2025 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska

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Contents

Executive Summary

This final 2025 Annual Deployment Plan (ADP) describes how the National Marine Fisheries Service (NMFS) will assign at-sea and shoreside fishery observers and electronic monitoring (EM) to vessels and processing plants engaged in halibut and groundfish fishing operations in the North Pacific.

The North Pacific Observer Program (Observer Program) is the largest observer program in the country and is responsible for monitoring a fleet of nearly a thousand vessels that fish a combination of hook-and-line, pot, and trawl gear across the Alaska Exclusive Economic Zone (EEZ) area of roughly 3.77 M km^2. Fishing activities are classed as belonging to either partial or full coverage components of the program. In the full coverage component of the program, every trip is monitored by 1 or 2 observers and the vast majority of groundfish harvest is covered by this portion of the program. In the partial coverage component, a subset of trips are randomly selected for monitoring by an observer or EM system. In 2025, NMFS expects to monitor a total of 3,822 trips and 20,711 days, consisting of an estimated 2,602 trips and 15,991 days in the full coverage component of the program, and 1,220 trips and 4,720 days in the partial coverage component. Despite being a much smaller component of overall monitoring, the ADP focuses on the partial coverage component of the program and outlines the science-driven methods for deployment of observers and EM systems to support statistically reliable data collection. Specifically, the ADP describes the scientific deployment design and selection rates—the portion of trips that are sampled by observers and EM— for the partial coverage category.

The Observer Program has four monitoring models in 2025: 1) at-sea observers combined with compliance cameras on catcher/processors and motherships; 2) at-sea observers without compliance cameras; 3) fixed-gear EM, and 4) at-sea compliance EM on catcher vessels combined with shoreside observers to sample deliveries in the pollock trawl fishery.

Budget & Cost Assumptions

For full coverage trips, vessel and processing plant owners/operators are responsible for procuring observer and EM hardware services directly through NMFS-authorized companies and EM service providers. For partial coverage trips, vessel owners/operators declare each trip in a NMFS database and if the trip is selected for coverage, a NMFS-contracted observer provider company arranges for coverage. Funding for partial coverage is obtained from an ex-vessel fee on landings from the prior year and is used by NMFS to pay for observer and EM services. To estimate the costs of monitoring in the partial coverage category, cost models were constructed for each monitoring method. Each model incorporates: the best available information; assumptions about both fixed and variable costs; and known economy of scale. For this final ADP, the NMFS set a budget of $4.19M to support monitoring of the partial coverage fisheries in 2025.

Deployment Design

The deployment design involves three elements: 1) the selection method to accomplish complete or random sampling; 2) division of the full and partial populations into selection groups or strata; and 3) the allocation of deployments among strata.

Selection method

In full coverage, every trip is selected and monitored by 1 or 2 observers if monitoring is completed at

sea, or by an EM system at sea and an observer at the processing plant receiving catch from the EM monitored vessel.

In the partial coverage category, NMFS will implement trip selection from all ports throughout Alaska to assign both at-sea observers and EM to fishing events for vessels. Trip-selection refers to the use of the fishing trip as the primary sampling unit, and is accomplished using the Observer Declare and Deploy System (ODDS). The rates at which trips are randomly selected by ODDS for monitoring are determined by the analysis in the ADP.

In the Gulf of Alaska (GOA), every EM Trawl trip will be monitored at-sea by an EM system and by observers at the processing plant[1] to collect data on salmon and halibut prohibited species catch (PSC). NMFS also will randomly select offloads for observers to conduct biological sampling of groundfish.

Sampling strata
Fishing trips are broadly divided into groups, or selection pools, defined by whether monitoring is required on all trips (Full Coverage) or a subset of trips (Partial Coverage) as well as whether the trips will be monitored at sea by observers or EM. Selection pools may be further split into sampling strata, each with a specified monitoring rate (Table 1). In 2025, NMFS will implement 6 selection pools and 10 sampling strata.

Full Coverage Observer Pool
Vessels and processors in the full observer coverage category must comply with observer and EM coverage requirements at all times when fish are harvested or processed. Every trip is monitored. Vessels and processing plants in full coverage include: Catcher/Processors (with limited exceptions); Motherships; Catcher Vessels participating in Limited Access Privilege Programs that have transferable PSC allocations as part of a catch share; and Shoreside Processors receiving or processing Bering Sea pollock.

BSAI EM Trawl Gear Pool
NMFS has issued a final rule to implement EM on pollock catcher vessels using pelagic trawl gear. Vessels must opt-in annually by November 1, and be approved by NMFS, to participate in the EM Trawl category for the upcoming fishing year. In the Bering Sea and Aleutian Islands (BSAI), these vessels are in full coverage and compliance monitoring with an EM system is required on every trip. In addition, processing plants are responsible for procuring observers to ensure that all EM Trawl deliveries by catcher vessels or tender vessels to shoreside processors are subject to required dockside monitoring. Of the 112 vessels that applied and were approved by NMFS in the EM Trawl Gear pool for 2025, 72 are expected to fish in the BSAI.

Partial Coverage Observer Trip-Selection Pool
There are 4 observer trip-selection strata based on gear and Fisheries Management Plan area for 2025:

- *Observer Fixed-gear BSAI*
- *Observer Fixed-gear GOA*
- *Observer Trawl BSAI*
- *Observer Trawl GOA*

Partial Coverage EM Fixed-Gear Pool

[1] Despite the fact they are fully monitored at sea by EM and, in 2025, all offloads will have shoreside monitoring, GOA EM Trawl trips are still in the partial coverage category and are still subject to the observer fee.

The EM Fixed-gear selection pool consists of 2 sampling strata:

- *EM Fixed-gear BSAI*
- *EM Fixed-gear GOA*

Vessel owners/operators opt into the EM Fixed-gear selection pool and, if approved by NMFS, that vessel will remain in the EM selection pool for the duration of the calendar year. All requests to be in or out of the EM selection pool for 2025 must have been received in ODDS by 1 November 2024. NMFS may approve or deny requests by vessels to be added to the EM Fixed-gear pool based on the priorities identified by NMFS and supported by the Council, including: vessel size, fishing effort, minimizing data gaps, and cost efficiency. A vessel may make a request on which permitted EM Service Provider they wish to work with for the calendar year, but final selection will be done by NMFS through consideration of cost efficiency, cost competitiveness, past compliance on any contract terms, and data delivery success. In 2025, 178 vessels were approved to fish in the EM Fixed- Gear pool.

Each year, all vessels in the EM Fixed-gear selection pool — including those that were previously in the pool — are required to submit and follow a NMFS-approved Vessel Monitoring Plan (VMP). As part of the VMP approval, NMFS will assess a vessel's past adherence to their approved VMP. The quantity and severity of compliance issues that negatively impact data quality and collection will be used to assess vessel eligibility to participate in the EM Fixed-gear program.

GOA EM Trawl Gear Pool

NMFS has issued a final rule to implement EM on pollock catcher vessels using pelagic trawl gear. Vessels must opt-in annually by 1 November, and be approved by NMFS, to participate in the EM Trawl category for the upcoming fishing year. Once approved, all trips where the vessel targets pollock with only pelagic trawl gear will be subject to the EM Trawl regulations. Vessels must indicate prior to the trip whether they intend to deploy pelagic trawl gear during a trip and compliance monitoring with an EM system is required on every trip. In addition, observers will monitor EM deliveries by catcher vessels or tender vessels to shoreside processors. A vessel may make a request on which permitted EM Service Provider they wish to work with for the calendar year, but final selection will be done by NMFS through consideration of cost efficiency, cost competitiveness, past compliance on any contract terms, and data delivery success. Of the 112 vessels that applied and were approved by NMFS for the EM Trawl Gear pool for 2025, 55 are expected to fish in the GOA.

Tender vessels are not subject to the annual opt-in deadline of November 1 and tender approvals are completed by NMFS, as needed. NMFS will cover the servicing costs of 6 tender vessel EM systems in 2025. These EM systems are portable and, as such, may be installed on multiple tender vessels throughout a given fishing year. Beyond the 6 systems that NMFS will pay for servicing, additional tender vessels could be approved for the trawl EM category, as long as they have a fully functional EM system and comply with their NMFS-approved VMP.

No-selection Pool

The no-selection pool is composed of vessels that will have no probability of carrying an observer or EM system on any trips for the 2025 fishing year. This stratum includes vessels <40 feet length overall and/or fishing with jig gear

Allocation Strategy for Partial Coverage

Allocation strategy refers to the method of allocating monitoring among strata to sample units. In 2025, the NMFS will implement the Proximity Allocation method to deploy fixed-gear EM and at-sea observers

in the partial coverage category. This method is precautionary with respect to obtaining data from all types of fishing activity (i.e., decreasing data gaps) while protecting against high variance associated with low sample sizes. This allocation method applies to all sampled partial coverage strata (i.e., does not apply to no-selection stratum) except the EM Trawl GOA stratum.

For the EM Trawl strata in the GOA, NMFS will implement Dockside Monitoring and the allocation method will be set by NMFS based on maximizing observer sampling duties.

Dockside Monitoring
Dockside monitoring by observers will occur in shoreside processing plants to enable sampling of deliveries from pollock vessels fishing with pelagic trawl gear. The data collection objectives are to 1) enumerate salmon bycatch from EM deliveries and deliveries that were observed at sea; 2) enumerate halibut bycatch from EM deliveries; 3) collect salmon genetic information to determine salmon bycatch area of origin; and 4) collect biological samples from non-salmon species from EM deliveries.

For EM Trawl vessels in the GOA that deliver pollock to shoreside processors or tenders, observers in the processing plant will complete objectives 1–3 (above) for every EM offload and will complete objective 4 (above) for a randomly selected subset of EM offloads.

For vessels in the GOA pollock fishery that do not participate in the EM Trawl program and deliver to shoreside processors, observers in the processing plant will complete objectives 1 and 3 for the offloads from trips that are randomly selected for at-sea observer coverage. Halibut PSC estimates will be based on sample data collected by at-sea observers using current Catch Accounting System methods. Objective 4 will be completed through at-sea sampling by the vessel observer, as has been the norm in the past.

For observed trips in the GOA pollock fishery outside of the EM Trawl strata that are delivered to tender vessels (as well as trawl trips outside of the pollock fishery), data to meet objectives 1 through 4 will be obtained from observer at-sea samples of the total catch.

For trips in the BSAI trawl pollock fishery, both catcher vessels in the EM Trawl pool and those not in EM Trawl, a census of salmon will be completed during the offload.

Selection Rates

The selection rates for deployment of observers and electronic monitoring in 2025 are summarized in Table 1.

Table 1. Summary of total trips, selection rates (rounded to the nearest whole number), the number of trips expected to be monitored in each sampling stratum in 2025.

Component	Pool	Stratum	Selection Rate (%)	Number of Trips Expected to be Monitored	Monitoring Location & Purpose
Partial Coverage	**Observer Trip Selection**	Fixed-gear BSAI	20	52	At-sea for discard & PSC estimation / biological sampling
		Fixed-gear GOA	6	118	
		Trawl BSAI	40	10	**Plus pollock trawl deliveries monitored dockside for salmon on selected trips**
		Trawl GOA	15	30	
	EM Fixed-gear Trip Selection	EM Fixed-gear BSAI	48	24	At-sea for discard & PSC estimation
		EM Fixed-gear GOA	11	100	
	EM Trawl GOA	EM Trawl GOA	100	886	At-sea EM compliance monitoring
			100	886	Dockside salmon & halibut PSC accounting
			33	295	Dockside biological sampling
	No-selection	No-selection	0	0	n/a
Full Coverage	**Full Coverage**	Full Coverage	100	847	At-sea for discard & PSC estimation / biological sampling Plus pollock trawl deliveries monitored dockside for salmon
	EM Trawl BSAI	EM Trawl BSAI	100	1,755	At-sea EM compliance monitoring
					Dockside salmon & halibut PSC accounting / biological sampling

Introduction

Purpose and Authority

This 2025 Annual Deployment Plan (ADP) describes how the National Marine Fisheries Service (NMFS) intends to assign at-sea and shoreside fishery observers and electronic monitoring (EM) to vessels and processing plants engaged in halibut and groundfish fishing operations in the North Pacific. This plan is developed under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1862), the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP), the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP), and the Northern Pacific Halibut Act of 1982. The ADP outlines the science-driven method for deployment of observers and EM systems to support statistically reliable data collection. The ADP is a core element in implementation of section 313 of the Magnuson-Stevens Act, which authorizes the North Pacific Fishery Management Council (Council) to prepare a fishery research plan in consultation with NMFS.

The Council's role in the annual deployment plan process is described in the analysis that was developed to support the restructured observer program (NPFMC 2011) and in the preamble to the proposed rule to implement the restructured observer program (77 FR 23326). The preamble to the proposed rule notes that:

> *NMFS would consult with the Council each year on the deployment plan for the upcoming year. The Council would select a meeting for the annual report consultation that provides sufficient time for Council review and input to NMFS. The Council would likely need to schedule this review for its October meeting. The Council would not formally approve or disapprove the annual report, including the deployment plan, but NMFS would consult with the Council on the annual report to provide an opportunity for Council input. The final deployment plan would be developed per NMFS' discretion to meet data needs for conservation and management. (77 FR 23344 & 23345).*

The ADP follows the process envisioned by the Council and NFMS when the restructured observer program was developed and implemented. As a result, both the ADP development and the evaluation of data collected by observers and EM is an ongoing process. NMFS is committed to working with the Council throughout the annual review and deployment cycle to identify improved analytical methods and ensure Council and public input is considered.

More details on the legal authority and purpose of the ADP are found in the Final Rule for Amendment 86 to the BSAI FMP and Amendment 76 to the GOA FMP (77 FR 70062, 21 November 2012). Further details on the integration of EM deployment into the ADP process are found in the final rule to integrate EM into the Observer Program (82 FR 36991).

North Pacific Groundfish and Halibut Observer Program

NMFS implements the Council's fishery research plan through the North Pacific Groundfish and Halibut Observer Program (Observer Program). The Observer Program provides the regulatory framework and support infrastructure for stationing observers and EM systems to collect data necessary for the conservation, management, and scientific understanding of the commercial groundfish and Pacific halibut fisheries of the BSAI and GOA management areas. Electronic monitoring is broadly defined as

technological tools which collect fishing data to support stock assessment and fishery management. In the North Pacific, EM is usually more specifically referencing video imagery and sensors to provide catch and discard information and compliance monitoring after video review.

The Observer Program is the largest observer program in the country and is responsible for monitoring a fleet of nearly a thousand vessels that fish a combination of hook-and-line, pot, and trawl gear across the Alaska Exclusive Economic Zone (EEZ) area of roughly 3.77 M km^2. The deployment of monitoring assets (observers and/or EM) is the first stage of a hierarchical sampling design (Cahalan and Faunce 2020). Since 2013, the fishing trip has been the primary sampling unit. Fishing trips made by vessels are assigned to either full or partial coverage.

In full coverage, every trip is monitored by 1 or 2 observers if monitoring is completed at sea, or by an EM system at sea and an observer at the processing plant receiving catch from EM monitored vessels. For full coverage trips, vessel and processing plant owners/operators are responsible for procuring observer and EM hardware services directly through NMFS-authorized companies. There are currently three NMFS-permitted observer service provider companies, two NMFS-approved EM hardware companies, and one EM review organization.

For partial coverage trips, vessel owners/operators declare each trip in a NMFS database and if the trip is selected for coverage, a NMFS-contracted observer provider company arranges for coverage. Funding for partial coverage is obtained from an ex-vessel fee on landings from the prior year and is used by NMFS to pay for observer and EM services. In the partial coverage component, the ADP specifies the scientific sampling design and the selection rates—the portion of trips that are sampled. NMFS and the Council recognized that selection rates in partial coverage, for any given year, would be dependent on available revenue generated from fees on groundfish and halibut landings. The annual apportionment of the budgets for observer deployment and EM system deployment is also reflected in the ADP process. The ADP process allows NMFS to adjust deployment in each year so that sampling can be achieved within budget constraints. While fisher participation in observer monitoring is automatic, if a vessel wishes to participate in at-sea EM they must volunteer, be approved by NMFS, and follow a Vessel Monitoring Plan (VMP). Cost efficiency of an EM vessel may change over time, but hardware infrastructure cannot be easily or cheaply modified to respond to different fishing effort patterns. As a result of these different rules of participation, NMFS evaluates each vessel volunteering for EM for cost efficiency, minimization of data gaps, and vessel size (as a proxy for ability to carry an observer) prior to accepting them into the EM strata.

Data Collection

Data collection through the Observer Program provides a reliable and verifiable method for NMFS to gain fishery discard (observers and EM) and biological information (observers only) on fish, and data concerning seabird and marine mammal interactions with fisheries. These data contribute to the best available scientific information used to manage the fisheries in the North Pacific. The design of the holistic monitoring program that meets mandates of the Magnuson-Stevens Act, Marine Mammal Protection Act (MMPA), and Endangered Species Act (ESA) ensures that multiple monitoring programs are not required on the fleet. While both observers and EM systems provide fishery-dependent data, these monitoring methods provide different information on catch and interactions with protected species. Table 2 summarizes the broad suite of data collection through the different monitoring approaches under the Observer Program. Observers and EM systems provide fishery-dependent information that is used to estimate total catch and interactions with protected species. Managers use these data to manage

groundfish and Prohibited Species Catch (PSC) within established limits and to document and quantify fishery interactions with protected species. Much of this information is expeditiously available (e.g., daily or at the end of a trip, depending on the type of vessel) to ensure effective management. Scientists also use fishery-dependent data to assess fish stocks, evaluate marine mammal and seabird interactions with fishing gear, characterize fishing impacts on habitat, and provide data for fisheries and ecosystem research and fishing fleet behavior.

ADP Process

On an annual basis, NMFS develops an ADP to explain how observers and EM will be deployed for the upcoming calendar year, and prepares an Annual Report that evaluates the performance of the prior year's ADP implementation. NMFS and the Council created this ADP / Annual Report process to provide flexibility in the deployment of monitoring assets used to gather reliable data for estimation of catch in the groundfish and halibut fisheries off Alaska.

The Annual Report is presented to the Council in June each year and informs the Council and the public about how well various aspects of the program are working. The review highlights areas where improvements are recommended to: 1) collect the data necessary to manage the groundfish and halibut fisheries; 2) maintain the scientific goal of unbiased data collection, and; 3) accomplish the most effective and efficient use of the funds collected through the observer fees.

A draft ADP that outlined sampling for the 2025 fishing year was prepared and presented to the NPFMC in October. This document represents the final ADP for 2025. The ADP allows for partial coverage strata definitions, participation requirements, allocation methods, and selection rates to change each year. Strata help define how trips will be monitored (for example which vessels belong to observer or EM selection pools and the requirements necessary to participate in each) and may be based on factors such as gear type, vessel length, home or landing port, availability of EM systems, funding, and monitoring goals. Since 2013, aspects of deployment have been adjusted through the ADP (e.g., NMFS 2020). The modifications have included moving types of partial coverage trips between selection pools or strata, varying the selection unit from vessel to trip, and changes in selection rates used to deploy observers and EM in the partial coverage category (Table 3).

The flexibility offered by the ADP allows NMFS and the Council to achieve transparency, accountability, and efficiency from the Observer Program to meet its myriad objectives. The ADP process ensures that the best available information is used to evaluate deployment, including scientific review and Council input, to annually determine deployment methods. The Observer Program is accountable to operate within annual financial constraints that are dependent on the amount of fee revenue collected from groundfish and halibut landings in the prior year and the anticipated future costs of monitoring and fishing effort.

Summary of 2024 ADP

In 2025, NMFS intends to carry forward the same sampling design that was used in 2024, albeit with different selection rates that are based on the budget and predicted fishing effort for the coming year. Because the sampling design in 2025 will be similar to the 2024 ADP, this section provides a short overview of the 2024 ADP and the analysis that was conducted in developing that ADP.

At the October 2019 Council meeting, the Council recommended an increase in the observer fee percentage from 1.25 percent to 1.65 percent for the Partial Coverage Observer Program and dovetailed

that recommendation with continued development of mechanisms to improve cost efficiency in the program as its highest priority. In response to a Council priority to improve cost efficiencies in the partial coverage category and to integrate upcoming changes into the observer program, including incorporating regulatory changes required by the Pacific Cod Trawl Cooperative (PCTC) and Trawl EM programs, NMFS initiated an evaluation of partial coverage to compare alternative scientifically robust, cost-effective sampling plans. The evaluation of alternative sampling plans can be found in the draft 2024 ADP (NMFS 2023a), which assisted NMFS and the Council with moving forward with a preferred design for the final 2024 ADP (NMFS 2023b).

The final 2024 ADP created a stratification definition based on monitoring method (Observer, EM Fixed-gear, EM Trawl), Fishery Management Plan (FMP) area (BSAI, GOA), and gear (Fixed, Trawl), where Fixed-gear combines hook-and-line and pot gear. The final 2024 ADP also described how the Proximity Allocation Method would be implemented to deploy observers and EM (NMFS 2023b). The Proximity Allocation Method is designed to spread sampled trips throughout the fisheries to increase the proportion of trips that are sampled or near a sampled neighbor and to be consistent between strata within a specified budget, while also protecting against small sample sizes within a stratum. As such, the Proximity Allocation Method is precautionary with respect to obtaining data from all types of fishing activity (decreasing data gaps) while protecting against high variance associated with low sample sizes.

The draft 2024 ADP (NMFS 2023a) compared multiple allocation methods, including a “hurdle” allocation approach that had been implemented starting in 2018. The hurdle approach allocated a single, set level of monitoring across all strata, and placed additional monitoring as resources allowed to meet specific monitoring goals. Unlike the hurdle approach that allocates samples equally among strata at low budgets, the Proximity Allocation method guards against small sample sizes and avoids wasteful sampling within individual stratum at any budget. Thus, the Proximity Allocation method serves the same purpose as the hurdle approach, with the added benefit that samples are representative for each stratum without over- or under-sampling any particular stratum. When reviewing the draft 2024 ADP, the Council supported implementation of the Proximity Allocation method (Appendix A) and also requested that NMFS continue to explore the hurdle approach. A discussion of these two allocation methods was provided in Appendix C of the draft 2025 ADP (NMFS 2024b).

Table 2. Data collected by at-sea observers, EM Trawl with shoreside observers, and EM Fixed-gear. A green checkmark (✓) indicates that the data are collected, a red ✕ indicates that the data are not collected, and blue arrows (⇔) indicate that compared to at-sea observers, some, but not all, data are collected.

Data Collected		At-sea Observers	EM Trawl + Shoreside Observers	EM Fixed-gear
Catch				
	Trip Characteristics (e.g., duration, total effort)	✓	✓	✓
	Haul Characteristics (e.g., location, effort, depth, gear performance)	✓	⇔	⇔
	Haul Level Species Composition - Counts	✓	✕	✓
	Haul Level Species Composition - Weights	✓	✕	✕
	Trip Level Species Composition - Counts	✓	✓	✓
	Trip Level Species Composition - Weights	✓	✓	✕
	Speciation of Similar Species (e.g., large red rockfish, king crabs)	✓	✓	✕
	Haul Specific Salmon PSC Enumeration	✓	✕	⇔
	Trip Specific Salmon PSC Enumeration	✓	✓	⇔
	USCG Marine Casualty Information	✓	⇔	⇔
Biologicals				
	Sex Length Data (fish and crab)	✓	✓	✕
	Pacific Halibut Size and Mortality Assessment	✓	✓	✕
	Trip Specific Age Structures (e.g., otoliths, scales, fin rays)	✓	✓	✕
	Trip Specific Tissue for Genetic Analyses	✓	✓	✕
	Tagged Organism Information	✓	✓	✕
	Stomach Samples (trophic interactions)	✓	⇔	✕
	Maturity Information	✓	⇔	✕
Protected Species				
	Marine Mammal Injury and Mortality	✓	⇔	⇔
	Marine Mammal Tissue (genetics, trophic information, contaminants)	✓	✕	✕
	Marine Mammal Interactions (non-lethal, non-injury)	✓	✕	⇔
	Marine Mammal Sightings	✓	✕	✕
	Verify Use of Seabird Avoidance Methods	✓	n/a	✓
	Seabird Mortality (catch by gear)	✓	✓	✓
	Seabird Mortality (vessel interactions)	✓	⇔	⇔
	ESA-Listed Seabird Carcass	✓	⇔	✕

Table 3. 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 are noted and the realized coverage rates evaluated in each Annual Report are noted in parentheses. PreIm = pre-implementation, prior to a fully regulated program; CP = catcher/processor vessel; CV = catcher vessel; GOA= Gulf of Alaska; BSAI = Bering Sea and Aleutian Islands; H&L = hook-and-line gear; LOA = vessel length overall; EM = electronic monitoring.

<table>
<tr><th rowspan="2">Year</th><th colspan="5">Observer Trip Selection</th><th colspan="2">EM Fixed-gear trip selection pool
EM required on randomly selected trips</th><th colspan="2">EM Trawl</th><th>Observer vessel selection pool</th><th colspan="2">No-selection pool
Observer coverage not required</th></tr>
<tr><th colspan="4">Trip-selection across all ports
Observer coverage required on all randomly selected trips</th><th>Port-based Trip Selection*</th><th></th><th></th><th></th><th></th><th></th><th colspan="2"></th></tr>
<tr><td>2025</td><td>Trawl BSAI: 40%</td><td>Trawl GOA 15%</td><td>Fixed-gear BSAI: 20%</td><td>Fixed-gear GOA: 6%</td><td rowspan="4">n/a</td><td>EM Fixed-gear GOA: 11%</td><td>EM Fixed-gear BSAI: 48%</td><td>GOA: 100% at-sea EM and shoreside salmon monitoring + 33% collection of biologicals</td><td rowspan="6">BSAI: 100% at-sea EM, shoreside monitoring, and collection of biologicals</td><td rowspan="6">n/a</td><td colspan="2" rowspan="3">Vessels < 40’ LOA and Jig gear</td></tr>
<tr><td>2024</td><td>Trawl BSAI: 72%</td><td>Trawl GOA : 21%</td><td>Fixed-gear BSAI: 44%</td><td>Fixed-gear GOA: 13%</td><td>EM Fixed-gear GOA: 24%</td><td>EM Fixed-gear BSAI: 74%</td><td rowspan="4">GOA: 100% at-sea EM + 33% shoreside monitoring and collection of biologicals</td></tr>
<tr><td>2023</td><td colspan="2">Trawl: 22.7% (32.3)</td><td>H&L: 17.9% (19.4)</td><td>Pot: 17.1% (17.8)</td><td colspan="2" rowspan="5">EM Fixed-gear (H&L and Pot): 30%</td></tr>
<tr><td>2022</td><td colspan="2">Trawl: 29.7% (29)</td><td>H&L: 19% (14.6)</td><td>Pot: 17.5% (18.1)</td><td colspan="2" rowspan="3">Vessels < 40’ LOA and Jig gear</td></tr>
<tr><td rowspan="3">2021</td><td colspan="4">Sep. 1 – Dec. 31:
Trawl: 21% (28.2) H&L: 18% (17.2) Pot: 18% (20.5)</td><td>All ports</td><td rowspan="2">EM Innovation Research 2–4 vessels</td></tr>
<tr><td colspan="4">Jan. 1 – Aug. 31: Limited waivers due to COVID-19</td><td>13 ports</td></tr>
<tr><td rowspan="2">2020</td><td colspan="4">Mar. 26 – Jun. 30: Waivers issued due to COVID-19</td><td>13 ports</td></tr>
<tr><td colspan="4">Mar. 26 – Jun. 30: Waivers issued due to COVID-19</td><td>Kodiak only</td></tr>
</table>

<table>
<tr><td></td><td colspan="5">Jan. 1 – Mar. 25:
Trawl: 20% (22.4) H&L: 15% (13.4) Pot: 15% (15.5)</td><td>Deployment in all ports</td><td colspan="2" rowspan="2"></td><td colspan="2" rowspan="2"></td><td rowspan="2">n/a</td><td rowspan="8">Vessels < 40’ LOA and Jig gear</td><td rowspan="2">EM Innovation Research 2–4 vessels</td></tr>
<tr><td>2019</td><td>Trawl: 24% (25.2)</td><td>Trawl Tender: 27% (35.7)</td><td>H&L: 18% (17.6)</td><td>Pot: 15% (14.0)</td><td>Pot Tender: 16% (29.5)</td><td rowspan="4">n/a</td></tr>
<tr><td>2018</td><td>Trawl: 20% (20.3)</td><td>Trawl Tender: 17% (35.0)</td><td>H&L: 17% (15.5)</td><td>Pot: 16% (15.5)</td><td>Pot Tender: 17% (29.0)</td><td>EM H&L: 30%</td><td>EM Pot PreIm: 30% (not used in catch accounting)</td><td colspan="2" rowspan="3">n/a</td><td rowspan="5">n/a</td><td rowspan="3">EM PreIm 60 vessels</td></tr>
<tr><td>2017</td><td>Trawl: 18% (20.7)</td><td>Trawl Tender: 14% (18.8)</td><td>H&L : 11% (12.0)</td><td>H&L Tender: 25% (0)</td><td>Pot: 4% (7.7)</td><td>Pot Tender: 4% (5.3)</td><td colspan="3" rowspan="3">n/a</td></tr>
<tr><td>2016</td><td colspan="2">Trawl: 28% (28.0)</td><td colspan="2">H&L: 15% (15.0)</td><td colspan="2">Pot: 15% (14.7)</td></tr>
<tr><td>2015</td><td colspan="3">Large Vessel 24% (23.4)
Trawl CVs, Small CPs, H&L/Pot CVs ≥ 57.5’</td><td colspan="3">Small Vessel 12% (11.2)
H&L/Pot CVs > 40’ and < 57.5’</td><td colspan="3">n/a</td><td>EM PreIm 12 vessels</td></tr>
<tr><td>2014</td><td colspan="6">All Trawl CVs and H&L/Pot vessels ≥ 57.5’ LOA: 16% (15.1)</td><td colspan="5">n/a</td><td>H&L/Pot CVs > 40’ and < 57.5’: 12% (15.6)</td><td>Voluntary EM</td></tr>
<tr><td>2013</td><td colspan="6">All Trawl CVs and H&L/Pot vessels ≥ 57.5’ LOA: 14.5% (14.8)</td><td colspan="5">n/a</td><td>H&L/Pot CVs > 40’ and < 57.5’: 11% (10.6)</td><td colspan="2">Vessels < 40’ LOA and Jig gear</td></tr>
</table>

*Observer coverage on randomly selected trips in specific ports. This protocol was implemented in response to the COVID-19 pandemic when travel and lodging conditions in specific ports allowed observers to meet and maintain applicable health mandates for deployment into the commercial fisheries.

Partial Coverage Budget and Cost Assumptions

NMFS set a budget of $4.19M to support monitoring of the partial coverage fisheries in 2025. The budget includes revenues generated from ex-vessel fees collected from fishing in 2023, estimated ex-vessel fees that are expected to be collected from fishing in 2024, and federal funds that are able to be secured for monitoring. However, there is more uncertainty in the 2025 annual budget and costs of monitoring than in past years. This uncertainty is due to: (1) difficult predictions regarding the amount of revenue that will be generated from fees for landings in 2024; (2) integrating the costs of trawl EM into the annual budgets; and (3) ongoing delays in receiving funding associated with the transition in NOAA's financial systems.

The partial coverage monitoring program has three monitoring methods: 1) at-sea observers; 2) EM Fixed-gear; and 3) at-sea compliance EM on vessels combined with shoreside observers to sample deliveries in the GOA pollock trawl fishery (note that EM Trawl trips in the Bering Sea are full coverage and therefore monitoring costs for those trips are excluded from the partial coverage budget). To estimate the costs of monitoring, cost functions were constructed for each of the three monitoring methods. Each function incorporates: the best available information; assumptions about both fixed and variable costs; and known economy of scale. An in-depth description of how the cost functions were generated is provided in Appendix B.

For this final ADP, the at-sea observer costs were a function of the number of sea days purchased, the price per guaranteed day and optional day, and travel costs. For EM Trawl, the cost function quantified shoreside observer cost per plant-day (including the number of guaranteed and optional days purchased, lodging, and food costs). The shoreside observer cost estimate assumed: five observers to monitor processing plants in Kodiak during A and B season; one observer to monitor plants in False Pass during B season only; all observers monitor on all calendar days while pollock fishing is open; and plant operations in 2025 are similar to the 2023–2024 period.

For both EM Trawl and EM Fixed-gear, the cost was a function of annual cost for EM equipment maintenance by EM service providers (which is dependent on the number of vessels in the pool) and video review costs. The cost models do not include new EM system installations and EM equipment replacements because those are supported separately from the Congressional Directed Spending funds that are administered through a grant with Pacific States Marine Fisheries Commission (PSMFC).

In total, EM Trawl was estimated to cost $911,000 which was deducted from the total $4.19M budget prior to allocation of the remaining funds (approximately $3.28M) to deploy at-sea observers and EM Fixed-gear.

2025 Deployment Methods

Selection Method

For 2025, NMFS will implement trip selection from all ports throughout Alaska to assign both at-sea observers and EM to fishing events for vessels in the partial observer coverage category. Trip-selection refers to the use of the fishing trip as the primary sampling unit, and is accomplished using the Observer Declare and Deploy System (ODDS; Faunce et al. 2021).

In the GOA EM Trawl stratum, trips are monitored in three ways: 1) every trip is monitored by an EM system at sea; 2) every offload is monitored for salmon and halibut by an observer at the shoreside processing plant receiving catch from EM vessels; and 3) EM vessel offloads will also be randomly selected by NMFS for biological sampling by observers in shoreside processing facilities.

In full coverage, every trip is selected and monitored by 1 or 2 observers if monitoring is conducted at sea, or by an EM system at sea and an observer at the processing plant receiving catch from EM vessels.

Selection Pools and Stratification Scheme

Fishing trips are broadly divided into groups, or selection pools, defined by whether monitoring is required on all trips (Full Coverage) or a subset of trips (Partial Coverage) as well as whether the trips will be monitored by observers or EM. Selection pools may be further split into sampling strata, each with a specified monitoring rate. In 2025, NMFS will implement 6 selection pools and 10 sampling strata.

Full Coverage

Full Coverage Observer Pool
Vessels and processors in the full observer coverage category must comply with observer coverage requirements at all times when fish are harvested or processed. Every trip is monitored by one or more observers. Specific requirements for the observer component of the full coverage stratum are defined in regulation at 50 CFR § 679.51(a)(2) and observers are required on every trip. Vessels and processing plants in full coverage includes the following:

- Catcher/processors (with limited exceptions).
- Motherships.
- Catcher vessels (CVs) participating in programs that have transferable PSC allocations as part of a catch share program, which includes: Catcher vessels harvesting PCTC quota; Bering Sea pollock (both American Fisheries Act [AFA] and Community Development Quota [CDQ] programs), the groundfish CDQ fisheries (CDQ fisheries other than Pacific halibut and fixed-gear sablefish; only vessels greater than 46 ft LOA); and the Central GOA Rockfish Program.
- CVs using trawl gear in the BSAI that have requested placement in the full coverage category.
- Inshore processors receiving or processing Bering Sea pollock.

EM Trawl in the BSAI Pool
NMFS has issued a final rule to implement EM on pollock catcher vessels using pelagic trawl gear. Vessels must opt-in annually by 1 November, and be approved by NMFS, to participate in the EM Trawl category for the upcoming fishing year. In the BSAI, these vessels are in full coverage and compliance monitoring with an EM system is required on every trip. In addition, processing plants are responsible for procuring observers to ensure that all EM Trawl deliveries by catcher vessels to shoreside processors are monitored (for more details, see section below on Dockside Monitoring).

Partial Coverage

Partial Coverage Observer Trip-Selection Pool
There are 4 observer trip-selection strata based on gear and FMP area for 2025.

- The *At-sea Observer Fixed-gear in the BSAI* stratum is composed of trips in the partial coverage category on vessels that are greater than or equal to 40 ft LOA, fishing pot or hook-and-line gear, and where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the BSAI.
- The *At-sea Observer Fixed-gear in the GOA* stratum is composed of trips in the partial coverage category on vessels that are greater than or equal to 40 ft LOA, fishing pot or hook-and-line gear, and where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the GOA.
- The *At-sea Observer Trawl gear in the BSAI* stratum is composed of all trawl trips in the partial coverage category that are not in EM Trawl where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the BSAI.
- The *At-sea Observer Trawl gear in the GOA* stratum is composed of all trawl trips in the partial coverage category that are not in EM Trawl where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the GOA.

EM Fixed-Gear Trip-Selection Pool

The EM Fixed-gear selection pool consists of 2 sampling strata:

- The *EM Fixed-gear in the BSAI* stratum is composed of vessels in the EM Fixed-gear selection pool, fishing pot or hook-and-line gear, where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the BSAI.
- The *EM Fixed-gear in the GOA* stratum is composed of vessels in the EM Fixed-gear selection pool, fishing pot or hook-and-line gear, where the vessel declared in ODDS that they intend to harvest the majority of the trip's catch in the GOA.

Any vessel in the EM Fixed-gear selection pool in 2024 remains eligible to be in the EM selection pool for 2025 unless:

- the vessel owner/operator submitted a request to leave the EM selection pool;
- NMFS has disapproved the vessel's VMP; or
- the vessel owner/operator was placed into probationary status due to repeated problems with EM system reliability and/or video quality, were notified of specific issues needed to bring the vessel into compliance, and the vessel owner/operator failed to address the problems; or they failed to adhere to the requirements in their VMP.

All requests to be included or removed from the EM selection pool for 2025 must have been received in ODDS by 1 November 2024. NMFS may approve or deny requests by vessels to be added to the EM Fixed-gear pool based on the priorities identified by NMFS (NMFS 2024b, AFSC and AKRO 2024b) and supported by the Council (Appendix A) including: vessel size, fishing effort, minimizing data gaps, and cost efficiency (e.g., the requesting vessels had enough fishing effort to indicate cost-effectiveness for the investment of an EM system and maintenance).

Nine vessels requested to be added to the EM Fixed-gear pool for the 2025 fishing year. These vessels were evaluated using the criteria listed above, including: vessel size, their potential for increasing data gaps, and the average number of fishing trips taken per year. One vessel was approved and the remaining eight were denied. One vessel was denied for having a high potential to increase data gaps whereas the other seven vessels either had no recent fishing history or fished too few trips to be cost-effective participants.

As part of the VMP approval, NMFS will assess a vessel's past adherence to their approved VMP. The quantity and severity of compliance issues that negatively impact data quality and collection will be used to assess vessel eligibility to participate in the EM Fixed-gear program in future years. For example, a vessel operator with recurring issues that have resulted in unusable or very poor quality EM data (e.g., obstructing the camera view) might be placed on probationary status or deemed ineligible. Issues with EM data quality are analyzed for each vessel at the end of the calendar year. Outreach letters, called "Notice of Improvement Needed" letters (NOI), are sent annually to vessels when the EM data they have provided is of consistent poor quality and improvements are required. These vessels are then placed in the Notice of Improvement Pool (NIP) and the vessel owner/operator is notified of specific issues they need to address to bring the vessel into compliance. This process was added to the VMP approval process starting in 2021. The NOI pool of vessels is roughly 10% of the total EM fleet, but they have a disproportionate impact on data quality because: they are very time consuming for reviewers (adding expense); it slows reviewing time of hard drives from compliant vessels, and; it causes data degradation and/or data loss. FMA reviews vessels on an annual basis and vessels that improve will be considered for eligibility in the EM program the following year. Vessels in the NIP group in the preceding year that do not improve and adhere to program responsibilities and guidelines may be ineligible to participate in the EM Fixed-gear pool the following year. The 2024 NIP includes 16 vessels. Six of the 16 NIP vessels are currently under review for potential removal due to lack of improvement in EM performance after an NOI was sent in 2024. NMFS will notify the vessel operator of their status through a cover letter attached to the VMP. Vessels which are removed from the EM Fixed-gear pool automatically revert to the observer pool.

In 2025, 178 vessels were approved to fish in the EM Fixed- Gear pool. The vessel owner/operator receives notification of NMFS approval of their placement in the EM Fixed-gear pool by logging into ODDS. Once approved, that vessel will remain in the EM selection pool for the duration of the calendar year. Each year, all vessels in the EM Fixed-gear selection pool—including those that were previously in the pool—are required to submit and follow a NMFS-approved VMP.[2]

EM Trawl in the GOA Pool

NMFS has issued a final rule to implement EM on pollock catcher vessels using pelagic trawl gear.[3] Vessels must opt-in annually by 1 November, and be approved by NMFS, to participate in the EM Trawl category for the upcoming fishing year. Once approved, all trips where the vessel fishes with only pelagic trawl gear will be subject to the EM Trawl regulations, as specified at 50 CFR 679.51(g). Vessels must indicate in ODDS whether they intend to deploy pelagic trawl gear during a trip and compliance monitoring with an EM system is required on every trip. In addition, catcher vessels delivering to a tender vessel instead of a shoreside processor must deliver to a tender vessel that is receiving only deliveries from EM Trawl catcher vessels and that tender vessel is required to be monitored by EM. Finally, observers will monitor EM deliveries by catcher vessels or tender vessels to shoreside processors (for more details, see section below on Dockside Monitoring). There were 112 vessels that applied and were approved by NMFS to be in the EM Trawl pool in 2025, 55 are expected to fish in the GOA.

Tender vessels are not subject to the annual opt-in deadline of November 1, as the shoreside processors often do not know the availability of a specific tender vessel until closer to the time that fishing will

[2] The VMP template is available at: https://alaskafisheries.noaa.gov/fisheries/electronic-monitoring

[3] If a vessel intends to deploy non-pelagic trawl gear, they will be subject to observer coverage as part of the Partial Coverage Observer Trip-Selection Pool.

occur. Tender approvals are completed by NMFS, as needed, and usually to occur in February and August as shoreside processors identify their tender vessel needs. NMFS will cover the servicing costs of 6 tender vessel EM systems in 2025. These EM systems are portable and, as such, may be installed on multiple tender vessels throughout a given fishing year. Beyond the 6 systems that NMFS will pay for servicing, additional tender vessels could be approved for the trawl EM category, as long as they have a fully functional EM system and comply with their NMFS-approved VMP.

No-selection pool

The no-selection pool is composed of vessels that will have no probability of carrying an observer or EM on any trips for the 2025 fishing season and represents a single stratum:

- The *No-selection* stratum is comprised of fixed-gear vessels less than 40 ft LOA, where length overall is defined in regulations at 50 CFR 679.2 as the centerline longitudinal distance, rounded to the nearest foot; and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear.

Partial Coverage Allocation Strategy

Allocation strategy refers to the method of allocating monitoring among strata to sample units. In 2025, the NMFS will implement the Proximity Allocation method, which is the same method applied under the 2024 ADP (see 'Summary of 2024 ADP' for more information). The Proximity Allocation method is designed to spread sampled trips throughout the fisheries to increase the proportion of trips that are sampled or near a sampled neighbor and to be consistent between strata within a specified budget, while also protecting against small sample sizes within a stratum. This allocation method applies to EM Fixed-gear and at-sea observer strata. In the EM Trawl GOA stratum, 33.33% of deliveries will be randomly selected for biological data collection and all EM Trawl GOA offloads will be monitored for salmon and halibut by shoreside observers. Details on how selection rates were determined are provided in Appendix B.

Dockside Monitoring

Dockside sampling methods

Dockside monitoring by observers will occur in shoreside processing plants to enable sampling of deliveries from pollock vessels fishing with pelagic trawl gear (Table 3). The data collection objectives are to: 1) enumerate salmon bycatch from EM deliveries and deliveries that were observed at sea; 2) enumerate halibut bycatch from EM deliveries; 3) collect genetic information from salmon in EM and observed deliveries; and 4) collect biological samples from non-salmon species from EM deliveries.

For EM Trawl vessels in the GOA that deliver to shoreside processors or tender vessels, observers in the processing plant will complete an enumeration of salmon and halibut bycatch for every EM offload. For EM Trawl catch that was originally delivered to a tender vessels, this enumeration will occur once the tender vessel offloads to a shoreside processor. Observers will collect salmon tissue samples for genetic analysis to determine the river of origin of bycaught salmon from all EM deliveries. In addition, for deliveries from trips with at-sea observer coverage, salmon enumeration and collection of salmon tissue samples for genetic analysis will be conducted at the shoreside processing plant. For 2025, NMFS proposes to collect genetic samples from 1 in 10 Chinook and 1 in 30 chum, which is the same sampling rate used in the full coverage fisheries. This would result in consistent sampling rates across all EM and observed trips and would spread genetic tissue collections over a larger number of offloads at a lower

collection rate, decreasing the amount of time an observer spends on tissue collection for deliveries with large numbers of salmon. Biological samples from non-salmon species will be collected from the 33% of EM Trawl deliveries in the GOA that are randomly selected for that sampling.

For trips in the GOA pollock fishery outside of the trawl EM strata that are delivered to tender vessels (as well as trawl trips outside of the pollock fishery), salmon counts and tissue samples will be obtained from salmon found within observer at-sea samples of the total catch.

For trips in the BSAI trawl pollock fishery, for catcher vessels both in the EM Trawl pool and those not in EM Trawl, a census of salmon will be completed during the offload.

Dockside observer coverage and Catch Monitoring Control Plans

To ensure that shoreside processors are meeting dockside monitoring requirements, they are required to submit and maintain Catch Monitoring Control Plans (CMCPs). Shoreside processors that receive landings from vessels in the EM Trawl category are required to have an approved CMCP, as specified at 50 CFR 679.28(g)(2). The CMCP is submitted by the owner and manager of a shoreside processing plant to NMFS for approval, and outlines how the processor will meet the applicable catch monitoring and control standards.

For processors receiving pelagic pollock deliveries in the BSAI full coverage fisheries, their CMCP indicates the specific number of observers that are necessary to meet program sampling objectives. NMFS may update the CMCP throughout the year to ensure that sufficient data can be collected, as processing effort may change seasonally. At a minimum, processors receiving AFA deliveries are required to have one observer per 12 hour period, as specified at 50 CFR 679.51(b)(2). Shoreside processors in the BSAI that receive AFA pollock trawl deliveries, both EM and non-EM, may be required to carry 4 observers per day (2 per 12 hour shift) to meet the observer program sampling requirements. Each shoreside processor has a unique operation and, as such, NMFS will work with each shoreside processor to determine the number of observers necessary to meet data collection needs and document the plant-specific requirements in the CMCP.

The deployment of observers, both at-sea and for dockside monitoring in the partial coverage program is determined through the ADP process, which factors in estimated costs and the anticipated budget. Through this process, the agency will determine the total number of observers needed in GOA shoreside processors. In 2025, based on data needs and sampling duties outlined for shoreside observers, one observer will be necessary per pollock processing line at each GOA shoreside plant. If a shoreside plant has two lines of operation for pollock, then two observers will be necessary. NMFS estimates that five observers will be needed to monitor processing plants in Kodiak while pollock fishing is open and that one observer will be needed in False Pass during the B season.

Table 4 summarizes the 2025 dockside sampling protocols for salmon and groundfish delivered by catcher vessels in the pelagic pollock fishery in the GOA and BS. Trips by non-pollock trawl vessels in the GOA fall under the partial coverage category and will be randomly selected for coverage by at-sea observers who will sample at-sea for salmon, salmon genetics, and groundfish biological samples.

Communication with observers

The CMCP also facilitates communication between the vessels, shoreside processors, and observers. This is achieved by requiring all necessary information be supplied to the observers. Catcher vessel and tender vessel operators will be required to follow landing notice procedures specified in their respective VMPs,

as specified at § 679.51(g)(3). The landing notice will be transmitted by the catcher vessel or tender vessel to the intended shoreside processor, as outlined in the VMP. Once the landing notice is received by the shoreside processor, that information will be provided to the shoreside observers as outlined in their CMCP. Beginning on 1 January 2025, Bering Sea shoreside processors will have an internal email account that allows observers to monitor daily schedules and other communications. The Alaska Regional Office (AKRO) will be included on these emails. This process will give observers adequate information to perform their sampling duties, and gives the agency the ability to track communications. These emails will be listed in the communication section of the CMCP. A similar process will be put in place for GOA shoreside processing plants.

Table 4. Summary of dockside sampling for catcher vessels in the pelagic pollock fishery in 2025.

FMP Area	Strata	Fishery	Offload location	Salmon and halibut PSC accounting	Salmon genetic samples	Biological sampling of groundfish in the plant
GOA	EM Trawl	Pelagic pollock	Shoreside plant or tender	Enumeration of all salmon and halibut PSC on 100% of deliveries.	1 in 10 Chinook and 1 in 30 chum	33% of deliveries
	Partial Coverage At-sea Observer Trips	Pelagic pollock	Shoreside plant	Enumeration of all salmon PSC on deliveries for observed trips. Estimates from halibut found within observer at-sea samples of the total catch on observed trips.	1 in 10 Chinook and 1 in 30 chum	Collected at-sea on observed trips
			Tender	Estimates from salmon and halibut found within observer at-sea samples of the total catch.	Within observer at-sea samples	Collected at-sea on observed trips
BS	EM Trawl	Pelagic pollock	Shoreside plant	Enumeration of all salmon and halibut PSC on 100% of deliveries.	1 in 10 Chinook and 1 in 30 chum	100% of deliveries
	Full coverage at-sea Observer Trips	Pelagic pollock	Shoreside plant	Enumeration of all salmon PSC on 100% of deliveries Estimates from halibut found within observer at-sea samples of the total catch.	1 in 10 Chinook and 1 in 30 chum	Collected at sea on 100% of trips

Selection Rates

The selection rates for deployment of observers (50 CFR 679.51(a)) and electronic monitoring (50 CFR 679.51(f)) in 2025 are summarized in Table 5. Using a combination of at-sea observers, dockside observer sampling, and EM, NMFS expects to monitor 2,602 trips in full coverage and 1,220 trips in partial coverage in 2025 (Table 5). Details on how selection rates were determined are provided in Appendix B.

Table 5. Summary of total trips, selection rates (rounded to the nearest whole number), the number of trips expected to be observed, and monitoring location and purpose, in each sampling stratum in 2025.

Component	Pool	Stratum	Total No. Expected Trips	Selection Rate (%)	No. Trips Expected to be Monitored	Monitoring Location	Monitoring Purpose
Partial Coverage	**At-sea Observer**	Fixed-gear BSAI	277	19.83	52	At-sea	Discard & PSC estimation/ biological sampling
		Fixed-gear GOA	1,861	6.16	118		
		Trawl BSAI	25	40.39	10		
		Trawl GOA	206	15.45	30		
	EM Fixed-gear	Fixed-gear BSAI	50	47.91	24	At-sea	Discard & PSC estimation/ biological sampling
		Fixed-gear GOA	867	11.11	100		
	EM Trawl	EM Trawl GOA	886	100	886	At-sea	EM Compliance
				100	886	Dockside	PSC accounting
				33.33	295	Dockside	Biological sampling
	No-selection	No-selection	1,453	0	0		
Full Coverage	**Full Observer**	Full observer coverage	847	100	847	At-sea	Discard & PSC estimation/biological sampling
	EM Trawl BSAI	EM Trawl BSAI	1,755	100	1,755	At-sea	EM Compliance
				100	1,755	Dockside	PSC accounting
				100	1,755	Dockside	Biological sampling

Observer Declare and Deploy System (ODDS)

Vessels in the partial coverage strata are required to notify NMFS and their fishery monitoring service provider with their intended fishing plans prior to departure. This is accomplished through phone or direct access to a web-application called ODDS. The strata and associated selection rates are programmed into ODDS for each ADP prior to the start of the year. For each logged trip, ODDS selects a four digit random number. If the random number is equal to or below the stratum-specific selection rate, the trip is selected for monitoring; otherwise the trip is not selected for monitoring. In this way, ODDS facilitates random selection of which trips will be monitored. In addition, owners or operators of vessels making trips in the EM Fixed-gear selection pool must also use ODDS to close each trip following the instructions in their VMP.

Users of ODDS are given flexibility to accommodate their fishing operations; up to three trips may be logged in advance of fishing and trips can be changed to accommodate changing plans. Since 2023, users were also able to cancel trips whether they were selected or not selected for monitoring. In the 2023 Annual Report presented to the Council in June 2024, NMFS noted an increasing percentage of selected

trips being canceled in the observed strata. The cancellation of selected trips results in any subsequently logged trips being automatically selected (called 'inheritance'). This not only results in a delay of monitoring, but also non-random deployment. The analysis showed that the current ODDS rules which govern how and when monitored trips are canceled are not enough to ensure unbiased data. As a result, NMFS recommended that the agency work with the Partial Coverage Fishery Monitoring Advisory Committee (PCFMAC) to develop an ODDS trip cancellation policy that will not significantly impede industry, affords the observer provider adequate time to deploy an observer, and reduces impacts to coverage rates and non-random monitoring. NMFS prepared discussion paper was presented to the PCFMAC[4] at their meeting in September and further discussed with the Council at their October meeting. The document outlined three proposed solutions to improve the cancellation rates for observer strata. The solutions were technical fixes that would be programmed within ODDS to improve the random and unbiased deployment of monitoring in the observer strata.

Beginning in 2025, the ODDS will no longer give vessel users the ability to cancel logged trips in the observed strata. This ensures that the deployment of observers is random and unbiased. Cancellations will continue to be allowed by users in the EM strata, as cancellations rates were assessed to be low and not differing between selected and unselected trips. Users will have an expanded ability to edit their non-selected trips—editing will now be able to take place after the trip's embark date passes. In some circumstances, some trips may be canceled by the ODDS call center, in which case the EM strata's inheritance rules will apply. For example, when the ODDS call center edits a selected trip that changes the trip's stratum, the next trip in the original stratum's queue, or if no other trip exists, the next logged trip, will be automatically selected for monitoring. The help fishery participants understand the changes to ODDS, NMFS is holding an outreach meeting during the December Council meeting (see Communication and Outreach)

Starting in 2025, an operator of a catcher vessel in the partial coverage EM Trawl category that has a NMFS-approved VMP must register anticipated trips in ODDS. Prior to embarking on each fishing trip, the owner or operator must specify the use of pelagic or non-pelagic trawl gear to determine EM Trawl category participation for the upcoming fishing trip.

For new partial coverage participants, vessel owners should contact NMFS at odds.help@noaa.gov to request an ODDS account. NMFS will then create a user account for the new partial coverage participant so that they may access the application at http://odds.afsc.noaa.gov/ and log eligible fishing trips electronically. Vessel owners can also log, change, or cancel trips through the ODDS call center (1-855-747-6377). Communication between users and NMFS is facilitated through odds.help@noaa.gov.

Annual Coverage Category Requests

Partial coverage catcher/processors

Under Observer Program regulations at 50 CFR 679.51(a)(3), the owner of a non-trawl catcher/processor can request to be in the partial observer coverage category, on an annual basis, if the vessel processed less than 79,000 lb (35.8 mt) of groundfish on an average weekly basis in a particular prior year. The deadline to request placement in the partial observer coverage category for the following fishing year is 1 July and

[4] Available at: https://meetings.npfmc.org/CommentReview/DownloadFile?p=64e0e69c-80fd-4cfd-ad92-62b90996488d.pdf&fileName=ODDS_Observer_Deploy_Declare_System_Trip_Cancellations_Inherits.pdf

the request is accomplished by submitting a form[5] to NMFS. Two catcher/processors requested, and NMFS approved, their placement in the partial coverage category for the 2025 fishing year.

Full coverage catcher vessels

Under Observer Program regulations at 50 CFR 679.51(a)(4), the owner of a trawl catcher vessel operating in the BSAI may annually request the catcher vessel to be placed in the full observer coverage category. Since implementation of the PCTC program in 2024, the only partial coverage trawl effort that this rule applies to is directed fishing for Pacific cod during C season. Requests to be placed into the full observer coverage in lieu of partial observer coverage category must have been made in ODDS[6] prior to 15 October 2024 for the 2025 fishing year. Each year, the list of catcher vessels that have been approved to be in the full coverage category is available on the NMFS website.[7] No vessels opted into the full coverage category for 2025.

Vessels Participating in Halibut Deck Sorting

On 24 October 2019, NMFS published a final rule to implement regulations allowing halibut to be sorted on deck of trawl catcher/processors in the non-pollock fisheries off Alaska. Fishing under the new regulations began on 20 January 2020. The final rule implementing this program does not specify the amount of time allowed for vessel crew to sort, and observers to discard, deck-sorted halibut. This flexibility enables NMFS to adjust sorting times in response to new information. In 2025, NMFS will continue to allow all vessels operating under these regulations 35 minutes to deck-sort and discard halibut. This uniform time allowance maintains the protocol from previous years and is consistent with the fact that there are no data to support vessel-specific deviations from the current time limit.

Voluntary Increase in Observer Coverage on Freezer Longline Vessels

The Freezer Longline Coalition (FLC) and Alaskan Observers, Inc. (AOI) are intending to deploy two observers on select catcher/processor longliners to increase the number of non-trawl lead level 2 (LL2) endorsed observers. This unique approach combines the two monitoring options in 50 CFR 679.51(a)(2)(vi)(E) and § 679.100(b) by taking increased observer coverage and using a flow scale.

Combining the monitoring options provides increased opportunities for observers to gain a non-trawl LL2 endorsement; supports the collection of high quality data by increasing sampling on these select vessels and sharing the sampling workload; and uses a flow scale to determine the weight of all retained Pacific cod. Additionally, deploying two observers to a challenging sampling platform has the potential to increase observer retention by improving the inexperienced observer's experience through mentorship and minimizing burn-out for the experienced observer.

[5] The form for small catcher/processors to request to be in partial coverage is available at: https://media.fisheries.noaa.gov/dam-migration/catcher-processor-observer-partial-coverage-request.pdf
[6] Instructions for catcher vessels to request to be in full coverage using ODDS are available at: https://www.fisheries.noaa.gov/resource/document/bsai-trawl-catcher-vessel-annual-full-observer-coverage-request
[7] List of BSAI trawl catcher vessels in full coverage available at https://www.fisheries.noaa.gov/resource/document/bsai-trawl-catcher-vessels-cvs-full-coverage

EM Development Projects

In addition to implementation of the regulated trawl EM program, NMFS supports ongoing innovation of EM and collaborating with industry partners on EM development projects, when funding and staff resources are available. Industry members frequently apply for funding through non-governmental organizations to support these projects and the Council often provides letters of support (Appendix A), and NMFS is committed to collaborating to the extent possible when funding decisions are announced.

Pending availability of staff resources, known and ongoing projects that NMFS intends to support in 2025, include:

- Alaska Groundfish Data Bank's Central Gulf of Alaska Rockfish Program EM Project
- RealTime Data/Deckhand Electronic Logbook development
- North Pacific Fishermen's Association & Under Sixty Cod Harvester's proposal with Saltwater, Inc to evaluate pot cod EM catch handling protocols

In addition, NMFS is in initial conversations with the Freezer Longline Coalition and FlyWire exploring a project to reduce observer workload through incorporating EM. Additionally, NMFS is seeking agency funding sources to support a project to explore alternative observer service delivery models through open market rates for partial coverage vessels in the Sablefish and Halibut IFQ fisheries as an alternative to a federal contract.

Communication and Outreach

NMFS is hosting an information session on the changes to ODDS in 2025 on Thursday, December 5 from 5:30 pm - 7:30 pm during the December Council meeting. See Flyer for details. Changes to ODDS in 2025 are necessary to help address the potential for bias in monitoring data. For technical information and Frequently Asked Questions regarding ODDS go to http://odds.afsc.noaa.gov/ and click the "ODDS login" button.

Observer Program staff are also available upon request for additional outreach meetings about the ODDS changes or other topics by teleconference and/or video conferencing, pending staff availability. To request a meeting or suggest a topic for discussion, please contact Lisa Thompson at 1-206-526-4229 or Lisa.Thompson@noaa.gov.

NMFS continues to communicate with industry groups and past participants as we work to ensure a smooth launch of the regulated Trawl EM program in 2025. AKRO staff are available for outreach meetings upon request. To request a meeting, please contact Joel Kraski at Joel.Kraski@noaa.gov . NMFS will publish Common Questions: Trawl Electronic Monitoring (EM) Category in the near future.

NMFS will also continue to communicate the details of the ADP to affected participants through letters, public meetings, NMFS Information Bulletins, and information on NMFS websites:

- Information about the Observer Program and Frequently Asked Questions on observer deployment are available at: https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-vessel-plant-operator-faq

- Frequently Asked Questions about EM Fixed-gear are available at: https://www.fisheries.noaa.gov/alaska/resources-fishing/frequent-questions-electronic-monitoring-em-small-fixed-gear-vessels

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Appendix A: Council motions on the ADP

Council Motion
C-4 Observer 2025 Annual Deployment Plan
October 5, 2024

The Council supports the draft 2025 Observer Annual Deployment Plan (ADP) for partial coverage fisheries with the changes outlined below. Observer coverage rates resulting from the selected design and the final budget are expected in the final ADP in December 2024. Regulations requiring 100% and 200% observer coverage requirements are unchanged.

- Inclusion of shoreside observers and electronic monitoring (EM) service/maintenance support for tenders such that the Western Gulf pollock fleet can fully participate in the pelagic trawl EM program in 2025.
- Change to the fishing trip cancellation policy in ODDS such that a person must edit (and not cancel) a trip selected for observer coverage to reduce temporal bias. NMFS should provide significant outreach to the fleet prior to 2025 to convey these changes.
- The Council supports additional fixed gear EM vessels in the EM pool in 2025 (up to 200 total vessels) provided they opt-in prior to November 1, 2024, funding is available, and they meet the criteria in the ADP.
- Additional outreach to fleets such that they understand all associated agency deadlines and the opportunity to opt-out of the fixed gear EM pool if not fishing such that the equipment can be used elsewhere.

The Council also reiterates its support for agency efforts to revise the zero selection pool (currently <40' fixed gear catcher vessels and jig gear) for cost efficiency purposes to potentially include fixed gear catcher vessels with 1-2 annual trips and/or low annual quota/volume.

The Council supports the agency pursuing steps to remove EM systems from vessels that have not fished for multiple years (e.g., 3, 4, or 5 years).

<u>NFWF Proposals</u>
The Council will provide written support for the following new and ongoing proposals submitted for funding from the National Fish and Wildlife Foundation (NFWF):

- Alaska Groundfish Data Bank's Central Gulf of Alaska Rockfish Program EM Project
- Alaska Longline Fishermen's Association and Archipelago's proposal to implement AI in fixed gear EM review
- RealTime Data/Deckhand Electronic Logbook development

The Council also supports the following related projects (not submitted for new funding at this time):

- North Pacific Fishermen's Association & Under Sixty Cod Harvester's proposal with Saltwater, Inc to evaluate pot cod EM catch handling protocols
- Freezer Longline Coalition's pilot project with FlyWire to reduce work burden on observers

C-1 Council motion
2023 Observer Annual Report & 2025 Annual Deployment Plan
June 8, 2024

2023 Annual Report
The Council appreciates the 2023 Annual Report on the observer program and recommends the following, in addition to SSC recommendations as practicable:

- Future annual reports should include the cost and number of full coverage observer days in the executive summary.
- Continue efforts to attempt to include data on the amount of catch monitored by electronic monitoring (EM) similarly to data on observed catch.
- Continue to provide a summary of issues highlighted in the previous year's annual report and how they were addressed. The 2023 annual report was informative regarding issues previously identified including EM image quality and EM video review timeliness.
- Given changes to the database used by observers to report potential violations in 2023, the Council supports OLE not including trends over time periods that are not comparable.

2025 Annual Deployment Plan (ADP)
The Council supports the following recommendations for the 2025 ADP:

- For the partial coverage program, use the 2024 proximity allocation method (except for pelagic trawl EM) and the following strata for deployment: (observer, EM Fixed-gear, EM Trawl), Fishery Management Plan areas (BSAI, GOA), and gear type (fixed, trawl)
- For pelagic trawl EM, maintain 100% EM at-sea monitoring and the 33% sampling rate of EM deliveries by shoreside observers
    - Continue to evaluate shoreside sampling priorities to balance observer workloads
    - Work with EM service providers and industry to budget for pelagic trawl EM
    - Modify the ODDS system to include pelagic trawl EM
- Maintain EM Fixed-gear selection pool of up to 177 vessels. As additional funds are available, increase the number of fixed-gear vessels in the EM selection pool up to 200. If needed, prioritize placement in the EM selection pool based on vessel size, fishing effort, minimizing data gaps, and cost efficiency. Remove vessels with repeated problems causing data loss from the EM pool.
- Improve EM video review times:
    - NMFS collaborate with PSMFC to establish a video review selection rate and review strategy to improve EM video review times to result in the most useful information for the most number of trips for a given cost
    - NMFS work with the Partial Coverage Fishery Monitoring Advisory Committee to develop prioritization rules that can be used to allocate review effort to the fisheries, gear types, times, and areas most dependent on EM data
    - NMFS conduct an assessment of any management impacts of delayed/missing EM Fixed-gear data
- To reduce temporal bias resulting from trip cancellations, NMFS work with the Partial Coverage Fishery Monitoring Advisory Committee to develop an ODDS trip cancellation policy that will not significantly impede industry, affords adequate time to deploy an observer, and reduces impacts to coverage rates and non-random monitoring

Funding delays: The Council recommends sending a letter to NOAA expressing concern with delays in the transfer of observer fee revenue, cost recovery funds, and pelagic trawl EM start-up funds to AFSC and NMFS due to the

new Commerce Department financial system. The letter should also express concern with the 2022 and 2023 sequestered portion of the observer fees not yet being transferred and available for observer deployment.

C-2 Observer 2024 Annual Deployment Plan
Council Motion
October 6, 2023

2024 ADP

The Council supports the following for the 2024 draft Observer Annual Deployment Plan (ADP) for partial coverage fisheries. Observer coverage rates resulting from the selected design and the final budget are expected in the final ADP in December 2023. Fisheries with 100% and 200% coverage requirements in regulation are not covered under the ADP. For the 2024 ADP:

- Use combined fixed-gear-FMP stratification scheme: fixed-gear: hook-and-line/pot gear (combined); trawl gear - - Monitoring method: Observer; fixed-gear electronic monitoring (EM); pelagic trawl gear EM Exempted Fishing Permit (EFP): BSAI; GOA
- Use proximity allocation scheme with the exception of the pelagic trawl EM EFP.
- 100% EM on pelagic trawl vessels participating in the EFP, plus 33% observer shoreside sampling rate for partial coverage EM EFP trips.
- Remove fixed-gear vessels which have not fished nor used their EM systems for 3 or more years from the EM stratum. Place such vessels under 50 feet into the no-selection pool and larger vessels into the observer-selection pool.

The Council requests NMFS re-evaluate the cost estimates for both fixed-gear and trawl EM, which directly affect the cost efficiency analysis and the resulting coverage rates.

If the final ADP combines fixed-gear types for selection, the Council recommends NMFS make clear to fishermen, NMFS staff, and OLE that there is no prohibition on vessels fishing both FMP areas in one trip, despite needing to choose a predominant area when logging trips into ODDS.

The Council supports additional EM Fixed-gear vessels added to the EM pool in 2024 (up to 200 total vessels) provided they opt-in prior to November 1, 2023, funding is available, and they meet the criteria in the ADP.

Future work (2025 ADP)

For the 2025 ADP, the Council recommends exploration of a revised hurdle and an analysis of how to effectively deploy days in addition to that hurdle, per the PCFMAC recommendation. The intent is to base the hurdle on the appropriate time and proximity scale to meet biological data collection needs, and then deploy additional monitoring, using at-sea observers, shoreside observers, and/or EM, to be placed where they are most cost effective for catch accounting purposes and for targeting specific types of information deemed necessary to meet legal mandates or assessment purposes. This will require further evaluation of the needed time/space scale for biological samples.

The Council requests NMFS re-evaluate the cost estimates for both Fixed-gear and EM Trawl without including the cost of initially purchasing the EM hardware for both fixed and trawl gear, clearly separating ongoing costs from start-up costs.

Pilot project proposal

The Council encourages submittal of an industry cooperative research grant proposal and encourages NMFS to provide data to support the project: 1) the ports of departure and return for the partial coverage fleet (e.g., how

many vessels/trips/catch are associated with smaller remote ports, aggregated as necessary to protect confidentiality); and 2) data on the amount of prior notice vessels are providing when registering trips in ODDS (e.g., is it the 72 hour minimum or are many vessels providing more notice). This project envisions a group of partial coverage fixed-gear vessels that continue to be selected for coverage through ODDS but procure observers through a private contract with an observer provider (remove the Federal contract component).

2024 NFWF proposals

The Council will provide written support for the proposals on p. 6 of the September 2023 PCFMAC report submitted for funding from the National Fish and Wildlife Foundation (NFWF) for the 2024 Electronic Monitoring and Reporting Grant Program. Funding for continuation of the pelagic trawl EM EFP is the highest priority, until NMFS completes regulations for the program (anticipated 2025).

Appendix B: Calculation of the Selection Rates for the Partial Coverage Strata of the 2025 ADP

Introduction

The Annual Deployment Plan (ADP) specifies how fishery monitoring assets (observers and electronic monitoring equipment [EM]) are deployed into fishing operations of the North Pacific by the North Pacific Groundfish and Halibut Observer Program (Observer Program). Fishery monitoring data is used for near real-time catch estimation for quota monitoring as well as in fish and marine mammal stock assessments as authorized through several statutes. The observer program is administered by the Fisheries Monitoring and Analysis Division (FMA) of the Alaska Fisheries Science Center (AFSC).

The sampling hierarchy used by FMA to obtain fishery dependent data has several levels, and the ADP is important because it affects the first, and top-most level of this hierarchy. The ADP is focused, although not exclusively, on fishing operations for which sampling rates will be less than 100% (i.e., the partial coverage fleet). The partial coverage fleet consists of catcher vessels and some catcher processors when not participating in a catch sharing or cooperative style management program and accounts for approximately 10% of the landed tonnage in the federal fishery. Changes to the composition of the partial coverage fleet have resulted from NMFS policy, North Pacific Fishery Management Council (Council) actions, and regulations. Since the inception of the ADP process in 2012 (2013 ADP), trip-selection has been the preferred method to deploy fishery monitoring assets into the partial coverage fleet.

For the sampling design employed by the observer program to be successful, it must include several key elements. These include randomized data collections over spatial and temporal scales (a probability sample), the collection of sufficient data, and the use of stratification and prespecification of sampling intensity to control precision of estimates, while also making efficient use of available funding (Cahalan and Faunce, 2020). The sampling design for the deployment of fishery monitoring assets (i.e., the deployment design) involves two elements; how the population of partial coverage trips is subdivided (*stratification*), and what proportion of the total observer deployments are to occur within these subdivisions (*allocation*).

The 2025 ADP process included a draft and final version. The draft 2025 ADP focused on presenting alternative deployment designs for consideration for the year ahead, while the final 2025 ADP is focused on predicting the most likely coverage rate that available budgets can afford given the selected design from the draft ADP. In this way, the ADP provides a process for the NMFS and the Council to evaluate and recommend improvements to fisheries monitoring in response to changing needs. This appendix contains the analyses used to define the deployment design for fishery monitoring in 2025.

Methods

Data Preparation: Defining the partial coverage fleet

A dedicated dataset developed by the staff of the Sustainable Fisheries Division of the Alaska Regional Office (AKRO) and the FMA of the AFSC was used in this analysis. Briefly, these data consist of species-specific catch amounts, fishing dates, locations, catch disposition, observation status, and associated ADP strata and are available from 1 January 2013 to 5 November 2024. For this analysis, the

expected fishing effort for 2025 was assumed to be similar to all partial coverage fishing effort for the most recent 12 month period (between 23 October 2023 through 22 October2024). However, to account for the fishery closure by trawl vessels targeting pollock in the Central Regulatory Area of the Gulf of Alaska (GOA) beginning on 25 September 2024[8], several adjustments and assumptions were made and are detailed where relevant.

As in past ADPs, trip data were altered to reflect fishing effort in the partial coverage fleet for the upcoming year. These alterations included: 1) using Observer Declare and Deploy System (ODDS) data to more accurately model the duration that observers are assigned to selected fishing trips (NMFS 2019, Appendix C); 2) labeling fishing activity by three 'historically low volume' Catcher-Processors as belonging to the partial coverage category; 3) labeling fishing by American Fisheries Act (AFA) eligible trawl vessels targeting Pacific cod in the Bering Sea and Aleutian Islands Fisheries Management Plan Area (BSAI FMP) as belonging to the full coverage fleet if they opted into full coverage for 2024; and 4) removing vessels with no probability of selection from the analysis (i.e., all trips corresponding to the no-selection pool). Vessel lists for the EM Fixed-gear pool and EM Trawl pool were updated to reflect the approvals and denials of requests to opt in or out of the pools. Compared to 2024, the EM Fixed-gear pool increased by one vessel (one request approved, eight requests denied, zero opted out). The total number of EM Trawl pool vessels is 112. The number of EM Trawl pool vessels expected to fish in the GOA (i.e., partial coverage) increased from 47 to 53, with the number of GOA-only vessels unchanged at 39 as two new vessels were added and two prior vessels did not re-apply.

The 2025 partial coverage sampling design includes the following strata, which are defined by gear type, monitoring method (observers or EM or none), and FMP (BSAI or GOA) are as follows:

1. At-sea Observer Fixed-gear BSAI: Observer monitoring of trips using hook-and-line, pot, or both gears on vessels that are greater than or equal to 40 ft length overall (LOA) and are not in EM Fixed-gear that are predominantly fishing in the BSAI.

2. At-sea Observer Fixed-gear GOA: Observer monitoring of trips using hook-and-line, pot, or both gears on vessels that are greater than or equal to 40 ft LOA and are not in EM Fixed-gear that are predominantly fishing in the GOA.

3. At-sea Observer Trawl BSAI: Observer monitoring of trips by vessels using trawl gear that are predominantly fishing in the BSAI, excluding trips where vessels are participating in EM Trawl.

4. At-sea Observer Trawl GOA: Observer monitoring of trips by vessels using trawl gear that are predominantly fishing in the GOA, excluding trips where vessels are participating in EM Trawl.

5. EM Fixed-gear BSAI: EM of trips using hook-and-line, pot, or both gears on vessels that are greater than or equal to 40 ft. LOA and have been approved to carry EM that are predominantly fishing in the BSAI.

6. EM Fixed-gear GOA: EM of trips using hook-and-line, pot, or both gears on vessels that are greater than or equal to 40 ft. LOA and have been approved to carry EM that are predominantly fishing in the GOA.

[8] See: https://www.fisheries.noaa.gov/bulletin/ib-24-41-nmfs-prohibits-directed-fishing-pollock-vessels-using-trawl-gear-central

7. EM Trawl GOA: Compliance monitoring of trips by vessels participating in the Pollock Trawl EM in the GOA and shoreside monitoring of offloads.

8. No-selection: No monitoring, including vessels less than 40 ft LOA, for trips fishing exclusively with jig gear, or vessels that have been temporarily removed from the EM Fixed-gear vessel pool.

Accounting for uncertainties

Uncertainty in fishing effort

The methods for estimating fishing effort, or the number of trips to occur by each stratum in 2025, are detailed in Appendix C. In short, the number of trips to occur in 2025 was assumed to be the same as in 2024, but because fishing in 2024 has not yet completed at the time of writing of this analysis, a statistical model was used to predict the expected number of fishing trips in each stratum based on the number of fishing trips that occurred in 2024 to date.

However, adjustments were required to account for the closure of the pollock fishery in the Central GOA by trawl vessels in 2024. The number of trips expected to occur in the At-sea Observer Trawl GOA and EM Trawl GOA strata were manually adjusted. The proportion of trips completed in these strata by 25 September 2023 were applied to the count of trips completed in 2024 so that fishing effort estimates in 2025 assumed that no such closure will occur. Additionally, the fishing trips that occurred in the Central GOA during September and October of 2023 were used to replace the trips that occurred in 2024.

Confidence intervals around the fishing effort estimates were calculated from the statistical model so that variability could be incorporated in the expected number of fishing trips by each stratum in 2025. This variability served two purposes. Firstly, the allocation algorithm is affected by the number of trips in each stratum and their distribution in time and space. Future populations of partial coverage fishing effort (1,000 iterations) were generated by resampling fishing trips from the prior year, where the number of trips sampled by each stratum varied according to each stratum's confidence intervals. By running differing populations of future fishing effort that vary in the total number of trips and when and where they occur, the sensitivity of the algorithm to different assumptions of future fishing effort can be evaluated. More importantly, the uncertainty in fishing effort can be reflected in the variability of the expected costs of monitoring deployment, as resampled populations that contain a greater number of fishing trips will result in a greater number of monitored trips and therefore greater costs, and vice versa.

Uncertainty in monitoring costs due to random trip selection

The ADP prescribes monitoring rates such that the predicted monitoring costs incurred in 2025 will be roughly equal to the budget available to deploy observers and EM into partial coverage (i.e., the monitoring budget). However, monitoring costs are affected by several factors, described below, that cannot be predicted with certainty but were incorporated into the analysis via simulation to create a distribution of total monitoring costs.

The random process of trip selection in ODDS may impact the realized costs in several ways. Firstly, although ODDS is programmed to select trips for monitoring at a specified rate, some degree of variation in each stratum's realized sampling rate is to be expected, and this affects the total number of trips monitored. Secondly, trips have varying durations and longer trips are generally more expensive to monitor than shorter trips, so monitoring costs may vary depending on which trips are randomly selected. In addition, at-sea observer monitoring costs may vary depending on the time of year (i.e., which contract

is active). All of this variability was accounted for by incorporating randomization into the simulated trip selection in ODDS at the prescribed trip selection rates ─ 100 times for each of the 1,000 resampled fishing populations for a total of 100,000 iterations. However, unpredictable processes, such as whether trips logged into ODDS are canceled, inherited, or waived, are not easily modeled and were assumed to not have occurred.

Budget and Monitoring Costs

The budget for monitoring the partial coverage fisheries was set at $4.19 million and includes revenues generated from ex-vessel fees in 2023 and 2024 and federal funds. It does not include the Congressional Directed Spending funds which were allocated to the Pacific States Marine Fisheries Commission (PSMFC) to support new installations for EM vessels and EM equipment replacements. Distinct from new EM system installation and replacements costs, the monitoring budget does account for the annual cost for EM equipment maintenance by EM service providers. The monitoring budget was reduced from the $4.4M used in the draft analysis to reflect 2024 fee revenues that were lower than were initially projected.

Cost Assumptions

The partial coverage monitoring program has three monitoring methods: 1) at-sea observers; 2) fixed-gear EM; and 3) at-sea compliance EM with shoreside observers to sample pollock deliveries. To estimate the costs of monitoring, cost models were constructed for each monitoring method. Each model incorporates: the best information available; assumptions about both fixed and variable costs; and known economy of scale. All of the cost models estimate the cost of the partial coverage monitoring program based on the available budget and monitoring costs paid by other funded sources. Costs for EM Trawl trips in the Bering Sea are full coverage and therefore those trips are excluded from these analyses. The cost subtotals are explained in as much detail as possible while maintaining the confidentiality of estimated prices included in the partial coverage observer contract.

EM Trawl in the GOA

Vessels in the partial coverage EM Trawl program in the GOA (EM Trawl GOA) carry EM systems for at-sea compliance and are sampled shoreside by observers for Prohibited Species Catch (PSC), catch, and biological samples. The 2025 cost estimate for EM Trawl is the sum of: 1) estimated shoreside observer plant day costs; 2) estimated shoreside observer travel costs (lodging and per diem for food but excluding airfare); 3) estimated EM data and video review costs; and 4) estimated vessel equipment costs.

In 2025, 143 days are estimated to occur in the GOA pelagic trawl pollock fishery. The shoreside observer cost estimate assumes: five (5) observers are required to monitor processing plants in Kodiak during A and B season; one (1) observer will be stationed at False Pass during B season only; all observers monitor on all calendar days while pollock seasons are open; and plant operations in 2025 are similar to the 2023–2024 years.. Under these assumptions, the total plant observer days in the GOA was estimated at 782 days.

The cost of a shoreside plant day is a function of total plant days, which contract year the days occur on, and the number and type of days purchased (guaranteed or optional) according to the partial coverage observer contract. Based on 2023–2024 fishery data, approximately 75% of the GOA pollock fishery will occur during the base year of the partial coverage contract and 25% during the first option year. The total

plant day costs were estimated by combining the estimated number of guaranteed and optional days with independent government estimates of day prices for the upcoming observer partial coverage contract.

The travel costs include estimates of the total lodging costs and total per diem costs. Air travel costs were assumed to be negligible because, unlike at-sea observers, shoreside observers are not expected to travel while deployed at a plant. Lodging costs were assumed at the Federal Government rate, which may differ during peak and off seasons and on locality. Multiplying the cost per night in each season (peak vs. off) by the number of days in each season and the number of rooms needed for each day (assuming two observers per room) yielded the estimated cost of lodging in each season. The sum of lodging costs in each season yielded the total lodging cost for 2025. Assuming the partial coverage provider cannot obtain a meal plan for the observers at their plants, per diem must be paid to observers at the Federal Government rate. The sum of the total lodging costs and the total per diem costs yielded the total GOA travel costs.

The costs of EM were separated by data and video review costs and vessel equipment maintenance costs. Data and video review costs for 2025 were calculated using inflation adjusted values from previously published estimates (Table E-1-2, NMFS 2024). The review cost per day was determined by dividing the sum of the transmittal, review, processing and storage costs by the total number of reviewed days. This review cost per day multiplied by the assumed fishing effort resulted in the estimate for data and video review costs for 2025. Vessel equipment maintenance costs were determined by multiplying estimates for the annual EM equipment upkeep fee per vessel in a year ($5,000) by the 39 GOA-only EM Trawl vessels, giving an estimate of $195,000. In addition, NMFS agreed to utilize fee funds for maintenance costs for EM systems for up to six tender vessels, totaling an estimated $30,000. Any vessels participating in EM Trawl that fish in the Bering Sea are responsible for the costs of their equipment and upkeep. Distinct from equipment maintenance costs, new EM system installation and replacement costs were assumed to be funded externally by the Congressionally Directed Spending funds, which are administered through a grant with the PSMFC.

In total, EM Trawl was estimated to cost approximately $991K which was deducted from the total $4.19M budget prior to allocation of the remaining funds to deploy at-sea observers and EM Fixed-gear.

At-sea Observers

At-sea observer costs were estimated as a function of sea day costs and travel costs. Like the previous contract, a number of ‘guaranteed’ sea days are purchased before ‘optional’ sea days are purchased. The current analysis uses independent Federal Government estimates of day prices for the upcoming observer partial coverage contract.

Estimating sea day costs for the 2025 calendar year involves two steps: 1) calculation of the number of days under the base contract that will have already been spent from 1 October to 31 December 2024; and 2) an estimate of the total number of days to be monitored 1 January to 31 December 2025. We first estimated the number of days monitored between 1 October and 31 December 2024 using fishing effort data from the same period in 2023 and the sampling rate for each stratum from the 2024 ADP. The values were then summed for each stratum to estimate starting days on the new contract as of 31 December 2024. Next, the total number of days that could be monitored by at-sea observers in 2025 was determined using the Proximity Allocation algorithm (described in the Allocation Method section), the costs of which accounted for the previously calculated number of days already on the base contract, the additional number of guaranteed and/or optional days afforded on the base contract, and additional days expected to

occur during option year 1. To estimate the total costs of partial coverage at-sea observer monitoring for 2025, an estimate of travel cost per sea day was calculated using detailed monitoring expenses that were compiled from internal reports for years 2017–2023. Annual totals of travel costs were divided by the number of sea days monitored and resulted in yearly estimates of travel cost per monitored day that were then inflation-adjusted to 2025 dollars. The average of the inflation-adjusted travel day costs from 2022 and 2023 was assumed as the estimate for 2025. The combination of sea day costs and travel costs represented the total cost of at-sea observers.

Fixed-Gear Electronic Monitoring

The 2025 cost estimate function for EM Fixed-gear includes the recurring costs for EM system maintenance and estimates of video review. Similar to EM Trawl, equipment installation or replacement costs for EM Fixed-gear were not included in the partial coverage budget and the equipment replacement costs were assumed to be covered through funds from Congress and administered through a grant with PSMFC.

The costs of EM service provider management and equipment maintenance that recur each year for EM Fixed-gear are assumed to scale with the number of vessels in the EM Fixed-gear pool. Equivalent 2025 costs were compiled for each year 2017–2021 by calculating the estimated inflation adjusted review costs from the product of the number of reviewed days and the inflation adjusted unamortized costs. The recurring costs from each year were derived by subtracting review costs from unamortized costs. The yearly total recurring costs divided by the sum of the number of vessels in the at-sea EM Fixed-gear pool in each year yielded the recurring cost per vessel. In this draft analysis, the recurring cost per vessel was estimated as $4,775.30.

Video review costs were made using summaries from years with complete EM cost information (2018–2021). For each year, the total review cost was adjusted for inflation and totaled. This total divided by the total number of reviewed days resulted in the 2025 estimate of review cost per day.

The total cost of the EM Fixed-gear program was estimated as a function of the number of vessels in the pool (178 vessels), the per-vessel EM service provider management and equipment maintenance costs, and the estimated number of video review days determined by the sampling rates prescribed by the Proximity Allocation algorithm multiplied by the estimated cost per review day.

Allocation Method

The entire allocation method involves several steps that are depicted in Figure B- 1. The sample allocation method used here, named Proximity Allocation, was introduced in the 2024 Draft ADP (NMFS 2023) and has two primary objectives: 1) minimize data gaps and 2) guard against low stratum-specific sample sizes. The algorithm evaluates the extent to which a stratum's sample rate achieves these objectives, maximizing the sample rates to the extent that the budget supports and such that all strata achieve these objectives to the same extent (weighing both objectives equally). This method is designed to distribute sampled trips throughout the fisheries by increasing the proportion of trips that are sampled or near a sampled neighbor in space and time while also protecting against high variance resulting from small sample sizes (and remaining within budget). This allocation method was applied to the at-sea observer and EM Fixed-gear strata only because sample rates in the EM Trawl GOA and no-selection strata were predetermined.

Defining Spatio-temporal Boxes

Expected fishing effort was categorized based on each trip's stratum, gear type used, and Alaska Department of Fish and Game (ADF&G) statistical areas fished. The spatial positions of each trip were categorized by overlaying a hexagonal grid with cells 200 km wide and identifying which cells contained the centroids of the ADF&G statistical areas. Trips were also assigned to temporal categories 1-week in duration based on each trip's start and end date. The spatial and temporal categorizations together created spatio-temporal units, or "boxes". Trips could belong to different weeks and hexagons but their weighting was set to total to one trip (e.g., a trip that crossed three boxes was counted as 0.33 trips in each box). The "neighborhood" of a box was defined as the number of trips in immediately adjacent spatial or temporal boxes. Hence, the overall extent of the neighborhood of a box is 600 km across and 3 consecutive weeks. The use of neighborhoods allows the boxes to be defined with finer resolution and reduces the impacts of the arbitrarily placed boundaries of each box (i.e., how the hexagon grid is placed or which day each 7-day block begins), including edge effects.

Data gaps were quantified as the proportion of trips that are in boxes without any samples in their neighborhoods. For any given monitoring rate, boxes containing a greater number of fishing trips have a higher probability of being monitored, and the neighborhood of the box will also have a higher probability of containing a monitored trip. Therefore, strata with fishing trips that are distributed widely in space and time (e.g., many boxes and each with few trips) are more likely to have a greater proportion of boxes with unmonitored neighborhoods and vice versa. Strata with diffuse fishing effort require a higher monitoring rate to achieve the same proportion of data gaps as a stratum with concentrated fishing effort.

The probability that there are no sampled trips in a neighborhood, $\hat{A}_b$, was estimated using the binomial approximation of the hypergeometric distribution:

$$\hat{A}_b = (1 - r)^{t_{G_b}} \qquad \text{Eq. 1}$$

where b is defined as the box of interest. G_b defines the neighborhood of box b (i.e., includes the adjacent 20 boxes — 6 spatial cells in the same week and 7 cells in the week prior and 7 in the week after), t_G is the number of trips t in a neighborhood G, and r is the initial (assumed) sample rate of each fishing trip. Hence, t_{G_b} is the number of fishing trips t in the neighborhood G of box b.

Proximity Index

The proximity index is the expected proportion of trips in a stratum's boxes that are in monitored neighborhoods and is therefore the opposite of our measure for data gaps — as sampling rate increases, the proximity index also increases. The proximity index is a function of the available budget, each stratum's monitoring cost and size (total number of trips), spatiotemporal distribution of fishing effort, and sample rate. Strata with clustered fishing effort will achieve a specified proximity index at a lower sample rate than strata with more diffuse fishing effort.

A binomial approximation to the hypergeometric distribution was used to generate the probability that there were no monitored trips in the neighborhood of box b, $\widehat{A_b}$, Eq. 1. The expected number of trips in sampled neighborhoods is the sum of the number of trips in the neighborhood, w_b, multiplied by the probability that one or more of those trips are sampled, $(1 - \widehat{A_b})$.

The proximity index, $\hat{T}$, is the average of the expected proportion of trips in monitored neighborhoods averaged over the $b = 1, \ldots..B$ boxes in the stratum.

$$\hat{T} = \frac{\sum_{b=1}^{B} w_b (1 - \hat{A}_b)}{B} \qquad \text{Eq. 2}$$

The proximity index is useful for prioritizing the allocation of samples to highly spatiotemporally dispersed strata. For a given budget, we could maximize the proximity index, increasing sample rates until reaching the budget cap. However, strata with highly concentrated fishing effort and relatively small stratum sizes would be allocated a small portion of the total sample amount (i.e., few monitored trips). For these strata, virtually all unmonitored trips are located near monitored trips even at low sample rates, and allocation based solely on this index can result in small sample sizes for these strata. Since variance is a function of sample size, these small sample sizes can lead to catch estimates with high variability. In addition, estimated length and age composition data that drive some stock assessments will be sparse, leading to stock assessment harvest recommendations with higher uncertainty. For these reasons, the Proximity Allocation also includes a variance scaling factor.

Variance Scaling Factor

To control for high uncertainty associated with estimates (e.g., buffer against low sample sizes [numbers of monitored trips]), the mathematical relationship between sample size and the variance of an estimated parameter (such as the sample mean) was incorporated into the allocation algorithm. By quantifying how the level of uncertainty around a stratum-level estimate changes based on its sample size and the proportion of the population sampled, this variance scaling factor causes the allocation algorithm to allocate more samples (monitored trips) to strata prone to higher uncertainty.

All populations have a base variance; the variability in a measured parameter (e.g., length) between all sample units (both in the sampled and unsampled). For the ADP, the population base variance is the between trip variance of a parameter over all trips in a stratum and will be different for different species (years, gear types, etc.). The variance of a parameter, *x*, is given in Eq. 3.

$$Var(x) = \frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N - 1} \qquad \text{Eq. 3}$$

Note that in Eq. 3 we are not summing only over those sample units that were sampled, but all sample units in the population (i.e., i = 1 to *N* where *N* is the total number of units in the population, rather than i = 1 to *n*, the number of sampled units in the population). Note that this variance does not change with sampling intensity (sample rate).

The estimated variance of the sample mean (or other parameter of interest) has two terms in addition to the population variance: the finite population correction factor (FPC; (*N*-*n*)/*N,* equal to 1 minus the proportion of the population sampled) and the inverse of the sample size (1/*n*)

$$\widehat{Var}(\bar{x}) = \frac{(N-n)}{N} \frac{1}{n} \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n - 1} \qquad \text{Eq. 4}$$

As the sample size increases (*n* increases*)*, we know more about the population, and hence estimates will have less variance. The estimated variance of the sample mean will decrease with increasing sample rates until all sample units are included in the sample (sample rate = 100%), at which point we have a census of the population and there is no variance. In addition, as a larger and larger portion of the population is

sampled (smaller FPC), we know more about the population, and the uncertainty about the estimate decreases.

The FPC and sample size combine to form a single variance scaling factor, *F*.

$$F = \frac{(N-n)}{N}\frac{1}{n} \qquad \text{Eq. 5}$$

F was incorporated into the Proximity Allocation algorithm such that a higher sample rate is assigned to strata with fewer total trips, and its influence lessens rapidly as stratum size (*N*) increases. In addition, when used in combination with the proximity index, it acts as a strong buffer against small stratum-specific sample sizes that would otherwise occur if allocation was strictly based on the proximity index.

Proximity Allocation Index

The final *proximity allocation index* used to allocate sampling effort to strata (*h)*, $\widehat{D}_h$, is the product of $\hat{T}_h$ (the average of the expected proportion of trips with monitored neighbors) and $(1 - F_h)$ (the variance scaling factor), where all terms are as previously defined:

$$\widehat{D}_h = (1 - F_h)\,\hat{T}_h \qquad \text{Eq. 6}$$

The expanded version of Eq. 6 highlights the estimation process, noting that the stratum-specific sample size, n_h, is an estimated parameter that is the product of stratum size, N_h, and the stratum monitoring rate, r_h:

$$\widehat{D}_h = \left[1 - \frac{N_h}{(N_h - N_h r_h)}\frac{N_h r_h}{1}\right]\frac{\sum_{b=1}^{B} w_{bh}(1-\hat{A}_{bh})}{B_h} = \left[1 - \frac{N_h}{(N_h - n_h)}\right]\frac{\sum_{b=1}^{B} w_{bh}(1-\hat{A}_{bh})}{B_h} \qquad \text{Eq. 7}$$

Equation 7 cannot be solved for stratum sample sizes or monitoring rates because $\hat{T}$, *F*, and costs are functions of sample size. Therefore, iterative numerical methods were used to determine the strata sample sizes that maximize the proximity allocation index while not exceeding the predetermined budget. The overall cost is the product of the number of trips in the stratum, the stratum-specific sampling rate, and the cost per trip for that stratum:

$$Cost = \sum_{h=1}^{H} N_h r_h c_h \qquad \text{Eq. 8}$$

where r_h is the stratum specific rate for the final proximity allocation index value, c_h is the cost per trip for stratum *h*, and N_h is the total number of trips for stratum *h*.

Proximity allocation index values were calculated for each stratum over a range of sampling rates 0.0001 to 0.9950, as well as the associated monitoring costs. From these estimates, the sample rates for each stratum that were associated with the maximal proximity allocation index value $\widehat{D}_h$ for the budget were identified.

Determining selection rates for 2025

The selection rates of the EM Trawl GOA stratum and no-selection stratum were specified by policy. In EM Trawl GOA, 100% of trips are to be monitored at-sea for compliance with full retention of catch requirements, 100% of shoreside deliveries are to be monitored for PSC enumeration and salmon genetic

tissue sampling by observers, and 33.33% (one in three) of shoreside deliveries are monitored by observers for groundfish biological and specimen data collection. These shoreside observers will also perform enumeration for salmon and salmon genetic sampling for offloads from monitored At-sea Observer Trawl GOA trips. The no-selection stratum is not monitored.

The selection rates of the remaining partial coverage strata were determined by the Proximity Allocation algorithm. The estimated costs of monitoring the EM Trawl GOA stratum were deducted from the budget first.

Results and Discussion

Table B- 1 summarizes how the $4.19M partial coverage monitoring budget was allocated to each monitoring method and the expected number of vessels participating in each stratum. Note that the overall budget is a 28% decrease from the $5.819M monitoring budget set in the 2024 ADP. In addition, these funds must also support the EM Trawl GOA stratum. In combination, the budget available to allocate to at-sea observers and EM Fixed-gear in 2025 is 43% less than the budget available for these purposes in 2024 with only an 11.8% reduction in fishing effort. The allocation indices and selection rates resulting from the partial coverage allocation algorithm are provided in Table B- 2. The proximity allocation index, a general measure of the degree of monitoring coverage allocated to the at-sea observer and EM Fixed-gear strata, was 0.7430. This represents a reduction from the value afforded in the 2024 ADP of 0.8846, indicating a higher potential for data gaps.

The selection rates, estimated number of trips, and days monitored are summarized in Table B- 3 for partial and full coverage strata. For the EM Trawl strata, the total number of monitored shoreside deliveries was estimated based on the expected number of trips by catcher vessels and estimates of the expected number of shoreside deliveries by catcher and tender vessels based on fishing activity in 2024. Note that the EM Trawl GOA stratum's monitoring rate of 33.33% strictly represents the portion of deliveries that will be monitored shoreside by observers for biological and specimen collection. All trips will be monitored at sea by EM systems for compliance with regulations and all associated EM deliveries will be monitored shoreside by observers for salmon and halibut enumeration as well as the collection of tissues from salmon to determine genetic stock of origin.

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Table B- 1. Budget allocation and vessel participation. The preliminary budget through the observer fee and NMFS funds for monitoring (both observer and EM) is $4.19 million. The number of vessels participating is estimated as the number of unique vessels that fished within each stratum within 365 days prior to the completion of the analyses. Some vessels may fish in multiple strata (e.g., a fixed-gear vessel may fish within the at-sea observer Fixed-gear GOA and BSAI strata.)

	Draft 2025 ADP	Final 2025 ADP
Partial Coverage Monitoring Budget		
At-sea Observer	$2,628,000	$2,314,000
EM Fixed-Gear	$977,000	$964,000
EM Trawl GOA	$795,000	$911,000
Total	$4,400,000	$4,189,000
Vessels Participating (Partial Coverage)		
At-sea Observer Fixed-gear BSAI	52	45
At-sea Observer Fixed-gear GOA	290	290
At-sea Observer Trawl BSAI	2	3
At-sea Observer Trawl GOA	46	46
EM Fixed-gear BSAI	11	9
EM Fixed-gear GOA	121	117
EM Trawl GOA	47	53
No-selection	291	290
Vessels Participating (Full Coverage)		
Full Coverage	75	73
EM Trawl BSAI	67	66

Table B- 2. Partial coverage allocation indices, including the estimated numbers of trips in a stratum (N_h), monitoring rates (r_h), number of observed or monitored trips (n_h), proximity index ($\hat{T}_h$), variance scaling factor (F_h), and proximity allocation index ($\hat{D}_h$). Partial trips can exist since these are used in mathematical algorithms.

Stratum (h)	N_h	r_h	n_h	$\hat{T}_h$	F_h	$\hat{D}_h$
Draft 2025 ADP						
At-sea Observer Fixed-gear BSAI	263.27	19.83	52.19	0.8481	0.1239	0.7430
At-sea Observer Fixed-gear GOA	1,922.86	6.16	118.46	0.8155	0.0890	0.7430
At-sea Observer Trawl BSAI	25.95	40.39	10.38	0.9772	0.2397	0.7430
At-sea Observer Trawl GOA	192.33	15.45	29.63	0.8940	0.1689	0.7430
EM Fixed-gear BSAI	51.45	47.91	24.31	0.8704	0.1463	0.7430
EM Fixed-gear GOA	903.60	11.11	100.25	0.8202	0.0942	0.7430

Table B- 3. Estimated number of trips in a stratum (N_h), number of observed or monitored trips/deliveries (n_h), observed or monitored sea days (d_h), at-sea coverage rates (r_h) resulting from the deployment sampling design described in the text for 2025). Estimated total number of shoreside deliveries observed for salmon and halibut PSC (o_h) and the estimated number shoreside deliveries observed for groundfish biological sampling (b_h) are listed for the EM Trawl strata.

Stratum (h)	N_h	n_h	d_h	r_h (%)	o_h	b_h
Draft 2025 ADP						
At-sea Observer Fixed-gear BSAI	257	59	418	22.82		
At-sea Observer Fixed-gear GOA	1,855	136	775	7.31		
At-sea Observer Trawl BSAI	24	11	33	47.36		
At-sea Observer Trawl GOA	314	37	117	11.76		
Total	**2,450**	**243**	**1,343**	**9.92**		
EM Fixed-gear BSAI	70	33	239	47.66		
EM Fixed-gear GOA	883	111	610	12.59		
Total	**953**	**144**	**849**	**15.11**		
EM Trawl GOA	**984**	**984**	**2,446**	**100.00**	**984**	**328**
No-selection	**1,389**	**0**	**0**	**0.00**		
Full	918	918	10,284	100.00		
EM Trawl BSAI	1,672	1,672	5,774	100.00	1,672	1,672
Total	**2,590**	**2,590**	**16,058**	**100.00**		
Final 2025 ADP						
At-sea Observer Fixed-gear BSAI	277	52	311	19.83		
At-sea Observer Fixed-gear GOA	1,861	118	687	6.16		
At-sea Observer Trawl BSAI	25	10	27	40.39		
At-sea Observer Trawl GOA	206	30	102	15.45		
Total	**2,369**	**210**	**1,127**	**8.86**		
EM Fixed-gear BSAI	50	24	175	47.91		
EM Fixed-gear GOA	867	100	558	11.11		
Total	**917**	**124**	**733**	**13.52**		
EM Trawl GOA	**886**	**886**	**2,860**	**100.00**	**895**	**298**
No-selection	**1,453**	**0**	**0**	**0.00**		
Full	847	847	9,902	100.00		
EM Trawl BSAI	1,755	1,755	6,089	100.00	1,755	1,755
Total	**2,602**	**2,602**	**15,991**	**100.00**		

Figure B- 1. Process diagram for the analyses contained in this appendix. Green boxes indicate inputs and blue boxes indicate iterative and randomization processes.

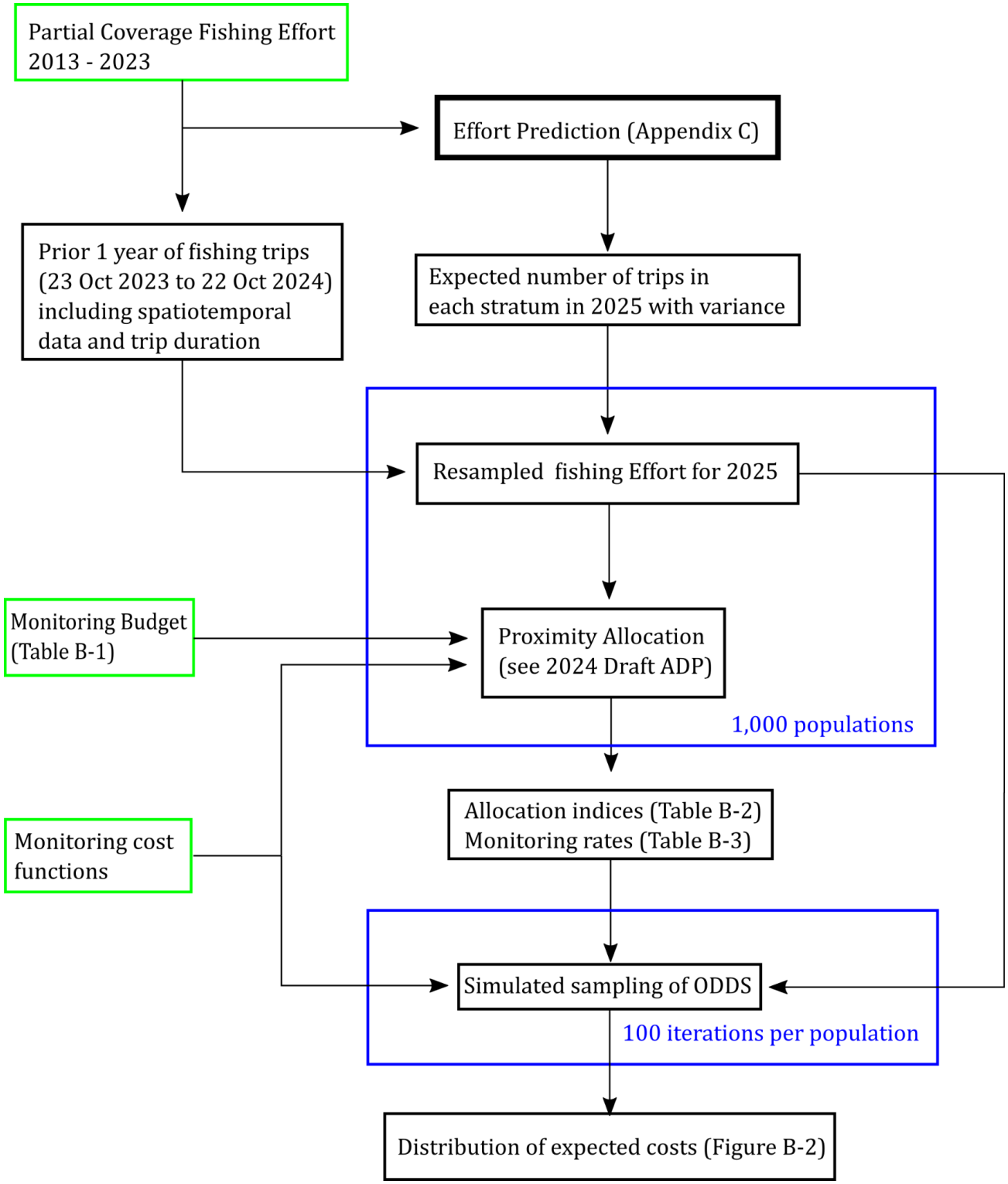
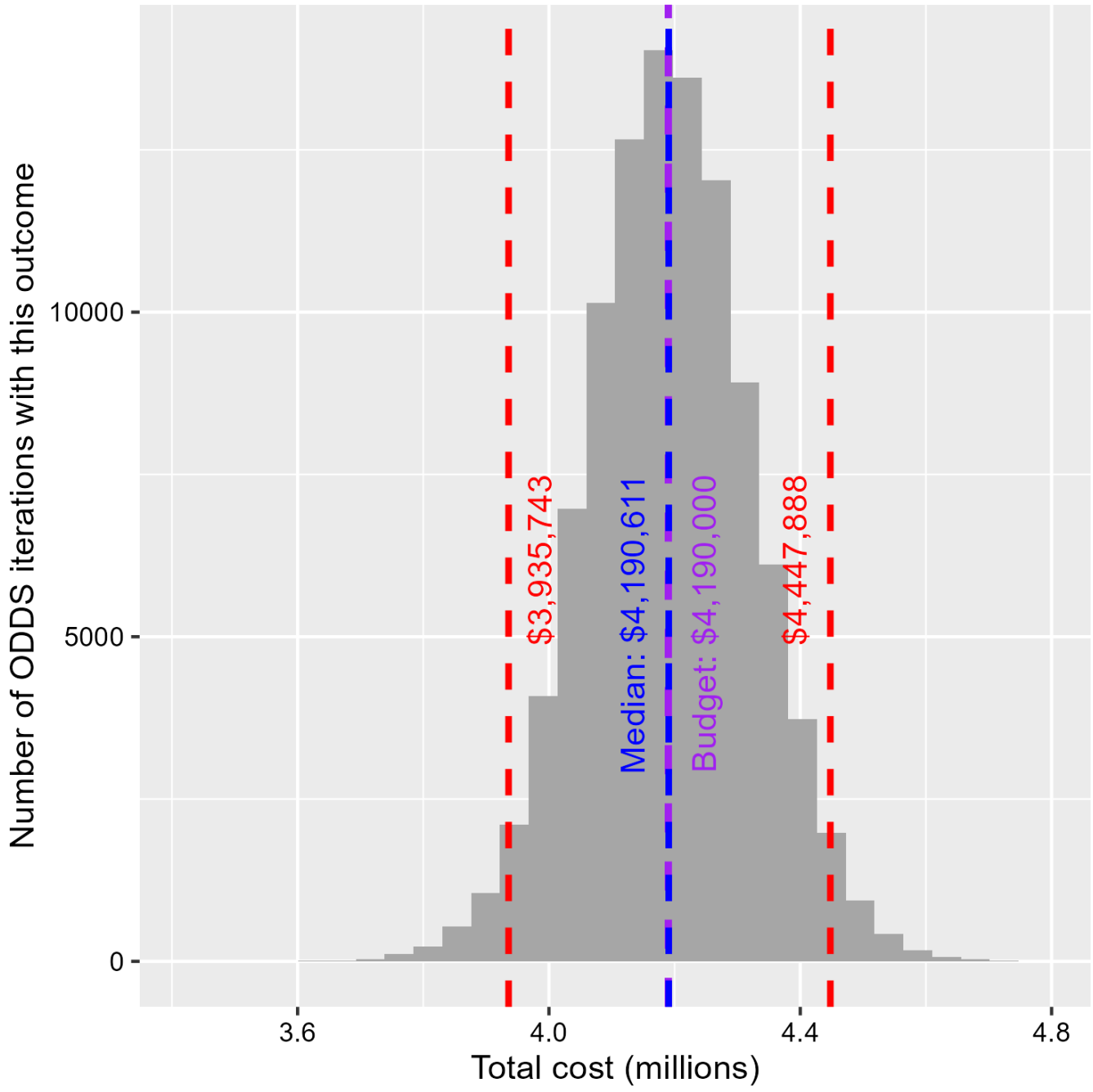


Figure B- 2. Summary of 100,000 outcomes of simulated sampling in ODDS (1,000 resampled populations of partial coverage fishing effort, each with 100 iterations of random trip selection) showing the total costs of the partial coverage monitoring program expected for 2025 from this analysis. Vertical lines depict the available budget (purple), median expected cost (blue), and 95% confidence limits (red).



Appendix C. Methods to predict fishing effort

Introduction

Setting monitoring rates for the next Annual Deployment Plan (ADP) year requires an estimate of fishing effort (i.e., the number of fishing trips or offloads) in each stratum, the monitoring budget for the upcoming year, and an estimate of the stratum-specific cost per trip. In addition, the Proximity Allocation method used in this ADP utilizes the spatiotemporal distribution of the fishing effort within each stratum to determine how much monitoring effort to allocate to each stratum. The purpose of Appendix C is to describe how we estimated the amount of fishing effort to occur in 2025. Predictions need to be as accurate as possible to set selection rates at levels that keep costs within an acceptable range of the available budget—setting rates too low risks the perception that too much money has been collected to spend on fishery monitoring, lowers data quality and quantity, increases potential for data gaps, and loses potential cost efficiencies (i.e., electronic monitoring costs scale with use), whereas setting rates too high risks running out of available funds.

Predicting future fishing effort is very challenging. This is because fishing effort is affected by a myriad of factors that include weather, market forces, fishing power, stock size and distribution, and captain ability and luck. Earlier work demonstrated that including available quota in predictions actually made predictions worse. Therefore, this analysis assumes that using the current year's fishing effort is the best estimate of next year's fishing effort for the ADP (Ganz and Faunce 2019).

As of the publication of this report, fishing effort for the year is incomplete. A date is set as the 'LAST_DATE' of the year (sometime in late October / early November), and the fishing effort from January 1 to the LAST_DATE is an important value to estimate fishing effort for the entire year. For the 2019–2023 ADPs the amount of fishing from January 1 to LAST_DATE was used to calculate the proportion of the entire year of fishing from past years of fishing in groups defined by FMP, trip target, and stratum. For example, if an average of 5% of the BSAI halibut HAL effort occurred during November and December of prior years, we might assume that 5% of that effort would occur in November and December of the current year. Thus, the year end estimate for the current year, and the value used for next year's ADP, would be the amount of fishing effort in the current year from January 1 to LAST_DATE multiplied by 1.05. For some groupings, where visual inspection of effort plots indicated unusual patterns, a subset of prior years was used to calculate this average proportion.

Prior methods of estimating effort suffered from three inefficiencies. First, identifying the years to use for estimating the proportion of trips from January 1 to LAST_DATE was by visual interpretation of plots. Second, the method ignores the utility of using catch from January 1 to LAST_DATE as a predictor in a formal statistical model. Third, the potential error in predictions was not well defined. For these reasons the final 2024 ADP used a statistical model to predict fishing effort. The use of a statistical model has the advantages of being faster, less subjective, and able to produce prediction intervals around estimates of effort. In this ADP, the model from last year was improved by changing an assumption about the underlying data and by changing the method to estimate confidence in the projections.

Methods

As in prior ADPs, to project fishing effort in each stratum of partial coverage fishing for 2025, data from 2013 to LAST_DATE of 2024 were relabelled to belong to the partial coverage fishing stratum of this ADP and summed for each year. For each year prior to 2024 (2013–2023), the number of trips from January–LAST_DATE were also calculated. To calculate the number of trips expected in each stratum

through the end of 2024, we tested the predictive ability of several statistical models starting with the model used in the final 2024 ADP. Uncertainty in last year's model was larger than the mean prediction and large enough to create negative estimates for the number of trips at the end of the year for some partial coverage strata – an impossible outcome which indicated an opportunity for improvement. This problem was corrected by changing the model assumptions about the mean-variance relationship of the data. The model used in the 2024 ADP assumed fishing trip data to be a normal continuous probability distribution[9]. However, fishing trips represent count data, which are bounded by zero at the low end and are not normally distributed. The Poisson distribution is the probability distribution that is best suited for count data. However, the Poisson distribution has an assumption that the relationship between the mean and variance is linear and equal. Because of this assumption, a generalized linear quasi-Poisson model was chosen to predict fishing trips in each stratum for 2024 because of its feature to calculate a scale parameter to properly account for differences in the mean-variance relationship from the expected 1:1 (overdispersion and underdispersion).

A series of six increasingly complex models were performed on the data. Model fits between each pair of successive models were compared using an analysis of variance F-test. This test reports the probability that the variance reduction from the more complex model compared to the lesser complex model is due to random chance. Low p-values indicated that the more complex model was better at predicting than the less complex model. The most complex model that represented a substantial improvement over the less complex model in each compared pair was chosen as the final model.

The above methods were sufficient to select the most parsimonious model for predicting the end of year number of fishing trips in each stratum for 2024. However, it is of interest to see how sensitive the model was to new data. This is important because overly complicated models can suffer from large changes in their predictive capacity with new data and there is a desire to avoid large changes in predictive models from one ADP to the next. Therefore, this analysis included a two-step model evaluation. In the first step, the final model was used to predict the final number of trips in each stratum expected in each terminal year from 2020 to 2024. In each evaluation, predictions of the number of trips at the end of the year were based on the selected model using data from 2013 to the prior year. For example, 2024 predictions for the number of trips per stratum at the end of the year were based on the actual number of year end trips and January 1 to LAST_DATE in each stratum from each year of 2013 to 2023. Likewise 2023 predictions of year end trips per stratum were based on the actual number of year end trips in each stratum each year from 2013 to 2022, etc. Robust models should result in predictions that are unbiased (close to, but not consistently higher or lower than actual values, and have errors that are roughly normally distributed). To evaluate this, the number of predicted year end trips in each stratum were compared to the actual number of end of year trips and plotted against each other. In addition, the distribution of the residuals (actual ± predicted values) were compared against the distribution of residuals expected from a normal distribution with the same mean and standard deviation of the actual residuals.

The first step of model evaluation looks at how robust the methods used in the ADP are for predicting the end of year trips per stratum for the current year, and gives some clues about how adding more data to the model improves model fit. However, what is needed is the end of year trips per stratum for *next* year. Following the assumptions used in past ADPs, this ADP assumes that the number of trips at the end of this year will be an accurate representation of the number of trips at the end of next year as well. To evaluate the accuracy of this assumption, we conducted a second model evaluation.

[9] This is commonly referred to as "normally distributed", and refers to a statistical probability distribution (as opposed to the opposite of an anomaly) that has a symmetrical shape with the mean and mode centered in the distribution.

In the second evaluation, the estimates for the end of year number of trips for the terminal year were advanced by one year, mimicking the assumption used in this analysis. For example, although year end trips for each stratum for 2022 exist and were predicted using the number of trips from January 1–LAST_DATE, Stratum, and ADP year in the step one evaluation, now those 2022 year end predicted trips were labeled as the year end predictions for 2023. In the second evaluation the performance of model predictions were made for years 2021–2023 (ADP years 2024 and 2025 have predictions for total trips at the end of the year but no actual trip counts to compare them to).

The uncertainty in model predictions from step two evaluations was impossible to determine for 2025 because there is no estimate for trip counts through the end of the year in 2024 and no estimate of the number of trips from January 1–LAST_DATE for 2025. Therefore it was decided to use the uncertainty estimate from the selected model for 2024 as the model uncertainty estimate for 2025. This results in lower uncertainty than would be expected in theory. However, it was decided that this known underestimate (of unknown magnitude) would be better than a guess given that the purpose of the uncertainty estimates was to generate alternative predictions for each stratum's year end trips for 2025. These alternative predictions were derived from the final model to generate asymmetrical (and correct) alternative predictions of trip counts that reflect uncertainty from the statistical model. These predictions were then used as inputs to simulate fishing by the partial coverage fleet in 2025 and determine selection rates that would meet the NMFS budget.

Model accuracy in hindcasting and forecasting were summarized by the mean percent bias (where percent bias = ((actual - predicted) / actuals) × 100) and the mean absolute percent difference (MAPE) between predicted and actual (where MAPE = (abs(actual - predicted) / actuals) × 100).

Results

The selected model (Model 3b) accounted for 91.5 % of the null deviance and included the interaction terms for Year, Stratum, and LAST_DATE (Table C- 1). The LAST_DATE was 5 November. Although subsequent candidate model F-test comparisons did have low p values, these were much larger than those between Models 1, 2, 3 and 3b (Table C- 1).

Step one evaluations (predictions through the end of the year) from the selected model were within 10% of the true value for 26 of 32 stratum and year combinations (Figure C- 1 top panel). The selected model exhibited a mean percent bias of less than 1%. The MAPE between predicted and actual was 8% among all stratum and year combinations. The distribution of residuals (actual values minus predicted) were well centered around zero with some residuals of more than -100 reflecting an underestimate of year end trips for some stratum and year combinations (Figure C- 1 bottom panel).

Step two evaluations (predictions for the end of the year advanced one year) were within 10% of the true value for 13 of 24 stratum and year combinations (Figure C- 2 top panel). The selected model exhibited a mean percent bias of 7.3 % (indicating a mean tendency to underestimate ate fishing effort). The MAPE between predicted and actual was 19.1% among all stratum and year combinations. The residuals were more distributed towards the tails than a normal distribution with some large positive values (Figure C-2 lower panel).

Model predictions and uncertainties for end of year trips for each stratum are depicted with their actuals (where available) in Figure C- 3.

Discussion

Changes to the model this year have allowed us to derive alternative estimates of the number of trips in each stratum for 2025 for use in simulations to determine the appropriate selection rate and have improved model performance. Changes to the probability distribution used in the model properly constrained trip predictions to be bounded at zero on the low end as is appropriate for count data. The annual cycle of the deployment plan allows for iterative improvements to the fisheries monitoring design and methods used to derive it to be made. This latest iteration of this analysis is evidence of that fact.

When methods to predict effort were in its infancy, there were not enough data points to justify using models. Now, with over ten years of data, models can be used. It is even possible in the foreseeable future to leverage actual time series models. Such models would be desirable because current models assume all years exist independently of one another, and trends in fisheries performance over time do occur.

References

Ganz, P., and Faunce, C. 2019. An evaluation of methods used to predict commercial fishing effort in Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-395, 19 p. https://doi.org/10.25923/gnyj-f281.

Table C- 1. Model candidates and their residual deviance. TOTAL is the total trips for a year, YR is the year of the data, STRATA is the inclusion of a parameter estimate for each stratum, and LAST_DATE is the number of trips from January 1 until the LAST_DATE of the current year. Addition (+) terms indicate main effects in the model only, whereas multiplication (×) terms indicate main effects and interactions were included. The term "poly" followed by YR and a number indicates that either a second order or third order polynomial spline was fit to the term YR. The model null deviance (no terms) was 56,868 on 87 degrees of freedom. Residual deviance is the amount of this null uncertainty unexplained by the model (smaller values are desirable). F-tests between the first and second models are shown in the last column of row 2. Likewise the F-test result between the second and third models are shown in the last column of row 3 and so on. Low F-test p-values indicate that the two models are different in their residual deviance and the model with the lower value is a better fit to the data. Model 3b was the selected model and is depicted in bold.

Model	Form	Df	Residual deviance	F-test p-value
Model 1	TOTAL ~ YR	86	56,867.5	NA
Model 2	TOTAL ~ YR × STRATA	72	1648.1	<0.001
Model 3	TOTAL ~ Year + STRATA × LAST_DATE	71	126.8	<0.001
Model 3b	**TOTAL ~ ADP × STRATA × LAST_DATE**	**56**	**48.1**	**<0.001**
Model 4	TOTAL ~ poly(YR, 2) × STRATA × LAST_DATE	40	24.3	0.011
Model 5	TOTAL ~ poly(YR, 3) × STRATA × LAST_DATE	24	12.0	0.16

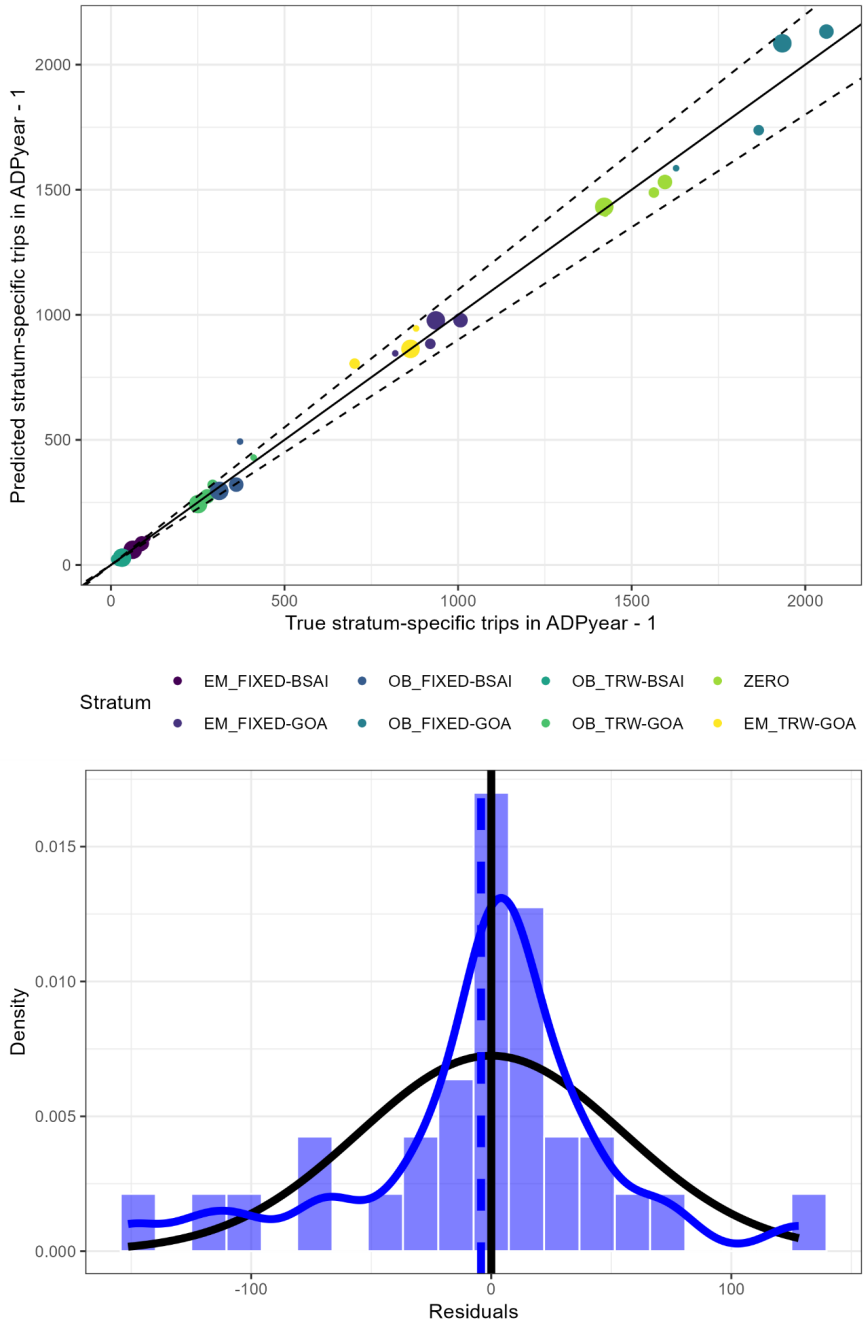


Figure C- 1. Comparisons of predicted effort for the end of the year in each stratum 2020 to 2023. Top panel depicts how close to true value predictions were. Points are sized in relation to their proximity to 2025 where 2023 is the largest and 2020 is the smallest. Dashed lines depict ± 10%. The bottom panel depicts the distribution of residuals (difference between true and predicted; blue histogram and a blue line). The dashed blue line depicts the mean value of residuals obtained from the model and the first step evaluation used to predict trips (use trips through January 1–LAST_DATE to estimate trips in the current year). The residuals obtained can be compared against an expected normal distribution of residuals with a mean of zero and the same standard deviation as the residuals from the model.

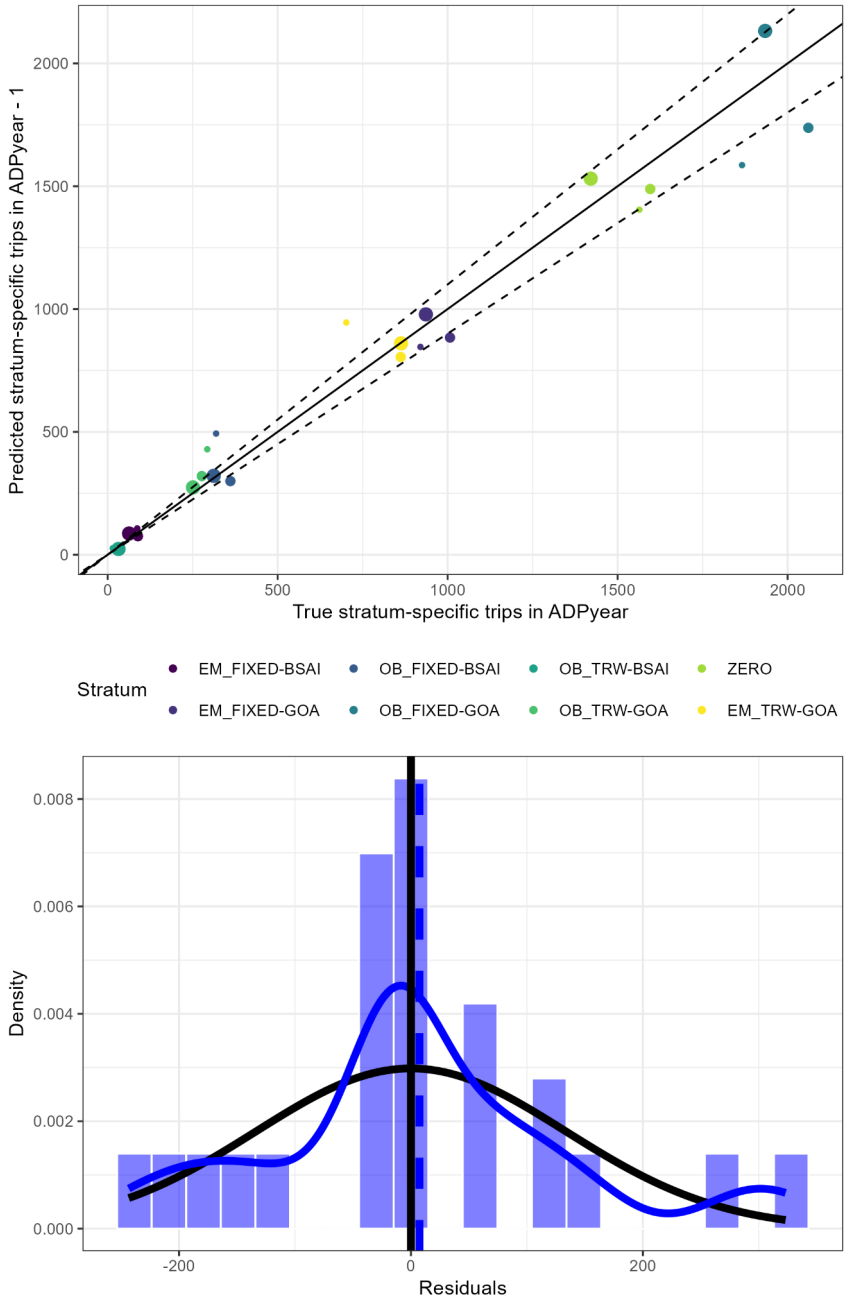


Figure C- 2. Comparisons of predicted effort for the end of the year in each stratum 2021 to 2023. Top panel depicts how close to true value predictions were. Points are sized in relation to their proximity to 2025 where 2023 is the largest and 2020 is the smallest. Dashed lines depict ∓ 10%. The bottom panel depicts the distribution of residuals (difference between true and predicted; blue histogram and a blue line). The dashed blue line depicts the mean value of residuals obtained from the selected model and the second step evaluation method used to predict end of year trips (predict through the end of the year and then use this as a proxy for the next year). The residuals obtained can be compared against an expected normal distribution of residuals with a mean of zero and the same standard deviation as the residuals from the model.

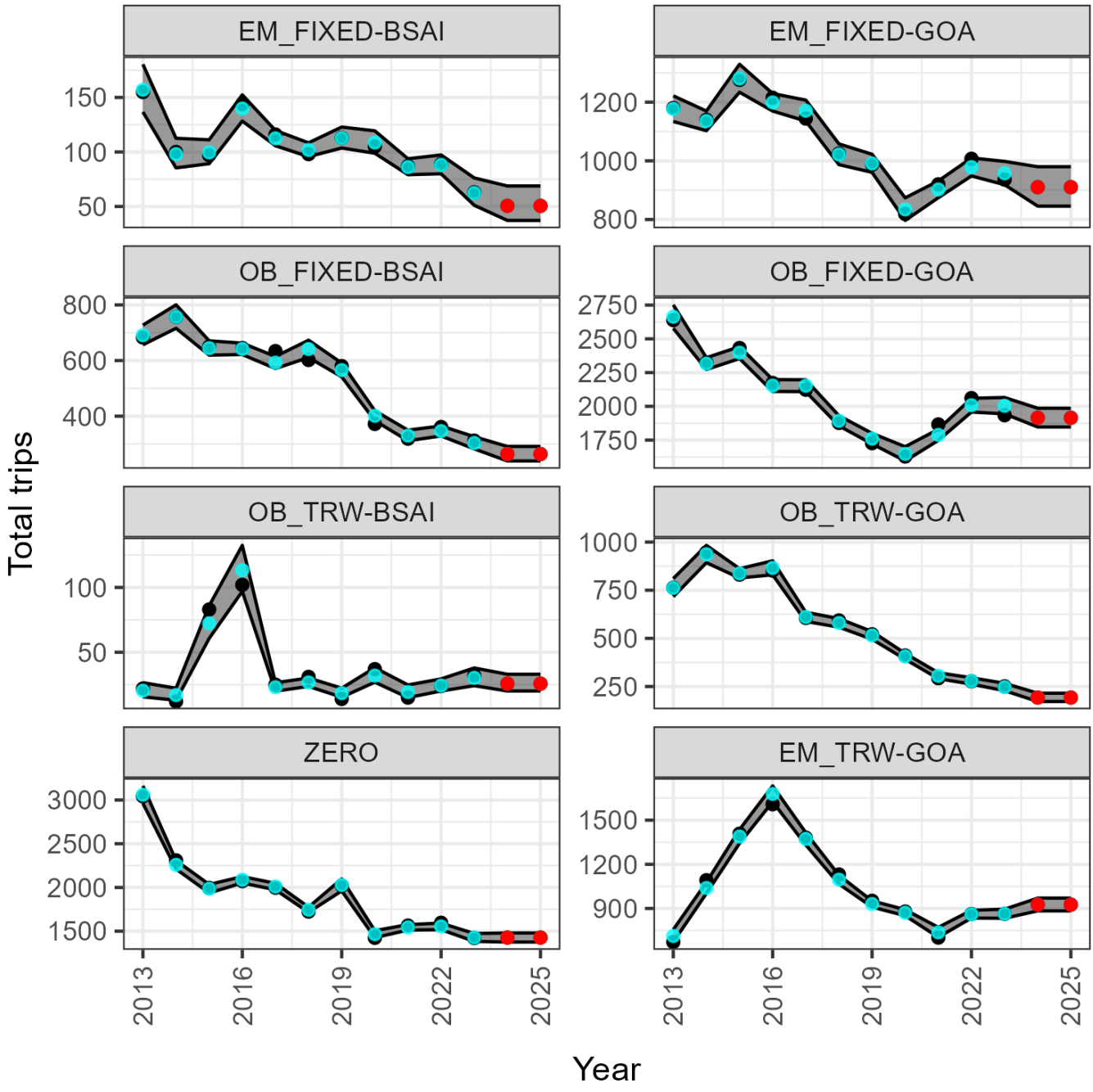


Figure C- 3. Partial coverage trips from each stratum by year. Black points represent realized effort. Cyan points represent model predictions. Red points represent predicted estimates. Shaded areas represent confidence intervals of estimated values from the model. Predicted values and model uncertainties are carried over from 2024 to 2025. For this reason the uncertainty values from 2025 are underestimated.