcoming transition to industry funding for the deployment of EM rather than grant funding, NMFS's anticipates difficulty in future years to be able to address the Councils monitoring objectives by maintaining observer selection rates above 15 percent. This is due to the expected decline in supplementary Federal funding and increasing reliance on fee revenues for the deployment of EM and EM video review.

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.

4.5.2. 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 may 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.

Under the current fee percentage, the data collection sampling design is continually being refined across all fisheries in the partial coverage category to ensure representatives samples and adequate sample sizes for stock assessment. The design of the Annual Deployment Plan and Annual Report process allows NMFS the flexibility to maintain these data under the current fee percentage. Increasing the fee percentage under either alternatives 2 or 3 would simply allow more revenue to be raised and would improve NMFS ability to reduce data gaps and be responsive to the Council's monitoring priorities. None of the action Alternatives considered in this analysis would reduce NMFS ability to collect biological information, or information on discards, in comparison to the status quo. Rather, the action alternatives could improve physical and biological data collection to the extent that observer and EM deployment in the partial coverage category is limited by available funding.

4.5.2.1. 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.

4.5.2.2. 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 4.5.3).

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.

4.5.2.3. 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.

4.5.2.4. 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.

4.5.2.5. 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.

4.5.2.6. Social and Economic impacts

The potential economic and social impacts of this action are described in the Regulatory Impact Review (RIR; Section 5.6).

4.5.3. 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.
7. Potential Development of Limited Access Privilege Programs

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

8. Charter Halibut Recreational Quota Entities
9. 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 20 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 20 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. Potential Development of Limited Access Privilege Programs	Unknown – will be analyzed	Unknown – will be analyzed	Unknown – will be analyzed
8. Charter Recreational Quota Entity	Reduction in annual fees	Reduction in observer days	No change expected
9. Guided Angler Fish (GAF) Program	Reduction in annual fees ($2.5k - $7k annually)	Reduction in observer days	No change expected

4.5.3.1. 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.

4.5.3.2. 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).

4.5.3.3. 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.

4.5.3.4. 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.

4.5.3.5. 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.

4.5.3.6. 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.

If approved, the trawl EM EFP could result in a reduction of fishing effort in the observer selection pool that in the 2020 fishing year. NMFS will consider the potential impacts on fishing effort in the process of developing the 2020 ADP. The Council will review the Draft 2020 ADP at its October 2019 meeting and NMFS will finalize the 2020 ADP in December 2019.

4.5.3.7. Potential Development of Limited Access Privilege Programs

The Council is considering some new limited access privilege programs (LAPPs), namely a LAPP for the trawl catcher vessel sector that fish BSAI Pacific cod and a LAPP for pot sector for large (greater than or equal to 60 ft) catcher vessels. Under current monitoring requirements, Pacific cod catcher vessels in the BSAI are in the partial coverage category. Since 2013, observer coverage rates in the partial coverage category have approximately ranged from 14.8 to 28 percent for trawl catcher vessels and 4 to 16 percent for pot catcher vessels. However, NMFS also allows the owners of BSAI trawl catcher vessels in the partial observer coverage category to volunteer on an annual basis for full observer coverage during all times that they participate in BSAI fisheries. Individuals who made this choice were typically owners of AFA catcher vessels that participate in the BSAI limited access Pacific cod trawl fishery to better manage Pacific halibut PSC limits within their cooperatives.

Catcher vessels participating in LAPPs with transferable PSC allocations are in the full coverage category. Therefore, the proposed BSAI Pacific cod trawl and pot LAPP would likely change Observer Program monitoring requirements for these fisheries. Depending on the specific elements of a LAPP, a variety of monitoring tools are available including observer coverage and EM for catch estimation and compliance monitoring. With the development of any LAPP in the future, the analysis would need to consider these impacts on the Observer Program.

4.5.3.8. 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.

4.5.3.9. 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 21 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

4.6. NEPA Summary

Under the current fee percentage, the data collection sampling design is continually being refined across all fisheries in the partial coverage category to ensure representatives samples and adequate sample sizes for stock assessment. The design of the Annual Deployment Plan and Annual Report process allows NMFS the flexibility to maintain these data under the current fee percentage. Increasing the fee percentage under either alternatives 2 or 3 would simply allow more revenue (as compared to the status quo) to be raised and would improve NMFS ability to reduce data gaps and be responsive to the Council's monitoring priorities. None of the Alternatives considered in this analysis would reduce NMFS ability to collect biological information, or information on discards, in comparison to the current program.

One of the purposes of an environmental assessment is to provide the evidence and analysis necessary to decide whether an agency must prepare an environmental impact statement (EIS). The Finding of No Significant Impact (FONSI) is the decision maker's determination that the action will not result in significant impacts to the human environment, and therefore, further analysis in an EIS is not needed. The Council on Environmental Quality regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." An action must be evaluated at different spatial scales and settings to determine the context of the action. Intensity is evaluated with respect to the nature of impacts and the resources or environmental components affected by the action. These factors

form the basis of the analysis presented in this Environmental Assessment/Regulatory Impact Review. The results of that analysis are summarized here for those criteria.

Context: The proposed action would increase the fee assessed on landings made by vessels in the partial coverage category under the Observer Program. The Observer Program is a monitoring program that 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.

Intensity: Considerations to determine intensity of the impacts are set forth in 40 CFR 1508.27(b). Each consideration is addressed below in order as it appears in the NMFS Instruction 30-124-1 dated July 22, 2005, Guidelines for Preparation of a FONSI. The sections of the EA that address the considerations are identified.

1) Can the proposed action reasonably be expected to cause both beneficial and adverse impacts that overall may result in a significant effect, even if the effect will be beneficial?

   Response: No. The Environmental Assessment (EA) analyzes the impacts of the proposed action on target species and concludes that no significant impacts are anticipated because the fisheries will still be managed under the harvest specifications process and the primary impacts identified are on data collection under the North Pacific Observer Program. (EA Section 4.5.2).

2) Can the proposed action reasonably be expected to significantly affect public health or safety?

   Response: No. No adverse impact of public health or safety is expected. The primary impacts identified are on data collection under the North Pacific Observer Program. The proposed action would implement a voluntary electronic monitoring program, so vessel owners or operators can consider safety when deciding whether to participate in the electronic monitoring program. (RIR Section 5.8 and Section 6.1).

3) Can the proposed action reasonably be expected to result in significant impacts to unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?

   Response: No. This action affects commercial fishing in the offshore waters of the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA), it will not impact any historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. This proposed action would increase the fee assessed on landings made by vessels in the partial coverage category under the Observer Program. The Observer Program is a monitoring program that does not increase fishing activity or change the measures currently in place to protect the physical and biological environment. (EA Section 4.5)

4) Are the proposed action's effects on the quality of the human environment likely to be highly controversial?

   Response: No. The proposed action would not change the prosecution of the fisheries in a manner that would impact the quality of the human environment. This is a non-controversial proposed action. (EA Section 4.5)

5) Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

   Response: No. The potential effects of the action are understood because of the fish species, harvest methods involved, and area of the activity (EA Section 4.5).

6) Can the proposed action reasonably be expected to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

   Response: No. This proposed action would not establish a precedent for future action with significant effects. Pursuant to NEPA, for all future amendments to the fishery management plans, appropriate environmental analysis documents will be prepared to inform the decision makers of potential impacts to the human environment and to implement mitigation measures to avoid significant adverse impacts.

7) Is the proposed action related to other actions that when considered together will have individually insignificant but cumulatively significant impacts?

   Response: No. The EA analyzes the cumulative impacts and no other actions were identified that would result in cumulatively significant impacts (EA Section 4.5.3).

8) Can the proposed action reasonably be expected to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?

   Response: No. This action affects commercial fishing in the offshore waters of the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA), it will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. This proposed action would increase the fee assessed on landings made by vessels in the partial coverage category under the Observer Program. The Observer Program is a monitoring program that does not increase fishing activity or change the measures currently in place to protect the physical and biological environment. (EA Section 4.5)

9) Can the proposed action reasonably be expected to have a significant impact on endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973?

   Response: No. The EA identifies that the proposed action would have no adverse impact on endangered or threatened species, or their critical habitat. The proposed action would not change the prosecution of the fisheries in a manner that would impact endangered or threatened species, and their critical habitat (EA Section 4.5).

10) Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for environmental protection?

   Response: No. This action poses no known risk of violation of Federal, state, or local laws or requirements for the protection of the environment.

11) Can the proposed action reasonably be expected to adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act?

   Response: No. The EA identifies that the proposed action would have no adverse impact on marine mammal stocks. The proposed action would not change the prosecution of the fisheries in a manner that would impact interactions with marine mammals. (EA Section 4.5).

12) Can the proposed action reasonably be expected to adversely affect managed fish species?

   Response: No. The EA analyzes the impacts of the action on managed species and no significant adverse impacts were identified. The primary impacts identified are on data collection under the North Pacific Observer Program. (EA Section 4.5).

13) Can the proposed action reasonably be expected to adversely affect essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act?

Response: No. The EA identifies that the proposed action would have no anticipated impact on ocean and coastal habitats and essential fish habitat because the action would not change the footprint or prosecution of the fishery in a manner that would have an impacts on habitat. Therefore, no impacts on ocean and coastal habitats and essential fish habitat are expected (EA Section 4.5).

14) Can the proposed action reasonably be expected to adversely affect vulnerable marine or coastal ecosystems, including but not limited to, deep coral ecosystems?

Response: No. Given that the proposed action would not change the prosecution of the fisheries, no impacts are expected on vulnerable marine or coastal ecosystems (EA Section 4.5).

15) Can the proposed action reasonably be expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: No. Given that the proposed action would not change the prosecution of the fisheries, no impacts are expected on biodiversity or ecosystem function (EA Section 4.5).

16) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: No. This action poses no risk of the introduction or spread of nonindigenous species into the exclusive economic zone off Alaska because it would not change fishing, processing, or shipping practices that may lead to the introduction of nonindigenous species. (EA Section 4.5)

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 assessed 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 monitoring 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's adopted alternatives for analysis were initially identified in February 2018 and revised in April 2019.

Alternative 1: Status quo. The observer fee percentage at 50 CFR 679.55(f) is 1.25 percent.

Alternative 2: Increase the observer fee up to 2 percent.

Option 1: Set the observer fee percentage at 1.5 percent.

Option 2: Set the observer fee percentage at 1.75 percent.

Option 3: Set the observer fee percentage at 2 percent.

Alternative 3: Increase the observer fee percentage by fishery sector (hook-and-line, pot, jig, and trawl) up to 2 percent.

Option 1: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 1.75 percent.

Option 2: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 2 percent.

Option 3: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.75 percent and set the observer fee percentage for the trawl fishery at 2 percent.

The options under Alternatives 2 and 3 are intended to focus the analysis on the impacts of specific fee percentage combinations within the possible range. In recommending a preferred alternative, however, the Council may select any fee percentage within the analyzed range under either alternative.

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."[17] The costs and benefits of this action with respect to these

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

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 assessed 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 Observer Program restructure under 77 FR 15019.[18] 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 monitoring 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 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 awarded a new observer contract in August 2019, 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 12 (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 minimum level of observer or EM coverage must be in order to provide statistically reliable estimates to manage the fishery. However, as described in Sections

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

4.2 and 4.3, 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. Thus, conservation, social, and economic benefits are considered more in terms of the diminished costs from greater management uncertainty. 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 monitoring objectives under existing funding levels. The eight monitoring objectives defined by the Council for the Observer Program are:

1. Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels
2. Improve discard estimates by minimizing variability and reducing data gaps
3. Monitoring PSC is a priority
4. Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs
5. Design the program with flexibility to respond to evolving data and management needs in individual fisheries
6. Distribute the burden of monitoring fairly and equitably among all fishery participants
7. Minimize the impacts of monitoring on operational choices of fishery participants
8. Foster and maintain positive public perception and stakeholder support

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 (ADF&G) 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.[19] 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 ADF&G fish tickets, are used for all groundfish except for sablefish IFQ and sablefish accruing to the fixed gear sablefish CDQ reserve.

5.5. Description of Partial Observer Coverage Fisheries

5.5.1. Monitoring Coverage, Fee Revenues, and Costs

5.5.1.1. Coverage levels

Section 3.4 describes 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 avoid the necessity to operate under the prior pay-as-you-go model in the first year the fee is assessed and collected to fund observer deployment in subsequent years. 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 22 seeks to estimate the number of observer days that could have been afforded through the previously collected fee revenues alone versus the supplementary Federal funding that has been received based on pre-season estimates (in the Annual Deployment Plans). In the event that supplementary Federal funding opportunities are diminished or no longer available this information is relevant in understanding the range of potential purchasing power based on past observer fees collected. This table compares the proportion of industry-funded observer fees which contribute to the budget, including revenue generated from last year's landings as well as industry funds that had been sequestered from the prior year (also reported from the 2018 Annual Report in Table 4), to the total budget of at-sea observer days for partial coverage deployment expressed in the Annual Deployment Plans. That proportion is applied to the number of observer days estimated to be afforded for the year in the Annual Deployment Plan. That proportion provides a rough estimate of the number of days able to be purchased with the industry paid observer fee[20], and the difference highlights the number of observer days estimated to be paid with the supplementary Federal funding.

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

[20] Note that this is a rough approximation for the purposes of this analysis. It does not take into account the different timelines of the contract year versus the calendar year. Also, there are a number of factors that affect the purchasing power of the observer fee, and a significant one is that under the contract, there is a discount applied when purchasing additional days above the specified annual minimum. As a result, the Table does not reflect that the number of days that could be afforded by the fee would have been less without the discount achieved through application of additional Federal dollars.

Table 22 also demonstrates the coverage rates that were expected to be achieved in the Annual Deployment Plan with the total number of observer days expected to be available through all funding sources.

The observer fee's purchasing power has varied between approximately 2,200 and 4,000 observer days since 2013. The additional NMFS funding allowed the purchase of between 0 and 3,533 additional days per year, which, at the high end can substantially increase the selection rate. If the partial coverage category was entirely industry-funded, the Council would likely only be able to afford coverage at selection rates slightly greater than 2017, which was estimated to be 3,127 observer days based on the Annual Deployment Plan budget (and realized 3,050 actual observer days).

Table 22 Coverage levels established in the Annual Deployment Plans (ADPs) for partial coverage, based on predicted budget for at-sea deployment days, 2013-2018. EM values not included.

Year	Total ADP budget of at-sea observer days for deployment in partial coverage1	Observer fees contributing to budget[1] (from previous year's landings + delayed receipt of sequestered funds) in $ millions	Approximation of Industry/Federal breakout of at-sea deployment budget[2]		Coverage levels set in the ADP based on the estimated budget for observer days		
	$ millions		number of days purchased with fees	number of days purchased with Federal funding	Pot	Longline	Trawl
2013	$4.48	n/a	0	3,533	LOA 40-57.5': 11%; >57.5': 15%		15%
2014	$4.80	$4.25	4,049	524	LOA 40-57.5': 16%; >57.5': 15%		15%
2015	$5.50	$3.76	3,636	1,682	LOA 40-57.5': 12%; >57.5': 24%		24%
2016	$4.50	$4.25	4,417	260	15%	15%	28%
2017	$3.60	$3.82	3,127	0	Pot: 4% Tender pot: 4%	Longline: 11% Tender longline: 25%	Trawl: 18% Tender trawl: 14%
2018	$5.54	$3.74	3,375	1,900	Pot: 16% Tender pot: 17%	17%	Trawl: 20% Tender trawl: 17%
2019	$4.45	$3.20	2,236	873	Pot: 15% Tender pot: 16%	18%	Trawl: 24% Tender trawl: 27%

[1] See specific values in Table 4. Note, in the text, the ADPs generally lump the sequestered fee revenue in with supplementary funding, but for this table it is counted as fee revenue.
[2] This approximation of days purchased is calculated by applying the proportion of the available budget that was derived from fees, to the total budget included in the ADP.

As explained in Section 4.1.2, although NMFS has developed an annual process that works to produce 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

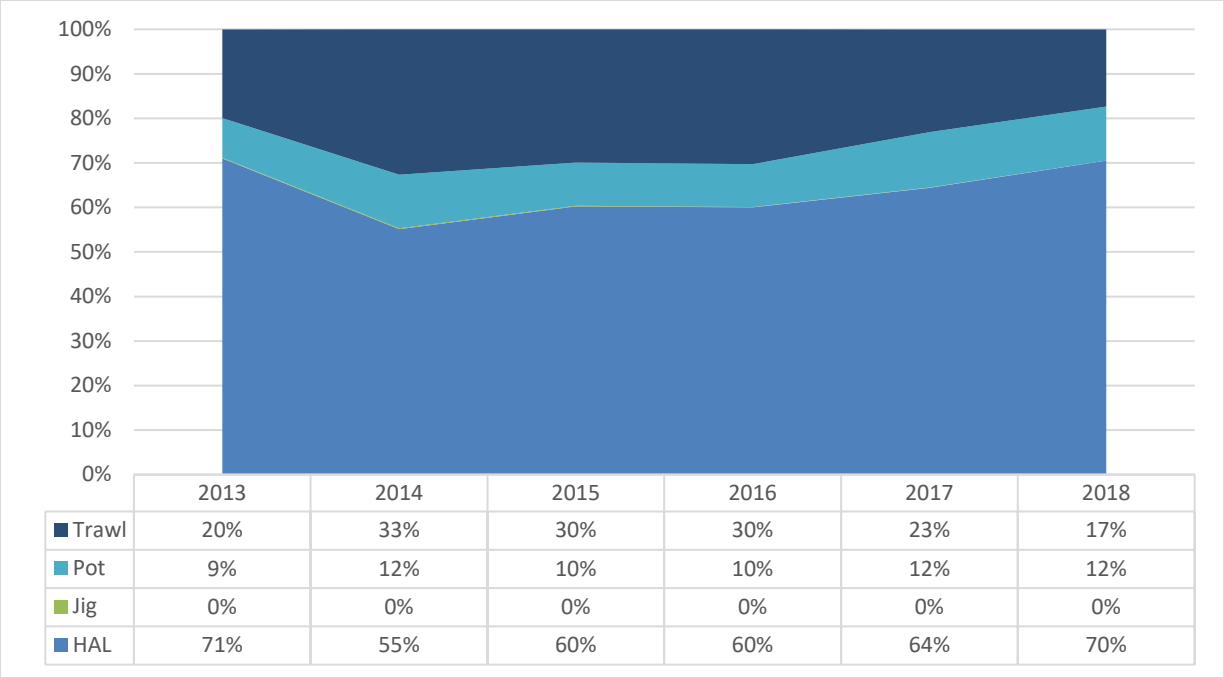
continue to get high quality data from observer coverage and maintain stakeholder confidence in estimates of bycatch.

5.5.1.2. 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 2018) (Table 10). 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).

A breakout by gear type is particularly relevant to the Council's consideration of Alternative 3, which considers implementing the fee variably among gear types. Table 10 shows clearly that the bulk of fee revenues have been generated by the HAL gear sector, specifically by catch of halibut and to a slightly lesser extent sablefish. Using the same data from Table 10 and Figure 9, Figure 32 provides a visual for relative fee contributions by gear type. Trawl contributions to the fee revenue have ranged from a high of 30% of the total in 2015 and 2016 to a low of 17% in 2018. Conversely, HAL was at a relatively lower relative contributions of 60% in 2015 and 2016 and become 70% of the share of the fee revenue in 2018. Pot contributions have increased from 9% (2013) to 12% (2018) and due to low volume, jig gear generally contributes less than a quarter percentage to the overall observer fee revenue.

Figure 9 further illustrates the relative share of fee revenues generated by each partial coverage species and gear type from 2013 through 2018. Together, HAL halibut and HAL sablefish have accounted for more than 50% of fee revenues throughout the entire time series. 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 of Pacific cod has generally decreased since 2013, with one uptick – percentage-wise – in 2014 due to a slump in revenues generated by sablefish. In terms of dollars, Table 10 illustrates a decline in Pacific cod fee revenues since 2014. The relative contribution from pollock remained roughly the same in 2018, around 18% of the total. Trends in the catch and value of key partial coverage species are further discussed in the Section 5.5.2



	2013	2014	2015	2016	2017	2018
Trawl	20%	33%	30%	30%	23%	17%
Pot	9%	12%	10%	10%	12%	12%
Jig	0%	0%	0%	0%	0%	0%
HAL	71%	55%	60%	60%	64%	70%

Figure 32 Relative percentage share of fee revenue generation, by partial coverage gear type (2013 – 2018).

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] Fees were adjusted for inflation using the 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).

5.5.1.3. 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 pay 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 on the trip level data 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 16). 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 Reports 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 is 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 $1,380 in 2018 (Table 5). The 2019 Annual Deployment Plan estimates a per-day cost of $1,430.[21] Per-day average observer costs are a rather blunt way of understanding what drives the cost of the program

[21] http://meetings.npfmc.org/CommentReview/DownloadFile?p=13252b3a-482b-4009-85ad-727d01384735.pdf&fileName=B2%202019%20ADP.pdf

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 12 illustrates the relationship between the average cost of an observer day and the total budget available to purchase days under different fee scenarios. Figure 12 figure estimates conservative ("old") cost curves based on assumptions in the April 2019 Initial Review analysis and the upper limit ("new") cost curve with updated assumptions using 2019 scenarios. These curves identify the cost per day afforded by the different budget levels resulting from potentially increased fee revenues.

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 their 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 terms of this contract are confidential.

For example, a budget of roughly $6 million would have resulted in a cost per day of between approximately $1,118 and $1,300, equating to between approximately 4,700 observer days and 5,500 observer days. The number of days afforded by a budget of roughly $4.5 million would have resulted in a cost per day between approximately $1,300 and $1,500, equating to between approximately 3,000 and 3,500 observer days. Table 13 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 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 Table 16 is set at $2.5 million. This amount reflects a reasonable upper bound for the potential costs of an expanding EM program given the total amount of funds obligated towards EM in Alaska in past years (AFSC 2019). 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 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

5.5.2.1. Catch

As discussed in Section 4.2.1.2,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 across the four key partial coverage species, for gear types and all species and gear combined (Figure 6). In terms of the species landed, 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. Gear types broken out include HAL, pot, jig, and trawl gear. Data are provided from 2013 through 2018. During the analyzed period, halibut landings were at their highest in 2013 with 21.6 million pounds and at their lowest in 2014 with 16.3 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 24.5 million pound in 2013 to 17.6 million pounds in 2016 but has recently trended upward. Pacific cod has decreased from 232.5 million pounds in 2014 and down to 101.8 million pounds in 2018, with a fairly drastic drop in 2016. Pollock is the only species showing a steady increase in catch between 2013 through 2017; however, catch decrease in 2018 relative to 2017.

Broken out by gear types, by far, trawl gear lands the greatest volume of catch. With an increasing and then decreasing trend, highly influenced by pollock harvest, trawl catch subject to partial observer coverage peaked in 2016 with 467 million pounds. Pot gear catch subject to partial observer coverage has experienced a generally stable trend between of on average 88 million pounds between 2013 and 2017 but dropped to 65 million pounds in 2018. Jig gear catches a relatively low volume of groundfish ranging from 0.1 million pounds (2017 and 2018) to 1.6 million pounds (2014). The timeseries provided in Figure 6 demonstrates decreasing trend in catch from HAL gear that is subject to partial observer coverage, dropping almost in half from 64 million pounds in 2013 to 38 million pounds in 2018. Overall, catch subject to partial observer coverage has shown an increasing and then decreasing trend, with a sharp drop from 2017 to 2018 which mimics the drop in catch experience in the trawl sector.

5.5.2.2. Value

Figure 7 in the Section 4.2.1.3 plots the weighted average standard prices/pound (adjusted for inflation) used by NMFS to assess the observer fee from 2013 through 2018. Inflation-adjusted standard prices for cod and pollock have steadily declined through the end of the time series in 2018. The standard price for halibut peaked in 2017 with a slight decline in 2018. The standard price for sablefish has trended upward since 2014.[22] Over the time-period examined, the average standard ex-vessel price for halibut has ranged from $5.37 in 2014 to $6.82 in 2017; sablefish from $3.02 in 2014 to $4.81 in 2018; Pacific cod from $0.28 in 2018 to $0.32 in 2014; and pollock from $0.19 in 2014 to $0.11 in 2018. It is clear that the two IFQ species yield greater value per pound and thus contribute more in potential observer fee revenues on a per pound basis. It is notable that standard prices for pollock display very little variation across years, and thus the amount that catch of the species contributes to fee revenues on a weight basis is driven more

[22] 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 was lower in 2013 and 2014 the standard price applied to trawl catch became higher in relative terms as it was still supported by the inclusion of higher-price pre-2013 years in the rolling average.

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 a low and slightly decreasing level around $0.30/lb. since in 2013.

NMFS standard prices for the 2018 and 2019 observer fee years are currently available online.[23] The following compares 2018 and 2019 statewide average prices (the highest level of aggregation that might be used) to the trendlines presented in Figure 7. 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. This represents a continued downturn from the trend illustrated in Figure 7.

- 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 7, the 2019 price represents a downturn of the trend. This could, in part, be 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 relatively 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 $0.10 in 2019, from $0.12 in the 2018 observer fee year. 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 33 and Figure 34, 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 U.S. macroeconomic shifts following the recession that began in 2008.[24] These figures provide a visual comparison for the ex-vessel value information pulled forward from Figure 7, and also provide context for the later discussion of future market direction.

[23] 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.
[24] Prices from before 2006 were omitted due to data quality issues for AKFIN's pricing algorithm.

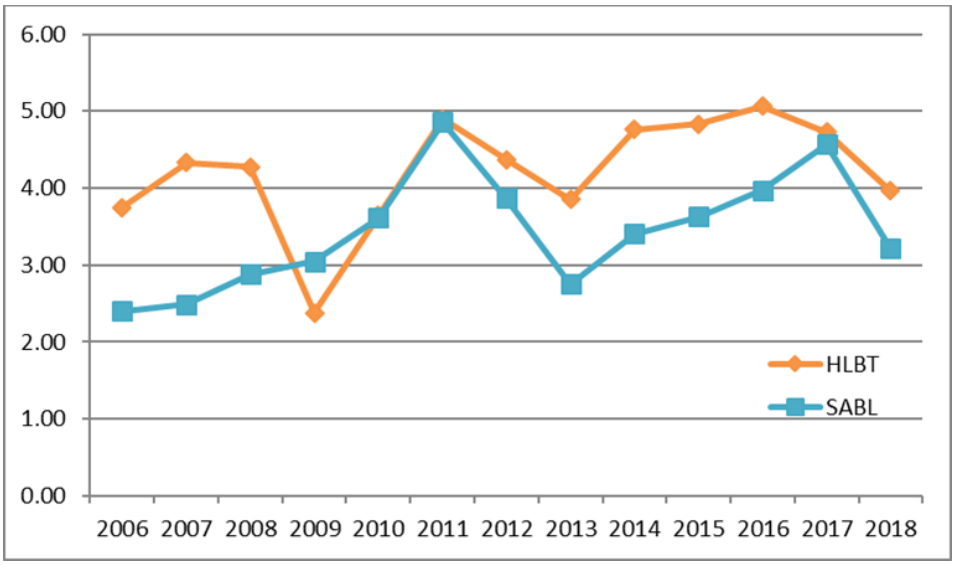


Figure 33 Alaska state-wide average ex-vessel $/lb. (nominal) for halibut and sablefish (2006 – 2018)
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT. *Note:* halibut ex-vessel prices are reported based on delivered weight (H&G).

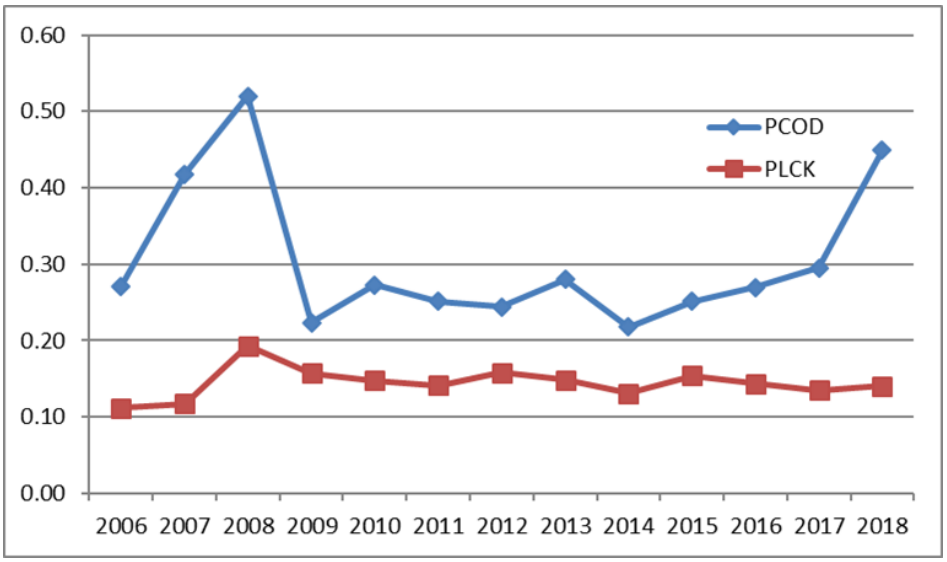


Figure 34 Alaska state-wide average ex-vessel $/lb. (nominal) for pollock and Pacific cod (2006 – 2017)
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Figure 8 in Section 4.2.1.4 illustrates the inflation-adjusted ex vessel value that is subject to observer fees, plotted over the examined period from 2013 through 2018. This figure demonstrates an interesting rising and falling trend for the value of pollock, resulting from a increasing trend in catch (Figure 6) but a decreasing trend in weighted ex vessel price (Figure 7). However, note that the magnitude of the scale of this figure is smaller for pollock than other species, and the price change for pollock was only on the magnitude of several cents, In contrast, halibut catch and price trends have followed a more similar pattern to each other, translating into an overall value that decreased in 2014 and rebounded until 2017.The total values for Pacific cod are lower in more recent years, with sablefish generally increasing since 2014. When all weights and values are combined, the annual trend in total partial coverage inflation-adjusted ex-vessel value is shown to have dropped substantially from $354 million in 2013 to $282 million in 2014, and then leveled out to roughly $300 million per year from 2014 through 2017. A slight downtick occurred in 2018, bringing the value to about $267 million. 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.

Figure 8 also demonstrates ex vessel values by gear type. HAL value peaked in 2013 around $251 million but since 2014 have trended between $150 and $200 million. Pot value have ranged between $30 and $40 million from 2013 through 2018. 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. As a lower volume fishery, jig value have been at roughly $0.5 million or less since 2013. Peak trawl value was around $90 million (2014 through 2016),but fell to roughly $46 million in 2018.

5.5.2.3. 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 2017 all the fisheries off Alaska accounted for 17% of global cod production (Pacific and Atlantic), 44% of global pollock production, 42% of global halibut production (Pacific and Atlantic), and 68% of global sablefish production.25 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 the global whitefish commodity supply (pollock and cod) indicates lower supply, particularly for cod, which has put upward pressure on many whitefish prices after a number of years of low 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 U.S. 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. In the near-term, sablefish and halibut prices have come under increased downward pressure from smaller average size of sablefish and increased supply of Atlantic halibut. Some substitute fishery products of note include Russian pollock, Pacific whiting, Atlantic cod, Atlantic halibut, and Patagonian toothfish.

Halibut

Pacific halibut is a premium whitefish product that receives high ex-vessel prices relative to other important partial coverage species. Pacific halibut is primarily sold the the U.S. domestic retail and food service industry. The trend in nominal ex-vessel values for Alaskan Pacific halibut has flattened since 2014 (Figure 33), and the market is currently challenged with lower prices and quota values 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. Preliminary

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

data from the forthcoming 2018 Economic SAFE show that the annual average halibut price in the GOA (areas 2C, 3A, and 3B) decreased 16% to $4.91/lb in 2018 compared to 2017. The opening price in 2019 was similar to 2018 and trade press reports that catch levels at the half-way point of the season are slightly slower than typical. Three prevailing explanations for stagnant or lower prices over the last two years are apparent among market analysts quoted in trade press: competition from smaller but emerging Atlantic 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 and imports to the U.S. grew 14%. 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 U.S. markets could also be aided by a relatively weak Canadian dollar.

As evident in Figure 33 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 United States. While a premium product, halibut is not without substitutes. Substitutes could include other premium seafood, other less expensive whitefish, or simply other expensive retail food items. Demand for high-price products is potentially more susceptible to boom-bust cycles as the products are more likely to be substituted when the margin between halibut and cheaper options grows, or in the presence of a 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, it is possible there comes a point that the upward trendline of reaches the inflation-adjusted halibut curve reaches the limit of consumers’ willingness to pay for a food portion. The upward sloping trendline could be used in a technical manner to project a real ex-vessel value that is 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 U.S.-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. The majority of sablefish is exported to Asian markets. A decreasing trend in biomass from the mid2000s 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. Preliminary data from the Economic SAFE (Aug. 2019) show that GOA fixed gear ex-vessel prices in 2018 were down 26% to $3.93/lb 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 U.S. currency making the product more expensive to international buyers, and price fatigue (i.e. less demand at the retail level as prices rise).

Price projections in the forthcoming 2018 Economic SAFE, based on year-to-date (as of Aug. 2019) fish ticket information, estimate that fixed-gear ex-vessel prices will continue to drop to $3.27/lb. Prior to 2019 ex-vessel prices peaked in 2011, declined to 2013, and then recovered to the peak level above $5/lb. in 2017 before falling in 2018, highlighting the volatility in sablefish prices (Figure 33). Economic SAFE price projections for 2020 and 2021 indicate some potential for recovery based on historical patterns however, due to the inherent volatility confidence bounds are large reflecting a wide range of potential future prices.

Whether or not the actual ex-vessel price recovers 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, increased supply of sablefish could inhibit ex-vessel price growth if demand does not increase. Third, U.S. 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 34, 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.[26] 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 U.S. and European markets that prefer the certification directly[27]. 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 forthcoming 2018 Economic SAFE figures cited above shows GOA Pacific cod ex-vessel fixed-gear prices increased 38% to $0.46/lb and trawl-caught increased 25% to $0.41/lb in 2018 compared to 2017. Projections based on year-to-date (as of Aug. 2019) fishticket information, estimate that fixed-gear and trawl ex-vessel prices will continue to increase to $0.51/lb and $0.45/lb, respectively, in 2019. Historical trends in prices suggest that future prices may revert towards the mean from these high price levels.

Pollock

Alaska pollock caught in Alaska accounts for roughly 45% of global pollock supply, with the remainder coming from Russia. In recent history, the GOA contributes approximately 10% of U.S. pollock

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

production. 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 products such as surimi and roe. In the GOA the primary product forms are head-and-gut (H&G), surimi, fillets, and roe, each have typically accounted for approximately 35%, 25%, 25%, and 13% of first-wholesale value in recent years. Recent increases in the GOA total allowable catch of pollock have roughly doubled catch between 2011 and 2017 to over 186 thousand t. However, stock projections for the near-term indicate a reduction from this high.

Ex-vessel prices for pollock in the GOA have been low in recent years but increased by 41% to $0.12/lb in 2018 compared to $0.09/lb 2017. The low prices in recent years were in, in part, related to low prices for some pollock first wholesale products which have also rebounded. First-wholesale prices for Alaska pollock fillets and H&G generally experienced a positive bounce-back in 2018 from a number of years of low priceswhich were driven by number of factors including a significant supply of whitefish on the global market, periods of high inventories, and a strong U.S. dollar. For example, 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 U.S. and putting downward pressure on Alaska pollock fillet prices.

The recent decrease in global whitefish supply and low inventories have supported first-wholesale and ex-vessel pollock prices. The forthcoming 2018 Economic SAFE for groundfish projects GOA pollock ex-vessel prices will increase modestly in 2019 to $0.13/lb. Based on the significant historical variation, the models indicate that pollock prices for 2020 will likely be in the range of $0.10/lb to $0.16/lb.

While the statewide outlook is positive, a number of potential headwinds for pollock remain. While global inventories are currently reportedly low, Russian pollock production remains high. Since much of Russian production goes to China as H&G the weak value of the Russian currency and high production putting downward pressure on these prices. Low prices for H&G pollock particularly impact the GOA since it makes up 35% of their production. Furthermore, Russia is modernizing production to increase primary processing of single-frozen fillets which could compete more directly with the single-frozen fillets produced in Alaska. Additionally, the current trade dispute with China and associated potential for tariffs creates uncertainty in markets and the supply chain which could negatively affect pollock prices.

5.5.3. Partial Coverage Harvesting and Processing Participation and Associated Communities

This section provides an overview of the stakeholders that harvest and process the key partial coverage fisheries and the communities they are associated with. This context is important in later discussion of the stakeholder and community impacts of an increase in observer fees (alternatives 2 and 3), and a potential to vary the fee by gear type (alternative 3). Extensive data on vessel counts, ex vessel gross revenue, and revenue diversification are also provided in Appendix G which links harvesters in the partial coverage category to communities where vessel owners lives. More detailed social and economic information is provided by the Alaska Fisheries Science Center's fishing community profiles for 196 Alaskan communities[28]. 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[29].

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

[28] https://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communities/profiles.php
[29] https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/humandim/communityprofiles/index.cfm

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 an 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 an 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, HAL, pot, and jig.

As discussed in Section 4.5.3, a regulatory change implemented in October 2016 allows trawl CVs operating in BSAI trawl limited access fisheries that would otherwise be in partial coverage to request 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 HAL 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 23 and Table 24, below, include these CPs.

Table 23 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 6 and Figure 8 in Section 4.2.1 for evidence of landings and total ex-vessel revenues declining since 2013 – for the four key partial coverage species (halibut, Pacific cod, and sablefish, and pollock).

Table 23 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 23 is included in Appendix G which further breaks out the geographic locations of vessel owners. That table (Table 38) 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 that are in the partial coverage category are located in Kodiak, Sitka, Petersburg, and Homer.

Table 24 illustrates the vessel participation trend with breakouts for fishery (gear type) and species. The difference between the "Total" vessel count in this table and Table 23is the result of double-counting vessels that participated in multiple gear types; the "Total" row in Table 24 sums across gear types. This table demonstrates that 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 HAL fisheries. While no conclusion is drawn, one could speculate that this relates to down-trending TACs and catch rates for halibut and Pacific cod. Though sablefish has recently displayed a positive ex-vessel price trend (Figure 33) 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 from 70 vessels to 18 vessels was possibly a reflection of the GOA stock decline that resulted in lower TACs for the years since.

Table 24 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 25 shows ex-vessel gross revenues (nominal millions of dollars) generated in the partial coverage fisheries from 2008 through 2017. An expanded version of Table 25 is included in Appendix G (Table 39) which 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 25 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 26 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 G (Table 40). 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 26 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 27 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 27 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 G to break out 44 Alaska communities of vessel ownership (Table 41). Table 41 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 27 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 27 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

Another relevant way to consider partial coverage fisheries' connection to communities is by looking at the gear types under partial coverage represented in each community. This is particularly relevant to alternative 3 which would apply a variable fee rate across gear types, potentially differentially impacting communities based on the type of fishing they are associated with. Figure 35 and Figure 36 demonstrate a break-down of cumulative ex vessel value (2013-2018) for different gear-types (HAL, jig, pot and trawl) in the partial coverage associated with different geographical locations (based on vessel owner's

residence). To provide a better visual, Figure 35 includes a scale suitable for the 12 locations with the greatest overall cumulative partial coverage ex vessel value from all gear types. Figure 36 includes the remaining locations in a different ex vessel value scale.

As can be seen in these figures, partial coverage trawling is most commonly associated with vessel owners from the state of Washington, and Oregon, as well as the Alaskan communities of Kodiak, Sand Point, King Cove and Anchorage. Locations that are associated with trawling are all also associated with other gear type. This makes sense as many trawl vessels are able to switch to other types of fishing; in particular 58' combo vessels from Sand Point and King Cove. Compared to other gear types, HAL vessels are associated with the greatest number of communities. This also makes sense as Table X demonstrates a much higher number of HAL vessels participating in partial coverage fisheries than in any other gear type. For instance, a median of 1,031 vessels in the halibut HAL fishery compared to a median of 87 vessels participating in Pacific cod trawl fishing over the time series.

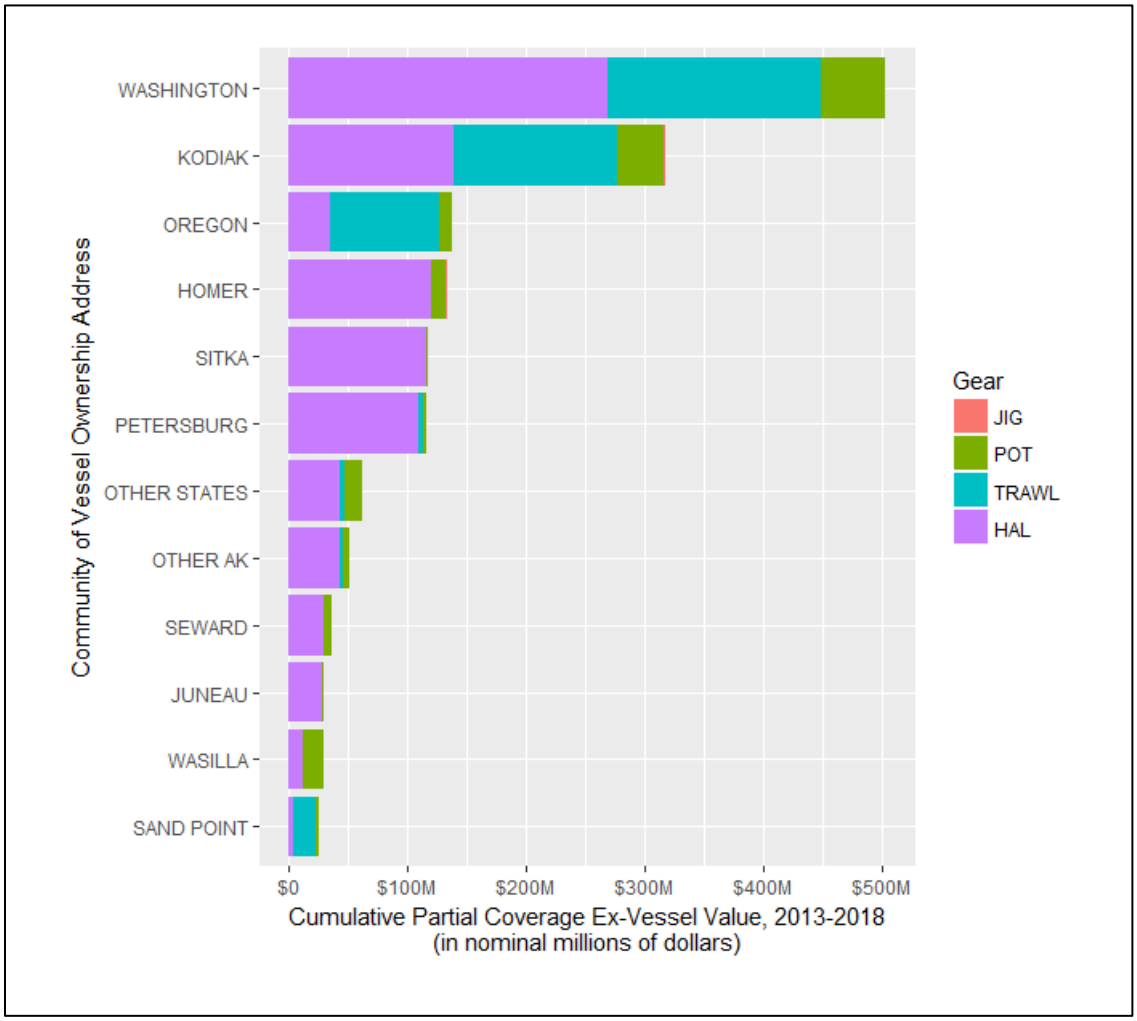


Figure 35 Cumulative ex vessel gross revenue value by gear type and by place of vessel ownership address (2013-2018). Includes 12 locations with the greater total ex vessel gross revenue value.

Source: NMFS Alaska Region observer fee data, CFEC vessel licensing data, and eLandings landing report and production report data

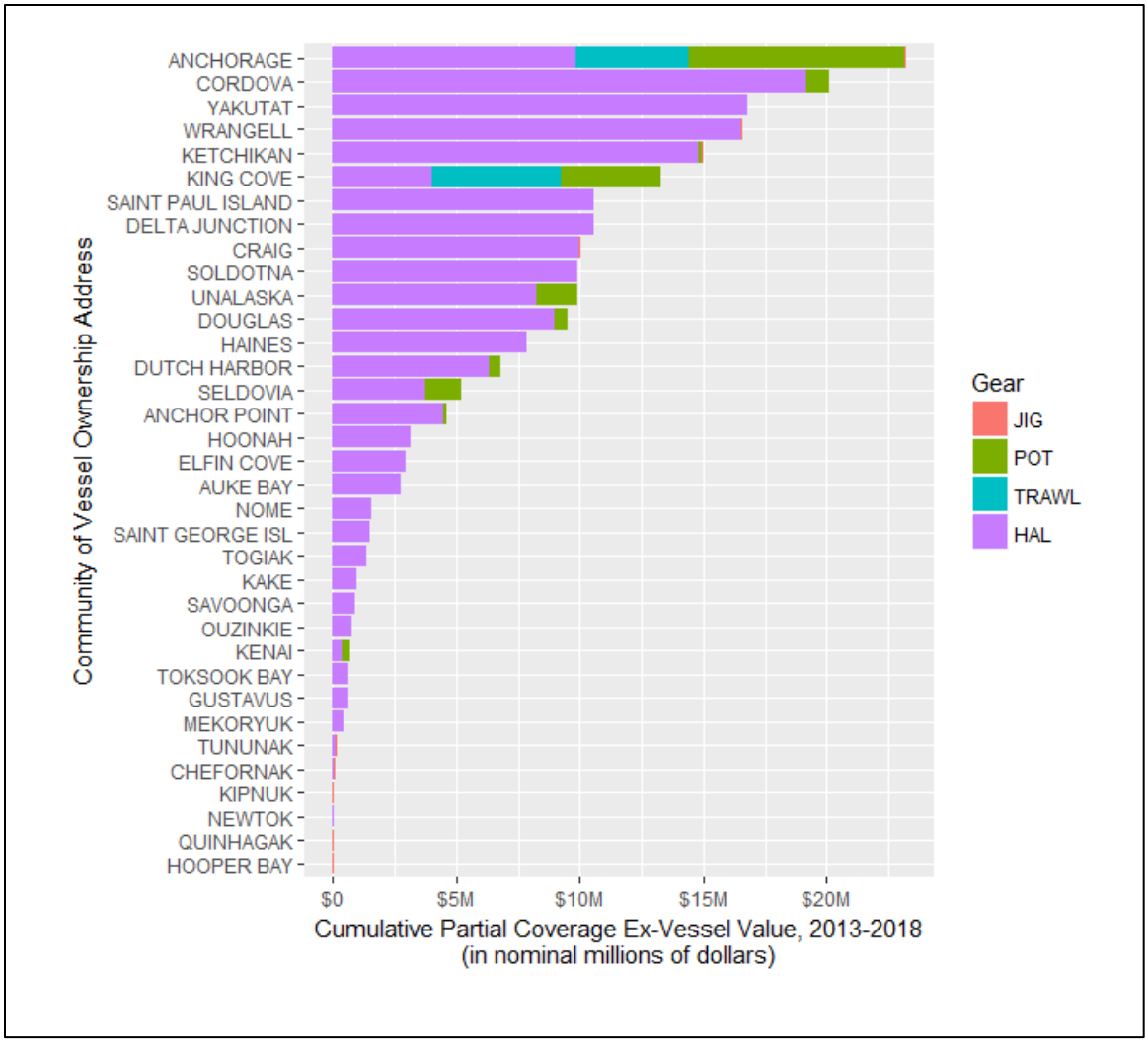


Figure 36 Cumulative ex vessel gross revenue value by gear type and by place of vessel ownership address (2013-2018). Includes 12 locations with the greater total ex vessel gross revenue value.

Source: NMFS Alaska Region observer fee data, CFEC vessel licensing data, and eLandings landing report and production report data

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. Thus, in addition to the harvesters, a change in the fee would be expected to directly impact the processors associated with partial coverage, in addition to impacting the communities they are associated with. 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 28 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 CPs. Note that the definition of CP 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 CP 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 (thus, act 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 28 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 relatively 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 may exist but may be less direct.

Table 29 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 29 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 CPs captured in Table 29 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 in 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 30 lists the cost recovery fees authorized under Magnuson-Stevens Act for LAPPs and the CDQ program. Cost recovery fees recover actual costs directly related to the management, data collection, and enforcement of the programs. Fees are generally determined by dividing direct program costs by the value of the fishery's landings. The Magnuson-Stevens Act mandates that cost recovery fees do not exceed 3% of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee. Table 30 indicates that cost recovery fees increased for all programs 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 and areas which contributed to this increase[30]. For example, the increase in the Halibut and Sablefish IFQ program was attributed to additional costs to maintain information systems.

Participants from the Halibut and Sablefish IFQ Program are the only harvesters represented in Table 30 that are required to pay both partial coverage observer fees as well as cost recovery fees. Most of the vessels participating in the LAPPs listed are in the full observer coverage category; thus, they are responsible for their own observer costs and are not assessed the partial coverage fee. The BSAI Crab Rationalization Program is not part of the Federal Observer Program but includes its own observer program requirements through the State of Alaska. Some AFA motherships and processors may also receive non-AFA deliveries that are subject to partial coverage fee, therefore requiring them to share in the cost.

[30] NMFS's Cost Recovery and Fee Programs web page links to the Federal Register notice announcing each subject fishery's standard prices and fee percentages by year through 2019, as well as to a cost recovery annual report for most subject fisheries through 2018 (https://alaskafisheries.noaa.gov/fisheries/cost-recovery-fee-programs). In addition to links on the Cost Recovery web page, Federal Register notices can be found at, https://alaskafisheries.noaa.gov/rules-notices/search.

Table 30 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[31]. 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.

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

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 online[32]. At the 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. 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.

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. The Council and NMFS have considered the different fishery operations and the safety of observers and fishermen in developing the existing monitoring requirements under the Observer Program and the proposed action would not change monitoring requirements or the process for developing the Annual Deployment Plan.

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 can increase with limited resources. 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, area-specific, or 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.

In this section, the analysts consider marginal benefits and costs to different stakeholder groups including communities using available qualitatively and quantitative information. A detailed evaluation of marginal benefits is particularly difficult in this case as many of the benefits are achieved at a programmatic level and accrue to the stakeholder level indirectly. For instance, Section 4.5.1 describes the informational benefits, which may be broadly classified as better accounting for catch, bycatch, and discards as well as biological stock assessment data needs. In addition to stakeholder impacts, under each proposed alternative, the analysts consider 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. These goals are articulated as the eight "monitoring objectives" described in Section 3.3.1 and listed below:

[32] https://www.commerce.alaska.gov/dcra/DCRARepoExt/Pages/AlaskaTaxableDatabase.aspx

1. Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels
2. Improve discard estimates by minimizing variability and reducing data gaps
3. Monitoring PSC is a priority
4. Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs
5. Design the program with flexibility to respond to evolving data and management needs in individual fisheries
6. Distribute the burden of monitoring fairly and equitably among all fishery participants
7. Minimize the impacts of monitoring on operational choices of fishery participants
8. Foster and maintain positive public perception and stakeholder support

In considering the costs and benefits of the observer program, the reader should bear in mind two caveats about the relationship between the fee collected and observer coverage able to be achieved. The analysts first note that observer coverage – measured in days at sea for observers or vessel days for EM – could produce diminishing marginal returns in terms of the gathering of necessary information.. For example, Figure 13 through Figure 16 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 by fishery (gear and target species). Also, increasing the fee percentage does not strictly mean that fee revenues will increase relative to previous years, since actual revenues are a function of the fee percentage, harvest, and standard ex-vessel prices. The Annual Deployment Plan process is designed to be adaptable under a variety of revenue and cost scenarios and this analysis illustrates how several factors influence the relationship between an increase in the fee percentage and the resulting observer EM selection rates given a specific scenario based on 2018 fishing effort and recent costs. Given the stated purpose and need to continue to improve the Observer Program, [and] maintain and enhance the Council's ability to meet monitoring objectives," as stated in the purpose and need, these notes are included so that the reader will not only consider how the fee percentage could influence the number of observer-days afforded or selection rates, but also consider what is the value of an additional (theoretical) observer-day relative to the program's cost to participants.

In addition to maximizing net benefits, the Magnuson-Stevens Act also requires the Council to consider a fee system that is fair and equitable to all fishery participants. While it 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. 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.

5.6.1. Impacts on Stakeholder Groups

Below, the analysts discuss the observer fee's impact on stakeholder groups on a more generalized conceptual level, with special consideration of the incremental costs and benefits that may accrue based on the increased fee suggested in the action alternatives. This section breaks out expected impacts in terms of distributional costs among different types of stakeholders most directly affected by the fee (in

particular harvesters and harvesting crew, processors, communities, as well as observers and observer providers). Section 5.9 further expands the scope of stakeholders to a National level, including more of the public that may be indirectly affected by the Observer Program changes. While more difficult to quantify, this section also discusses the marginal benefits the Observer Program and the proposed changes generate for stakeholder groups.

5.6.1.1. Distributional Costs to Stakeholders

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. Some of the potential impacts of a user fee, like fleet consolidation on the margins, are things that *might* have happened when 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.

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. 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. In other words, firms with low profit margins face higher marginal impact than firms with higher profit margins, all else equal. This means a fee that applies an even 1.25% percentage across fisheries will still produce distributional costs across participants. 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 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 37 is a diagram of theoretical dockside supply and demand for a fish (e.g. halibut).[33] 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). 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.

33 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).

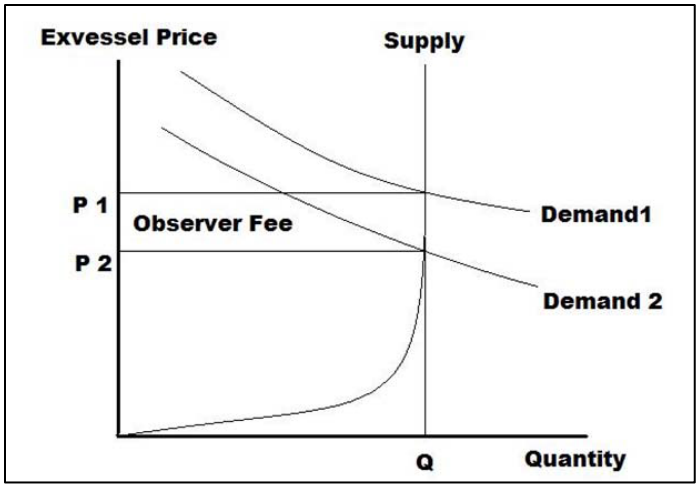


Figure 37 Conceptual diagram of ex-vessel supply and demand for a fully harvested, valuable fish (e.g., halibut)

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 or the communities of residence for those individuals involved in partial coverage fisheries (e.g. through the sale of licenses or quota share). 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 conclude that it would be a rare case if an increase in the fee up to 2%, were 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 (e.g. captains, crew, vessel owners, quota/ permit holders) may 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 Annual Deployment Plan 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.

Alternative 2 would increase the observer fee from 1.25% of gross ex vessel revenue up to 2% across all gear sectors evenly (with suggested options of 1.5%, 1.75%, or 2%). 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. An increase in the observer fee represents an additional cost of business for these stakeholders that may lower profitability, depending how these costs are absorbed. As noted previously, the information necessary to assess the marginal impact on profitability for an individual harvesting or processing operation 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, the same fee rate has a greater effect on entities with thin margins or low revenues relative to their fixed costs. Similarly, 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. Due to the inelastic supply suggested above, it is possible that harvesters may bear more of the additional cost than the processing sector.

The potential impacts of raising the fee on Alaska fishing **communities** is also an extension of the effects described previously. Negative impacts could occur in particular, if the increase in fee incentized a change in the where fishing, processing, or observer deployment occurs or the communities of residence for those individuals involved in partial coverage fisheries (e.g. through the sale of licenses or quota share). Appendix G (and the summary in Section 5.5.3.1) 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%.

Alternative 3 would apply variable fee percentages to the partial coverage sectors (further described in Section 5.6.4**Error! Reference source not found.**). As described relative to other options, it is not expected that an increase in this fee up to 2% for any sector would change the composition of the fishing fleets or processing sector, although depending on how this cost is absorbed, it would likely affect the participants overall profitability.

As previously described, partial coverage fisheries in the North Pacific represent a wide range of operation types, with varying private costs, and associated taxes and fees. While this analysis does not have information on firm-level or sector-level net revenue, it is understood that in general terms, an additional fee is most disruptive to those operating nearest their profit margin. Thus, in considering the distributional impacts of increasing the observer fee variably by sector, it is important to take under consideration the previous existence of varying net revenues for these operations, in addition to the sector-based distributional impacts that would inherently be imposed under the options considered in Alternative 3. Alternative 3 could either compound or moderate the negative distributional effects of the fee across **harvesters, harvesting crews, processors**, and **associated communities** depending on the net revenue of the partial coverage sectors. In particular, depending on the profitability in the partial coverage trawl sectors relative to the partial coverage fixed gear sectors.

Scalable fees were suggested by the SSC during the Observer Program's restructure (NPFMC 2011). In its concern about a regressive tax that would inherently impose a greater marginal impacts on low profit fisheries (or operations within a fishery) the SSC had pointed out that imposing a lower fee on lower-profit fisheries or entities could reduce some of the negative impacts of the fee on their operations. The SSC suggested that the regressive nature of this tax could be offset in part by different rates in different fisheries:

> *"Other distributional consequences of a revenue based fee structure could be addressed through varying the fee-rate across fisheries in proportion to their total catches or in proportion to the volume and composition of their incidental and PSC catches."* (June 2010 SSC minutes)

Under Alternative 3, all proposed options would impose a higher fee on the partial coverage trawl sector relative to the fixed gear sectors. Based on these three options, fees would increase for all sectors, but the trawl sector would consistently be responsible for a quarter of a percent to a half of a percent more than the fixed gear sector. Other unknown factors (such as private costs) make it different to know how a greater fee increase trawlers may truly affect the partial coverage trawl sector's net profitability relative to fixed gear sectors.

However, focusing for a moment solely on gross revenues would mean trawl harvesters and harvesting crew would be more negatively impacted relative to fixed gear harvesters and crew (see Section 5.5.3.1 for vessel counts within this sector). This could also more negatively affect processors and communities associated with trawl harvest and landing. Figure 35 and Figure 36 show the communities that have been most associated with partial coverage trawl fishing (based on registered address of the vessel owner) which include: communities in the state of Washington and Oregon, Kodiak, Sand Point, Anchorage, and King Cove in particular. With the exception of Sand Point, which appears to have a greater proportion of revenues derived from partial coverage trawling than fixed gear fishing in the Federal partial coverage category, these communities are all relatively diversified in other types of partial coverage fishing which may temper some of the negative impacts to these communities and the processor located there that receive deliveries from trawl vessels in the partial coverage category.

5.6.1.2. Benefits to Stakeholders

Revenue generated from the fee funds observer and EM deployment for the purpose of collecting statistically reliable data for fishery management, which is crucial to the stakeholders' ability to continue benefitting from the commercial groundfish and halibut fisheries off Alaska. Quantifying the incremental benefits stakeholders experience from the use of at-sea data is difficult; particularly in regard to how a specific fee percentage increase relates to a dollar value of benefits due to the indirect relationship and the suite of independent factors that influence how that fee percentage translates into area and gear-specific data. For example, the partial coverage fleet has a diversity of operations, with operators making choices based on their personal incentives. Bycatch limits may directly influence operator behavior, or there maybe indirect influences that are very difficult to measure such as how observer information is incorporated into stock assessments (conservation and management needs; see Section 3.2.2). This analysis is caveated with the notion that additional fee revenues do not translate at a constant scale into additional observer-days or a higher trip selection percentage. However, this does not mean benefits do not accrue to stakeholders.

In addition to the fee percentage set in regulation, many sections of this document have worked to describe past and future factors that may also influence the revenue that may be generated, the Observer Program's ability to achieve monitoring objectives under future effort, value, and cost scenarios, and ultimately determine net benefits to stakeholders. In estimating how different fee percentages could achieve programmatic objectives, relative to previous years, even with some increase in fee rate, overall revenues could be higher or lower depending on the biological and market status of the target species.

However, this analysis focuses on the comparison of the action alternatives and options *relative to* no action (Alternative 1), as opposed to the action alternatives relative to past Observer Program performance or ideal performance. One could view Alternative 1 as the absence of a fee increase and under Alternative 1 underlying factors of future effort, value and cost scenarios continue to evolve as well. Therefore, it cannot be stated with certainty that an increase in the observer program fee would guarantee an increase in the overall annual revenue to fund observer and EM deployment given the uncertainty of harvests and prices that affect ex-vessel value. The analysis in Section 4.2.1 demonstrates theoretical funding levels under the action alternatives that would reduce the risk that fluctuations in funding levels would impact the ability to meet monitoring objectives relative to no action (see in particular Table 11 and Table 12, as well as Figure 10 and Figure 11).

This relationship between the observer fee and the stakeholders' ability to continue benefitting from the resource, is often indirect, but is also discussed throughout this document. Although the Observer Program is designed to assess resources and data need annually in order to produces a statistically reliable sampling plan for the collection of scientifically robust data at any level of observer coverage, sampling from larger scales of time and space may not be as representatives and can produce higher levels of uncertainty. This can affect the participating stakeholder (harvesters, processors and associated communities) through fisheries management decisions that are made.

For instance, Section 4.3.6 and Table 18 describe examples of data-rich or data-poor situations that resulted in NMFS Inseason Management action, which in turn effected the fleet. For instance, when there is low observer coverage in an area and one trip results in a high PSC estimate, that rate has more influence. When catch is used that is less spatially or time-specific, this can result in information being used that is not as specific to a fishery (e.g. using the FMP-level). Lower levels of information for a specific strata can mean more conservative closures based on PSC or TAC management, sometimes marginally reducing fishing opportunity due to directed species or PSC. Uncertainty and inefficiency in management (e.g. it requires lead-up time for NMFS to publish an opener/ closure notice) can also make it more difficult for the fleet to manage their PSC. NMFS Inseason Management's decisions play a critical role and can impact the fleet's ability to fully utilize the resource and reduce catch of unwanted species. Thus, having a high level of area-specific information can diminish inefficiencies and improve the certainty in management, ultimately benefiting harvesters and harvesting crew.

Moreover, 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 and communities benefit where better management tools (data) result in greater availability of the TAC and more product delivered.

Alternative 2 and **Alternative 3** are two different ways to reach levels of funding that would be more likely to achieve statistical sampling needs and monitoring goals in the future relative to no action. This is particularly relevant in light of expected changes in costs (potential EM costs and increasing observer cost-per-day), diminished stocks relative to previous years (e.g. Pacific cod), in addition to diminished or non-existent supplementary Federal funding. While there is no guarantee that external factors will allow for specific coverage levels in the future, the Observer Program's ability to apply a base level of coverage of at least 15% across with additional funds remaining, would be more likely under one of the action alternatives relative to no action. Ensuring additional revenue was available for the Observer Program would increase the likelihood that the Council and its advisory bodies could also pursue monitoring objective in addition to providing a representative sample.

5.6.2. Impacts Relative to Monitoring Objectives

The Council and its advisory bodies have developed eight "monitoring objectives" described in Section 3.3.1. This section considers the two action alternatives' (Alternative 2 and 3) ability to achieve each monitoring objective relative to no action (Alternative 1).

1. **Minimize the "monitoring effect" so data from observed vessels are representative of unobserved vessels**

The monitoring effect (also called the "observer effect") is a potential source of bias in observer data that can occur if vessel operators behave differently on a monitored trip than they do on an unmonitored trip. This could manifest as statistical differences in the spatial representativeness, trip characteristics, or temporal representativeness of the data from observed vessels compared to vessels when they do not carry an observer. 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[34]. 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.

[34] In 2017, 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.

The ability to detect any monitoring effect 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.

Maintaining or expanding coverage in the form of more observer days or broader EM implementation 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. With the increased fee proposed under **Alternative 2** relative to no action (**Alternative 1**), this alternative is expected to provide more funding for coverage relative to no action. 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 will not result in maintaining coverage levels for all fisheries. Therefore **Alternative 2** is expected to have some positive impact on the ability to increase detection of a monitoring effect, relative to **Alternative 1**, so data from observed vessels are representative of unobserved vessels.

The likely impact of **Alternative 3** relative to no action are similar to **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. Observer and EM selection rates for the various sectors would continue to be established each year in the ADP independent of the amount of fees collected from that sector so it is not possible to say that raising the fee in only one fishery could reduce such a monitoring 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 Annual Deployment Plan process in the manner that best achieves objectives, reaches baselines, and reduces variance estimations given the funding constraint and the cost of the Federal contract(s).

2. Improve discard estimates by minimizing variability and reducing data gaps

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 for a fishery, then estimation of discarded catch must be made using information from outside a specific fishery. For example, if observer information is unavailable in a Federal reporting area with a certain time period then estimation looks for information outside of the time area and time period which the fishery occurred. This increases uncertainty in management. This approach is explained in more detail in Section 4.3.1. 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.

While the restructured program has done much to make progress on this objective, meeting this objective is also, in a sense, a function of available funds and targeted deployment as determined by the Annual Deployment Plan and subject to effort projections that vary annually. Relative to **Alternative 1**, the greater revenue that should be possible under **Alternative 2** or **Alternative 3** is expected to have a positive impact on improving discard estimates, including minimizing variability and reducing gaps; however, this relationship is not direct. The overall quality of the variance estimates is contingent on a number of factors that are not related to the fee percentage (e.g., fee revenues, monitoring costs).

3. Monitoring PSC is a priority

The final 2019 Annual Deployment Plan optimized trips above the baseline 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; as demonstrated by Table 4 in Annual Deployment Plan 2019)[35]. The draft 2019 Annual Deployment Plan did not anticipate sufficient funding to cover *any* amount of optimized coverage above the 15% baseline. The final 2019 Annual Deployment Plan was only able to include optimization because fishing effort is expected to be lower than originally anticipated in October 2018, when the draft 2019 Annual Deployment Plan was presented.

If the Council chooses **Alternative 2 or Alternative 3**, it may be *more likely* that revenues collected could potentially alleviate some funding challenges and increase the likelihood that optimization above a 15% baseline is possible, relative to **Alternative 1**. Again, external factors will determine whether any of the alternatives and option can reach a level of optimization above the 15%. 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. **Alternative 3** provides the most targeted approach to linking the observer fee to a monitoring objective because the trawl gear sector is the primary partial coverage fishery that is constrained by PSC limits set in regulation[36]. Figure 32 shows 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.

4. Collect fishery-dependent data sufficient for stock assessment and ecosystem assessment/protected species needs

NMFS's multi-faceted approach to detecting species decline and rare events would not be directly impacted by this action. However, maintaining the Observer Program with consistent, reliable observer 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.

All else equal, **Alternative 2** and **3** are expected to have no impact or a slightly positive impact on the achievement of this objective, relative to no action. Given the indirect relationship between observer fees and coverage level able to be afforded each year, no alternative can guarantee increasing rates of coverage or stable coverage rates. The action alternatives should; however, be able to pursue this objective more readily than no action. Moreover, 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 Annual Deployment Plan 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 **Alternative 3** compared to **Alternative 2** in achieving this monitoring objective is not apparent.

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

The deployment of monitoring effort is not directly related to the source of fee revenues and this action does not propose changes to this program design. Relative to **Alternative 1**, **Alternative 2** 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

[35] From Section 4.1.2: 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 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.
[36] Halibut PSC limits are also in effect for the longline Pacific cod fishery.

EM program was, in large part, implemented as a tool to increase flexibility of how monitoring is executed.

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 change the existing flexibility within the annual review and planning process to respond to evolving data and management needs relative to **Alternative 2**.

6. Distribute the burden of monitoring fairly and equitably among all fishery participants

Alternative 1 would maintain the current system of equal fee assessment 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 development of the current Observer Program structure, the Council considered assessing a lower fee on vessels less than 60 ft. LOA to minimize the costs to smaller operations. However, the Council recommended the fee be assessed equally across all landings in the partial coverage category because an ex-vessel value fee is commensurate both to each operation's ability to pay and the benefits received from the fishery. The ex-vessel value of the catch is expected to fluctuate, as are the catch quotas.

The Council considered the ex-vessel value based fee to be fair and equitable 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. Section 2.9.2.2.5 of the analysis for the Restructuring the Observer Program notes that an ex-vessel value fee was the most equitable method of funding observer coverage because it is based on the value of the resource each operation brings to market (NPFMC 2011). The structure of the fee system minimizes the impacts to small entities compared to the previous pay-as-you-go or daily fee systems where some smaller vessel operators faced observer costs that were disproportionately high relative to their revenue. An ex-vessel value fee is commensurate both to each operation's ability to pay and the benefits received from the fishery. The ex-vessel value of the catch was expected to fluctuate, as well as the catch quotas.

Some stakeholders have pointed out that in addition to the observer fee, the Halibut and Sablefish IFQ participants also pay a cost recovery fee as a percent of ex vessel value to account for management costs related to this program. Other harvesters in the partial coverage category are not subject to cost recovery fee payments.

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.

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. Under all alternatives considered in this analysis, there would not be a change to how the observer fee is shared between harvesters and processors.

Under **Alternative 2** the observer fee would be increased equally across fisheries in the partial coverage category maintaining the status quo rationale that this fee structure is fair and equitable.

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 observer fee (NMFS 2011) is that an equal fee is the most practicable way to achieve equitable monitoring responsibilities among the harvesting and processing sectors. If the Council recommends a fee percentage under **Alternative 2**, the implication would be that the Council affirms that an equal fee across all fisheries in the partial coverage category continues to be fair and equitable.

Under **Alternative 3**, the Council could recommend increasing the observer fee percentage variably for each of the fisheries (gear sectors) within the partial coverage category.

Halibut and Sablefish IFQ stakeholders have asserted that the current observer fee percentage assessed equally on all gear sectors in not fair and equitable because the proportion of the fee revenues generated from halibut and sablefish landings is larger than the proportion of observer coverage days needed to monitor the halibut and sablefish IFQ fisheries. In addition to the observer fee, Halibut and sablefish IFQ participants are also assessed a cost recovery fees as a percent of ex vessel value to reimburse NMFS and IPHC management costs related to administering the IFQ program (including the halibut port sampling program to support of the halibut stock assessment).

Since 2013, the Council has requested that NMFS maintain higher observer coverage rates for 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.

As described Section 2.9.2.1 of the analysis for Restructuring the Observer Program, a primary objective that is accomplished by the design of the fee system is that user fees are not directly linked to actual coverage levels when levels are less than 100 percent. Consistent with fee program principles described in Section 2.9.2.2 of that analysis, fees collected from any particular fishery would not be spent monitoring that particular fishery. However, under **Alternative 3** of this analysis, the Council could recommend a fee percentage increase that could shift the proportion of revenue generated by a specific gear sector to more closely align with the realized observer coverage needs for that sector without directly linking the user fees with the resulting coverage rates. This could alleviate stakeholder concerns about the balance of fee revenues across all fisheries in the partial coverage category.

7. Minimize the impacts of monitoring on operational choices of fishery participants

The Observer Program design would not be directly affected by this action; thus, it is not expected the actions alternatives considered will have substantial influence over the operational decisions of participants to enter or exist a fishery. For instance, while the number of vessels 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. 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. In addition, the development of the fixed-gear EM program has been 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).

In terms of how vessels operate in the fishery, **Alternative 2** could increase observer coverage levels in some cases (relative to **Alternative 1**). To the extent that vessels would behave differently when carrying an observer, this alternative could exacerbate that effect. 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.

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%.

8. Foster and maintain positive public perception and stakeholder support

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. 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. Some projects are focused on expanding or improving the representativeness of coverage to achieve certain monitoring 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.

Each alternative may generate support/ disagreement differently among different stakeholder. **Alternative 1** might foster positive public perception from stakeholders who want to minimize their fee, but it might not foster positive perception from those who request increased monitoring on all (or certain) fisheries or sectors or those who seek to promote the other seven monitoring objectives. If coverage levels become lower due to factors independent of industry fees (e.g. Federal funding, increased costs, decreases TAC or prices), public perception of the representativeness of the program may weaken. Conversely, selecting **Alternative 2** would be an affirmative action responsive to stakeholder concern about the ongoing stability of the program; however, this alternative would result in an even increased fee percentage across all those participating in partial coverage fisheries, which may not be well received by those participants. Selecting **Alternative 3** would also be an affirmative action responsive to concern about the ongoing stability of the program. This alternative would result in an increased fee percentage variably across all those participating in partial coverage fisheries. 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 may not be fair and equitable. However, again, those receiving an increased fee percentage; particularly those receiving the greater increase in fee percentage, may not be providing their support.

5.6.3. 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 recommended by the Council, noting that all participants benefit from the data that allow sustainable management of the fisheries.

The existing program design allows NMFS and the Council to allocate observer effort towards its multiple objectives within an established budget. Each year, 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.

It is important to understand that an alternative which takes no action (Alternative 1) may not produce observer coverage levels similar to those afforded since 2013. 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 assessing additional fees impacts stakeholders. This document highlights the fact that annual fee revenues are not easily predicted and the set of possible outcomes in future years includes stagnation or decline (in either nominal or real dollar terms).

The Council has acknowledged that the observer and EM monitoring program is potentially entering a period of lower budgets owing to the loss of supplementary Federal funds. In addition reduced quotas for key partial coverage species such as Pacific cod, and ex-vessel price outlooks that appear flat to moderately positive – a continuation of the relatively lower-value period from 2013 through 2018 compared to the pre-implementation years (Section 5.5.2.3). 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 12)[37]. 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 just on fee revenue growth but on growth relative to inflation ("real dollar" growth) and relative to costs.

Table 22 summarized the amount of revenue brought in through the fee from 2013 through 2019 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 in most year

[37] 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.

since its inception. However, those funds unlikely to be reliably 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 11 (Section 4.2.1.6) shows a range of risks (probability) of not realizing certain revenue amounts for a given fee percentage, including the 1.25% level of Alternative 1 based on previous conditions. This range is indicative of variability in ex-vessel prices and changes in allowable catch. Based on ex-vessel values observed in the time series (2013-2018), the status quo fee percentage resulted in revenues of at least $3 million in all years, of $3.5 million in five of six years, of $4 million in one of six 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 for fishing effort in 2018 required an estimated budget of $4,442,581 based on the conservative ("old") cost curve and $3,978,523 based on the upper limit ("new") cost curve. The ability to spend extra "optimizable" days to meet certain monitoring objectives would, under the current Annual Deployment Plan, only kick in after that hurdle is met. This means that even under the less conservative newly estimated cost curve, the current observer fee my be unlike to reach even the 15% hurdle, let alone have the means to further optimize coverage based on monitoring objectives.

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 $2.5 million. Given the 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 Annual Deployment Plan process. The reader can refer to Table 16 in Section 4.2.2.7 to see the remaining fee revenue for a range of average fee revenue collected from all gear types (based on Table 12). For example, under Alternative 1's rate of 1.25%, the average fee revenue for all gear types (2013-2018) would have been $3.8 million. After the deduction of EM costs the remaining revenue for observer deployment would have been between $3.6 and $1.3.

5.6.4. 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 and the options listed under Alternative 2, the Council is mainly considering *increasing* the fee to some level between 1.25% and 2% (inclusive). Options under Alternative 2 specifically evaluate a fee set at 1.5%, 1.75%, and 2%, applied evenly across sectors.

The fee revenue analysis in Section 4.2 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 2013-2018 period (see Table 11 and Table 12, as well as Figure 10 and Figure 11). For instance, Table 11 breaks out the possible revenues that could have been derived from different fee percentages under the options of Alternative 2 (1.5%, 1.75%, and 2%), based on the minimum, mean, and maximum ex vessel values of the different gear sectors from 2014 through 2018. Table 12 further aggregates the potential fee revenue from these options based for all gear types. For instance, this tables demonstrates mean ex vessel values of $4.57 million, $5.34 million, and $6.10 million for Options 1, 2, and 3 respectively. This is compared to a mean revenue of $3.81 million under the no action alternative for all years (2013-2018) and all gear types. Figure 10 demonstrates the visual of this difference in potential observer fee revenue that could be achieved relative to no action. Figure 11 breaks out the time series of 2013-2018 to demonstrate the

number of years the Observer Program would have been above different thresholds of funding based on the Alternatives and Options. For instance, Alternative 2, Option 2 (1.75% observer fee for all gear types) would have hit $4.5 million in funding in 4 of the 6 years evaluated and $6.0 million in funding in 1 of the 6 years evaluated.

The Gap Analysis in Section 4.2 applies mean revenues from the Revenue Analysis retrospective study to the exploration of how a higher fee percentage could achieve the baseline 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 a table that shows available fee revenues after EM costs have been deducted (Table 16 in Section 4.2.2.7).

To the extent that a goal of this alternative is to have additional fee revenues relative to Alternative 1, No Action, and that those funds and resultant observer days can be "optimized" to achieve monitoring objectives, Table 13 provides a useful example of how monitoring resources are currently translated into monitoring 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 14 shows that the Gap Analysis simulation dedicated 69% of optimizable monitoring (that which is available after meeting the baseline) to the trawl stratum, 28% to the hook-and-line stratum, and less than 2% to each of the tender-trawl, pot, and tender-pot strata.

5.6.5. Alternative 3 – Adjust the Fee Variably Among Sectors

Alternative 3 would allow the Council to recommend increasing the observer fee percentage variably for each of the fisheries (gear sectors) within the partial coverage category. The options determined by the Council in April 2019, suggest three combinations of variable fee percentages:

Option 1: 1.5% for the hook-and-line, pot, and jig fisheries
1.75% for the trawl fisheries

Option 2: 1.5% for the hook-and-line, pot, and jig fisheries
2.0% for the trawl fisheries

Option 3: 1.75% for the hook-and-line, pot, and jig fisheries
2.0% for trawl fisheries

The motion from April 2019 also makes it clear that the Council could select a different combinations of fee percentages within this alternative set (i.e. no higher than 2% for any partial coverage sector), so long as the analysis demonstrates impacts related to this full range of fee percentages. This full range of options can be assessed through Table 11, which retrospectively characterizes 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 between 2013 and 2018. For example, Table 31 sums these potential revenue levels listed in Table 11 across all gear types based on the Council's three suggested fee percentage combinations under Alternative 3. The gap analysis in Section 4.2.2.2 states that in order to meet the 15% hurdle for fishing effort in 2018 an estimated budget of $4,442,581 would be required under the old cost curve and $3,978,523 would be required under the new cost curve. All fee

combination options under Alternative 3 would provide at least that much when compared to mean revenue and revenue in the years that generate the maximum value (for HAL the max year was 2013, for jig 2014, for pot 2017, and for trawl 2016). Table 11 allows the reader to evaluate any combination of fee percentages by gear type, in order to assess how much the sector would have been contributing in those past years.

Table 31 A comparison of possible observer fee revenues under the options of Alternative 3, based on the minimum, mean, and maximum annual ex vessel value for each gear type between 2013 and 2018.

Options under Alt 3	Fee %	Sector	Min	Mean	Max
Alt 3, Option 1	Fixed gear at 1.5%	HAL	$2,329,011	$2,912,608	$3,771,375
		Jig	$1,610	$5,136	$9,127
		Pot	$444,062	$489,822	$578,686
	Trawl at 1.75%	Trawl	$809,650	$1,359,692	$1,629,974
Total for all gear types under Alt 3, Opt 1			$3,584,333	$4,767,258	$5,989,162
Alt 3, Option 2	Fixed gear at 1.5%	HAL	$2,329,011	$2,912,608	$3,771,375
		Jig	$1,610	$5,136	$9,127
		Pot	$444,062	$489,822	$578,686
	Trawl at 2.0%	Trawl	$925,315	$1,553,933	$1,862,827
Total for all gear types for Alt 3, Opt 2			$3,699,998	$4,961,499	$6,222,015
Alt 3, Option 3	Fixed gear at 1.75%	HAL	$2,717,180	$3,398,042	$4,399,937
		Jig	$1,878	$5,992	$10,648
		Pot	$518,072	$571,458	$675,134
	Trawl at 2.0%	Trawl	$925,315	$1,553,933	$1,862,827
Total for all gear types under Alt 3, Opt 3			$4,162,445	$5,529,425	$6,948,546

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 2018, other groundfish accounted for, on average, 2% 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 2018 Annual Urban Alaska (formerly Anchorage) Consumer Price Index (http://live.laborstats.alaska.gov/cpi/index.cfm, accessed 6/5/2019).
[3] For HAL the year which generated the minimum value was 2014, for jig and trawl 2018 and for pot it was 2016. The year which generated the maximum value for HAL was 2013, for jig was 2014, for pot was 2017, and trawl was 2016.

Figure 10 and Figure 11 go on to more explicitly demonstrate the possible funding levels the Alternative 3's three options could have potentially supported under past (2013-2018) conditions. Figure 10 illustrates the potential increase to the observer fee revenue relative to the no action alternative (a fee percentage of 1.25%). These options can also be seen relative to the potential revenue obtained through the three options under Alternative 2. For instance, Alternative 3, Option 3 would afford the 2nd highest increase in fee revenues (Alternative 2, Option 3 would afford the 1st). Alternative 3, Options 1 and 2 would afford the 4th and 5th highest possible increase in observer fee revenues. Figure 11 further illustrates the incremental improvements in possible observer program funding levels by classifying the proportion of years (between 2013-2018) that would have reached different funding thresholds.

Although each sector currently pays the same fee as a percentage of their gross ex vessel revenue (1.25%), difference in volume of landed weight and ex vessel value means that the relative proportion of ex-vessel values and fee revenues generated by each gear sector are substantially different. This document provides background information on the relative proportion of ex-vessel values and fee revenues

generated by each gear sector since 2013. Figure 9 and Figure 35 both show 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.

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 4.5.3.2 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, 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 and enforcement protocol in the BSAI or GOA groundfish or halibut fisheries (some of which is described in Section 4.3). 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. Regardless of the alternative the Council chooses, NMFS staff who are involved in the collection of fees do not believe that collecting different fee percentages based on gear sector would impose a significant marginal administrative cost. Thus, no change in management and enforcement 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 action alternatives at a National level. Again, Alternative 2 considers an increase to the Observer fee for all gear types equally up to 2% (particularly, at a fee percentage of 1.5%, 1.75%, and 2%). Alternative 3 looks at a fee increase which could be variable by fishery sector (hook-and-line, pot, jig, and trawl) up to 2% for each sector, with a suite of options demonstrating potential combinations of percentages.

At a National level, the Observer Program provides widespread direct and indirect benefits. The collection of information by independent observers using a statistically reliable sample of fishing vessels helps to create a foundation for sustainably managed fisheries. In additional to ensuring that the North Pacific region is complying with necessary laws (Magnuson-Stevens Act, the Marine Mammal Protection Act, the Endangered Species Act, and other applicable Federal laws and treaties), these independently collected data are used in stock assessments, by inseason managers in determining catch of target, incidental catch and PSC species, as well as other marine ecosystem research. Incorporating this best available scientific information provides long-term conservation benefits for fish stocks and other marine resources. This benefits stakeholders that directly participate in partial coverage fisheries (allowing greater management efficiency in the fisheries they participate in due to better information on target species and PSC use), those that participate in other fisheries (for example, state of Alaska salmon fisheries or Federal crab fisheries that may benefit from the greater level of knowledge on PSC use), and those that may be unrelated to commercial fishing (for example, a charter captain interested in PSC use, a native Alaskan community interested in protected species interactions, or a private citizen interested in healthy fish stocks, sea bird and marine mammal populations in the United States). A robust Observer Program ensures that the public receives unbiased information about the use of a public resource that would otherwise occur outside the public view.

While the Observer Program is currently in place and this analysis is charged with focusing on the *marginal* benefits to the Nation based on the potential increases in fee percentage described in Alternative 2 and 3, these marginal changes can be qualitatively understood as incremental improvements to the benefits of robust observer data as described above. For instance, the incremental improvements in the spatiotemporal quality of the data gathered through the Observer Program can boost the certainty in

management. When the CAS must pool data from larger scales of time and space, these estimates may not be as representative and contain higher uncertainty, leading Inseason Mangers to make more conservative decisions regard opening and closing fisheries. This improved certainty in data quality can influence decisions made by fishery managers, which can in turn improve the fleet's ability to fully utilize the resource and reduce catch of unwanted species.

Moreover, the status quo benefits from the Observer Program may not be fully realized under future conditions with the realistic possibility of diminished supplementary Federal funding, an increase in per-day observer costs, and/ or the addition of more EM costs to be accounted for in the Observer budget. For instance, if there are no longer resources for allocating above the 15% coverage hurdle, there may be less ability to address the Council's eight monitoring objectives (see Section 3.3). While increasing the observer fee does not guarantee that any certain level of observer coverage could be achieved due to the independent factors of effort, ex vessel prices, TAC, and observer-cost-per-day, increasing the fee should produce greater revenue relative to the no action fee percentage (1.25%) with which to focus towards observer monitoring goals.

These potential benefits from the alternatives which would raise the observer fee percentage up to 2% of a sector's gross ex vessel revenue would be associated with a cost. In this case marginal costs are more straightforward to quantify than marginal benefits. The analysis demonstrates that between 2013 and 2018 all gear types together in the partial observer coverage category paid between $3.3 million and $4.4 million (inflation adjusted dollars; Table 10). The analysis also demonstrates the range of additional fees that the industry would have been responsible for under the action alternatives and based on 2013-2018 conditions (Figure 10). These additional observer fee revenue increases range from a mean (inflation adjusted) $760,000 (Alternative 2, Option 1), up to an additional $2.3 million (Alternative 2, Option 3). This additional fee would represent a direct cost to harvesters and processors associated with partial coverage fisheries. While these estimates present an idea of gross ex vessel revenue that would be collected, individual-level or industry-level cost information is not available for this analysis. Thus, it is not possible to estimate the extent of negative impacts that may occur at the margin (e.g. consideration of change in net profitability at the individual or sector-level). However, it is likely that in addition to these direct costs, an increase in the observer fee percentage could result in additional indirect costs to other stakeholders and dependent communities as well.

In recommending an observer fee percentage the Council will need to consider the sampling needs for observer and EM data, and whether those needs are currently being met. As mentioned previously in this analysis, 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, area-specific, or species-specific sampling. At lower levels of observer coverage, fishery managers may take more conservative or precautionary approaches towards management decisions.

Stipulating that the existing monitoring plan has provided a net benefit to the Nation in the form of less-biased data, 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. 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.

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.

The implementation of this action would not affect the ability of the fishery management plan to prevent overfishing while achieving optimum yield. The proposed action evaluates the impacts of increasing the observer fee assessed on landings in the partial coverage category of the Observer Program. Observer data would continue to be used to provide estimates for the fishing activities without coverage and where EM does not collect that specific data, using established procedures. This information will continue to be available to fishery managers and stock assessment authors in order to monitor and prevent overfishing. (Section 4.5)

National Standard 2 — Conservation and management measures shall be based upon the best scientific information available.

An essential component of the best scientific information to support management and scientific information needs is collected through a comprehensive fishery monitoring program for the groundfish and halibut fisheries off Alaska, with the goals of verifying catch composition and quantity, including of those species discarded at sea, and collecting biological information on marine resources. Each year, the Council and NMFS review the performance of the previous year's deployment plan and make adjustments to observer and EM deployment for the upcoming year. This annual flexibility allows for iterative improvements in the scientific sampling plan to adapt to evolving data needs all within the available budget. (Section 4.3)

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.

The proposed action would impact the amount of fee revenues available each year for the deployment of observers and EM. This action would not affect the ability of the Council and NMFS to manage individual fish stocks throughout their range, as the proposed change would not eliminate the availability of any source of data, and observer and EM data will continue to be used to provide estimates for the fishing activities. (Section 4.5)

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.

The proposed action would impact the fee percentage assessed on landings made in the partial coverage category under the Observer Program. Alternative 2 would increase the fee equally across all landings in

the partial coverage category and Alternative 3 would allow the fee percentage to be increased differentially by vessel gear type. This action would not allocate or assign fishing 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.

The Observer Program is designed, to the extent practical, to minimize the impact of monitoring requirements on the operational choices of fishery participants. Specifically, several provisions allow specific vessels to request full coverage in lieu of partial coverage, partial coverage instead of full coverage, and EM instead of observer coverage within the partial coverage category. These voluntary measures were implemented considering the monitoring requirements needed and the potential benefits to vessel operators. (Section 3.3 and 4.5.3)

National Standard 6 — Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The proposed action to increase the observer fee and resulting revenue for deployment of fishery observers and EM increases the ability for NMFS and fishery managers to adapt to varying fishery data needs through the Annual Deployment Plan process. (Section 3.3)

National Standard 7 — Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The proposed action to increase the observer fee utilizes the existing Observer Program infrastructure. As part of the Annual Deployment Plan process, the Council and NMFS annually discuss monitoring needs and how best to most effectively allocate monitoring costs between the EM and observer deployment. (Chapter 4)

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.

The proposed action to increase the observer fee considers economic impacts on affected communities (Section 5.6.1). Any negative distributional effects on the communities related to the fee would be tied to any changes to where fishing, processing, or observer deployment occurs or the communities of residence for those individuals involved in partial coverage fisheries (e.g. through the sale of licenses or quota share). Appendix G provides data on vessel counts, ex vessel gross revenue, and revenue diversification which links harvesters in the partial coverage category to communities where vessel owners lives (this is further summarized in Section 5.5.3). Additionally, Figure 35 and Figure 36 provide information on the relative composition of gear types in the partial coverage fisheries related to different communities. These figures are relevant to Alternative 3 in particular, which considers applying observer fee percentages variably across sectors.

The analysts do not expect that the increases in fees proposed would alone result in consolidation of the fishing fleets and it would be a rare case for it alone to result in harvesters existing the fishery. 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 (e.g. captains, crew, vessel owners, quota/ permit holders) may be offset to some extent by the income and spending on lodging and consumption by observers stationed in those same 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.

The Council's fisheries research plan, as implemented by the Observer Program, provides the standardized reporting methodology to assess the type and amount of bycatch occurring in the groundfish and halibut fisheries. The proposed action to increase the observer fee maintains this standardized reporting methodology because this action would only impact the amount of funding for the deployment of observers or EM and would not change how decisions are made during the annual deployment planning and review process. Management decisions would be deployed using scientific sampling and data from EM would be used in the Catch Accounting System. By integrating EM into the Observer Program, under the proposed action, the Council and NMFS will have an additional tool to respond to bycatch data needs in the fisheries. Observer and EM data on bycatch would be used to inform the Council's and NMFS' development of conservation and management measures that, to the extent practicable, minimize bycatch and minimize mortality of bycatch that cannot be avoided. (Chapter 4.5)

National Standard 10 — Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The implementation of the proposed action is not likely to have any effect on the safety of human life at sea. Per section 313(b)(1)(D) of the Magnuson-Stevens Act, the Council and NMFS have taken into consideration the operating requirements of the fisheries and the safety of observers and fishermen in developing the monitoring requirements under the Observer Program. (Section 3.3 and Section 5.5.5)

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.

This action is consistent with the Council's Ecosystem Vision Statement in that it seeks to maintain and improve the Observer Program that provides widespread direct and indirect benefits. The collection of information by independent observers using a statistically reliable sample of fishing vessels helps to create a foundation for sustainably managed fisheries, affecting stock assessments, inseason management of the fisheries, ecosystem assessments, and informed management decisions. While the Observer Program is currently in place and this analysis is charged with focusing on the *marginal* impacts of the potential increases in fee percentage described in Alternative 2 and 3, these marginal changes can be qualitatively understood as incremental improvements to the benefits of robust observer data. For instance, the incremental improvements in the spatiotemporal quality of the data gathered through the Observer Program can improve our understanding of interactions among ecosystem components through biological data collected by observers from samples and from observations of interactions with marine mammals and seabirds. These data in turn influences decisions made by fishery managers and scientists.

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8. References

Cahalan, J., J. Gasper., and J. Mondragon. 2015. Catch estimation in the Federal trawl fisheries off Alaska: A simulation approach to compare the statistical properties of three trip-specific catch estimators. Canadian Journal of Fisheries and Aquatic Sciences, 2015, 72(7): 1024-1036.

Cahalan, J. Gasper, and J. Mondragon. 2014. Catch sampling and estimation the Federal groundfish fisheries off Alaska, 2005 edition. U.S. Dep.Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46. pp.

Gasper, J., C. Tide, G. Harrington, J. Mondragon, J. Cahalan, S. Bibb, and G. Merrill. 2019. Supplement to the Environmental Assessment for Restructuring the Program for Observer Procurement and Deployment in the North Pacific. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-19, 168 p. https://doi.org/10.25923/ck9d-jy76

NMFS. [National Marine Fisheries Service]. 2015. Final Supplement to the Environmental Assessment for Restructuring the Program for Observer Procurement and Deployment in the North Pacific. NMFS Alaska Region, PO Box 21668, Juneau, AK 99802-1668. September 2015. Available at https://repository.library.noaa.gov/view/noaa/19843

NMFS. 2017a. North Pacific Observer Program 2016 Annual Report. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available at https://www.afsc.noaa.gov/Publications/ProcRpt/PR2017-07.pdf

NMFS. 2017b. 2018 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available at http://www.npfmc.legistar.com/gateway.aspx?M=F&ID=1d07178d-0a96-41ee-8bd5-f9becdfbc14a.pdf

NMFS. 2018a. 2019 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available at http://meetings.npfmc.org/CommentReview/DownloadFile?p=13252b3a-482b-4009-85ad-727d01384735.pdf&fileName=B2%202019%20ADP.pdf

NMFS. 2018b. North Pacific Observer Program 2017 Annual Report. AFSC Processed Rep. 2018-02, 136 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115. Available at http://www.afsc.noaa.gov/Publications/ProcRpt/PR2018-02.pdf

NMFS. 2018c. Fissel et al. Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area: Economic Status of the Groundfish Fisheries Off Alaska, 2017. Available at http://www.afsc.noaa.gov/refm/docs/2018/economic.pdf

NMFS. 2019. Alaska Fisheries Science Center and Alaska Regional Office. 2019. North Pacific Observer Program 2018 Annual Report. AFSC Processed Rep. 2019-04, 148 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

NPFMC. [North Pacific Fishery Management Council]. 2006. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for proposed Amendment 86 to the Fishery Management Plan for Groundfish of the Bering Sea/Aleutian Islands Management Area and Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska. May 12, 2006.

NPFMC. 2011. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Proposed Amendment 86 to the Fishery Management Plan for Groundfish of the Bering sea/Aleutian Islands Management Area and Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska. Restructuring the Program for Observer Procurement and Deployment in the North Pacific. March. Available at https://repository.library.noaa.gov/view/noaa/4291

NPFMC. 2014. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for proposed Amendment to the Fishery Management Plan for Groundfish of the Gulf of Alaska: Chinook Salmon Prohibited Species Catch in the Gulf of Alaska non-Pollock Trawl Fisheries. May 2014. Available at https://alaskafisheries.noaa.gov/sites/default/files/analyses/goa97earirfa.pdf

NPFMC. 2018. Status of analytical projects related to the Observer Program, updated February 1, 2018. Available at http://meetings.npfmc.org/CommentReview/DownloadFile?p=ff1df791-d540-4e4a-89fd-0f85d7c6ec96.pdf&fileName=E1%20Observer%20Program%20related%20analytical%20tasks.pdf

NPFMC. 2019. Initial Review Draft Environmental Assessment / Regulatory Impact Review for Proposed Regulatory Amendment to Adjust the Partial Coverage Observer Fee. April 2019. Available at: https://meetings.npfmc.org/CommentReview/DownloadFile?p=6de7ee62-3643-4b2b-9319-76e77108480e.pdf&fileName=C7%20Observer%20Program%20Fee.pdf

Appendix A. Council Motions

October 2017

Agenda Item C-5 FINAL MOTION: Draft 2018 Annual Deployment Plan
October 6, 2017

[…]

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.

Feburary 2018

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.

April 2019

Agenda Item C-7 Observer Fee Analysis
April 6, 2019

The Council adopts the following revised alternatives for analysis with deletions shown in ~~strikethrough~~ and new language is underlined.

Alternative 1: Status Quo. The observer fee ~~of~~ percentage at 50 CFR 679.55(f) is 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~~.

Option 1: Set the observer fee percentage at 1.5 percent.
Option 2: Set the observer fee percentage at 1.75 percent.
Option 3: Set the observer fee percentage at 2 percent.

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).~~

Increase the observer fee percentage by fishery sector (hook-and-line, pot, jig, and trawl) up to 2 percent.

Option 1: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 1.75 percent.

Option 2: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.5 percent and set the observer fee percentage for the trawl fishery at 2 percent.

Option 3: Set the observer fee percentage for the hook-and-line, pot, and jig fisheries at 1.75 percent and set the observer fee percentage for the trawl fishery at 2 percent.

The Council recommends releasing the analysis for public review after the following revisions and additions:

- Include 2018 data in the tables and figures that describe possible fee revenues and resulting gap analysis.
- Additional discussion of the impacts and benefits of increasing the observer fee for each of the alternatives and options.

Staff should consider and incorporate comments from the SSC, AP, and FMAC to the extent practicable.

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 subtracted from a total allowable catch limit under §679.20(a)	No	No.
(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]

Appendix C. Factors that Impact Cost per Observer Sea-day

Excerpt from 2019 ADP (NMFS 2018a).

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;
- 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.

Appendix D. Trip level Data Gap Analysis using 2017 Fishing Effort

When the initial review draft of the observer fee analysis was first presented, the fishing effort from 2017 was the most recent complete year available for use with the gap analysis. In chapter 4.2.2 of this document, the gap analysis was updated with 2018 fishing effort. Overall, fishing effort decreased from 2017 to 2018. The tables and figures presented below are analogous to those in chapter 4.2.2 but are based off of fishing effort in 2017 to illustrate how the rates afforded and data gaps change in a scenario with slightly higher fishing effort within a 2019 budget/cost scenario.

Table 32 Observer budgets, equivalent Alternative 2 observer fee rates, cost per day, and days purchased under 2019 budget scenarios.
Resulting strata-specific selection rates (via the 15% baseline + optimization strategy in the ADP) are also shown for fishing effort in 2017. 'Old' and 'New' refer to the cost curves and can be used to represent lower and upper bounds of cost efficiency, respectively.

Observer Budget	Alt. 2 Fee %	Cost Per Day			Days			Deployment Strata	Selection Rate		
		Old		New	Old		New		Old		New
$3,048,677	1.00	$1,836.41	-	$1,648.12	1,660	-	1,850	HAL	0.073	-	0.081
								POT	0.073	-	0.081
								TRW	0.073	-	0.081
								TenP	0.073	-	0.081
								TenTR	0.073	-	0.081
$3,810,846	1.25	$1,770.27	-	$1,446.59	2,153	-	2,634	HAL	0.094	-	0.115
								POT	0.094	-	0.115
								TRW	0.094	-	0.115
								TenP	0.094	-	0.115
								TenTR	0.094	-	0.115
$4,573,015	1.50	$1,526.44	-	$1,279.57	2,996	-	3,574	HAL	0.131	-	0.155
								POT	0.131	-	0.151
								TRW	0.131	-	0.162
								TenP	0.131	-	0.151
								TenTR	0.131	-	0.166
$5,335,184	1.75	$1,389.71	-	$1,182.08	3,839	-	4,513	HAL	0.163	-	0.184
								POT	0.152	-	0.155
								TRW	0.185	-	0.241
								TenP	0.153	-	0.159
								TenTR	0.195	-	0.269
$6,097,354	2.00	$1,302.23	-	$1,118.18	4,682	-	5,453	HAL	0.19	-	0.214
								POT	0.156	-	0.16
								TRW	0.255	-	0.32
								TenP	0.161	-	0.167
								TenTR	0.287	-	0.372

Table 33 Optimization weights based on discards, PSC chinook, and PSC halibut for 2017 effort with 2019 strata definitions.

Strata	Optimization Weights
HAL	0.2869
POT	0.0189
TENDER_POT	0.0024
TRW	0.6646
TENDER_TRW	0.0272

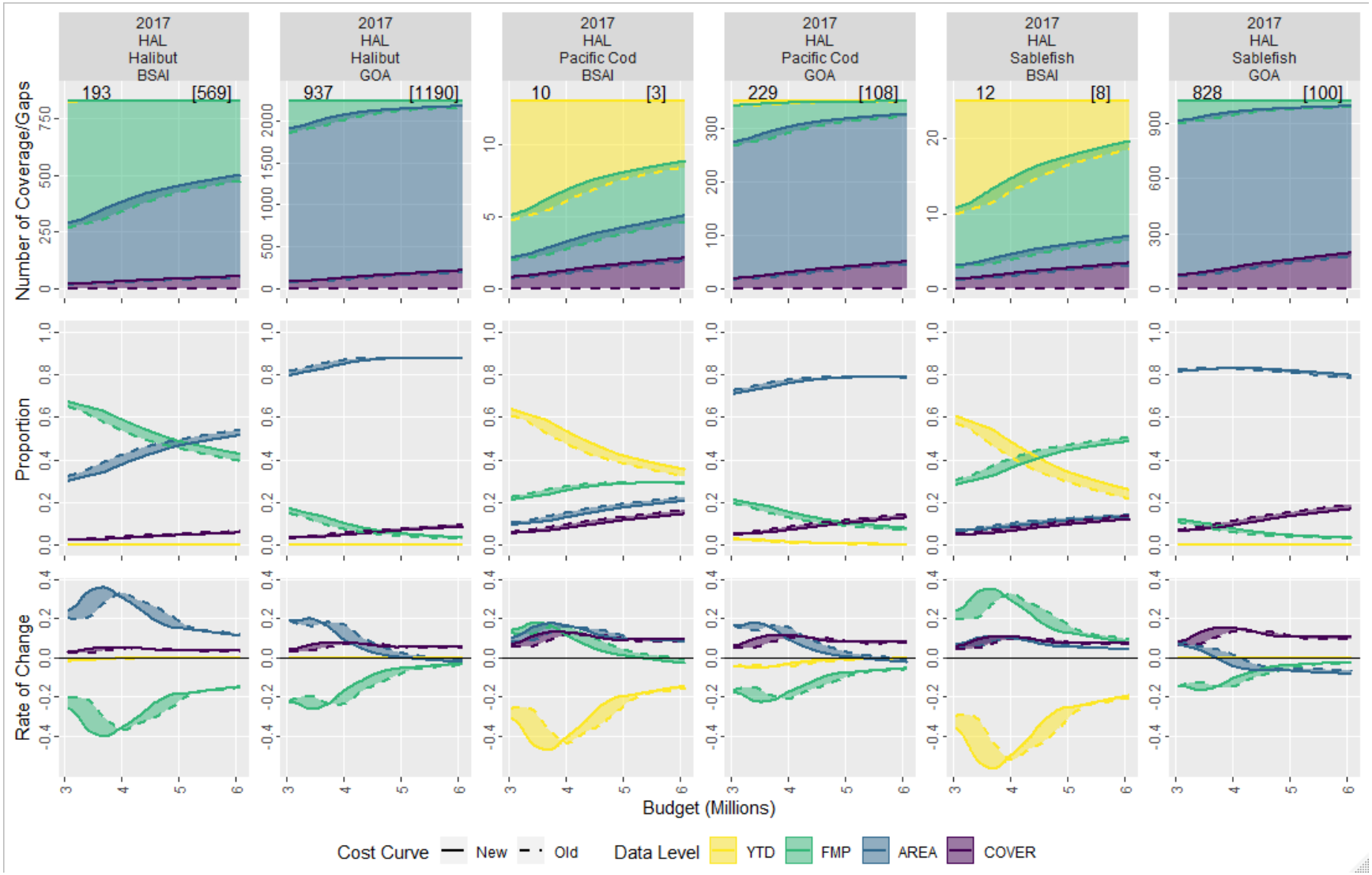


Figure 38 Gap analysis results for 2017 hook-and-line gear trips within the observer pool's HAL stratum and no-selection pool.

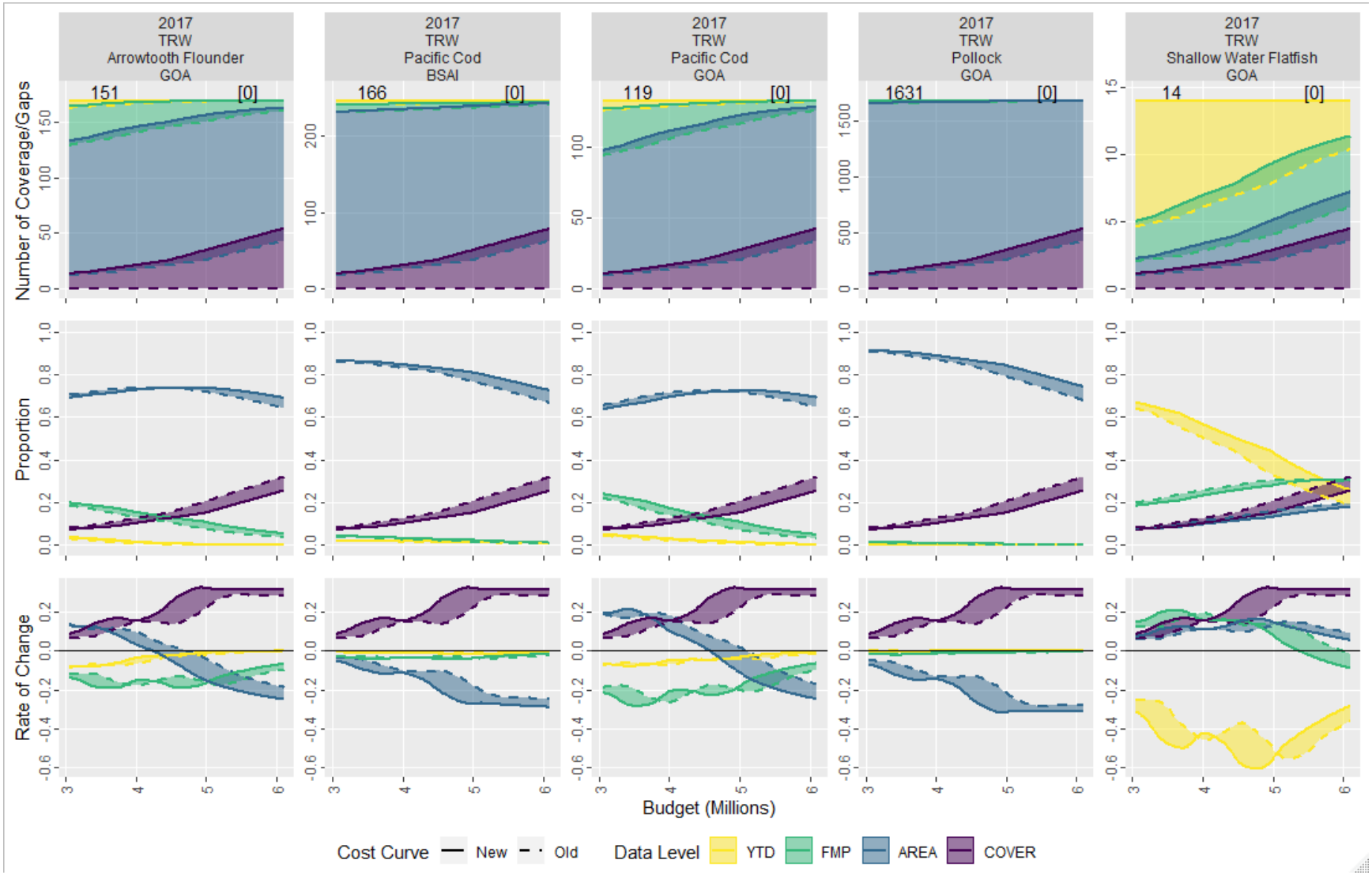


Figure 39 Gap analysis results for 2017 trawl gear trips within the observer pool's TRW stratum.

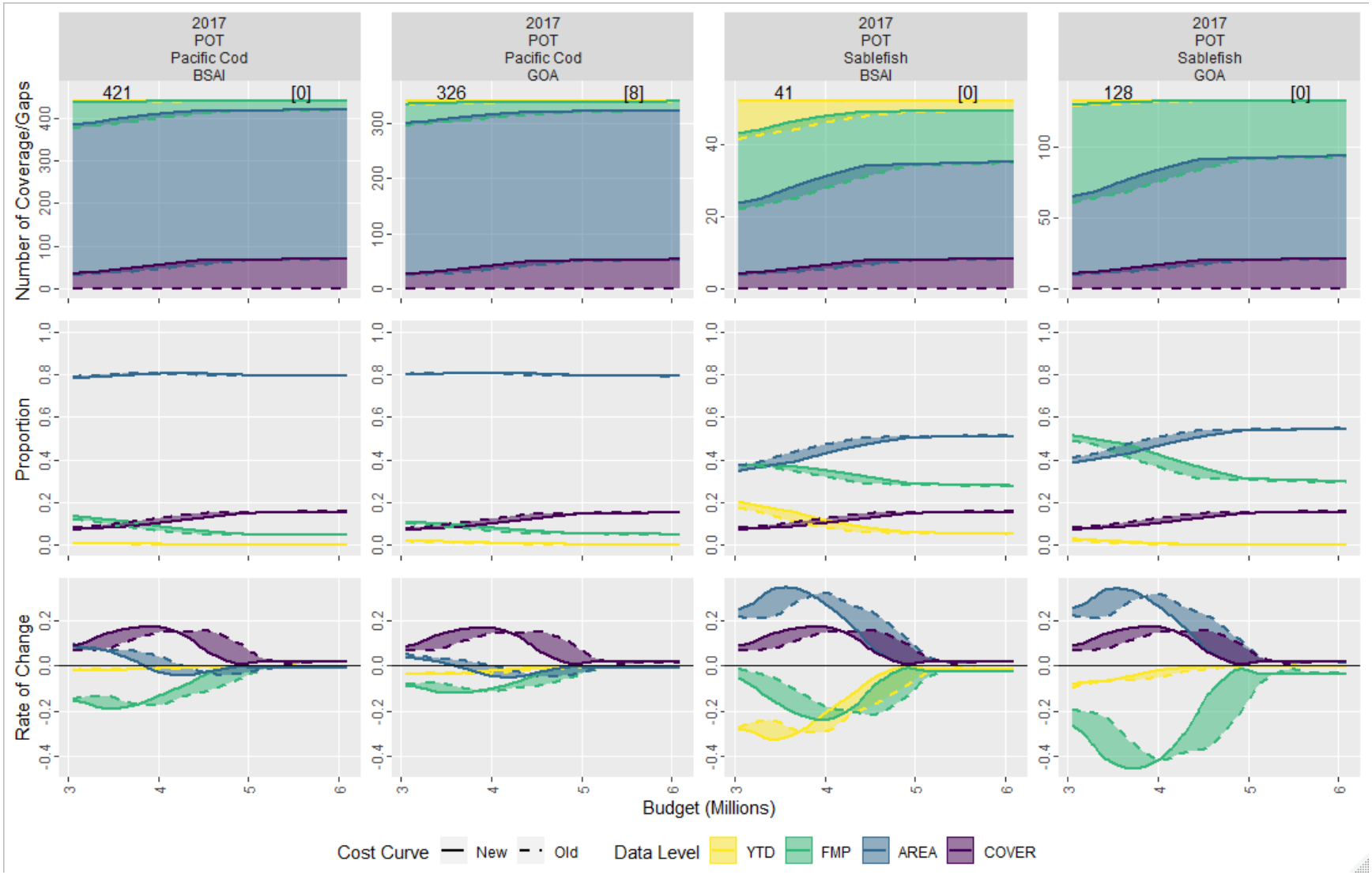


Figure 40 Gap analysis results for 2017 pot gear trips within the observer pool's POT stratum and no-selection pool.

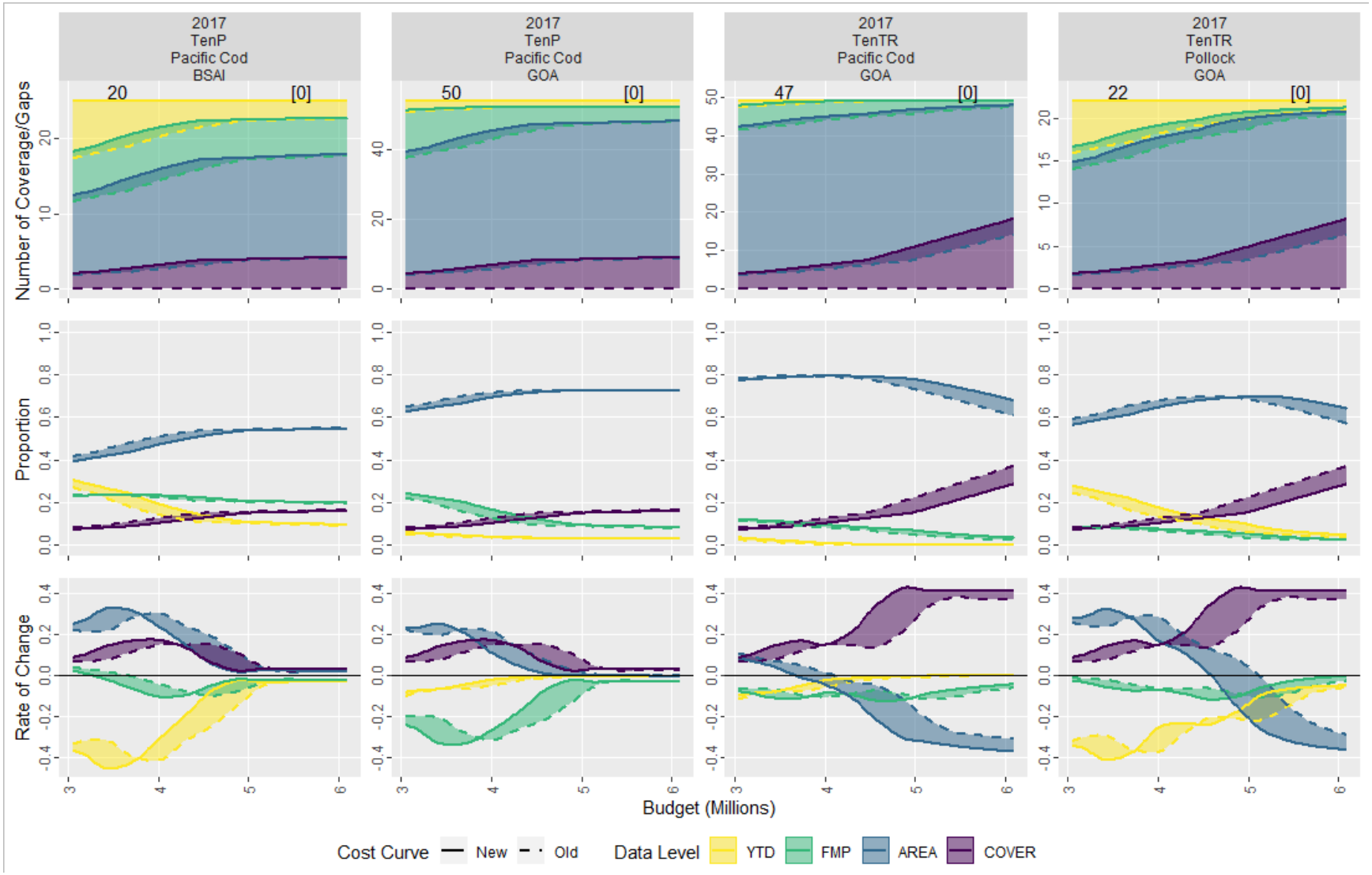


Figure 41 Gap analysis results for 2017 tender trips within the observer pool's POT_TENDER and TRW_TENDER strata.

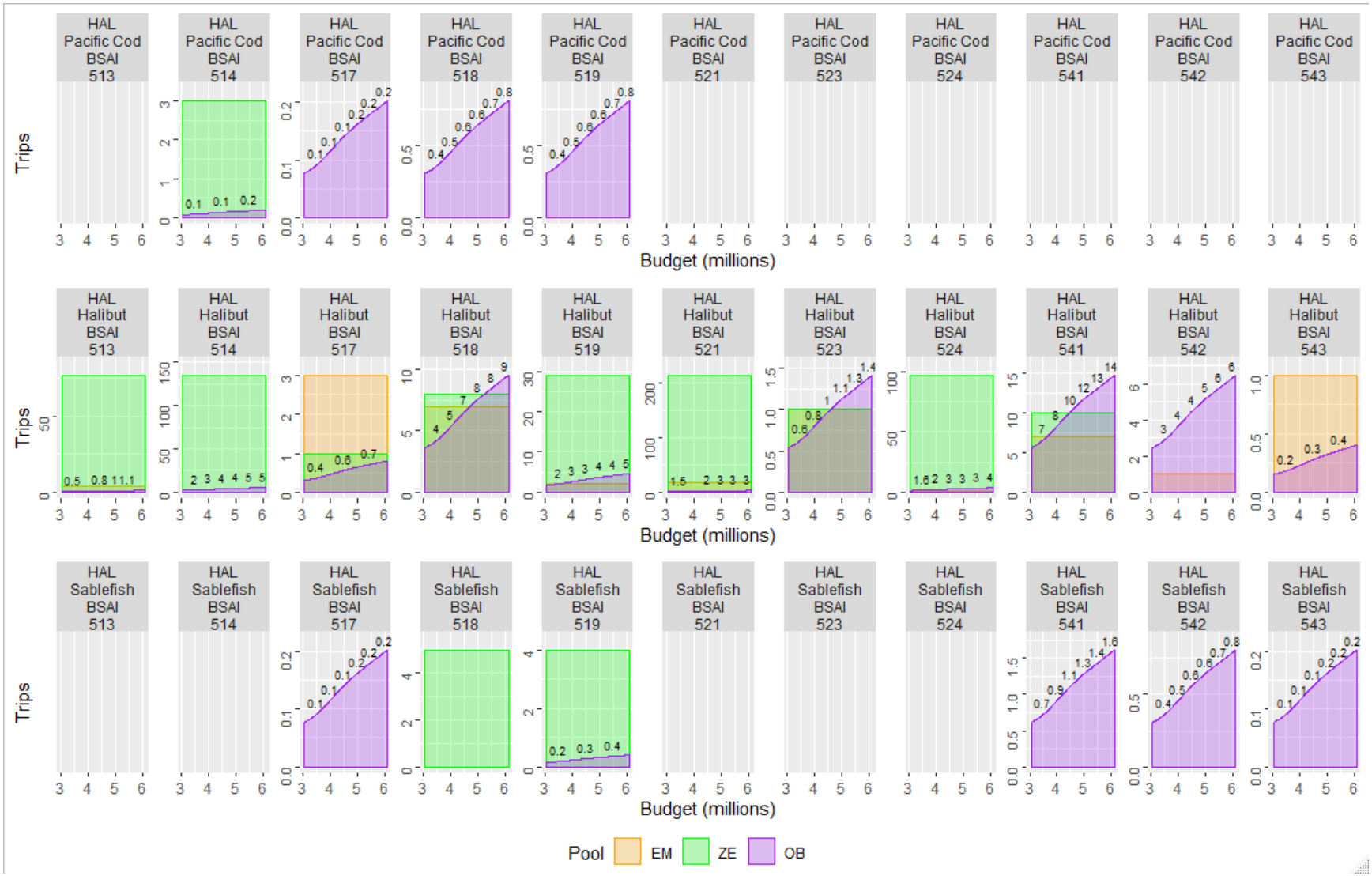


Figure 42 **EM pool effort, no-selection pool effort, and expected number of observed trips in 2017 with HAL gear in the BSAI, separated by NMFS reporting area and trip target. The numbers represent the expected number of observed trips at the given observer budget.**

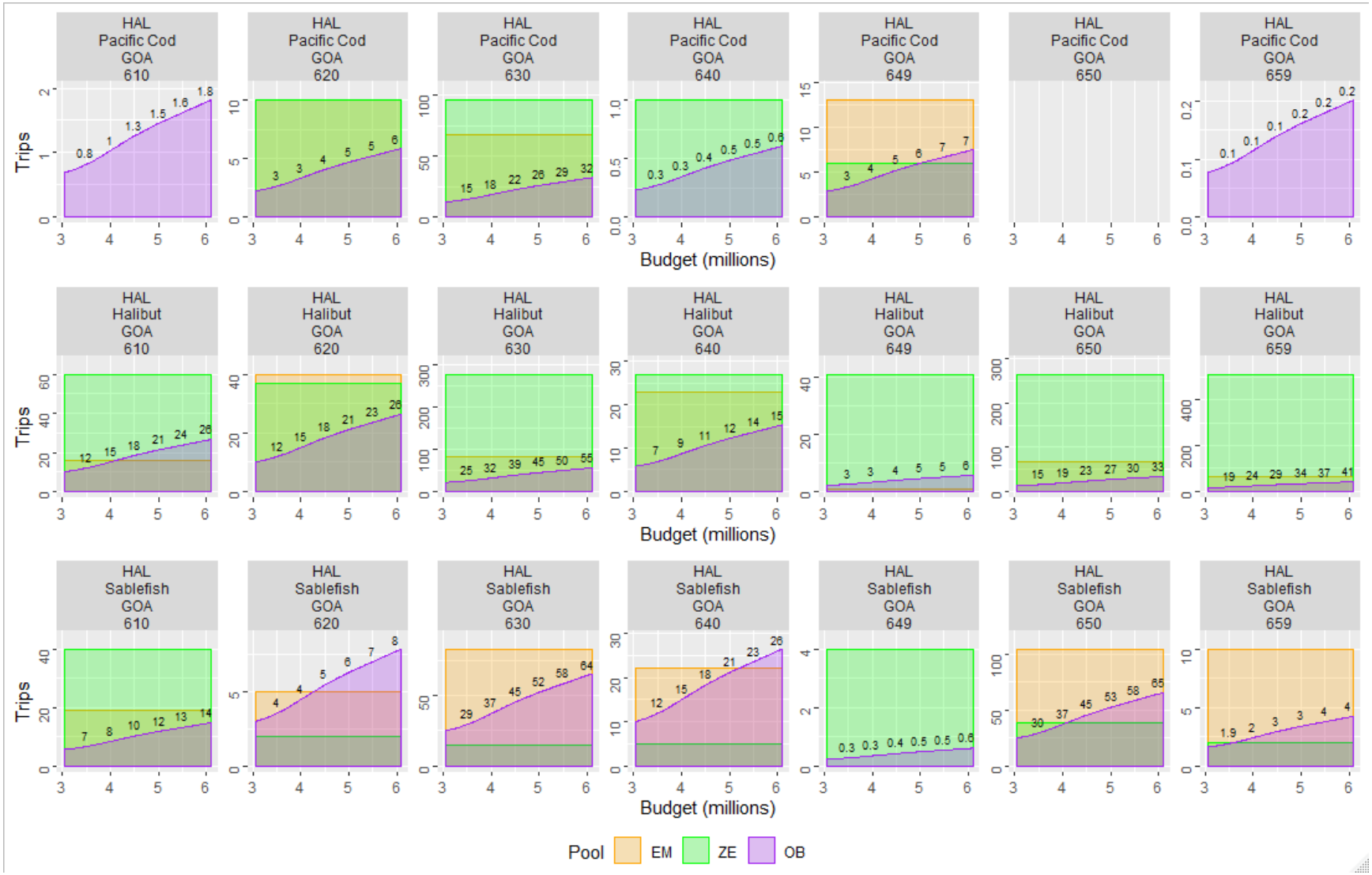


Figure 43 **EM pool effort, no-selection pool effort, and expected number of observed trips in 2017 with HAL gear in the GOA, separated by NMFS reporting area and trip target. The numbers represent the expected number of observed trips at the given observer budget.**

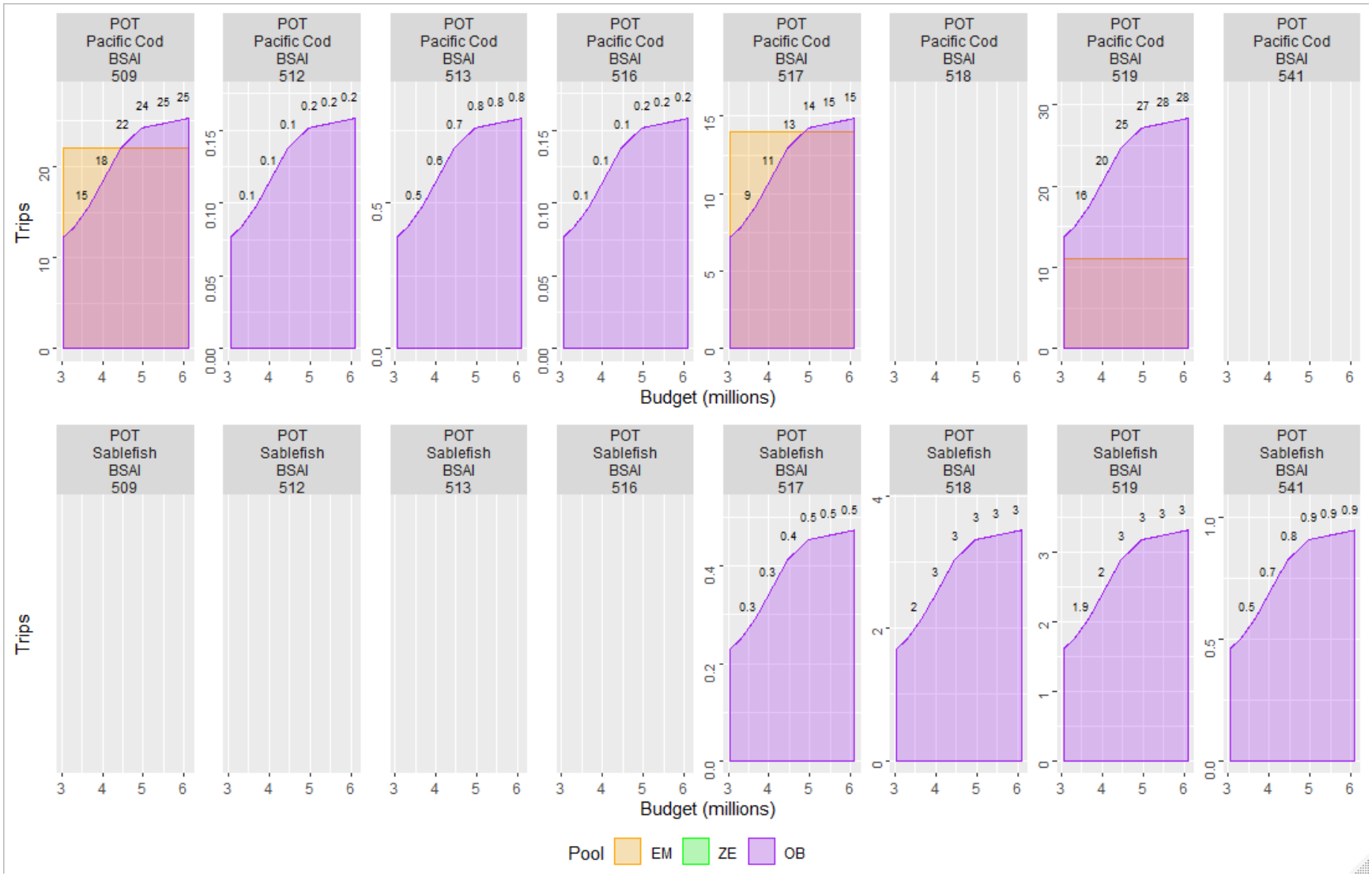


Figure 44 **EM pool effort, no-selection pool effort, and expected number of observed trips in 2017 with POT gear in the BSAI, separated by NMFS reporting area and trip target. The numbers represent the expected number of observed trips at the given observer budget.**

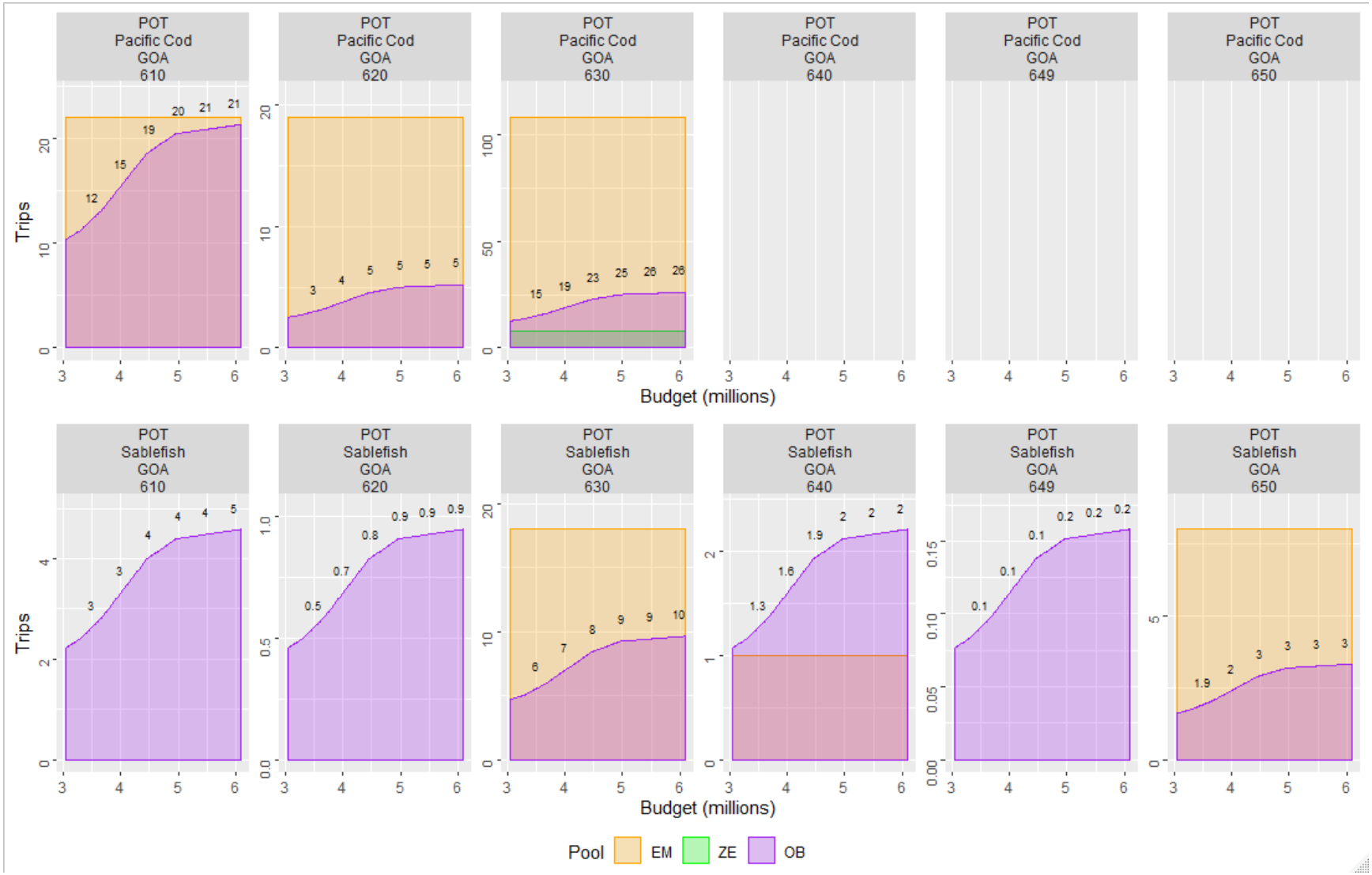


Figure 45 **EM pool effort, no-selection pool effort, and expected number of observed trips in 2017 with POT gear in the GOA, separated by NMFS reporting area and trip target. The numbers represent the expected number of observed trips at the given observer budget.**

Appendix E. Methods to Estimate Partial Coverage Costs

Support of the Council's fee analysis for the partial coverage portion of the fleet has required the FMA Division of the AFSC to generate estimates of future coverage rates that may be expected given different fee revenues. This calculation requires both fishing effort and cost per unit to be estimates in future years. In Section 4.2.2, the Council's fee analysis uses a fixed fishing effort in its calculations that are not discussed here. This appendix describes the differences between the two methodologies used to conduct future cost per unit calculations .

The cost per unit for this exercise is the observer day. It is important that four factors need to be taken into consideration in calculating this metric. These include the cost of guaranteed days, the cost of optional days, travel costs, and changes in the cost rates for guaranteed days and optional days in the future given inflation and other factors. The first method described below was presented in the April 2019, Initial Review Draft and resulted in the cost per day estimates at the various budget scenarios in Figure 9 of that Analysis and included as Figure 46 in Appendix F. Initial Review Draft Gap Analysis. The second method described below was used to prepare the cost per day estimates presented in Figure 12 of this analysis.

First Method

These four factors were addressed first according to the following. First the cost of a fully-funded contract consisting of only guaranteed days (G) was calculated from:

$$G = \left(n_g \times c_g\right) + \left(r_T \times B\right)$$

where n_g is the number of guaranteed days, c_g is the cost rate (\$) of a guaranteed day, r_T is the rate of total expenditures allocated to travel, and B is the available budget. Values for n_g were originally set at 2000. Values for c_g derive from linear regressions of c_g vs year for years 2016 to 2018 and substituting in the year of interest (accounting for future inflation changes), and r_T derived from the ratio of actual travel costs incurred in 2016 divided by the total expenditures for partial coverage in *calendar* year *2016* (0.3349).

Next the available funds available for optional days was calculated from:

$$O_{\$} = B - G$$

if $O_{\$}$ was negative, a new value for the number of guaranteed days was calculated from:

$$n_g = 2000 - \left(\frac{-O_{\$}}{G}\right)$$

and the number of afforded optional days was set to zero, otherwise it was calculated from:

$$n_o = \frac{B - G}{c_o}$$

where c_o is the cost rate (\$) of an optional day derived from linear regressions of c_o vs year for years 2016 to 2018 and substituting in the year of interest (accounting for future inflation changes).

Total number of days afforded (n) for a budget was derived by summing n_g and n_o and the cost for an observer day was derived from B divided by n.

Second Method

The terms and definitions in this method are identical to the first method unless otherwise noted.

In this method the cost of a contract consisting of guaranteed days only was calculated from:

$$G = \left[c_g \times (1 + r_T)\right] \times n_g$$

Here r_T was calculated from the actual ratio of travel costs to day costs for the *contract* year (June *2017* - June *2018* inclusive = 0.3494).

Next the available funds available for optional days was calculated from:

$$O_\$ = B - G$$

if $O_\$$ was negative, a new value for the number of guaranteed days was calculated from:

$$n_g = 2000 - \left[\frac{-O_\$}{c_g \times (1 + r_T)}\right]$$

and the number of afforded optional days was set to zero, otherwise:

$$n_o = \frac{O_\$}{c_o \times (1 + r_T)}$$

Total number of days afforded (n) for a budget was derived by summing n_g and n_o and the cost for an observer day was derived from B divided by n.

Discussion

The second method has three advantages over the first method. The first method is fiscally conservative because it applies the travel ratios to the total budget in its calculations for guaranteed costs (G) instead of applying them equally across all day types as is done in the second method. The second method also uses more updated information in its calculation of travel ratios than the first method. Finally, the use of the contract year in the second method enabled for the confirmation that the calculations for the fee analysis were accurate since they could be compared to the actual values for 2018. The second method is preferred over the first, more conservative method.

Appendix F. Initial Review Draft Gap Analysis

This Appendix includes the gap analysis based on the 2013 through 2017 revenue scenario and 2107 fishing effort as presented in the April 2019 Initial Review Draft Analysis.

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 in Table 34, 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 in Figure 46; 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 35.

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% baseline + 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 35. The optimization weights are presented in Table 36.

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 54 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

Figure 47 through Figure 50 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 35.

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 (see Table 36), 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% baseline, 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 51). 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.

<u>Observer coverage for biological data in regards to EM</u>

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 52 and Figure 53 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 52, HAL Halibut fisheries in NMFS Area 521, or Figure 53, Pot Cod fisheries in NMFS Area 630).

Table 34 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).

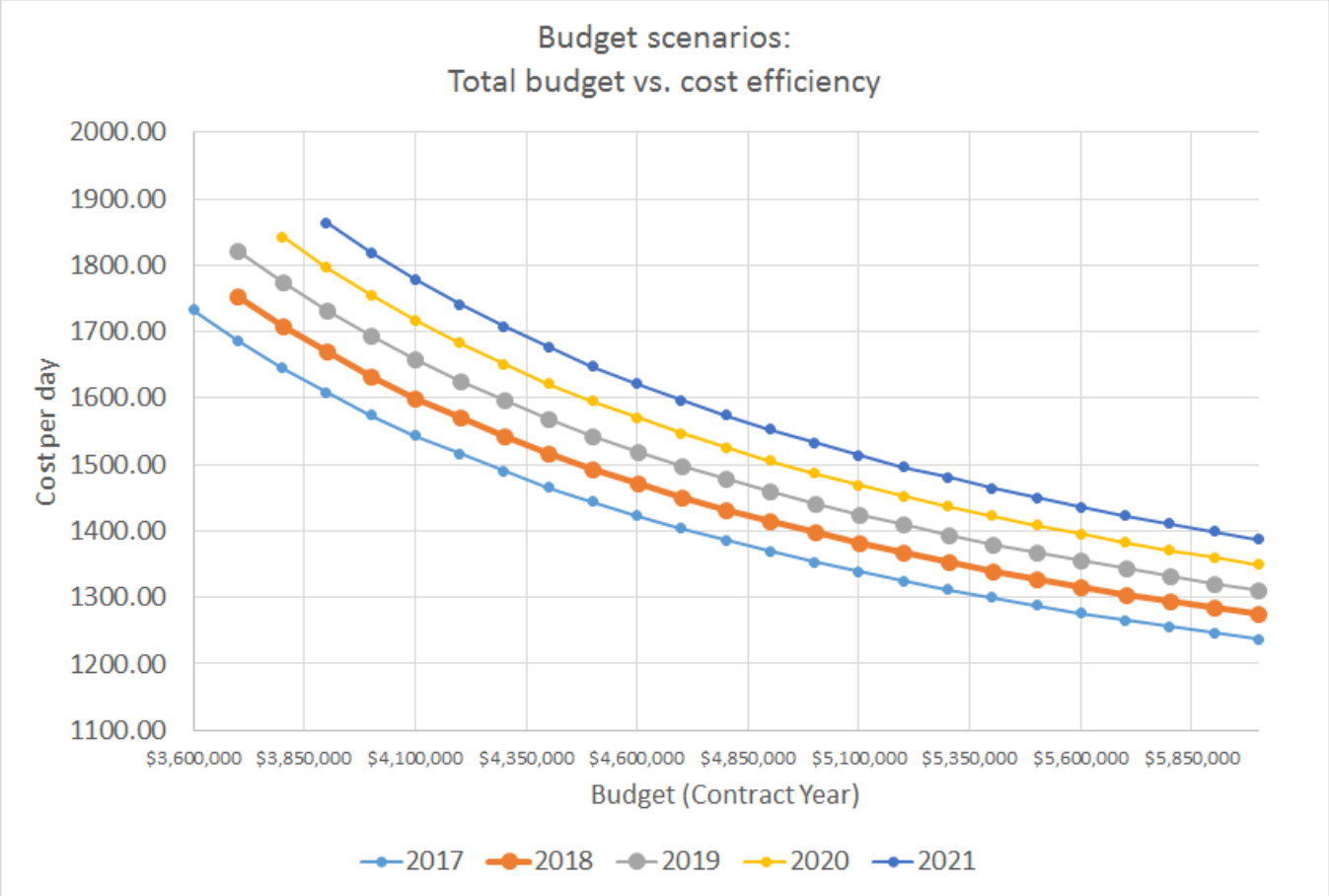


Figure 46 **Anticipated cost per observer sea day in the partial coverage contract under varying budget scenarios. The cost incorporates the anticipated cost per day for guaranteed and optional days in the future (given the current contract year-over-year cost increases) and illustrates the relationship between the budget and the cost per day (not inflation corrected). Note the 2019 budget curve was used in the gap analysis.**

Table 35 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 36 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 37 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

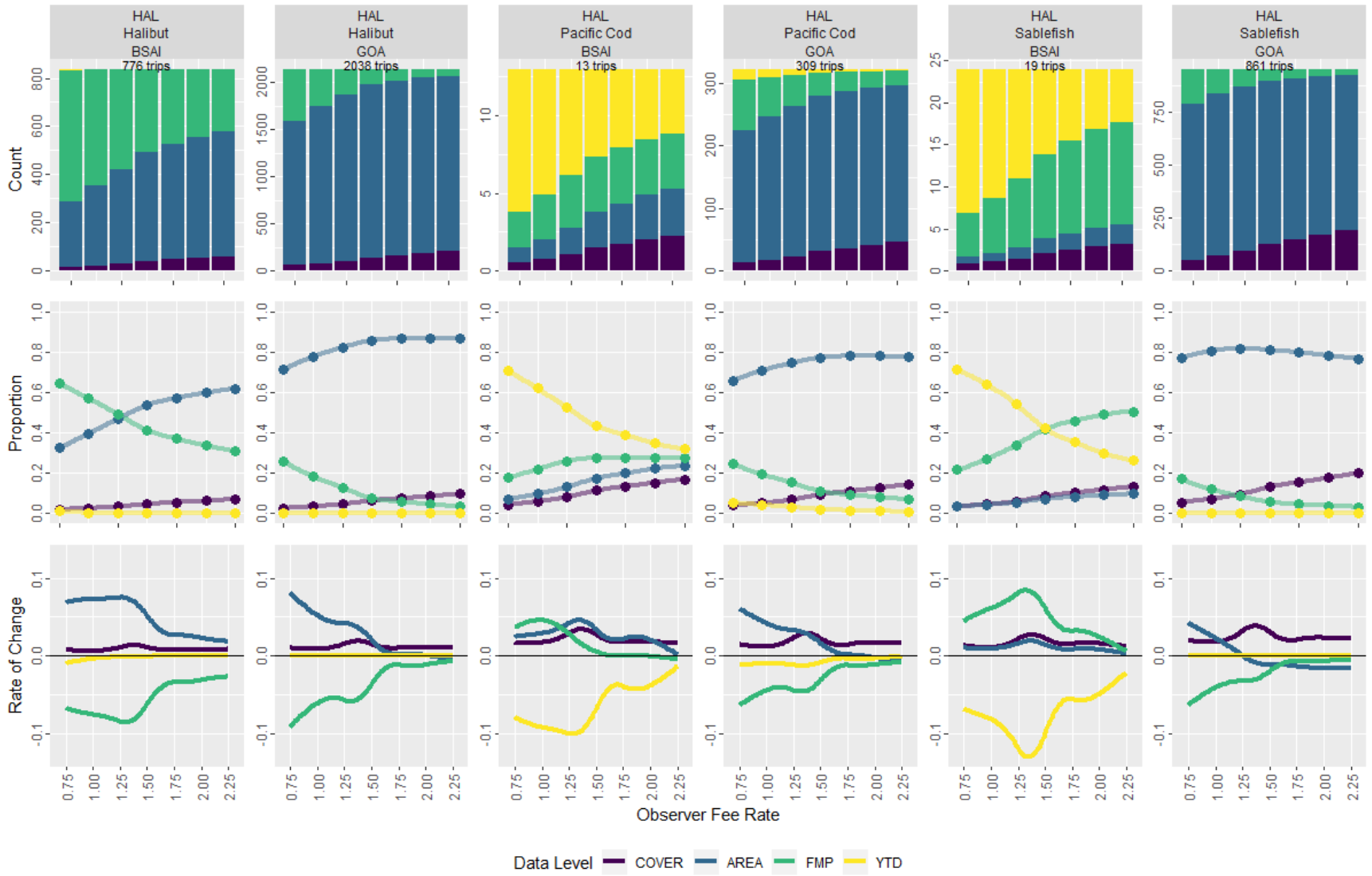


Figure 47 Gap analysis results for 2017 HAL gear trips within the observer pool's HAL stratum and no-selection pool.

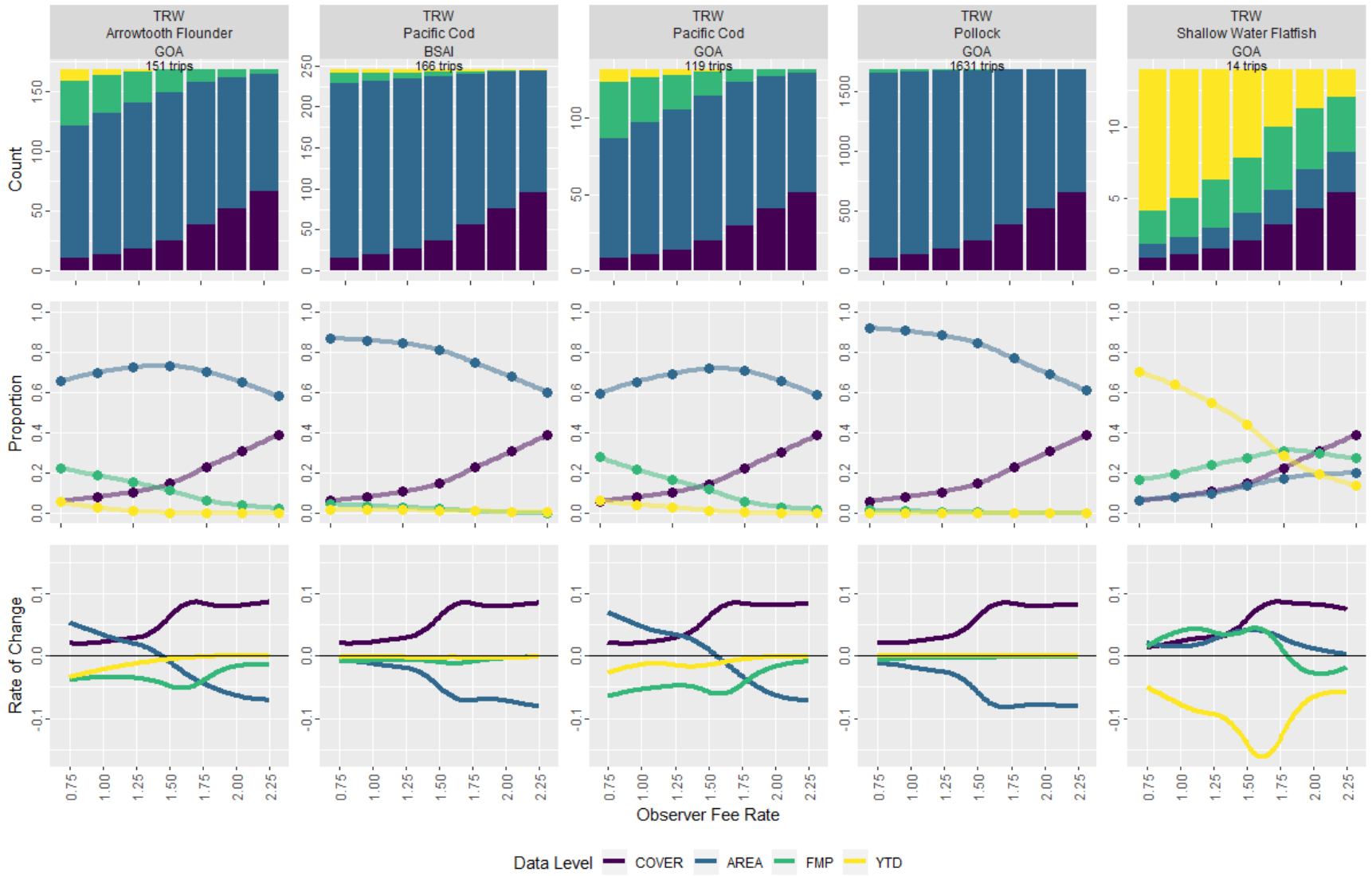


Figure 48 Gap analysis results for 2017 TRW gear trips within the observer pool's TRW stratum.

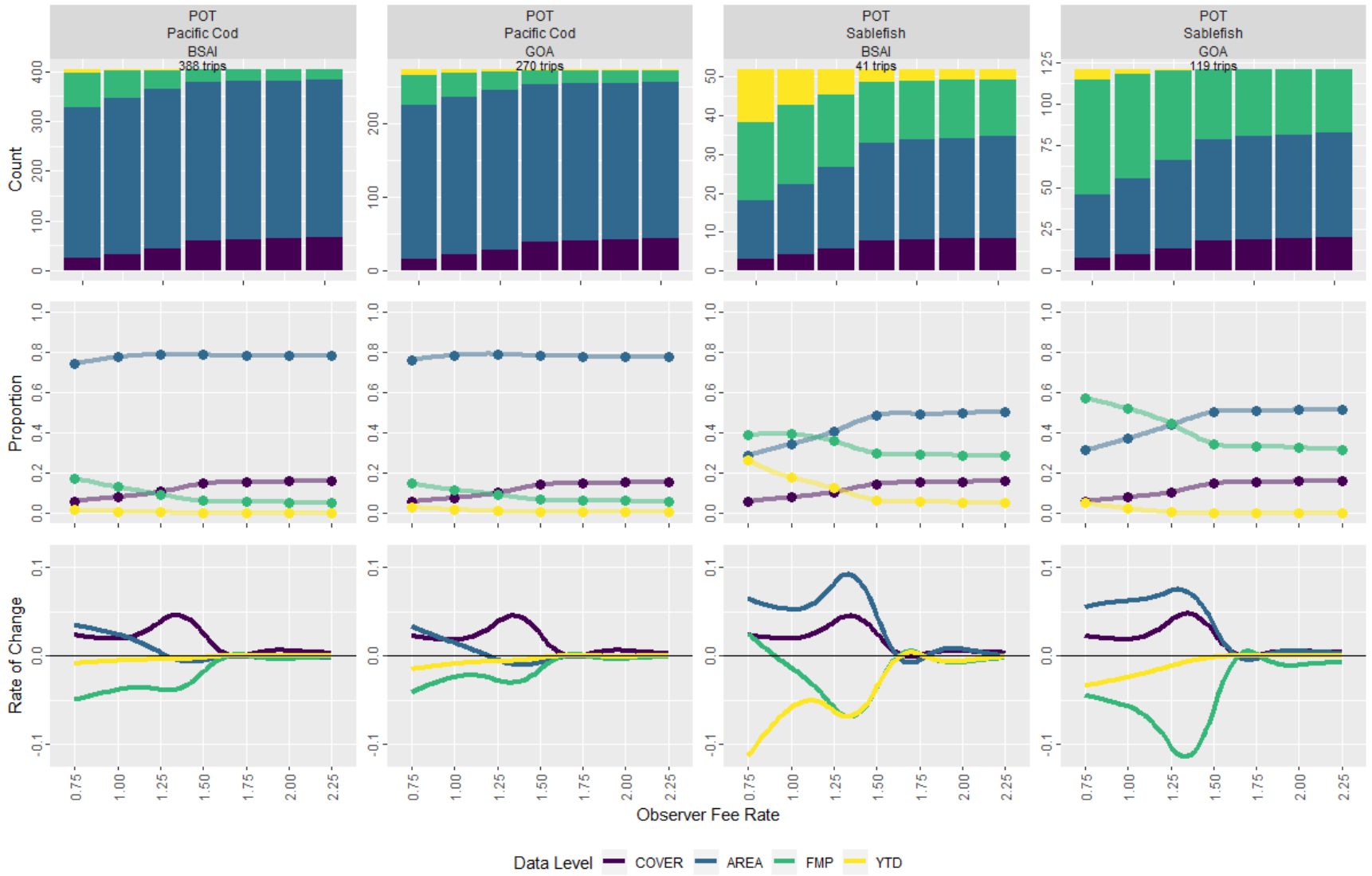


Figure 49 Gap analysis results for 2017 POT gear trips within the observer pool's POT stratum and no-selection pool.

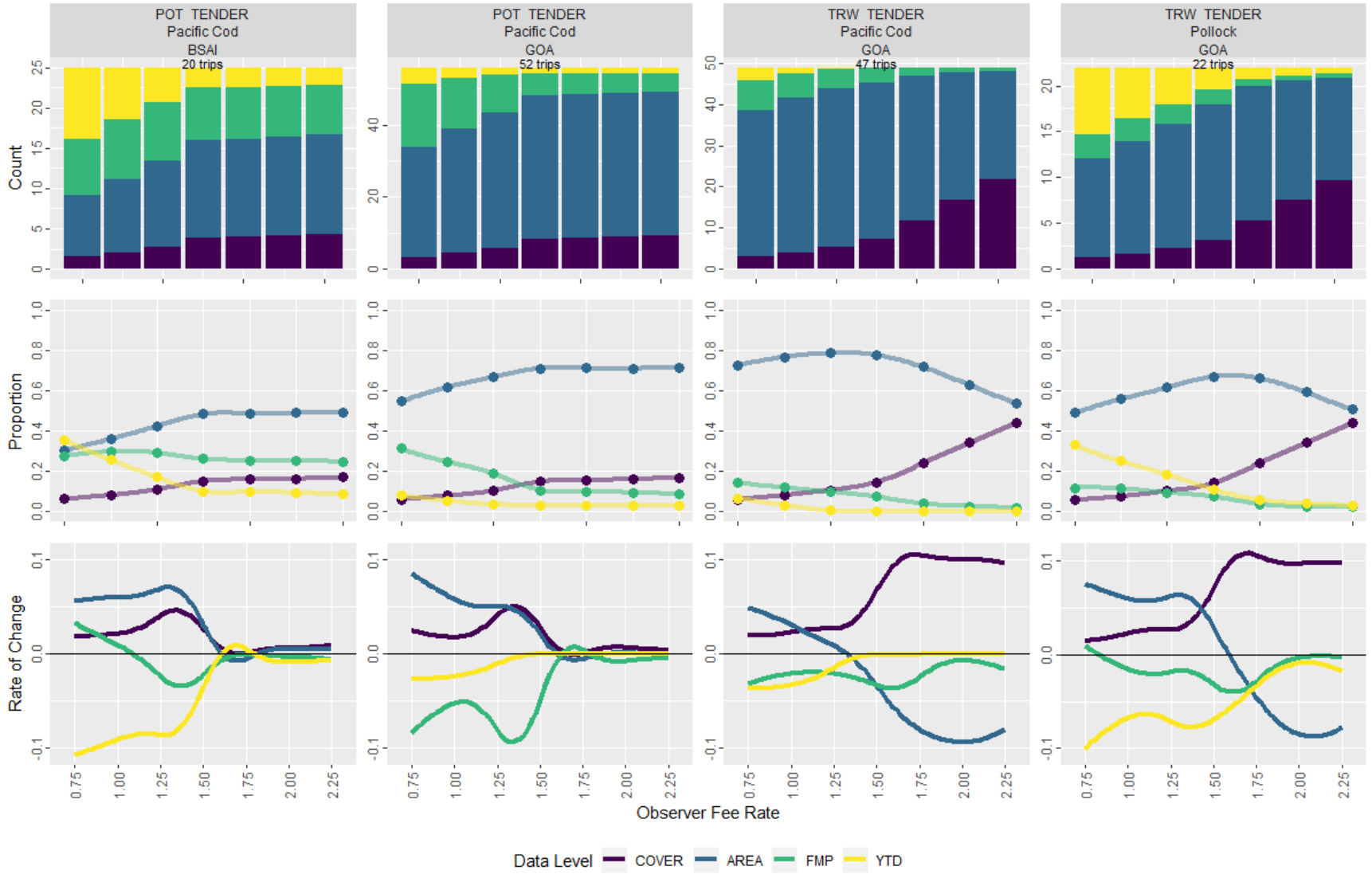


Figure 50 Gap analysis results for 2017 tender trips within the observer pool's POT_TENDER and TRW_TENDER strata.

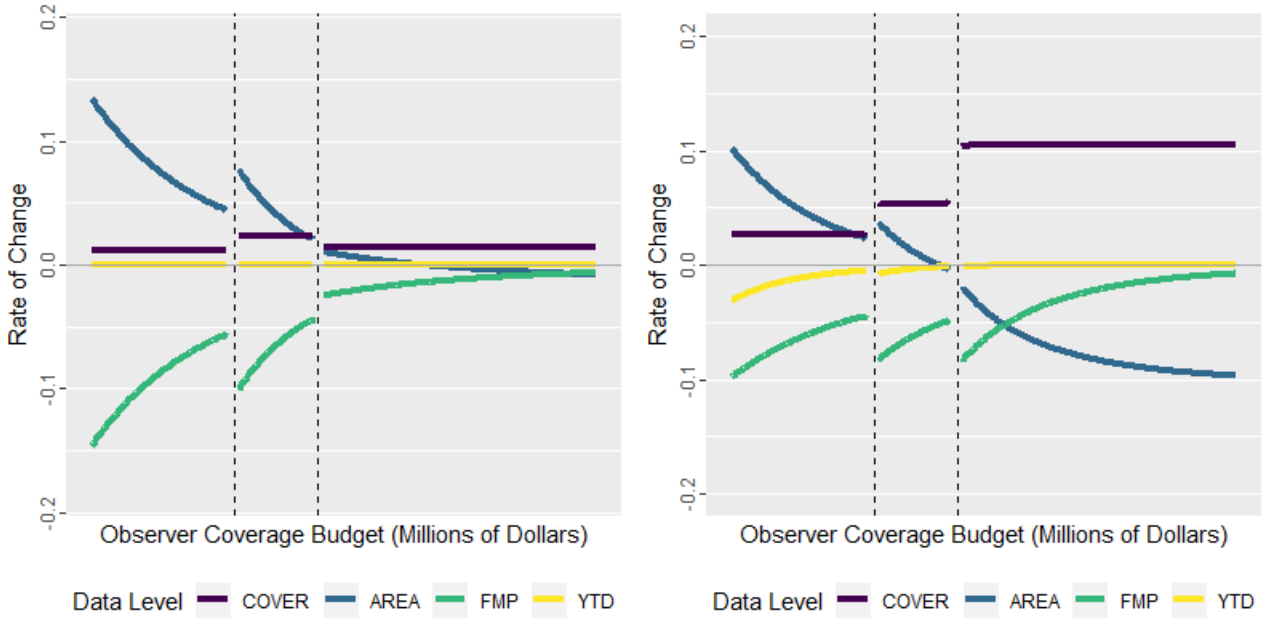


Figure 51 Example rate of change curves from numerical approach to gap analysis.

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% baseline 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.

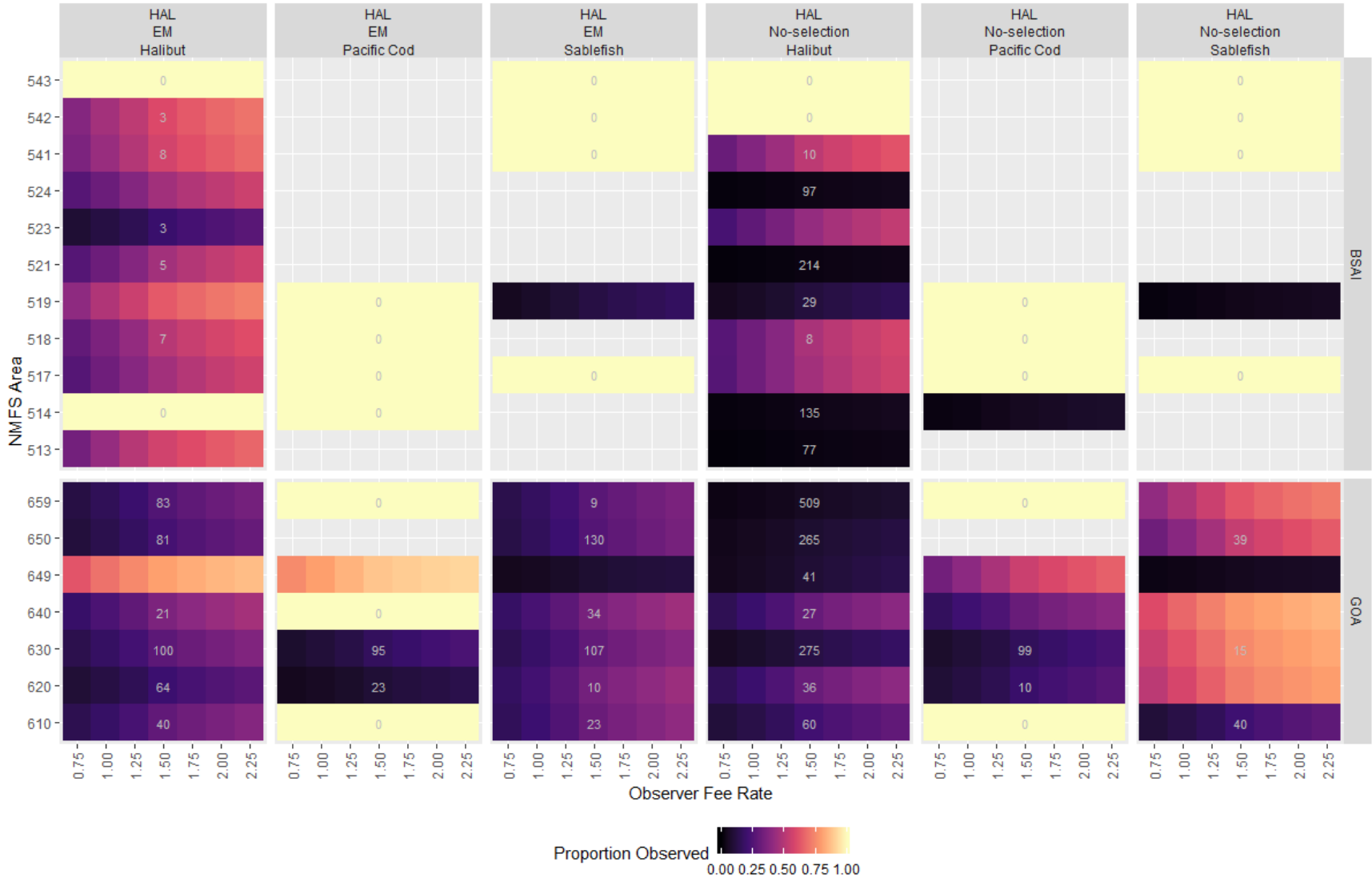


Figure 52 **Proportion of expected number of observed trips versus effort in the EM pool and no-selection pool for trips using HAL gear, separated by NMFS Area and trip target, as a function of the observer fee rate. The EM and no-selection pool effort, as the number of trips in 2017, are shown (except in cases where NMFS Areas are represented by data from fewer than 3 vessels).**

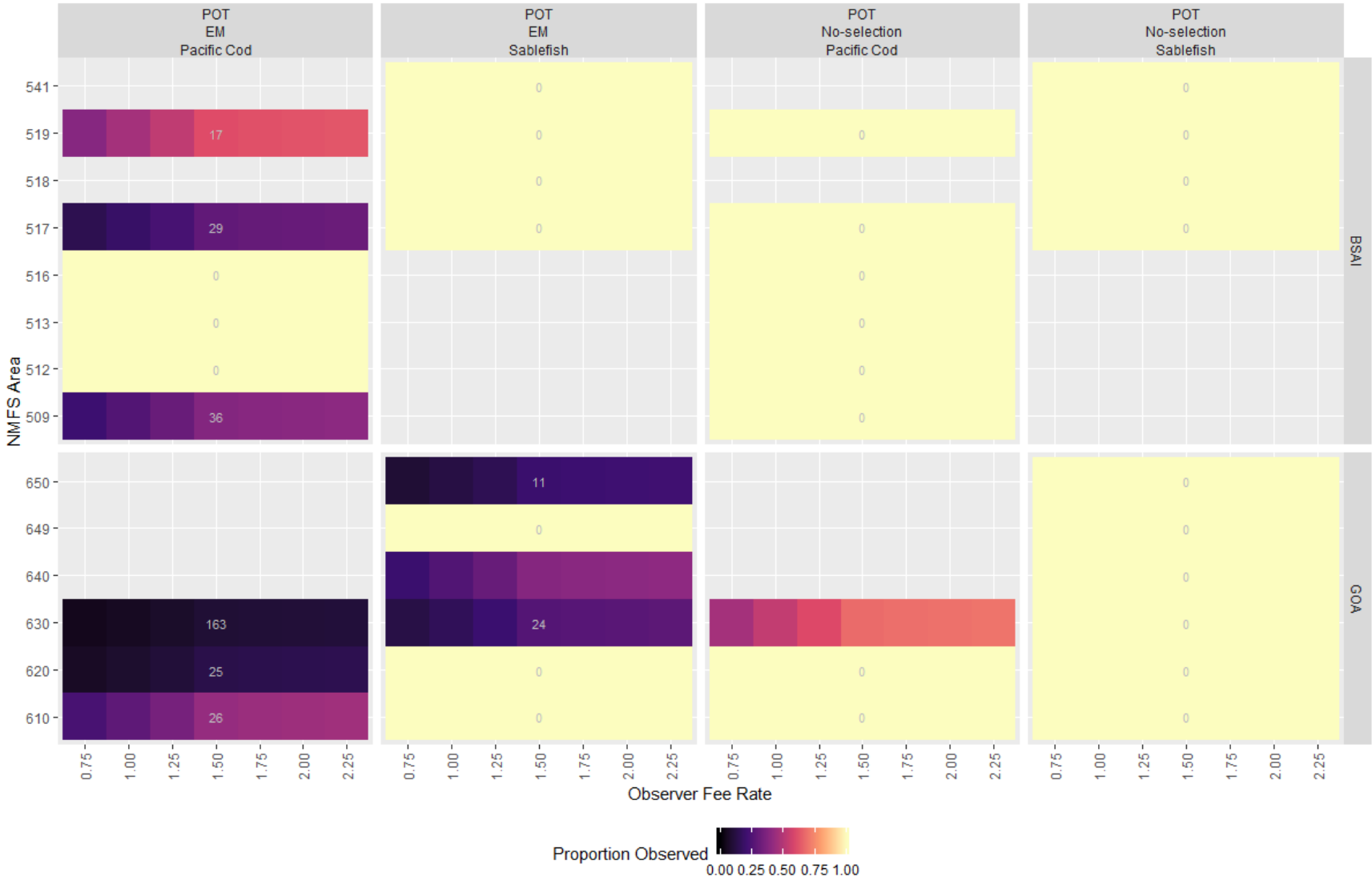
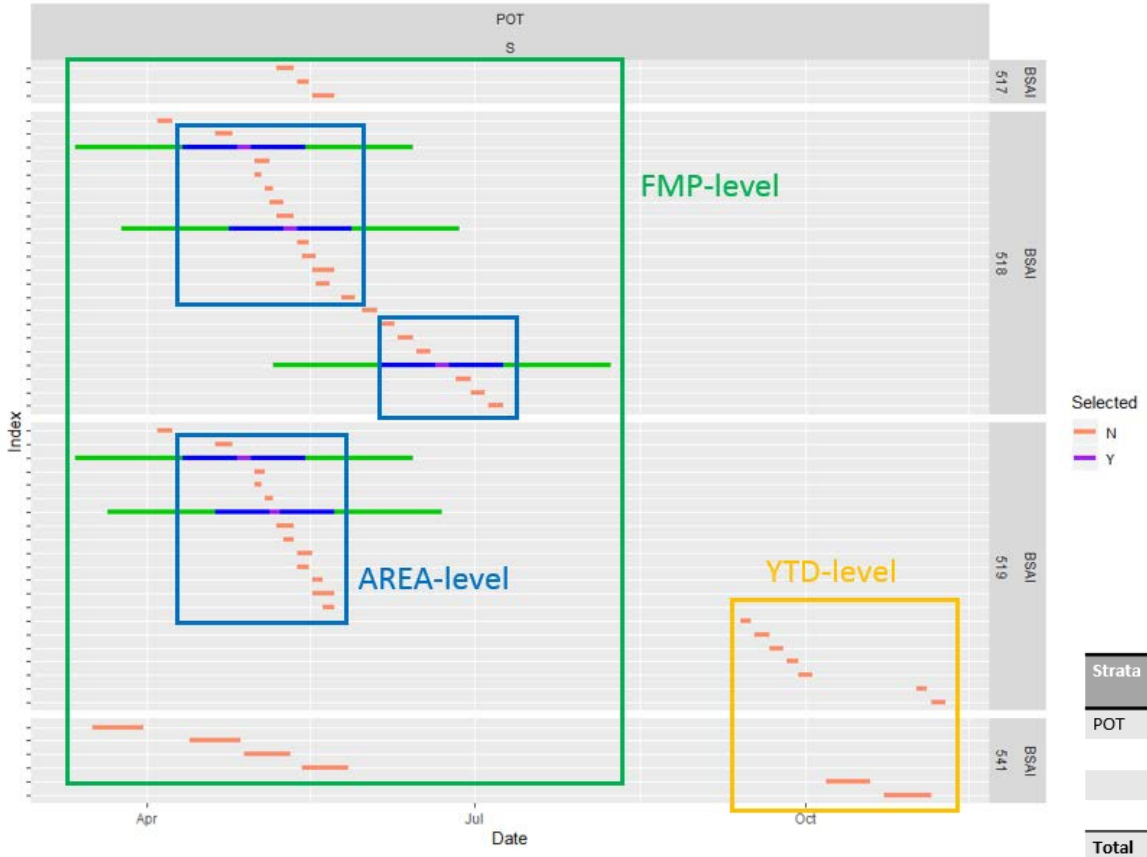

POT
EM
Pacific Cod
POT
EM
Sablefish
POT
No-selection
Pacific Cod
POT
No-selection
Sablefish
BSAI
GOA
NMFS Area
541
519
518
517
516
513
512
509
650
649
640
630
620
610
17
29
36
11
24
163
25
26
0
0.75
1.00
1.25
1.50
1.75
2.00
2.25
Observer Fee Rate
Proportion Observed
0.00 0.25 0.50 0.75 1.00

Figure 53 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	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 54 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

Appendix G. Community-level partial coverage participation

Including ex-vessel revenue, and dependency on partial coverage fisheries.

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

Table 38 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 39 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 40 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 41 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%