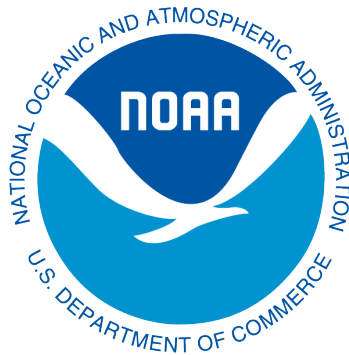


2022 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska

December 2021



NOAA
FISHERIES

Fisheries Monitoring and Analysis Division, Alaska Fisheries Science Center
National Marine Fisheries Service
7600 Sand Point Way NE
Seattle, WA 98115

National Marine Fisheries Service, Alaska Regional Office
P.O. Box 21668
709 W. 9th Street
Juneau, Alaska 99802

Accessibility of this Document: Every effort has been made to make this document accessible to individuals of all abilities and compliant with Section 508 of the Rehabilitation Act. The complexity of this document may make access difficult for some. If you encounter information that you cannot access or use, please email us at Alaska.webmaster@noaa.gov or call us at 907-586-7228 so that we may assist you.

Suggested Citation

NMFS (National Marine Fisheries Service). 2021. 2022 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802.

Contents

| | |
|---|-----------|
| Executive Summary | 4 |
| Introduction | 7 |
| <i>Purpose and Authority</i> | 7 |
| <i>Process and Schedule</i> | 8 |
| Summary of 2021 ADP | 9 |
| 2022 Deployment Methods | 10 |
| <i>At-Sea Deployment Design</i> | 10 |
| Selection Method | 11 |
| Selection Pools (Stratification Scheme) | 11 |
| Allocation Strategy | 13 |
| <i>Dockside Monitoring</i> | 14 |
| <i>Deployment Rates</i> | 15 |
| <i>Observer Declare and Deploy System (ODDS)</i> | 15 |
| <i>EM development projects</i> | 16 |
| <i>Annual Coverage Category Requests</i> | 17 |
| Partial coverage catcher/processors | 17 |
| Full coverage catcher vessels | 17 |
| <i>Vessels Participating in Halibut Deck Sorting</i> | 17 |
| Communication and Outreach | 18 |
| References | 18 |
| List of Preparers and Contributors | 19 |
| Appendix A. Council motions related to Annual Report and ADP | 20 |
| Appendix B. Calculation of the Selection Rates for 2022 | 22 |

Executive Summary

This 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 during the calendar year 2022. The ADP outlines the science-driven method for deployment of observers and EM systems to support statistically reliable data collection.

The North Pacific Observer Program is the largest observer program in the country and covers vessels in both partial coverage and full coverage. 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 2022, NMFS expects to monitor 3,012 trips, consisting of an estimated 17,936 days, in the full coverage component of the program. The ADP mainly focuses on the partial coverage component of the program and specifies the scientific deployment design and selection rate—the portion of trips that are sampled by observers and EM.

At-sea Deployment Design

The deployment design for the partial coverage component of the program involves three elements: 1) the selection method to accomplish random sampling; 2) division of the population of partial coverage trips into selection pools or strata; and 3) the allocation of deployment trips among strata.

Selection method:

- Trip-selection refers to the method of selecting fishing trips as the sampling unit. Trip selection is facilitated through vessels logging their trips into the Observer Deploy and Declare System (ODDS) and being notified by the system if the trip is selected for coverage.
- In 2022, observers and EM will be deployed using the trip selection model in all ports throughout Alaska.
- NMFS continues to monitor ongoing State of Alaska health advisories, travel restrictions, and quarantine requirements associated with the COVID-19 pandemic. Deployment of EM and observers at all ports is consistent with the June 29, 2021 [updated NOAA Fisheries observer waiver policy](#), which states that vessels are no longer eligible for release from observer coverage under the Emergency Rule if a fully vaccinated or quarantined/shelter-in-place observer is available. If necessary, NMFS could modify the deployment approach and limit the number of ports with available observers in response to transportation availability and/or changes in health and travel advisories. Any revisions to the deployment of observers due to changes in health and travel advisories would be published through an Alaska Region Information Bulletin.
- If no observers are available for deployment, NMFS could release partial coverage trips from observer coverage on a case-by-case basis. This approach is consistent with existing regulatory authority at 50 CFR 679.51(a)(1).

Selection pools:

- *Observer trip-selection pool:*
 - In 2022, there will be 3 sampling strata for the deployment of observers:
 - Hook-and-line vessels greater than or equal to 40 ft LOA,
 - Pot vessels greater than or equal to 40 ft LOA, and
 - Trawl vessels making a trip not covered by the EM EFP.

- *EM trip-selection pool:*
 - The fixed-gear EM pool in 2022 will consist of 171 vessels approved by NMFS. Three vessels that participated in fixed-gear EM during 2021 requested to be removed from EM and were replaced by 3 vessels new to EM for 2022. The 3 new vessels were selected using a prioritized list based on: vessel size, fishing effort, minimizing data gaps, and cost efficiency. An additional 7 vessels requested to be in the EM pool but were not approved by NMFS due to the cost inefficiencies of having hardware committed to vessels with very minimal fishing effort. These vessels may be good candidates for mobile EM systems currently being tested.
 - Prior to fishing, all the vessels in the EM selection pool— including those there were previously in the pool —are required to submit and follow an NMFS-approved VMP.
 - As part of the VMP approval, NMFS will assess a vessel's adherence to their approved VMP. The quantity and severity of conformance issues that impact the quality and usability of data will be evaluated to determine the standing of a vessel and their eligibility to participate in the fixed gear EM program. A vessel with poor standing will be placed into probation status and the vessel owner/operator will be notified of specific issues they need to address in order to bring the vessel into compliance with the VMP. Failure of a vessel operator to address these issues or comply with other conditions of the VMP may result in the vessel not being eligible to participate in the EM pool in the following year.
- *Trawl Electronic Monitoring Trip-Selection Pool:* This pool is composed of all vessels fishing under an Exempted Fishing Permit (EFP) to evaluate the efficacy of EM on pollock catcher vessels using pelagic trawl gear in the Bering Sea and Gulf of Alaska. The goal for EM is compliance monitoring of maximized retention. Catch accounting for the vessel's catch and bycatch is done via eLandings reports and shoreside plant observers. Industry received National Fish and Wildlife Foundation (NFWF) funding to support the project that includes catcher vessels, tender vessels, and shoreside processors. In 2022, 79 vessels are expected to participate in Trawl EM.
- *No-selection pool:* The no-selection pool will be composed of fixed-gear vessels less than 40 ft LOA and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear.

Allocation Strategy:

In 2022, NMFS will implement an observer deployment allocation strategy of an adjusted 15% baseline, plus optimization based on discarded groundfish, Pacific halibut PSC, and Chinook PSC. This method (abbreviated as “15% + Opt 95”) represents a data-based, cost efficient strategy to preferentially allocate more samples into the trawl deployment stratum with PSC-limited fisheries as intended by the Council and is also precautionary with respect to avoiding bias and increasing the chance of getting data across all gear types and areas. The approach provides a balance between minimizing the variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce gaps in observer coverage in the partial coverage category.

Dockside Monitoring

Observers will continue to collect genetic samples from salmon caught as bycatch in groundfish fisheries to support efforts to identify stock of origin. Dockside monitoring by observers occurs in the pollock fishery to enable complete enumeration of salmon bycatch and to conduct biological sampling.

For trips in the BSAI trawl pollock fishery, both for catcher vessels in the trawl EM pool and those not in trawl EM, a census of salmon will be completed during the offload. Offload monitoring for salmon will also take place for vessels in the trawl EM pool that deliver either a tender and shoreside processor in the GOA. Trips will be randomly selected and offloads will be monitored by observers in shoreside processing facilities.

For vessels that do not participate in the EFP and deliver to shoreside processors in the GOA pollock fishery, trips that are randomly selected for at-sea observer coverage will be completely monitored for Chinook salmon bycatch by the vessel observer during offload of the catch at the shoreside processing facility. For trips in the GOA pollock fishery (outside of the EFP) that are delivered to tender vessels and trips outside of the pollock fishery, salmon counts and tissue samples will be obtained from all salmon found within observer at-sea samples of the total catch.

Partial Coverage Deployment rates

The 2022 budget for EM and observer deployment in the partial coverage component of the program 2022 is \$5.22M, which sustains the fixed-gear EM program at \$1M and funds at-sea and shoreside monitoring by observers.

The deployment rates (rounded to the nearest whole number) for strata in 2022 are—

- No Selection – 0%
- Hook-and-line – 19%
- Pot – 17%
- Trawl vessels not participating in the EM EFP – 30%
- Fixed-Gear EM – 30%
- Trawl EM EFP—100% at-sea EM; plus: 30% shoreside monitoring in GOA or 100% shoreside monitoring in BS

Introduction

Purpose and Authority

This 2022 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), in consultation with NMFS, to prepare a fishery research plan. NMFS implements the Council's fishery research plan through the North Pacific Observer Program (Observer Program). The Observer Program provides the regulatory framework 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.

The Observer Program is the largest observer program in the country and covers vessels in both partial coverage and full coverage. Data collection through the Observer Program provides a reliable and verifiable method for NMFS to gain fishery discard and biological information 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. 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 within established limits and to document and reduce 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 interactions with fishing gear, characterize fishing impacts on habitat, and provide data for fisheries and ecosystem research and fishing fleet behavior.

In the full coverage component of the program, every trip is monitored by 1 or 2 observers. In the partial coverage component, the ADP specifies the scientific sampling design and the selection rate—the portion of trips that are sampled. The selection rates can change from one calendar year to the next to achieve efficiency, cost savings, and data collection goals. 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 decision about how to apportion fees between observer deployment and EM system deployment is also made during the ADP process. The ADP process allows NMFS to adjust deployment in each year so that sampling can be achieved within financial constraints.

Some aspects of deployment can be adjusted through the ADP, including the assignment of vessels to a specific partial coverage selection pool, and the allocation strategy used to deploy observers and EM in

the partial coverage category. The ADP also defines the criteria for vessels to be eligible to participate in the EM selection pool and can include factors such as gear type, vessel length, home or landing port, and availability of EM systems.

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, November 21, 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).

Process and Schedule

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 the ADP process to provide flexibility in the deployment of observers and EM to gather reliable data for estimation of catch in the groundfish and halibut fisheries off Alaska. 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.

In the full coverage component of the program, every trip is monitored whereas in the partial coverage component, the ADP specifies the selection rate—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 selection rates can change from one calendar year to the next to achieve efficiency, cost savings, and data collection goals. The annual decision about how to apportion fees between observer deployment and EM system deployment is also made during the ADP process. The ADP process allows NMFS to adjust deployment in each year so that sampling can be achieved within financial constraints.

Some aspects of deployment can be adjusted through the ADP, including the assignment of vessels to a specific partial coverage selection pool, and the allocation strategy used to deploy observers and EM in the partial coverage category. The ADP also defines the criteria for vessels to be eligible to participate in the EM selection pool and can include factors such as gear type, vessel length, home or landing port, and availability of EM systems.

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 NMFS 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.

The schedule for the 2022 ADP is as follows:

- **June 2021:** NMFS presented the 2020 Annual Report (AFSC/AKR 2021) to the Council and the public. The Annual Report process 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. The 2020 Annual Report provided a comprehensive evaluation of Observer Program performance including costs, sampling levels, issues, and potential changes for the 2022 ADP.
- **September 2021:** Based on direction from the Council (Appendix A) and experience from observer deployment and health and safety considerations during 2021, NMFS prepared and released the draft 2022 ADP (NMFS 2021), which contained recommendations for deployment methods in the partial coverage category.
- **September – October 2021:**
 - *Review of the draft ADP:* The Council reviewed the draft 2022 ADP and associated Plan Team and Fishery Monitoring Advisory Committee recommendations. Based on input from its advisory bodies and the public, the Council provided recommendations for the final 2022 ADP (Appendix A). NMFS reviewed and considered these recommendations; however, extensive analysis and large-scale revisions to the draft 2022 ADP are not feasible. This constraint is due to the short time available to finalize the 2022 ADP prior to the December 2021 Council meeting, and practical limitations on planning for deployment (including modifying a federal contract with the observer provider) and associated processes that need to be in place by January 1, 2022.
 - *Requests to participate in EM selection pool:* The deadline for vessels in the partial coverage category using fixed to request to be in the 2022 EM selection was November 1, 2021.
- **December 2021:** NMFS finalizes and releases the 2022 ADP to the public during the Council meeting.

Summary of 2021 ADP

In December, 2020, NMFS released the final 2021 ADP (NMFS 2020). In 2021 EM was deployed according to trip-selection in 2021. Due to limitations on transportation and health mandates associated with COVID-19, observers were deployed according to a port-based trip selection model in 2021. Under the port-based trip selection model, observers were deployed on randomly selected trips from specific ports. In addition, this method excluded trips from observation if they did not depart and land within a port that was on the list of observable ports. The observable ports were identified because travel and

lodging conditions allowed observers to meet and maintain applicable health mandates and advisories for deployment into the commercial fisheries and because there were expected to be enough fishing trips originating and ending in these ports to make it cost effective to place observers in these communities. These ports included: (1) Akutan, (2) Dutch Harbor/Unalaska, (3) False Pass, (4) Homer, (5) Juneau, (6) Ketchikan, (7) King Cove, (8) Kodiak, (9) Nome, (10) Petersburg, (11) Sand Point, (12) Seward, (13) Sitka, and (14) Yakutat. In statistical terms, prior to COVID-19, all ports were within the sampling frame, whereas only some ports remain in the sampling frame in response to COVID-19.

In August, 2021, NMFS released an Information Bulletin¹ to announce the expansion of observer deployment for all ports throughout Alaska beginning on September 1, 2021. This change was consistent with the updated NOAA policy on observer waivers,² which states that vessels are no longer eligible for release from observer coverage under the Emergency Rule if a fully vaccinated or quarantined/shelter-in-place observer is available.

The 2021 ADP allocated observed trips among three strata defined by gear according to a 15% plus optimized allocation. The optimized allocation was based on the variance of discarded groundfish and Pacific halibut PSC, and Chinook salmon PSC (NMFS 2020).

The strata and deployment rates (rounded to the nearest whole number) for 2021 were—

- No Selection – 0%
- Trawl – 16%
- Hook-and-line – 15%
- Pot – 15%
- Fixed-Gear EM – 30%
- Trawl EM EFP–100% at-sea EM; plus: 30% shoreside monitoring in GOA or 100% shoreside monitoring in BS

2022 Deployment Methods

The Observer Program uses a stratified hierarchical sampling design where trips and vessels represent the primary sampling units. Observers and EM are deployed into strata that are defined through a combination of regulations and the annual deployment process. Subsequent and lower levels of the sampling design at sea include the sampling of hauls, conducting species composition, obtaining lengths and biological tissues including those used for ageing, sexual maturity and genetics. Dockside monitoring by observers occurs in the pollock fishery to enable complete enumeration of salmon bycatch and to conduct biological sampling.

At-Sea Deployment Design

The sampling design for at-sea deployment of observers and EM in the partial coverage category involves three elements: 1) the selection method to accomplish random sampling; 2) division of the population of partial coverage trips into selection pools or strata (stratification scheme); and 3) the allocation of deployment trips among strata (allocation strategy).

¹ NMFS Information Bulletin: <https://www.fisheries.noaa.gov/bulletin/ib-21-39-notice-alaska-observer-requirements-partial-coverage-fleet-effective>

² NOAA policy from June 29, 2021: <https://www.fisheries.noaa.gov/bulletin/update-noaa-fisheries-observer-waiver-policy>

Selection Method

Trip-selection refers to the method of selecting fishing trips as the sampling unit. Trip selection is facilitated through vessels logging their trips into the Observer Declare and Deploy System (ODDS) and being notified if the trip is selected for coverage.

For 2022, NMFS will implement trip selection from all ports throughout Alaska as the method of assigning both observers and EM to at-sea fishing events for vessels in the partial observer coverage category. Deployment of EM and observers at all ports is consistent with the June 29, 2021 [updated NOAA Fisheries observer waiver policy](#), which states that vessels are no longer eligible for release from observer coverage under the Emergency Rule if a fully vaccinated or quarantined/shelter-in-place observer is available. The agency continues to monitor ongoing State of Alaska health advisories, travel restrictions, and port-specific recommendations and requirements associated with the COVID-19 pandemic. If transportation availability and/or health and travel advisories change, NMFS could modify the deployment approach and restrict deployment to a set of ports with available observers. Any revisions to the deployment of observers due to changes in health and travel advisories would be published through an Alaska Region Information Bulletin.

In addition to logging each of their trips, vessels in the EM selection pool will also use ODDS to close each trip following the instructions in their Vessel Monitoring Plan (VMP).

Waivers related to COVID-19

In accordance with the June 29, 2021 [updated NOAA Fisheries observer waiver policy](#), vessels are no longer eligible for release from observer coverage under the Emergency Rule if a fully vaccinated or quarantined/shelter-in-place observer is available. If no observers are available for deployment, NMFS could release partial coverage trips from observer coverage on a case-by-case basis. This approach is consistent with existing regulatory authority at 50 CFR 679.51(a)(1). AIS will work with NMFS to release trips when they are unable to provide an observer who is compliant with applicable protective plans.

Selection Pools (Stratification Scheme)

The division of the population of partial coverage trips into selection pools, or strata, is the stratification scheme. Each year, the ADP defines the deployment strata and how vessels are assigned to specific partial coverage selection pools.

No-selection pool

The no-selection pool is composed of vessels that will have no probability of carrying an observer on any trips for the 2022 fishing season. These vessels are:

- fixed-gear vessels less than 40 ft length overall, where length overall is defined in regulations at 50 CFR 679.2 and means the centerline longitudinal distance, rounded to the nearest foot; and
- vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear.

Trip-Selection Pool for Observer Deployment

The three observer trip-selection strata based on gear (trawl, hook-and- line, and pot) will remain the same for 2022.

EM Selection Pool

Vessels in the partial coverage category using fixed gear had the opportunity to request to be in the 2022 EM selection pool using ODDS. Any vessel in the EM selection pool in 2021 remains eligible to be in the EM selection pool unless a request is submitted to leave the EM selection pool, NMFS has disapproved the vessel's VMP, or if vessel operator has repeat problems with EM system reliability or video quality or has failed to comply with the requirements in their VMP. All the requests to be in or out of the EM selection pool for 2022 must have been received by November 1, 2021. Any vessel that did not request to participate by this deadline is not eligible for placement in the 2022 EM selection pool and in the partial coverage trip selection pool for observer coverage.

The fixed-gear EM pool in 2022 will consist of 171 vessels approved by NMFS. Three vessels that participated in fixed-gear EM during 2021 requested to be removed from EM and were replaced by 3 vessels new to EM for 2022. The 3 new vessels were selected using a prioritized list based on: vessel size, fishing effort, minimizing data gaps, and cost efficiency. An additional 7 vessels requested to be in the EM pool but were not approved by NMFS due to the cost inefficiencies of having hardware committed to vessels with very minimal fishing effort. These vessels may be good candidates for mobile EM systems currently being tested (see section on EM Development).

Vessel owner/operators receive notification of NMFS approval of their placement in the EM 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 the vessels in the EM selection pool—including those there were previously in the pool—are required to submit and follow an NMFS-approved Vessel Monitoring Plan³.

As part of the VMP approval, NMFS will assess a vessel's adherence to their approved VMP. For example, does a vessel operator have recurring issues (such as obstructing the camera view or consistently not addressing camera cleanliness) that have resulted in unusable or very poor quality EM data? The quantity and severity of compliance issues that impact the quality and use of that data will be used to assess the standing of a vessel and their eligibility to participate in the fixed gear EM program. NMFS will notify the vessel operator of their status through a cover letter attached to the VMP approval on an annual basis. A vessel with poor standing will be placed into probation status and the vessel owner/operator will be notified of specific issues they need to address in order to bring the vessel into compliance. Failure of a vessel operator to address these issues or comply with other conditions of the VMP may result in the vessel not being eligible to participate in the EM pool in the following year. Thus far, NMFS has not disapproved any EM vessels for 2022 for failure to comply with the requirements in their VMP.

EM system installation and maintenance will be scheduled in the primary ports of Sitka, Homer, Kodiak, and secondary ports such as Juneau, Petersburg, Sand Point, King Cove, and Dutch Harbor may have periodic EM installation services available. Vessels not available during scheduled dates of EM installation in a secondary port will be required to travel to a primary port for EM installation services prior to the date of their first logged trip in ODDS. Primary and secondary port services apply to EM equipment installation and servicing only, there are no restrictions on where a vessel may make landings associated with this program. Once installed, the EM sensors and cameras will remain on the vessel

³ The 2021 VMP template is available at: <https://alaskafisheries.noaa.gov/fisheries/electronic-monitoring>

until either 1) the boat opts out of the EM pool for the following year; or 2) NMFS determines that the vessel will not be eligible to participate in the EM selection pool the following year.

Trawl Electronic Monitoring Trip-Selection Pool

NMFS has issued an Exempted Fishing Permit (EFP) to evaluate the efficacy of EM on pollock catcher vessels using pelagic trawl gear in the Bering Sea and Gulf of Alaska⁴. NMFS approved the EFP in January, 2020, allowing pollock catcher vessels using pelagic trawl gear to use EM systems in lieu of at sea observers. The goal for EM is compliance monitoring of maximized retention. Catch accounting for the vessel's catch and bycatch is done via eLandings reports and observers in the shoreside processing plants. The specific requirements for vessels in the trawl EM trip-selection pool was determined through the permit approval process. Industry has received National Fish and Wildlife Foundation (NFWF) funding to support the project that includes catcher vessels, tender vessels, and shoreside processors. In 2022, 79 vessels are expected to participate in Trawl EM.

Summary of 2022 Deployment Strata

The following deployment strata will be in place for vessels in the partial coverage category for deployment of observers (50 CFR 679.51(a)) and electronic monitoring ((50 CFR 679.51(f)) in 2022:

- ***No-selection pool:*** The no-selection pool is composed of vessels that will have no probability of carrying an observer on any trips for the 2022 fishing season. These vessels are fixed-gear vessels less than 40 ft LOA⁵ and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear.

- ***Observer trip-selection pool:*** Observers will be deployed from all ports throughout Alaska in 3 sampling strata:
 - ***Hook-and-line:*** This pool is composed of all vessels in the partial coverage category that are greater than or equal to 40 ft LOA that are fishing hook-and-line gear.
 - ***Pot:*** This pool is composed of all vessels in the partial coverage category that are greater than or equal to 40 ft LOA that are fishing pot gear.
 - ***Trawl:*** This pool is composed of all vessels in the partial coverage category fishing trawl gear.

- ***EM selection pool:*** The EM selection pool will be composed of up to 171 fixed gear vessels.

- ***Trawl EM trip-selection pool:*** This pool is composed of all vessels fishing under the EFP permit.

Allocation Strategy

Allocation strategy refers to the method of allocating deployment trips among strata. Starting in 2018, NMFS has implemented the observer allocation strategy of 15% threshold plus optimization, where observer sea days are first allocated equally up to a threshold coverage rate and the remaining sea-days are allocated using an algorithm that maximizes precision for chosen metrics (such as halibut PSC) for

⁴ More details on the EFP permit are available at: <https://www.fisheries.noaa.gov/alaska/resources-fishing/exempted-fishing-permits-alaska>

⁵ Length overall (LOA) is defined in regulations at 50 CFR 679.2 and means the centerline longitudinal distance, rounded to the nearest foot.

the least cost. The draft 2022 ADP provided more information on an adjusted approach where the baseline coverage rate ensures a 95% probability of achieving the threshold coverage rate of 15%, after which additional observer days are allocated using an optimization algorithm ('15% + Opt 95'; NMFS 2021).

The adjusted approach to the 15% hurdle addresses issues that arise with the way baseline coverage has been defined in past ADPs. Coverage rates below 15% have been shown to exacerbate data gaps in fisheries monitoring and catch estimation (Gasper et al. 2019). Past ADPs have used the number of samples required to achieve 15% coverage *on average* among simulations to set coverage rates. This results in a 50% likelihood of not achieving 15% coverage, and this likelihood of not achieving the desired coverage rate increases in strata with fewer trips. While it is possible to pool data across areas to produce bycatch estimates, the result is a higher likelihood that fishery managers will be reliant on estimates derived from multiple fisheries and large spatial domains. To address these concerns, the adjusted baseline allocation sets a baseline coverage rate so that a minimum of 15% selection is achieved in at least 95% of the simulations.

In 2022, NMFS will implement an observer deployment allocation strategy of an adjusted 15% baseline, plus optimization based on discarded groundfish, Pacific halibut PSC, and Chinook PSC.

This method is precautionary with respect to avoiding bias and increasing the chance of getting data across all gear types and areas while still providing the ability for 'extra' monitoring to be distributed based on an optimization plan. The approach provides a balance between minimizing the variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce gaps in observer coverage in the partial coverage category.

Dockside Monitoring

Observers will continue to collect genetic samples from salmon caught as bycatch in groundfish fisheries to support efforts to identify stock of origin. Dockside monitoring by observers occurs in the pollock fishery to enable complete enumeration of salmon bycatch and to conduct biological sampling. For trips in the BSAI trawl pollock fishery, both for catcher vessels in the trawl EM pool and those not in trawl EM, a census of salmon will be completed during the offload. Offload monitoring for salmon will also take place for vessels in the trawl EM pool that deliver either a tender and shoreside processor in the GOA. Trips will be randomly selected and offloads will be monitored by observers in shoreside processing facilities.

For vessels that do not participate in the EFP and deliver to shoreside processors in the GOA pollock fishery, trips that are randomly selected for at-sea observer coverage will be completely monitored for Chinook salmon bycatch by the vessel observer during offload of the catch at the shoreside processing facility. For trips in the GOA pollock fishery (outside of the EFP) that are delivered to tender vessels and trips outside of the pollock fishery, salmon counts and tissue samples will be obtained from all salmon found within observer at-sea samples of the total catch.

If COVID-19 protocols at shoreside processing plants prevent vessel observers from entering the processor to complete any further sampling, NMFS may alter data collection procedures to accommodate safety protocols. This would follow the methods developed in 2020, where shore-based observers completed the sampling for pollock trawl vessels regardless of whether the vessel was observed at-sea or if it participated in the trawl EM EFP.

Deployment Rates

The trip selection rate for vessels in the EM selection pool is based on recommendations from the Council and the selection rate will be 30% of trips in 2022.

To determine the deployment rates for the observer-deployment in the partial coverage strata, NMFS uses the available sea-day budget and estimates of anticipated fishing effort. The budget is set with the goal of stabilizing observer coverage rates across years to avoid having very high coverage rates driven by high revenue years followed by low coverage rates in years with low revenue. The 2022 budget for EM and observer deployment in the partial coverage component of the program 2022 is \$5.22M, which sustains the fixed-gear EM program at \$1M and funds at-sea and shoreside monitoring by observers.

The estimates of available sea-day budget and anticipated fishing effort are the primary inputs into simulation models used to generate anticipated outcomes from different selection rates (Appendix B). Sample size using the adjusted optimization allocation (“15% + Opt 95”) and resulting coverage rate estimates were generated through simulation following the approach used for previous ADPs in which each simulation trial mimics an ADP selection draw for the year (Appendix B). Each vessel in the sampling strata of the partial-coverage fleet does not undertake identical numbers of trips and days in a year; the simulation approach provides NMFS with a full range of potential outcomes from random sampling (selections) of different vessels and trips. The simulated deployment rates were determined from an evaluation of estimated annual program costs assessed against the risk of exceeding the Observer Program’s available funds.

In 2022, NMFS expects to monitor 3,012 trips in the full coverage component of the program and 990 trips will be monitored for catch accounting in the partial coverage category (Table 1). The deployment rates (rounded to the nearest whole number) for strata in partial coverage in 2022 are—

- No Selection – 0%
- Hook-and-line – 19%
- Pot – 17%
- Trawl vessels not participating in the EM EFP – 30%
- Fixed-Gear EM – 30%
- Trawl EM EFP–100% at-sea EM; plus: 30% shoreside monitoring in GOA or 100% shoreside monitoring in BS

Observer Declare and Deploy System (ODDS)

For 2022, the user experience in ODDS will not change for a vessel operator. NMFS will retain the current business operating procedure of allowing vessels to log up to three trips in advance and programming that prevents a 40 – 57.5’ fixed gear vessel from being randomly selected for a third consecutive observer trip. Vessels are allowed to cancel or change any unobserved trips (logged trips that have not been selected to carry observer coverage) themselves, but any observed trips (logged trips that have been selected for observer coverage) that must be rescheduled need to be coordinated by contacting the ODDS call center (1-855-747-6377). As NMFS has described in the previous Annual Reports, ODDS programming allows vessel operators to change the dates for future observed trips.

Table 1. Summary of total trips, allocation weights, deployment rates, and the number of trips expected to be observed in each -sampling stratum in 2022.

| Component | Pool | Stratum | Total Number of Expected Trips | Allocation Weight | Deployment Rate (%) | Number of Trips Expected to be Observed |
|------------------|-------------------------|------------------|--------------------------------|-------------------|---------------------|---|
| Partial Coverage | Observer Trip Selection | Hook-and-line | 1,218 | 0.33 | 19.02 | 232 |
| | | Pot | 960 | 0.05 | 17.48 | 168 |
| | | Trawl | 666 | 0.62 | 29.65 | 197 |
| | | Total | 2,844 | 1.00 | 20.99 | 597 |
| | EM trip selection | EM Hook-and-line | 632 | | 30.00 | 190 |
| | | EM Pot | 255 | | 30.00 | 77 |
| | | Trawl EM (GOA) | 418 | | 30.00* | 126 |
| | | Total | 1,305 | | 30.00 | 393 |
| | No selection | Hook-and-line | 1,413 | | 0.00 | 0 |
| | | Pot | 56 | | 0.00 | 0 |
| Total | | 1,469 | | 0.00 | 0 | |
| Full Coverage | Full | Observer | 1,819 | | 100.00 | 1,819 |
| | | Trawl EM | 1,193 | | 100.00 | 1,193 |
| | Total | 3,012 | | 100.00 | 3,012 | |

*Trawl EM has 100% compliance monitoring at-sea with video and 30% of offloads are sampled by observers at the shoreside processing plant.

EM development projects

In addition to ongoing pre-implementation of trawl EM, NMFS supports ongoing innovation of EM and collaborating with industry partners on EM development projects, when funding is available. EM projects for 2022 include:

EM Innovation Project (EMIP)

The goal of this ongoing effort, spearheaded by the AFSC FMA Division, is to develop and integrate computer vision algorithms into cost-effective electronic monitoring systems with the aim of providing automated catch accounting data. This research is supported through competitive processes, funded by the Fisheries Information Systems (FIS) and the National Observer Program (NOP). There will be no vessels involved in the project in 2022. The effort will focus on the ongoing development of automated video analyses to detect, track, and classify catch events.

Evaluating more cost-effective and mobile EM systems

This is an ongoing project with North Pacific Fisheries Association and Alaska Longline Fishermen's Association (ALFA) and funded through a grant from the National Fish and Wildlife Foundation (NFWF). The project is developing and testing lower cost EM hardware that could be moved between vessels, which could increase the cost effectiveness of the fixed-gear EM program. The first phase of

the project involves 6 vessels in the EM pool that will do a side-by-side comparison of their existing EM system and the mobile EM system. Pending the results of Phase 1, the next phase would be to test the effectiveness of the mobile EM systems with 12 vessels that are either in the zero selection pool (vessels <40ft LOA) or in the Observer Trip Selection pool. If a vessel carrying an EM system through this project was selected for observer coverage, NMFS could waive the observer coverage on that trip.

Test Trawl EM systems on Fixed-Gear Vessels

Aleutians East Borough has received funding from the NFWF for a project to test EM configurations on vessels that fish using multiple gear types. The project would also evaluate catch handling and EM data review protocols for pot vessels in the fixed gear EM program. Volunteer vessels will take observers to provide a proof-of-concept and allow a side-by-side comparison of observer vs. EM counts of bycatch. The project will involve vessels that are already part of the trawl EM EFP and industry partners would work with NMFS to develop appropriate EM system set up and configurations and appropriate VMP requirements.

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 July 1 and the request is accomplished by submitting a form⁶ to NMFS. Six catcher/processors requested, and NMFS approved, placement in the partial coverage category for the 2022 fishing year.

Full coverage catcher vessels

Under Observer Program regulations at 50 CFR 679.51(a)(4), the owner of a trawl catcher vessel may annually request the catcher vessel to be placed in the full observer coverage category for all directed fishing for groundfish using trawl gear in the BSAI management area for the upcoming year. Requests to be placed into the full observer coverage in lieu of partial observer coverage category must be made in ODDS⁷ prior to October 15, 2021 for the 2022 fishing year. NMFS published the list of catcher vessels that have been approved to be in the full coverage category on the NMFS website⁸.

Vessels Participating in Halibut Deck Sorting

On October 24, 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 January 20, 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 2022, NMFS will continue to allow all vessels operating under these regulations 35 minutes to deck-sort and discard

⁶ The form for small catcher/processors to request to be in partial coverage is available at: <https://www.fisheries.noaa.gov/webdam/download/85047638>

⁷ 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>

⁸ 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>

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 current the time limit.

Communication and Outreach

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

- Information about the Observer Program and Frequently Asked Questions 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 are available at: <https://www.fisheries.noaa.gov/alaska/resources-fishing/frequent-questions-electronic-monitoring-em-small-fixed-gear-vessels>
- 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 available for outreach meetings upon request by teleconference and/or video conferencing pending staff availability and local interest. A community partner would be needed to organize a location and any necessary equipment to facilitate additional meetings. To request a meeting or suggest a topic for discussion, please contact Jennifer Ferdinand at 1-206-526-4076 or Jennifer.Ferdinand@noaa.gov.

References

- Alaska Fisheries Science Center and Alaska Regional Office (AFSC and AKR). 2021. North Pacific Observer Program 2020 Annual Report. AFSC Processed Rep. 2021-03, 143 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115. Available at <https://www.fisheries.noaa.gov/resource/document/north-pacific-observer-program-2020-annual-report>
- NMFS (National Marine Fisheries Service). 2021. Draft 2022 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available at <https://www.fisheries.noaa.gov/resource/document/draft-2022-annual-deployment-plan-observers-and-electronic-monitoring-groundfish>
- NMFS. 2020. 2021 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 9980. Available at <https://www.fisheries.noaa.gov/resource/document/2021-annual-deployment-plan-observers-and-electronic-monitoring-groundfish-and>
- NPFMC (North Pacific Fishery Management Council). 2011. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Proposed Amendment 86 to the Fishery Management Plan for Groundfish of the Bering sea/Aleutian Islands Management Area and Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska: Restructuring the Program for Observer Procurement and Deployment in the North Pacific. March 2011. 239 p. plus appendices. Available at <https://www.fisheries.noaa.gov/resource/document/ea-rir-irfa-proposed-amendment-86-fmp-groundfish-bsai-and-amendment-76-fmp>.

Gasper, J., C. Tide, G. Harrington, J. Mondragon, J. Cahalan, S. Bibb, and G. Merrill. 2019. Supplement to the Environmental Assessment for Restructuring the Program for Observer Procurement and Deployment in the North Pacific. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-19, 168 p. Available at <https://www.fisheries.noaa.gov/resource/document/supplement-environmental-assessment-restructuring-program-observer-procurement-0>

List of Preparers and Contributors

ADP Analysis Team:

Craig Faunce, Alaska Fisheries Science Center (AFSC)

Phil Ganz, Alaska Regional Office (AKRO)

Geoff Mayhew, Pacific States Marine Fisheries Commission (PSMFC)

Other contributions from:

Maggie Chan, AKRO

Jennifer Ferdinand, AFSC

Josh Keaton, AKRO

Jennifer Mondragon, AKRO

Mike Vechter, AFSC

Appendix A. Council motions related to Annual Report and ADP

C-5 Observer Annual Deployment Plan Council Motion October 14, 2021

The Council supports the following PCFMAC and NMFS recommendations for the 2022 draft Observer Annual Deployment Plan (ADP) for partial coverage fisheries. Observer coverage rates resulting from this approach and the final budget are expected in the final 2022 ADP in December. Fisheries not covered under the ADP remain in the full (100% or 200%) coverage category.

- Three gear-based deployment strata (hook-and-line, pot, and trawl)
- Trip selection from all ports
- Observer deployment allocation strategy of adjusted 15% plus optimization for groundfish discards, halibut PSC and Chinook salmon PSC
- Zero selection pool of fixed-gear vessels <40'LOA and vessels fishing with jig gear
- Fixed and pelagic trawl gear electronic monitoring (EM) deployment strategies, including current priorities for inclusion in the fixed gear EM pool plus ability of a vessel to share EM systems
- Maintaining NMFS' ability to release a trip from observer coverage on a case-by-case basis
- Maintaining the automatic release of a trip if the vessel has been selected for three consecutive trips

The Council supports maintaining this stratification and allocation strategy for 2023 with the clarification that additional fixed gear EM vessels may be added to the EM pool in 2023 (up to 200 total vessels) provided they opt-in prior to November 1, 2022, additional funding for EM equipment is secured, and they meet the criteria in the ADP.

The Council strongly supports NMFS' continued work on the comprehensive partial coverage cost efficiencies analysis, including the PCFMAC recommendations, under a schedule that ensures the results inform the next observer contract with the objective that the new contract will contain cost efficiency measures and support additional efforts to manage costs.

C-1 2022 Annual Deployment Plan
Council motion
June 10, 2021

The Council provides the following recommendations on the draft 2022 Annual Deployment Plan (ADP) for partial coverage fisheries:

- 1) maintain the three gear-based strata (pot, longline, trawl).
- 2) evaluate trip-based vs port-based deployment. Evaluation of port-based deployment should maintain the existing 14 ports and reflect updated COVID-19 rules (e.g., vaccination status may alleviate need for 14-day quarantine and allow movement among ports).
- 3) maintain the 15% baseline hurdle for each gear type and optimize such that all additional observer days above the baseline coverage level are placed on trawl gear. The Council supports evaluation of the FMAC suggestion to ensure optimization days if funding alone is not sufficient, as practicable.
- 4) additional fixed gear electronic monitoring (EM) vessels should be added as possible under existing funds. A vessel's ability to share EM systems in select ports should be considered as an additional criterion to prioritize new candidate EM vessels for the EM pool.

The Council further supports the May 2021 FMAC recommendations including completion of the comprehensive partial coverage cost efficiencies analysis in 2022 for implementation in the 2024 ADP and in time to inform and affect the next Federal observer contract. The Council priorities for cost efficiency in partial coverage remain: 1) completing a regulated program for use of EM for pelagic trawl in the GOA and BSAI; 2) integration of electronic monitoring into the overall monitoring of fixed gear; and 3) evaluation of different criteria to define the 'zero selection' pool for fixed gear. The Council recommends ongoing communication with the Council's PCFMAC during this process.

Appendix B. Calculation of the Selection Rates for 2022

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 Observer Program (Observer Program) of the Alaska Fisheries Science Center, National Marine Fisheries Service (NMFS). The ADP is focused 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. Changes to the composition of the partial coverage fleet have resulted from NMFS policy, Council actions, and regulations.

The sampling design hierarchy used to obtain fishery dependent data has several levels, and the ADP is important since it affects the first, and top-most level of this hierarchy (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 ADP process includes a draft and final version. The draft ADP is focused on presenting alternative deployment designs for consideration for the year ahead, while the final 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 an annual process for the NMFS and the North Pacific Fisheries Management Council (Council) to evaluate and recommend improvements to fisheries monitoring in response to changing needs.

Since the inception of the ADP process, trip-selection has been the preferred method to deploy fishery monitoring assets into the partial-coverage fleet. Trip-selection refers to the use of the fishing trip as the primary sampling unit, and is accomplished through the Observer Declare and Deploy System (ODDS; Faunce et al. 2021). Partial coverage trip-selection participants are sent a letter prior to the start of the calendar year with their username and password so that they may access the ODDS and log planned fishing trips electronically. There is also a telephone number that many fishermen use to log trips. Each logged trip is assigned a random number of four digits ranging from 0 to 1. This random number is evaluated against a pre-programmed selection rate in ODDS that derives from the ADP. If the random number is below or equal to the selection rate, then a trip is selected for observation.

Changes to the 2020 ADP

An emergency rule waived observer coverage in the partial coverage fleet of the North Pacific between 26 March and 30 June 2020 in response to the COVID-19 pandemic⁹. In order to safely allow the resumption of observer based fishery monitoring after that time, NMFS required observers to complete a 14 day quarantine upon arrival at a new port. This new requirement for observers necessitated a re-examination of how observers were being deployed into the partial coverage fleet. The result was to monitor only those fishing trips that departed from and delivered catch to ports listed by NMFS. This was termed port-based trip-selection. The NMFS list of ports were defined as those that were determined to be: 1) feasible to deploy observers from given current health mandates and 2) receive enough fishing effort to make the deployment of observers worthwhile. The ports that fit the two criteria above included: (1) Akutan, (2) Dutch Harbor/Unalaska, (3) False Pass, (4) Homer, (5) Juneau, (6) Ketchikan,

⁹ NOAA Fisheries Alaska Information Bulletins IB 20-29 and IB 20-45.

(7) King Cove, (8) Kodiak, (9) Nome, (10) Petersburg, (11) Sand Point, (12) Seward, (13) Sitka, and (14) Yakutat. Port-based deployment was continued into 2021 with the same list of ports. Beginning 1 September 2021, the deployment of observers returned to regular trip-selection with deployment from all ports and selection rates among strata scaled proportionally to result in anticipated total deployment days as specified in the Final 2021 ADP (NMFS 2020).

The draft 2021 ADP

The Draft 2022 ADP recommended trip-based deployment among all ports, and focused on four alternative ways to allocate samples among gear-based strata (NMFS 2021). These alternatives were provided to facilitate meaningful movement towards the goal of one fully-integrated fishery monitoring program, where each monitoring tool is maximized towards efficiency and effectiveness.

Since 2018 a base level of coverage (*baseline coverage*) has been instituted across all deployment strata before preferential allocation. Preferential allocation has been in the form of optimized days according to an optimization algorithm that maximizes precision for discarded groundfish, Pacific halibut Prohibited Species Catch (PSC), and Chinook PSC for the least cost based on Council guidance.

Baseline coverage has been set at 15%, but has a 50% chance of failure if coverage rates were actually set to 15%. This has been an undesirable feature of the baseline coverage approach to date. The Draft 2022 ADP presented two allocation methods to address the potential to fail to achieve the baseline coverage. Applying the same coverage weight among all strata (equal coverage method) addresses the issue because it represents the maximum baseline coverage afforded. Alternatively, a ‘15% + Opt 95’ method addresses the issue because it sets baseline coverage at a rate that represents a 95% probability of achieving the baseline coverage of 15% while also maximizing variance reduction for the cost of additional afforded coverage among strata.

The Fisheries Monitoring Science Committee (FMSC; formerly the Observer Science Committee) is a group of scientists and statisticians who use fisheries monitoring data. Their input on ADP and Annual Reports is largely restricted to the Annual Deployment Performance Review (e.g. Ganz et al. 2020). At the request of the FMA Director, the FMSC reviewed the Draft 2022 ADP and concluded that of the allocations analyzed, the ‘15% + Opt 95’ had the best chance of meeting the Observer Program's objectives of achieving a representative sample in time and space through minimum baseline coverage, and its optimization method represents a data-based cost-efficient strategy to preferentially allocate more samples into the trawl deployment stratum (which has more variable PSC than other strata) as intended by the Council.

The 2021 Sampling Design

Following the Councils’ review of the Draft 2022 ADP, the sample allocation strategy of ‘15% + Opt 95’ was adopted for the final ADP. In this method, each stratum is allocated a number of sample days required to achieve a 95% probability that at least 15% of trips will be observed (the baseline), and then additional monitored trips are allocated through a blended optimal allocation algorithm. This algorithm, which has been in use since 2013, equally weights three optimal allocations among strata that each consider trip cost and variance in either discarded groundfish, Pacific halibut PSC, or Chinook salmon PSC. If the baseline cannot be achieved, all observer-based strata receive the same selection rate.

Methods

The methods in this section largely follow those used in the Draft 2022 ADP (NMFS 2021). They are visually depicted in Figure B-1.

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 Fisheries Monitoring Division (FMA) of the Alaska Fisheries Science Center 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 from 1 January 2013 to 19 October, 2021.

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 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 four ‘historical 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 Aleutian Islands Fisheries Management Plan Area (BSAI) as belonging to the full coverage fleet if they indicated this was their preferred coverage for this activity in 2022, and (4) removing vessels with no probability of selection from the analysis (i.e., all trips corresponding to hook and line and pot gear on vessels < 40’ length overall (LOA), as well as vessels fishing jig gear). Vessel lists for a Pollock Trawl EM Exempted Fishing Permit (EFP) and Fixed Gear EM participation were updated following information provided by industry (Trawl EM) and approval processes by the FMA Division through ODDS after Nov. 1¹⁰ respectively.

The preferred scenario of the Draft 2022 ADP included the following strata, which are defined by gear and monitoring method (observers or EM):

1. **HAL_EM:** EM of trips using hook-and-line gear on vessels that are greater than or equal to 40 ft. LOA and have been approved to carry EM.
2. **POT_EM:** EM of trips using pot gear on vessels that are greater than or equal to 40 ft. LOA and have been approved to carry EM.
3. **HAL:** Observer monitoring of trips using hook-and-line gear on vessels that are greater than or equal to 40 ft LOA and are not participating in Fixed Gear EM.
4. **POT:** Observer monitoring of trips using pot gear on vessels that are greater than or equal to 40 ft LOA and are not participating in Fixed Gear EM.
5. **TRW:** Observer monitoring of trips using trawl gear on vessels not participating in the Pollock Trawl EM EFP.

Selection rates for strata using EM were set at 30% based on NMFS policy and Council working group input. The sample allocation strategy for observer-monitored strata follows the ‘15% + Opt 95’ method.

Budget Forecasting

Partial coverage observer deployment is paid for according to a contract between NMFS and its partial coverage observer provider. Under this contract there are guaranteed days that carry a high ‘front-load’ cost that includes much of the risk / reward incurred by the provider. Above and beyond this number of guaranteed days there are option days. Option days are less expensive to NMFS on a per unit basis. In this way, when measured in terms of total costs per day, economic efficiency is correlated with budget size - the larger the budget, the less deployment costs per unit. This ADP uses contract day costs for

¹⁰ The rules governing fixed-gear EM participation are specified in regulations published in 2017. Participation in EM is voluntary. Between September 1 and November 1 of each year, vessels can request to participate in EM through ODDS. After November 1, NMFS approves or denies EM requests based on vessel eligibility and the available funding.

observer coverage and a ratio estimator of actual travel to contract day costs to generate models of total costs for a given number of contracted days for future years. Using inputs of the available budget, past expenditures, and estimated revenue from fee proceeds, an initial budget can be set so that the observer program can be sustained for a predetermined period of time. This method ensures the most up-to-date cost information is used while balancing the needs for a stable fishery monitoring program.

In this analysis a budget was set to support a minimum contract size of 2,000 days for fiscal year 2021-22 and subsequent years until August 2024 (the final contract option year) while also sustaining \$1M for fixed-gear EM every year (Table B-2). In addition, an estimated \$210,000 was budgeted to cover anticipated costs of a regulated dockside Trawl EM program between January and August 2024 in expectation that the program would be regulated and EFP funds could no longer be used for this activity.

Accounting for uncertainties

The uncertainties inherent in this analysis include how fishing activity will change from the past to 2022, and how coverage rates need to be set in order to keep the fishery monitoring program fiscally solvent. Accounting for these uncertainties was accomplished through simulation described in more detail in the following sections.

Predicting future fishing effort

Predicting future fishing effort is simplified by assuming the future is most similar to the prior year. However, when this analysis is conducted only a partial year of 2021 is available. For this analysis, data for 2021 were available through 19 October. Future fishing effort for the upcoming year was predicted by projecting the end of 2021 fishing effort and assuming that would equal 2022 fishing effort. The projection largely follows the methods detailed in Ganz and Faunce (2019). Briefly, trends in cumulative effort from 2018-2021 inclusive were examined by stratum, Fishery Management Plan (FMP) area (GOA or BSAI), and target species (Halibut, Pacific cod, Pollock, Sablefish, or "Other"), and a set of years similar to 2021 were selected for projection. The ratios of total effort over effort-to-date from previous similar years were applied to the effort-to-date in 2021 for each stratum, FMP, and target species combination. In this analysis the average ratio was used among years with some exceptions. For EM POT and POT sablefish in the GOA, only the ratio from 2020 was used. In the BSAI, Zero Coverage Pacific cod and POT Sablefish used the average ratio between 2019 and 2020. A ratio of 1 was applied in cases where 2021 effort-to-date was considered finished by 19 October 2021.

Uncertainty in fishing effort

A source population of trips for simulation was created by appending fishing effort during 20 October - 31 December 2020 to fishing effort during 1 January - 19 October 2021. Simulated fishing populations for 2022 were then generated by sampling with replacement the source population of trips until the number of fishing trips in each stratum, FMP area, and target species was equal to the number of fishing trips predicted. To account for uncertainty in the predicted number of fishing trips for 2022, the total predicted number of fishing trips was adjusted for each simulation by adding a random value sampled from a normal distribution that represented up to $\pm 11.2\%$ of the original prediction (the average absolute percentage that estimates have differed from realized effort since 2018). This process was repeated 1,000 times to create 1,000 versions of the 2022 fishing effort (*2022 simulated populations*), each with its own unique trip duration distribution.

Uncertainty due to Pollock trawl EFP

The Pollock Trawl EM EFP includes a provision where a vessel fishing in the Gulf of Alaska (GOA) may opt out of the EFP (and thus opt into random selection for at-sea observer coverage) on a trip-by-

trip basis. For Pollock Trawl EM EFP vessels in partial coverage, simulated future fishing trips were given a 74.02% probability of being under the EFP by random draw based on past participation in the EFP (2020 - 2021) on a trip by trip basis.

Determining deployment rates for 2021

The selection rate that can be afforded in the coming year depends on several factors, chiefly the amount of fishing that is expected to occur, the available budget, and estimated monitoring costs. It is important to note that while the 2022 partial coverage fishing effort was predicted by stratum, FMP area, and target species, observers are only deployed by stratum. The optimal sample allocation weightings for each stratum were calculated using an updated 2018 - 2021 data set by following the methods detailed in the Draft 2022 ADP for the preferred design (NMFS 2021).

Uncertainty in trip-selection

One problem that arises in simulating future fishery monitoring is the need to account for variation in which trips are selected for monitoring. If only short trips are selected, more trips may be afforded by the same amount of money (and hence a higher selection rate) than if longer trips were selected. As in past ADPs, the analysis of potential deployment rates was conducted through iterative stratified random sampling without replacement. For each 2022 simulated population, each trip was assigned a random number between 0 and 1 and ODDS selection processes were simulated. This random number assignment and ODDS simulation was repeated 1,000 times for each of the 1,000 2022 simulated population to incorporate differences in ODDS selections and selected trip durations. A total of 1,000,000 outcomes result.

Uncertainty in monitoring costs

The total cost of the observer-based fishery monitoring program was calculated using the cost of an observer day and the distribution of trip durations from each of the 1M outcomes. Cost per day was estimated in order to most closely match expense rates specified by the partial-coverage contract. Estimates of cost per day took into account whether the day was a guaranteed day (up to 2,000 days) or an optional day, and estimated travel costs from a linear model using monthly days purchased against travel cost invoices. Total expenditures in simulated fishery monitoring deployments for 2022 were set so that there was an equal chance of being over or under budget. The steps taken to calculate selection rates are depicted as a diagram in Figure B-1.

Results and Discussion

Table B-2 shows the available budgets and expected vessel participation for the partial coverage fleet between the Draft 2022 ADP and this analysis. The available budgets for partial-coverage at-sea observer deployment and Fixed Gear EM were set at \$4,219,223 and \$1,000,000, respectively - a slight increase from Draft 2022 ADP values. The fixed-gear EM pool consisted of 168 vessels approved by NMFS. Three Fixed Gear EM vessels requested to be removed and were replaced by 3 new vessels. In past ADPs, vessels that volunteered for continued participation in federally funded Fixed Gear EM Research were considered to be placed in the zero selection pool. However, there will be no vessels participating in Fixed Gear EM Research in 2022 due to COVID-related travel restrictions for support staff and the prioritization of other EM innovation projects. A list of 79 vessels expected to participate in Trawl EM EFP was received on 8 September 2021. Expected vessel participation for the other fishery monitoring strata is provided in Table B-2.

The coverage rates expected to be afforded in 2022 are shown for the Draft 2022 ADP and this analysis in Table B-3. Coverage rates among all strata are sufficient to meet the adjusted hurdle and include additional optimized allocation among all sampled populations (Figure B-2).

The expected difference between the available budget and the expended cost is depicted as a risk-profile in Figure B-3. The 95% confidence interval ranges between \$268,227 under budget (-6.3%) and \$274,661 over budget (+6.5%).

Literature Cited

- Cahalan, J. and C. Faunce. 2020. Development and implementation of a fully randomized sampling design for a fishery monitoring program. U.S. Fishery Bulletin 118:87-99.
- Faunce, C., M. Moon, P. Packer, G. Campbell, M. Park, G. Lockhart, and N. Butterworth. 2021. The Observer Declare and Deploy System of the Alaska Fisheries Science Center. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-426, 86 p.
- Ganz, P., and C. Faunce. 2019. An evaluation of methods used to predict commercial fishing effort in Alaska. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-395, 19 p.
- Ganz, P., C. Faunce, G. Mayhew, S. Barbeaux, J. Cahalan, J. Gasper, S. Lowe, and R. Webster 2020. Deployment performance review of the 2019 North Pacific Observer Program. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-411, 87 p.
- NMFS (National Marine Fisheries Service). 2019. Final 2020 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802.
- NMFS. 2020. Final 2021 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802.
- NMFS. 2021. Draft 2022 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802.

Table B-1. Description of deployment strata for fisheries monitoring of the partial coverage fleet in 2022. NFWF = National Fish and Wildlife Foundation.

| Stratum | Applies to | At-Sea | | | | Dockside | | | |
|-------------------------|--|-----------------|---|---|----------------------|-----------------|--|----------------|----------------|
| | | Monitoring tool | Purpose | Selection Rate | Funding Source | Monitoring tool | Purpose | Selection Rate | Funding Source |
| Fixed Gear EM | Fixed Gear Vessels that volunteer | EM | Catch Estimation | 30% | NFWF / Industry fees | None | NA | 0% | NA |
| Trawl EM | Vessels fishing pelagic trawl gear in the pollock fishery identified in an exempted fishing permit (EFP) | EM | Full retention Compliance | 100% | NFWF | Observers | Catch & PSC Estimation/ Biological sampling | 30% | NFWF / NMFS |
| Observer Trip Selection | Longline, Pot vessels >= 40'; and Trawl vessels not participating in the trawl EM EFP | Observers | Catch Estimation | Rates afforded according to baseline + optimization | Industry fees | None | NA | 0% | NA |
| No Selection | Jig Vessels, vessels < 40' | None | Economic efficiency & logistics (eg lack of bunk space) | 0% | None | None | NA | 0% | None |

Table B- 2. Differences in budgets and vessel participation between the Draft 2022 ADP and this analysis. Funding is listed for sectors that are funded through the observer fee and NMFS funds. 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 vessel may fish within both EM POT and EM HAL, or a trawl vessel may fish within the Observer pool and Pollock Trawl EM EFP pools).

| | Draft 2022 ADP | Final 2022 ADP |
|---|-----------------------|-----------------------|
| Total anticipated funding (\$) | | |
| At-sea Observer | 4,118,880 | 4,219,223 |
| Fixed gear EM | 1,000,000 | 1,000,000 |
| Total | 5,118,880 | 5,219,223 |
| Vessels participating (partial coverage) | | |
| At-sea Observer Hook-and-line | 288 | 288 |
| At-sea Observer Pot | 133 | 128 |
| At-sea Observer Trawl | 77 | 71 |
| EM Hook-and-line | 126 | 121 |
| EM Pot | 45 | 48 |
| EM Trawl | 40 | 40 |
| Pollock Trawl EM EFP | 44 | 44 |
| Zero coverage Hook-and-line | 305 | 305 |
| Zero coverage Pot | 8 | 10 |

Table B- 3. Comparison of the predicted number of trips in a stratum (N_h), the optimal sample weighting (W_{hopt}), predicted number of observed or monitored trips (n_h), observed or monitored days (d_h), and coverage rates (r_h) resulting from the deployment sampling design described in the text. Values are medians (50th percentile) from simulated populations and are not directly comparable to the mean values presented in Table B-3 in the Draft 2022 ADP. The values from that document have been re-calculated here for proper comparison.

| Pool | Stratum (h) | N_h | W_{hopt} | n_h | d_h | r_h (%) |
|-----------------------|----------------------------|--------------|-------------|------------|--------------|--------------|
| Draft 2022 ADP | | | | | | |
| Observer | Hook-and-line | 1,178 | 0.24 | 214 | 1,118 | 18.21 |
| | Pot | 990 | 0.07 | 173 | 992 | 17.48 |
| | Trawl | 681 | 0.68 | 191 | 617 | 28.10 |
| | Total | 2,849 | 1.00 | 578 | 2,727 | 20.32 |
| EM | Hook-and-line | 703 | - | 211 | 1,070 | 30.00 |
| | Pot | 343 | - | 103 | 537 | 30.00 |
| | Pollock Trawl EM EFP | 389 | - | 117 | 331 | 30.00 |
| | Total | 1,435 | - | 431 | 1,938 | 30.00 |
| Zero | Hook-and-line | 1,329 | - | 0 | 0 | 0.00 |
| | Pot | 40 | - | 0 | 0 | 0.00 |
| | Total | 1,369 | - | 0 | 0 | 0.00 |
| Final 2022 ADP | | | | | | |
| Observer | Hook-and-line | 1,218 | 0.33 | 232 | 1,236 | 19.02 |
| | Pot | 960 | 0.05 | 168 | 935 | 17.48 |
| | Trawl | 666 | 0.62 | 197 | 654 | 29.65 |
| | Total | 2,844 | 1.00 | 597 | 2,825 | 20.99 |
| EM | Hook-and-line | 632 | - | 190 | 977 | 30.00 |
| | Pot | 255 | - | 77 | 414 | 30.00 |
| | Pollock trawl EFP (GOA) | 418 | - | 126 | 363 | 30.00 |
| | Total | 1,305 | - | 393 | 1,754 | 30.00 |

| | | | | | | |
|------|-------------------------|--------------|----------|--------------|---------------|---------------|
| Zero | Hook-and-line | 1,413 | - | 0 | 0 | 0.00 |
| | Pot | 56 | - | 0 | 0 | 0.00 |
| | Total | 1,469 | - | 0 | 0 | 0.00 |
| Full | Full | 1,819 | - | 1,819 | 13,676 | 100.00 |
| | Pollock Trawl EM EFP | 1,193 | - | 1,193 | 4,260 | 100.00 |
| | Total | 3,012 | - | 3,012 | 17,936 | 100.00 |

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

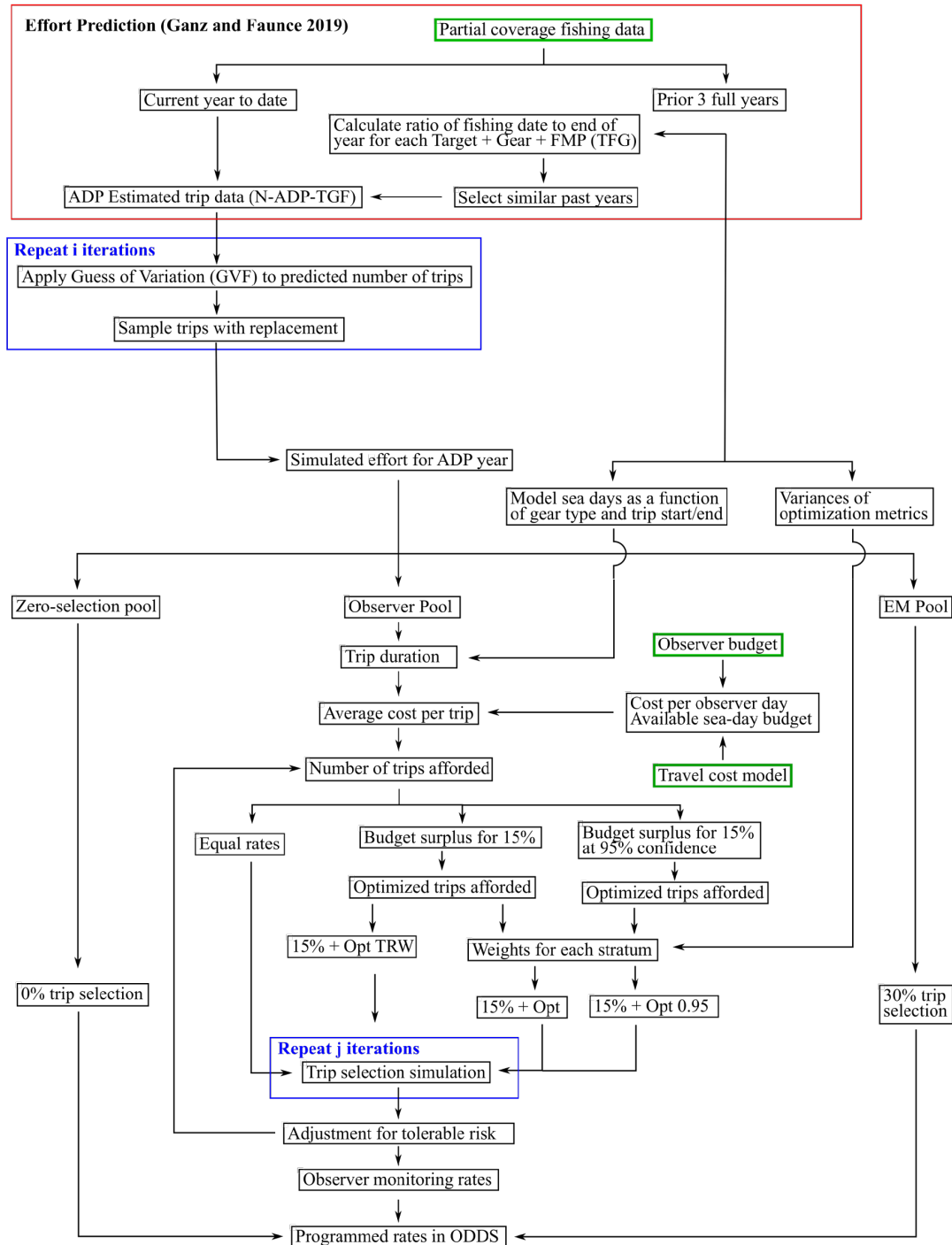


Figure B- 2. Afforded strata-specific rates of at-sea observer coverage for 2022. Individual points within the distributions are the mean selection rates from 1,000 ODDS simulations performed on 1,000 populations (1,000 data points are depicted per stratum although there were 1M outcomes). The 15% selection rate is depicted by the dashed black line. The means from all populations are denoted as cyan 'X's, the medians from all populations are denoted as red horizontal lines, and the distribution of the points is represented by red ovals (the wider the oval the more outcomes had that value).

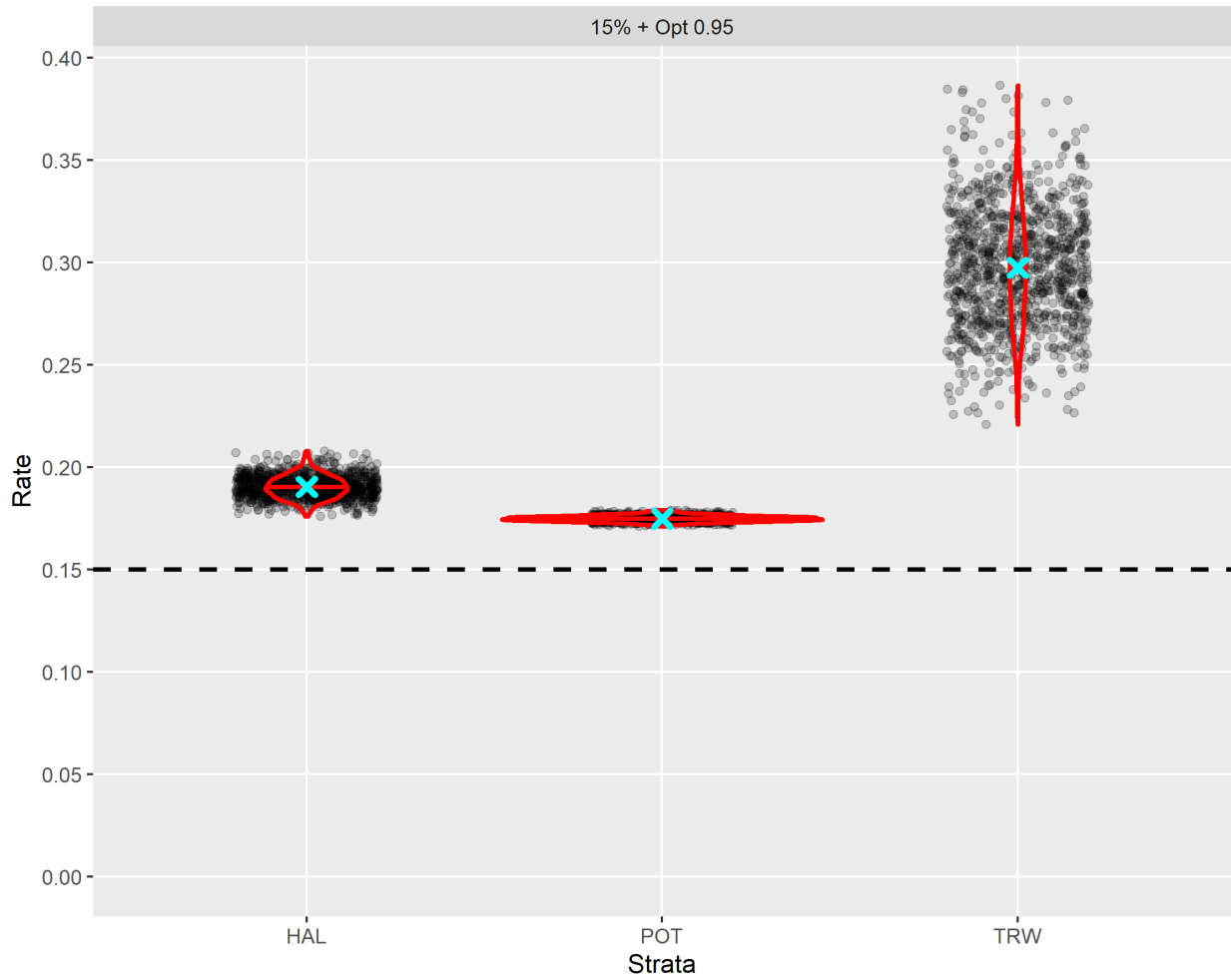


Figure B- 3. Summary of 1,00,000 outcomes of simulated sampling showing the total cost of the program expected for 2022. Vertical lines depict the available budget (dashed purple line), median expected cost (dashed blue line), and 95% confidence limits (dashed red lines).

