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

September 2021

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Suggested Citation

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.

Contents

Executive Summary

This draft 2022 Annual Deployment Plan (ADP) documents how the National Marine Fisheries Service (NMFS) intends to assign fishery observers and electronic monitoring (EM) to vessels fishing in the partial observer coverage category (50 CFR 679.51(a)) in the North Pacific during the calendar year 2022.

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; 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.
    - NMFS recommends trip selection in all ports throughout Alaska for both the observer and EM selection pools in 2022.
    - 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.
    - Consistent with existing regulatory authority at 50 CFR 679.51(a)(1), NMFS could release trips from observer coverage on a case-by-case basis for vessels. NMFS will use this authority when no observers are available for deployment.
    - If necessary, NMFS could modify the list of ports with available observers in the future 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.
- **Selection pools:**
    - ***Observer trip-selection pool*:**
        - NMFS recommends 3 sampling strata based on gear for the deployment of observers in 2022: trawl, hook-and- line, and pot.
    - ***EM trip-selection pool*:**
        - Vessels in the partial coverage category using fixed gear may request to be in the 2022 EM selection pool using ODDS. Any vessel in the EM selection pool in 2021 will remain eligible to be in the EM selection pool unless a request is submitted to not be in the EM selection pool for 2022 or NMFS has disapproved the vessel's 2021 Vessel Monitoring Plan (VMP). All requests to be in or out of the EM selection pool for 2022 must be received by **November 1, 2021**. Any vessel that does not request to participate by this deadline will not be eligible for placement in the 2022 EM selection pool and will be in the partial coverage trip selection pool for observer coverage.

- Based on available funding for EM, the EM selection pool will be composed of up to 169 fixed gear vessels, which would maintain the size of the EM pool from 2021.
- If funding is insufficient to accommodate all the vessels that request to participate in the EM selection pool, NMFS will prioritize placement in the EM selection pool as follows:
  - vessels that are already equipped with EM systems;
  - vessels that are cost effective for EM and unlikely to introduce large data gaps; and
  - vessels 40-57.5 ft LOA where carrying an observer is problematic due to bunk space or life raft limitations.
- NMFS assesses a vessel's adherence to their approved VMP, including the quantity and severity of conformance issues that impact the quality and usability of data. A vessel owner/operator with repeat compliance issues will be notified through a cover letter attached to the VMP approval. Failure of a vessel operator to address these issues or comply with 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 with 70 catcher vessels in 2021. Additional funding is being sought to continue supporting the EFP in 2022.
- ***No-selection pool*:** NMFS continues to recommend that the no-selection pool continue to 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:** NMFS recommends an observer deployment allocation strategy of adjusted 15% plus optimization discarded groundfish, Pacific halibut PSC, and Chinook PSC in order to meet the monitoring objectives of achieving a representative sample in time and space through minimum baseline coverage. This optimization method 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.

- **Estimated deployment rates:** NMFS uses estimates of anticipated fishing effort and available sea-day budgets to determine selection rates for observer deployment in each stratum. NMFS set a preliminary budget for the draft 2022 ADP of $5.119M resulting in estimated coverage rates: Hook-and-line – 18.21%; Pot – 17.48%; Trawl – 28.10%; Fixed Gear EM – 30%; and Trawl EM EFP – 100% at-sea EM (plus: 30% shoreside monitoring in GOA and 100% shoreside monitoring in BS). ***These coverage rates are preliminary estimates and will differ from rates determined in the final ADP.*** Once the final budget is known, an updated estimate of anticipated fishing effort and simulation models will be used to estimate expected coverage rates in the final 2022 ADP.

- In addition to ongoing pre-implementation of trawl EM, NMFS supports ongoing innovation of EM and collaborating with industry partners on EM development and cost efficiency projects, if funding is available. Potential EM projects for 2022 include:
    - Continuing the EM Innovation Project (EMIP) to develop and integrate computer vision algorithms into EM systems;
    - Evaluating more cost-effective and mobile EM systems; and
    - Testing trawl EM systems on fixed-gear vessels.
- Observers will continue to collect genetic samples from salmon caught as bycatch in groundfish fisheries to support efforts to identify stock of origin. For trips in the BSAI trawl pollock fishery, a census of salmon will be completed during the offload. Offload monitoring for salmon will also take place for a random selection of vessels in the trawl EM pool in the GOA. 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 salmon bycatch by the vessel observer during offload. 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.
- NMFS is developing an integrated evaluation of the partial coverage category. This will account for upcoming changes to the trawl components of partial coverage (BSAI Pacific cod Limited Access Program and transition of Trawl EM to a regulated program) and a new contract for observer coverage in the partial coverage category. This integrated view of fixed gear will enable evaluation of each data collection method (observers and EM) and design sampling that combines both to be most effective. The analysis would incorporate the goal of spending the limited, available funding more efficiently such that more coverage (both EM and observers) is achieved for the cost. NMFS recommends that this effort be conducted holistically with a target date of being fully implemented by 2024. To enable staff to work on the analysis, NMFS recommends that the elements of the final 2022 ADP are carried forward to 2023.

Introduction

Purpose and Authority

This draft 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 describes 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 implemented the Council's fisheries 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.

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).

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. Scientists use fishery-dependent data to assess fish stocks, provide data for fisheries and ecosystem research and fishing fleet behavior, assess marine mammal interactions with fishing gear, and characterize fishing impacts on habitat. 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.

Process and Schedule

On an annual basis, NMFS develops an ADP to describe 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 annual analysis and evaluation of the data collected by observers and the ADP development is an ongoing process and this ADP follows the process envisioned by the Council and NMFS when the restructured observer program was developed and implemented. 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 this draft 2022 ADP containing recommendations for deployment methods in the partial coverage category.

- **October 2021:**

    - *Review of the draft ADP*: The Council reviews this draft 2022 ADP and any associated Plan Team, Trawl EM Committee, and Partial Coverage Fishery Monitoring Advisory Committee recommendations. Based on input from its advisory bodies and the public, the Council may choose to clarify objectives and provide recommendations for the final 2022 ADP. NMFS will review and consider 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, 2021.
    - *Requests to participate in EM selection pool*: Vessels in the partial coverage category using fixed gear may request to be in the 2022 EM selection pool using the Observer Declare and Deploy System (ODDS) by November 1, 2021.

- **December 2021:** NMFS will finalize the 2022 ADP and release it to the public prior to 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 Bulletin[1] 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

[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

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% + 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 enumerations of salmon bycatch and conduct biological sampling.

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).

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.

In June 2020, NMFS recommended considering port-based deployment, if necessary, to protect lives and livelihoods. 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. **For 2022, NMFS recommends 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. 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) (Appendix C).

Waivers

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)

Trip-Selection Pool for Observer Deployment:
NMFS recommends three observer trip-selection strata based on gear:

- 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.

EM Selection Pool:
Vessels in the partial coverage category using fixed gear may request to be in the 2022 EM selection pool using ODDS.[3] Any vessel in the EM selection pool in 2021 will remain eligible to be in the EM selection pool unless a request is submitted to not be in the EM selection pool for 2022 or NMFS has disapproved the vessel's 2021 VMP. All requests to be in or out of the EM selection pool for 2022 must be received by November 1, 2021 . Any vessel that does not request to participate by this deadline will not be eligible for placement in the 2022 EM selection pool and will be in the partial coverage trip selection pool for observer coverage.

In 2021, NMFS added a step to the Vessel Monitoring Plan (VMP) approval process to increase compliance and address data quality issues. As part of the VMP approval, NMFS evaluates a vessel's adherence to their approved VMP including the quantity and severity of conformance issues that impact the quality and usability of data. 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? A vessel owner/operator with repeat compliance issues is notified through a cover letter attached to the VMP approval. Failure of a vessel operator to address these issues or comply with conditions of the VMP may result in the vessel not being eligible to participate in the EM pool in the following year.

[3] The request to be part of the EM selection pool can also be made online at http://odds.afsc.noaa.gov or by calling the ODDS call center at 1-855-747-6377.

Based on the estimated budget for the draft ADP, the EM selection pool will be composed of up to 169 fixed gear vessels, which would maintain the size of the EM pool from 2021. If funding is insufficient to accommodate all the vessels that request to participate in the EM selection pool, NMFS will prioritize placement in the EM selection pool as follows:

- vessels that are already equipped with EM systems;
- vessels that are cost effective for EM and unlikely to introduce large data gaps; and
- vessels 40-57.5 ft LOA where carrying an observer is problematic due to bunk space or life raft limitations.

Trawl EM 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 Alaska[4]. 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 shoreside plant observers. The specific requirements for vessels in the trawl EM trip-selection pool was determined through the permit approval process.

Industry received National Fish and Wildlife Foundation (NFWF) funding to support the project with 70 catcher vessels in 2021 Additional funding is being sought to continue supporting the EFP in 2022.

Summary of 2022 Deployment Strata:

NMFS recommends the following deployment strata for vessels in the partial coverage category (50 CFR 679.51(a)) 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 LOA[5] and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear.
- ***Observer Trip-Selection Pool:*** Observers will be deployed from select ports throughout Alaska. NMFS recommends 3 sampling strata in the observer trip-selection pool:
    - ***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:*** Based on the estimated budget for the draft ADP, the EM selection pool will be composed of up to 169 fixed gear vessels, which would maintain the size of the EM pool from 2020.
- ***Trawl EM trip-selection pool:*** This pool is composed of all vessels fishing under the EFP permit.

[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.

Allocation Strategy

Allocation strategy refers to the method of allocating deployment trips among strata. Appendix B provides a comparison of the alternative stratification schemes by evaluating the relative performance of 4 allocation strategies:

1. **Equal rates afforded:** where observer days are allocated in proportion to the size of the strata so that all strata get the same coverage rates. The use of equal allocation and threshold base-coverage rate is precautionary with respect to avoiding bias and increasing the chance of getting data across all gear types and areas.

2. **15% baseline, plus optimization:** where observer sea days are first allocated in proportion to the size of the strata up to a threshold coverage rate of 15% and the remaining sea-days are allocated using an optimization algorithm that maximizes precision for discarded groundfish, Pacific halibut PSC, and Chinook PSC for the least cost.

3. **15% baseline, plus trawl-specific optimization:** where observer sea days are first allocated in proportion to the size of the strata up to a threshold coverage rate of 15% and the remaining sea-days are allocated to trawl vessels.

4. **Adjusted 15% baseline, plus optimization:** where observer sea days are first allocated in proportion to the size of the strata up to a coverage rate that ensures a 95% probability of achieving the threshold coverage rate of 15%, after which additional observer days are are allocated using an optimization algorithm that maximizes precision for discarded groundfish, Pacific halibut PSC, and Chinook PSC for the least cost.

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). However, 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 this, 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. This approach 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.

NMFS recommends an observer deployment allocation strategy of 15% baseline adjusted, plus optimization based on discarded groundfish, Pacific halibut PSC, and Chinook PSC. This allocation strategy maximizes precision for discarded groundfish and PSC for the least cost. This 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.

Estimated Deployment Rates

Based on recommendations from the Council, NMFS recommends maintaining a 30% selection rate for the Fixed-gear EM selection pool for 2021. NMFS uses estimates of anticipated fishing effort and available sea-day budgets to determine selection rates for observer deployment in each stratum.

NMFS uses estimates of anticipated fishing effort and available sea-day budgets to determine selection rates for observer deployment in each stratum. NMFS set a preliminary budget for the draft 2022 ADP of $5.119M resulting in estimated coverage rates: Hook-and-line – 18.21%; Pot – 17.48%; Trawl – 28.10%; Fixed Gear EM – 30%; and Trawl EM EFP – 100% at-sea EM (plus: 30% shoreside monitoring in GOA and 100% shoreside monitoring in BS). ***These coverage rates are preliminary estimates and will differ from rates determined in the final ADP.*** Once the final budget is known, an updated estimate of anticipated fishing effort and simulation models will be used to estimate expected coverage rates in the final 2022 ADP.

EM development and cost efficiency projects

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

<u>EM Innovation Project (EMIP)</u>

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 count, identify and measure fish.

<u>Evaluating more cost-effective and mobile EM systems</u>

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 would involve 6 vessels in the EM pool that would 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.

<u>Test Trawl EM systems on Fixed-Gear Vessels</u>

Aleutians East Borough is seeking funding from the NFWF for this 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. If funded, the project would 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.

Chinook Salmon Sampling in the Gulf of Alaska

To the extent possible, observers will continue to collect genetic samples from salmon caught as bycatch in groundfish fisheries to support efforts to identify stock of origin. 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.

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 form[6] 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 ODDS[7] prior to October 15, 2021 for the 2022 fishing year. NMFS will publish the list of catcher vessels that have been approved to be in the full coverage category on the NMFS website[8].

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[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 availabe at https://www.fisheries.noaa.gov/resource/document/bsai-trawl-catcher-vessels-cvs-full-coverage

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

2023 Deployment Methods & Integrated Analysis

NMFS is developing an integrated evaluation of the partial coverage category to address the Council's goal for cost efficiency. This analysis will account for upcoming changes to the trawl components of partial coverage (BSAI Pacific cod Limited Access Program and transition of Trawl EM to a regulated program) and a new contract for observer coverage in the partial coverage category. An integrated view of fixed gear will enable evaluation of each data collection method (observers and EM) and a sampling design that combines both to be most effective. The analysis will incorporate the goal of spending the limited, available funding more efficiently such that more coverage (both EM and observers) is achieved for the cost. NMFS recommends that this effort be conducted holistically with a target date of being fully implemented by 2024. To enable staff to work on the analysis, NMFS recommends that the elements of the final 2022 ADP are carried forward to the 2023 ADP.

Communication and Outreach

NMFS will 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 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.

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Appendix A: Council motion on the ADP

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: Comparison of alternative sampling designs for 2022

Introduction

The North Pacific Observer Program uses a hierarchical sampling design with randomization at all levels to achieve unbiased data from fishing operations in the region (Cahalan and Faunce 2020). The Annual Deployment Plan (ADP) documents how NMFS plans to deploy observers in the partial coverage category onto fishing trips in the upcoming year under the limits of available funding.

The ADP provides an annual process for NMFS and the Council to evaluate deployment and improve the sampling design. The adopted design in the Final 2021 ADP allocated observed trips among three strata defined by gear according to a 15% + optimized allocation. The optimized allocation resulted from the interactions of stratum size and variance from a combination of discarded groundfish and Pacific halibut Prohibited Species Catch (PSC), and Chinook salmon PSC (NMFS 2020a).

In March 2020 the NMFS issued waivers from observer coverage as a result of the COVID-19 pandemic. Vessels participating in the fixed gear (Hook and Line - HAL, and Pot Gear - POT) Electronic Monitoring (EM) pool were not affected. The guidance provided to analysts was that observers would be required to make a 14 day quarantine upon arrival to a new port. By June 2020 partial observer coverage had been reinstated in Alaska by switching from a trip-based deployment method to a port-based trip deployment method. Basically these two methods are identical, using the trip as the primary sampling unit. However, the port-based trip deployment method excludes fishing activities from observation if they do not depart from and land within a port that is within the NMFS list of observable ports. The NMFS observable ports are 1) feasible to deploy observers from given current health mandates and 2) receptive of enough fishing effort to make the deployment of observers worthwhile. 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. The NMFS designated 14 ports that fit the two criteria above, from which they would deploy observers for partial coverage: (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 June 2020 the Council recommended that the NMFS place a high priority on developing a 2021 ADP that provides necessary data and is also responsive to continued COVID-19 challenges and Council priorities, particularly improving cost efficiencies in the partial coverage category. In order to collect necessary data while remaining responsive to COVID-19, the NMFS continued port-based trip deployment into 2021, but opened deployment up to all ports starting September 1st after vaccine availability, health mandates, and industry safety protocols allowed for sufficiently free movement of observers across the areas in which they work[9]. In recognition that it would not be feasible for the NMFS to perform a holistic analysis in one year that makes meaningful progress toward cost efficiencies while integrating the multiple components of the partial coverage portion of the Observer Program, the NMFS proposed to the Partial Coverage Fisheries Monitoring Committee (PCFMAC) and the Council that the 2022 ADP be kept in place for both 2022 and 2023 so that staff would have time to design a more integrated and cost-efficient program for implementation under a new contract in 2024. That proposal was supported by the PCFMAC and Council, with the recognition that it will be especially important to have a

[9]https://www.fisheries.noaa.gov/bulletin/ib-21-39-notice-alaska-observer-requirements-partial-coverage-fleet-effective

2022 ADP that has the best chance of meeting monitoring objectives, as it will be in place for two years. This recognition of the added importance of the 2022 ADP influenced the allocation designs analyzed in this appendix, resulting in a total of four allocation designs, two of which have never been evaluated before. These four allocation designs are described and analyzed below.

Methods

Data Preparation: Defining 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 this general design have resulted from NMFS policy, Council action, and regulations. Activities expected to occur in 2022 that will continue to be excluded from observer coverage include 1) catcher vessels while fishing in state-managed fisheries, 2) catcher vessels fishing with jig gear, 3) fixed gear vessels that volunteer and are approved by the NMFS to carry EM (either for catch accounting or innovation research), and 4) fishing trips that are conducted under a trawl gear EM EFP. In 2022, the NMFS anticipates that no vessels will participate in EM innovation research. The trawl gear EM EFP is an Exempted Fishing Permit (EFP) issued by NMFS for trawl catcher vessels using pelagic trawl gear. This EFP creates a new EM trawl stratum within which discards will be monitored by EM systems for compliance and catch accounting (including salmon) will be performed by dockside observers. Since EFP vessels were previously covered by at-sea observers, the program reduces the total number of trips/days fished within the at-sea observer pool.

This analysis attempts to predict future fishing effort and future expenditures towards fishery monitoring in the North Pacific. The uncertainties inherent in this activity include determining which vessels will participate in which monitoring pool, 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. In response to the COVID-19 pandemic, both the Draft and Final 2021 ADPs added a guess variation factor (GVF) around the estimate of future fishing effort, in recognition that market forces and health mandates added uncertainty to the estimate of how much fishing effort would occur in 2021 (NMFS 2020a, NMFS 2020b). This method is retained in this ADP, although the range of uncertainty has been reduced, and is now based on the differences between effort predictions and realized effort in prior years.

A database containing 2018 - 2021 species-specific catch amounts, dates, locations, and observation status was first created from data maintained by the Alaska Regional Office and the Fisheries Monitoring and Analysis (FMA) Division of the Alaska Fisheries Science Center (AFSC). The data were then parsed to reflect the partial coverage fleet subject to observer coverage in 2022, and finally re-labelled according to the deployment designs described below.

Uncertainty due to participation in fishery monitoring pools

The composition of the partial coverage pool for 2022 was created by assuming that the same AFA-endorsed trawl catcher vessels that volunteered to carry full observer coverage when fishing in the Bering Sea and Aleutian Islands in 2021 will continue to do so in 2022, and that the list of fixed gear EM vessels in 2021 would also be the same for 2022. The list of Trawl EM EFP vessels for 2022 was provided by the EFP principal investigators prior to this analysis.

Uncertainty due to Electronic Monitoring

In the past there has been interest in examining scenarios in which the EM pool is expanded by a number of vessels. However, it is unknown which vessels might apply and be accepted into the EM pool. To address this in the past, a random draw of possible additional vessels was used to simulate this expansion. Unfortunately, the results of this exercise were deficient. First, because it is a random draw, on average the results of adding new vessels always show unbiased outcomes. In reality, the act of adding new vessels to the EM pool is not the result of random draws. Instead it is the result of a volunteer process that is then vetted by the NMFS according to policy and data needs. Prior approaches to simulate potential impacts of increasing the EM pool were discontinued since it is unknown which vessels will volunteer from one year to the next, and the EM vessel selection process is not random. Instead, this Draft 2022 ADP assumes that fixed gear EM vessels will remain the same as in 2021. The Final 2022 ADP will evaluate the impact of adding specific vessels to the fixed gear EM pool if funding for additional vessels should become available.

Uncertainty due to Pollock Trawl EFP

The pollock trawl EFP includes a provision where a vessel fishing in the Gulf of Alaska (GOA) may opt out of the EFP (and thus into random selection for at-sea observer coverage) on a trip-by-trip basis. For EFP vessels in partial coverage, simulated future fishing trips were given an 74.03% probability of being under the EFP by random draw. This probability was estimated from participation in the EFP during the fall 2020 and spring 2021 pollock seasons.

Predicting future fishing effort

Fishing effort for 2022 was predicted using the preferred methods described 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"). Although 2021 fishing effort is used to predict effort for 2022, only a partial year is available when this analysis is conducted. In order to project 2021 fishing effort to the end of the year, we used the ratio of total effort to effort to date from previous years, and projections were made for each gear type, FMP, and target species combination for 2021. This estimate for the end of the year trips in 2021 was used as the mean fishing effort (in terms of trips) for 2021, with variation added in simulations according to the GVF.

Uncertainty in Trip Selection

To incorporate the inherent uncertainty in the estimate of 2022 fishing effort, the number of estimated trips for 2022 in each Gear + Target + FMP combination was altered by up to 11.2% in either direction. That is the average absolute percentage that estimates have differed from realized effort since 2018 (Ganz et al. 2019, Ganz et al 2020, AFSC and AKRO 2021). The process of generating a forecast for numbers of future fishing trips and selecting trips from the past to generate a population was repeated 500 times for each scenario.

One problem that arises in simulating future fishery monitoring is the need to account for variation in trip duration and which trips are selected for monitoring. If only short trips are accounted for, more trips may be afforded by the same amount of money (and hence a higher selection rate) than if longer trips were selected. For each 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 1000 times for each population.

Budget Forecasting

Observer deployment is paid for according to a negotiated contract between NMFS and its 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 contractor. Above and beyond this number of guaranteed days there are option days. Option days are less expensive 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 draft ADP uses negotiated contract day costs for 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 the coming year and future years. Using inputs of the available budget, past expenditures, and estimated revenue from fee proceeds, an initial budget can be set so that an identical sized observer program in terms of days can be sustained for a predetermined period of time. In this analysis a budget was set so that a fiscally sustainable observer program could be maintained until 2024 while also sustaining a $1M EM fishery monitoring program every year.

Alternative Scenarios for the 2022 ADP

Four alternative 2022 ADPs, termed *scenarios,* were created for comparison to one another:

1. **Equal rates:** In this scenario, rates for each gear-based observer stratum are set equal to one another. The one rate that can be afforded is then calculated.
2. **15% + Opt:** This is the allocation that was used for deployment of observers in 2021. In this scenario, the number of trips necessary to ensure that each stratum reaches 15% coverage on average (with 50% probability) is found first. Any additional days are then optimized among strata based on halibut PSC, chinook PSC, and discards.
3. **15% + Opt 0.95:** This is the first ADP in which this allocation has been evaluated. In this scenario, the number of trips necessary to ensure that each stratum reaches 15% coverage with 95% probability is found first. Any additional days are then optimized among strata based on halibut PSC, chinook PSC, and discards (using the same methods as the 15% + Opt scenario).
4. **15% + Opt TRW:** This scenario was proposed in a motion by the Council at its June 2021 meeting, and this is the first ADP in which it has been evaluated. In this scenario, the number of trips necessary to ensure that each stratum reaches 15% coverage on average (with 50% probability) is found first. Any additional days are then allocated to the trawl (TRW) stratum.

The entire process of building future fishing populations and assigning Scenarios is depicted in Figure B-1.

Deployment Design

The sampling design for observer deployment (hereafter '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*). Each scenario evaluated in this ADP used the same stratification, but differed in allocation.

Stratification

Stratification is the partitioning of units in the population into independent groups (or sub-populations). These groupings are individually called stratum (strata if plural). Stratified random sampling is the act of obtaining independently random samples from within each stratum. For this reason, strata need to be defined based on criteria known prior to the draw of the sample. This means that elements of fishing trips known prior to departure are valuable in defining deployment strata, whereas catch or target species is not.

There are numerous reasons for creating strata. These include: when a separate estimate for a subpopulation is desired, when administrative convenience (field logistics) requires it, and to increase the precision of sample-based estimates of the total. Increased precision is accomplished through the division of a heterogeneous population into homogeneous sub-populations, and the resulting variance of the population total being calculated from the variance of the individual strata (Cochran 1977). The collection of strata that together subdivide the population of trips in partial coverage constitutes a stratification.

The one stratification evaluated in this study divides partial coverage trips into three strata based on gear type only:

- Hook and Line ≥ 40' LOA (HAL):
- Pot ≥ 40' LOA (POT):
- Trawl (TRW).

Sample Allocation

Sample allocation refers to the allotment of trips afforded to a stratum. Four types of sample allocations were compared for 2022 observer deployment. These types are:

1. Equal rates

This allocation design estimates the equal coverage rate (trips sampled/total trips) across strata that can be afforded with available funding. This design allocates samples proportional to fishing effort (in terms of trips *N*) in a stratum (*H*). The cost of an observed trip in each stratum (c_h) is estimated as the product of the mean trip duration in a stratum and the cost of an observer day. The equal coverage rate afforded (r) across all strata was then calculated as

$$r_h = \frac{F_{2022}}{\sum_{h=1}^{H} c_h N_h}, \qquad (1)$$

where F_{2022} is the estimated funds from the budget forecasting.

2. 15% + Optimized

Unlike equal rates afforded, this sample allocation adopts a "hurdle" approach to optimization. First, observer sea days are allocated equally up to a 15% coverage rate (the base-rate, or hurdle). Then, once 15% has been met, an optimal allocation algorithm (described below) is used to allocate remaining resources among strata. If available funding does not permit equal allocation up to 15%, equal rates allocation is employed instead. The minimum 15% coverage rate was recommended by the Fisheries Monitoring Science Committee because it has been shown to eliminate or minimize severe gaps in

observer data (Faunce et al. 2017, NMFS 2017a, Gasper et al. 2019), and was adopted by NMFS since the 2018 ADP (NMFS 2017b). This allocation first estimates the number of trips left over in each stratum after 15% coverage has been met using

$$N_{h+} = N_h - \left(0.15 \times N_h\right) \qquad (2)$$

and then calculates the new budget (F_{2022+}) available for optimized allocation among strata using

$$F_{2022+} = \sum_{h=1}^{H} c_h N_{h+}. \qquad (3)$$

The F_{2022+} and N_{h+} is then allocated following the optimized design. Optimal allocation beyond the 15% minimum hurdle maximizes precision for the chosen metrics for the least cost. If n_+ is the number of optimized observed trips afforded among all partial coverage fishing trips above 15% minimum coverage in each strata (N_{h+}), the number of samples that is considered optimum for each stratum (n_{h+}) is denoted by the product of the total sample size and the optimal weighting (W_{hopt}),

$$n_{h+} = n_+ \times W_{hopt}, \quad \text{where} \quad W_{hopt} = \frac{\frac{N_{h+}S_h}{\sqrt{c_h}}}{\sum_{h=1}^{H}\left(\frac{N_{h+}S_h}{\sqrt{c_h}}\right)} \quad \textit{Cochran (1977).} \qquad (4)$$

While equation 4 gives the allocation of optimized trips among strata, it does not give the total sample size of optimized trips. To obtain this we can rearrange equation 4 as

$$n_+ = \frac{F_{2022+}\sum_{h=1}^{H}\left(\frac{n_{h+}s_h}{\sqrt{c_h}}\right)}{\sum_{h=1}^{H}(N)} \quad \textit{Cochran (1977).} \qquad (5)$$

Cochran (1977) shows that the blended optimal allocation (m_{h+}) is derived from the average number of optimal sample sizes measured across L metrics,

$$m_{h+} = \frac{\sum_{l=1}^{L} n_{l,h+}}{L}. \qquad (6)$$

It is worth noting that unless n_{h+} among all metrics are positive ly correlated, the resulting compromise allocations may be substantially different from n_{h+} for any individual target metric.

3. 15% + Optimized at 95% confidence level

This method is a modification of the 15% + Optimized allocation strategy. Here the baseline coverage threshold is not the desired minimum rate. Instead, it is elevated so that the desired minimum rate is achieved in most iterations. Specifically, we rely on the expectations from a binomial distribution to set observer sea days among strata so that there is a 95% probability of realizing the 15% baseline threshold in each stratum. Additional afforded days are allocated among strata using the same optimization methods asusing the same optimization methods as the 15% + Opt method.

4. 15% + Optimize TRW

This method uses the same baseline definition and approach as the 15% + Optimized method. However, unlike that method, any days afforded beyond those needed to achieve baseline coverage are simply allocated entirely into the TRW stratum.

Evaluation of Alternative Designs

Data from 2018, 2019, and 2020 were combined and treated as a single meta-year for the calculation of optimal allocation weightings (W_{hopt}) in each strata, including trip duration, discarded catch, halibut PSC, and Chinook salmon PSC[10].

Similarity Indices

The methods used in this analysis are identical to those used in the 2021 Draft ADP. Potential 2021 partial coverage fishing events from multiple populations were used as the basis for performing a simplified version of the Catch Account System's (CAS) post-stratification process. This was done to quantify the degree to which data from monitored trips are available within specified spatiotemporal distances to unmonitored fishing trips. In general, the larger the distance, the greater the potential for problematic gaps (sparse or no data collected) and poorly representative samples within a given domain (e.g., post-strata in CAS or data groupings used within stock assessments).

This analysis included four distinct types of monitoring coverage that are used within and between partial coverage selection pools: 1) Monitored observer pool trips relative to unmonitored observer pool trips (OB-OB), 2) Monitored observer pool trips relative to all zero-selection pool trips (OB-ZE), 3) Monitored EM pool trips relative to unmonitored EM pool trips (EM-EM), and 4) Monitored observer pool trips relative to all EM pool trips (OB-EM, observer data available to support EM monitoring). The OB-OB and OB-ZE comparisons are important because they reflect how well observed trips - trips that supply bycatch rates and biological tissues for stock assessment - represent other trips in the observer and zero selection pool respectively. The EM-EM comparison is important because it reflects the overlap between monitored trips - trips that supply catch rate information - and unmonitored EM trips. The OB-EM analyses are important because they describe the overlap between the two elements of EM catch estimation - observer data that supplies average weight information and EM trips that supply catch rate information.

Domains of interest were defined by gear type, FMP, and the dominant species landed (trip target) to broadly mimic the post-strata CAS employs to generate discard estimates for the observer, zero-selection, and EM pools.

Each trip within each domain was assigned one of four categories based on whether the trip was monitored or its proximity to a monitored trip: 1) trip was monitored (or "covered", CD), 2) nearest monitored trip occurred 15 days before or after the unmonitored trip in the same NMFS area (AD), 3) nearest monitored trip occurred within 45 days before or after the unmonitored trip in the same FMP (FD), or 4) the nearest monitored trip met none of the other categories and the nearest monitored trip occurred within the same year (YD) (Table B-1). Next, a 'similarity index' was calculated as a weighted proportion of trips within each of the four distance categories:

$$S_D = \left(P_{CD} \times 1\right) + \left(P_{AD} \times 0.75\right) + \left(P_{FD} \times 0.25\right) + \left(P_{YD} \times 0\right)$$

[10] The Council did not choose to include crab PSC in their October 5th 2019 Motion, 2019.

where S_D is the index for a given post-stratum D and P_{CD}, P_{AD}, P_{FD}, and P_{YD} are the proportions of trips in each distance category. The similarity index represents one value that reflects an overall measure of the spatiotemporal availability of monitoring data within a given post-stratum.

Results and Discussion

Fishing Effort Forecast

This analysis uses a total amount of observer days that facilitates stable and fiscally solvent fishery monitoring in the partial coverage fleet until 2024 while also supporting a $1M EM fishery monitoring component. The partial coverage fishery in Alaska has declined in terms of total trips fished from 2018-2020 (Figure B-2). This analysis estimates that fishing effort in 2021 and 2022 will be similar to the amount of fishing effort that occured in 2020. The estimate of partial coverage fishing effort in 2021 is 5,644 trips, which represents a 1% decline from 2020 (5,700 trips). Expectations of fishing effort (including EM and zero-coverage) in 2022 range between 5,012 and 6,276 trips.

Budget Forecasts

Forecasts estimated that an annual $5.119 M budget would sustain observer and EM fishery monitoring for 2022 and beyond (Table B-2). Simulated sampling among allocations showed good agreement among all populations which means that the analysis is working as designed and selection rates were set to the same budget constraints (Figure B-3). Figure B-3 illustrates the complete range of potential costs that could occur in 2022 to help aid in future planning.

The $1529.48 estimated cost per observer day is lower than in the 2021 Final ADP for several reasons. In 2020 and 2021, the increased costs of observer coverage attributed to quarantining observers and the need to waive coverage for many trips resulted in fewer sea days. This in turn made it impossible to reach the minimum number of sea days on the partial coverage contract and afford the cheaper option days that result in higher efficiency (lower cost-per-day). However, selection rates for the observer strata were modified starting September 1, 2021 in order to reflect changes to COVID-19 safety protocols for observer deployment including opening coverage to all ports and no longer waiving trips that embark and disembark from different ports. Observers were also assumed to no longer be required to quarantine after traveling to new ports, so those additional costs were assumed to be minimal. The selection rates were updated to meet the $4.485 M budget of the 2021 ADP, and when coupled with the assumed lower costs of deployment, a sufficient number of sea days are expected to meet and exceed the contract minimum and afford cheaper option days for the 2022 ADP.

Evaluation of Alternatives

<u>Selection rates for observer strata</u>

The resulting coverage rates examined are relatively similar among all allocation methods for fixed gear strata, with median values ranging from 15-19%. The largest differences among methods are noticed within the TRW stratum, with median values ranging from 19-41%. At least one fixed gear stratum in the 15% + Opt and the 15% Opt TRW have coverage rates very close to 15% (Table B-3), so there is increased risk of not achieving this minimum level of coverage in practice. It should also be noted that the rates afforded varied due to the uncertainty in fishing effort for the upcoming year. This was especially the

case in the TRW stratum within the 15% Opt TRW allocation scheme. Strata with rates that have higher variances in afforded rates are more likely to result in underspending or overspending.

This analysis did not consider alternate scenarios that impact the participation of vessels in the different monitoring pools, so the number of vessels within each pool is constant among the allocation schemes evaluated. The number of vessels and average number of trips within each pool and stratum are shown in Table B-4, as well as the average number of trips and days monitored under each allocation scheme.

Similarity Analyses

The monitoring rates afforded by the different allocation strategies result in a range of similarity index values that can be achieved. These in turn reflect the potential benefits and tradeoffs of the different allocation strategies towards the goal of achieving a representative sample of fishing activities in Alaska. Although similarity index values increase with greater selection rates, the magnitude of the increase depends on the number of trips within a domain and their arrangement in time and space. The similarity indices resulting from the four allocation schemes considered in this analysis did not vary as much as in prior ADPs because the latter considered vastly different scenarios that affected the participation in different pools and therefore the number of trips in domains.

Within the HAL stratum, the Equal Rates allocation scheme had the largest similarity index values (Figure B-4) because it resulted in the greatest selection rate for this stratum (Table B-3). However, index values from the Equal Rates allocation were similar to those from the 15% + Opt and 15% + Opt 0.95 allocation schemes. Within HAL, the 15% Opt TRW scheme resulted in lower similarity indices in OB-OB comparisons of the BSAI Halibut, GOA Halibut, and GOA Sablefish domains, in OB-EM comparisons of the GOA Halibut domain, and in OB-ZE comparisons of the GOA Halibut domain. Within the OB-OB comparison of the GOA Sablefish domain, 15% + Opt 0.95 had higher similarity indices than 15% Opt TRW, but 15% + Opt did not differ from 15% Opt TRW.

Within the POT stratum, the Equal Rates allocation also resulted in the largest index values that were very similar to those from the 15% + Opt and 15% + Opt 0.95 allocations (Figure B-5). Both Equal Rates and 15% + Opt 0.95 had higher index values than the 15% + Opt TRW allocation strategy within the OB-OB comparisons of the BSAI Pacific cod and GOA Sablefish domains. Additionally, the index values from the 15% + Opt 0.95 were greater than those from 15% + Opt within the OB-OB comparison of the GOA Sablefish domain for the POT stratum. All allocation schemes had comparable similarity indices in the OB-EM and OB-ZE comparisons.

Within the TRW stratum, the 15% + Opt TRW allocation scheme resulted in the highest similarity index values. Although the index values from the 15% + Opt TRW method at a 44% coverage rate were always greater than those of Equal Rates at 19% coverage, they were not drastically different from the index values that resulted from the the 15% + Opt or 15% + Opt 0.95 allocation strategies that had coverage rates of 34% and 28% respectively (Figure B-6).

Across all fixed gear domains, Equal Rates resulted in the greatest similarity index values of all allocation methods compared and this result was consistent among all data comparisons (OB-OB, OB-EM, and OB-ZE. In contrast, the 15% Opt TRW scenario results in the highest index values for the TRW stratum, but often produces the lowest index values for fixed gear. The 15% + Opt 0.95 method results in similarity index values intermediate to Equal Rates and 15% Opt TRW (Figure B-7).

Caveats

This analysis relies on several key assumptions. First, we assume that discarded catch on each sampled trip is known without variance, and a simple single stage estimator of trip variances is used in optimization algorithms. The variances used in this analysis are not the same that will arise from the five-stage sampling design of the observer program (Cahalan et al. 2014). Previous studies have demonstrated that although the vessel was a significant factor in estimating total discards, the first stage of nested sampling designs (vessel or trip) is often the stage with the least amount of variance (Allen et al. 2002, Borges et al. 2004). Multi-stage based estimates of variance for each stratum and metric will be used in subsequent analyses when they become available. Past performance is no guarantee of future returns, and in no time series is this more obvious than when the effects of COVID-19 are considered on partial coverage fishing effort in Alaska. However, here analysts have done their best to incorporate multiple sources of variation - including their own uncertainty - in an honest attempt to provide a suite of possible outcomes. While to some readers this may be unsatisfactory, we prefer to be 'vaguely correct' over being 'precisely wrong'.

It is important that the reader understand that the resulting coverage rates for observer deployment depend upon the estimated amount of future fishing effort and the available number of observer days which is dependent upon budget and trip duration. In addition, budget values are always expected to change from draft to final versions of the ADP and we are still unsure about the potential effects of COVID-19 and the participation of vessels in EM. Consequently, **the resulting coverage rates presented in this study should only be considered preliminary estimates and <u>will differ</u> from rates determined in the Final ADP.** Once a sampling design for the Final ADP is established, updated values for expected fishing effort and budget will be generated, and a similar simulated sampling procedure using those updated values will be used to estimate expected coverage rates following the methods described in the methods section of this analysis.

Summary

The anticipated fishing effort and budgets for 2022 appear substantial to support baseline observer coverage levels on average. This is encouraging, since the 15% baseline represents a *minimal* coverage level. However, the likelihood of achieving the 15% baseline coverage diminishes with smaller strata sizes and lower budgets. The 15% baseline approach used in ADPs since 2018 has a 50% chance of failure if coverage rates were actually set at 15%. This is an undesirable feature of the baseline coverage approach to date, and is addressed in the equal allocations (because this method distributes samples based equally on stratum size and thus is the maximum baseline coverage afforded) and the 15% + Opt 95 methods (which sets a higher probability of achieving the baseline). Recalling that the optimization routine maximizes variance reduction for the cost, it represents the mathematical equivalent of greatest 'bang for the buck'. Therefore, of the allocations that maximize baseline success and address the Council's objective to focus on PSC limited fisheries with a cost-effective program, the 15% + Opt 95 is the remaining viable option.

ADP Analyst Team Recommendations and future direction.

ADP analysts belong to a larger group of scientists and statisticians who use fisheries monitoring data. The Fisheries Monitoring Science Committee (FMSC; formerly the Observer Science Committee) role is to mainly perform the annual deployment performance review that is included in Annual Reports, however it may serve additional roles as requested. This year the FMA Director asked for the group's

input on the alternative methods examined in this ADP. Although this review has been provided as a separate document, we reiterate its conclusions here:

The FMSC concluded that of the allocations analyzed, the '15% + Opt 95' has 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 with PSC concerns as intended by the Council.

FMSC members anticipate that they will be able to participate in the integrated evaluation of the partial coverage category for 2024.

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Table B-1. Description of the scores used in similarity index calculations.

Category	Resolution	Condition	Score
C	Fine	All trips monitored ("Covered")	1.00
A		Within 15 days of monitored trip in same NMFS Area	0.75
F		Within 45 days of monitored trip in same FMP	0.25
Y	Coarse	Year-to-Date', i.e. > 45 days and/or FMP	0.00

Table B-2. Budget for observer and EM deployment. Funds were distributed to all remaining contract option years (to 2024) to allow for an equal number of sea days each calendar year.

Total 2022 Budget	2022 EM Budget	2022 Observer Budget	Observer Sea Days 2022-2024	2022 Observer Cost Per Day
5.119 M	$1 M	4.119 M	2,693	$1529.48

Table B-3. Selection rates and number of observed sea days resulting from the four allocation schemes considered. Number of trips per strata (N) and optimization weights (W_{hopt}). 'Rate Reqd' is the selection rate required to meet the 15% hurdle at the specified confidence level. Lower and Upper represent the 0.025 and 0.975 quantiles of the selection rate afforded.

				Confidence		Days			Rate		
Allocation scheme	**Strata**	***N***	$W_{h\ opt}$	**Level**	**Rate Reqd**	**Hurdle**	**Opt**	**Total**	**Lower**	**Median**	**Upper**
Equal Rates	HAL	1,178				922	271	1,193	17.56	19.44	21.76
	POT	990				851	251	1,101	17.56	19.44	21.76
	TRW	681				330	97	428	17.56	19.44	21.76
15% + Opt	HAL	1,178	0.2410	0.50	15.00	922	142	1,064	16.45	17.47	18.73
	POT	990	0.0747	0.50	15.00	851	44	895	15.48	15.83	16.25
	TRW	681	0.6842	0.50	15.00	330	404	734	26.40	34.59	44.50
15% + Opt 0.95	HAL	1,178	0.2421	0.95	16.86	1,036	188	1,110	17.12	18.21	19.54
	POT	990	0.0749	0.95	17.04	967	139	990	17.06	17.48	18.04
	TRW	681	0.6831	0.95	17.52	386	258	594	20.24	28.10	37.79
15% Opt TRW	HAL	1,178				922	0	922	15.00	15.00	15.00
	POT	990				851	0	851	15.00	15.00	15.00
	TRW	681				330	641	971	32.18	44.09	59.06

Table B-4. Mean expected vessels (V_h), trips (N_h), monitored trips (n_h), and monitored days (d_h) within each pool and stratum (h) for each of the allocation schemes evaluated.

				Equal Rates		**15% + Opt**		**15% + Opt 0.95**		**15% Opt TRW**	
Pool	**Stratum (h)**	V_h	N_h	n_h	d_h	n_h	d_h	n_h	d_h	n_h	d_h
OB	HAL	288	1,178	229	1,193	206	1,073	214	1,118	177	922
OB	POT	133	990	192	1,101	157	898	173	992	149	851
OB	TRW	77	681	132	428	235	760	191	617	301	971
EM	HAL	126	703	211	1,070	211	1,070	211	1,070	211	1,070
EM	POT	45	343	103	537	103	537	103	537	103	537
EM	TRW	40	389	117	331	117	331	117	331	117	331
ZE	HAL	305	1,329	0	0	0	0	0	0	0	0
ZE	POT	8	40	0	0	0	0	0	0	0	0

Figure B-1. Process diagram for the generation of fishing populations and evaluation of the different allocation strategies. Inputs are outlined in green and randomly repeated processes are outlined in blue.

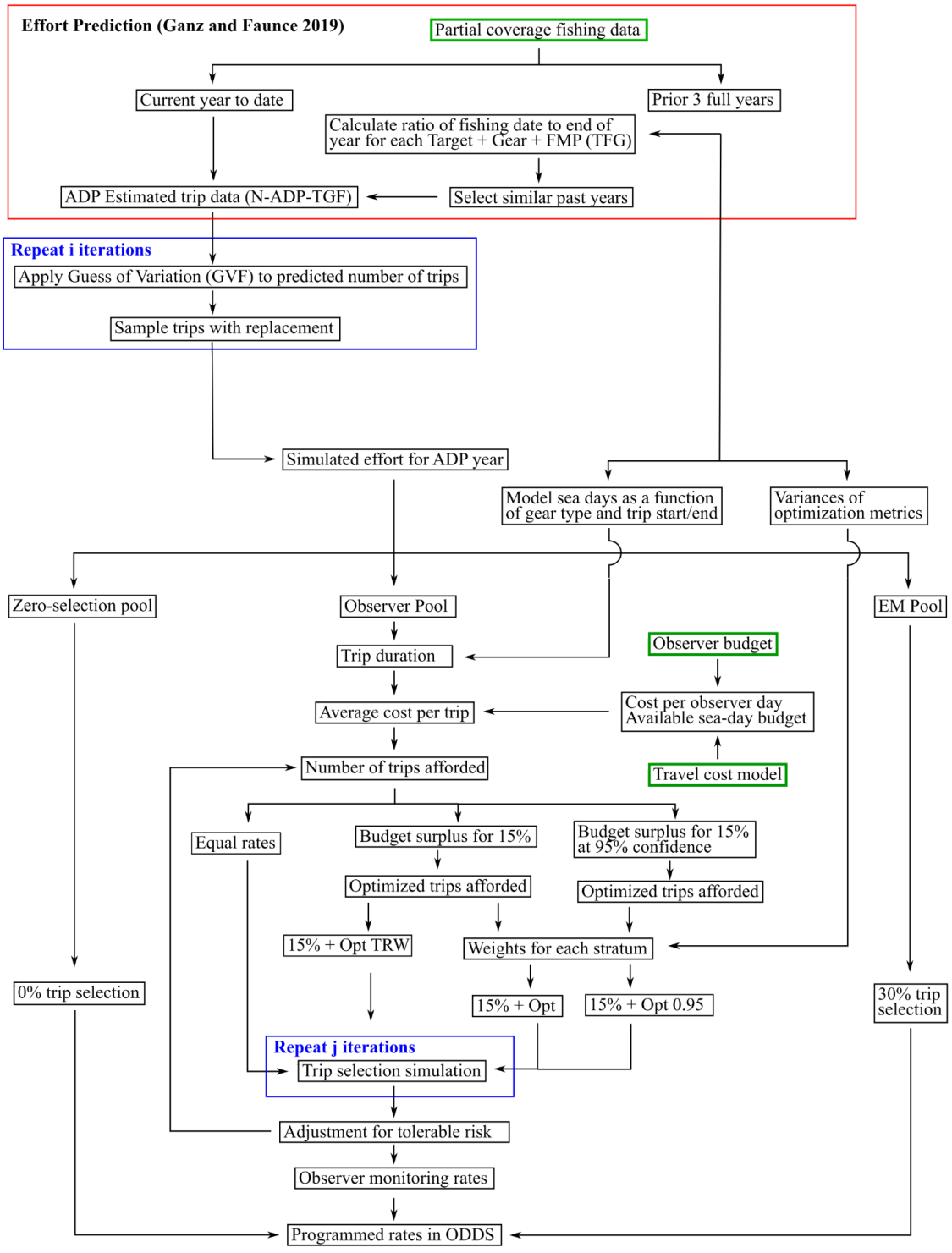


Figure B-2. Partial coverage fishing effort (in trips) from 2018 to 2020. Points in red (2021 and 2022) are estimates based on past fishing effort. Red bars around the 2022 fishing effort represent the Guess Variation Factor (GVF) that was applied to that estimate in order to account for uncertainty. Simulations in this analysis had an equal probability of containing any number of trips within the GVF range.

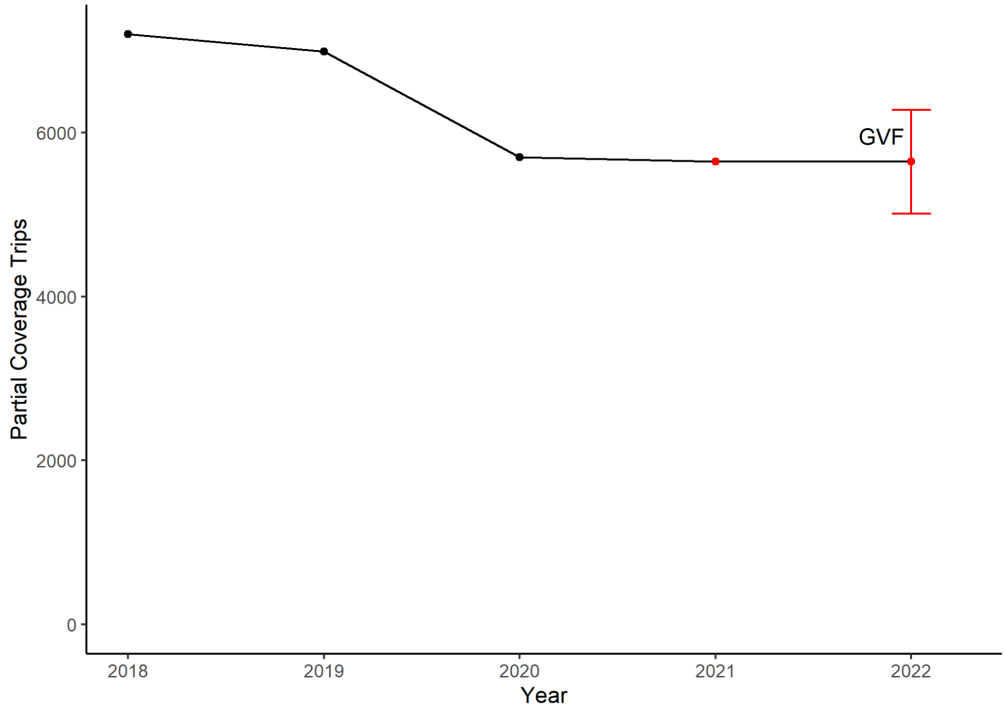


Figure B-3. Budget outcomes for each Scenario and allocation examined across all iterations and populations. The gray filled dome shape is the relative frequency of the budget expended. The purple line is the budget required for a fiscally sustainable fishery monitoring program, the blue line is the median cost while the red dashed lines denote extreme (0.5 and 99.5%) outcomes.

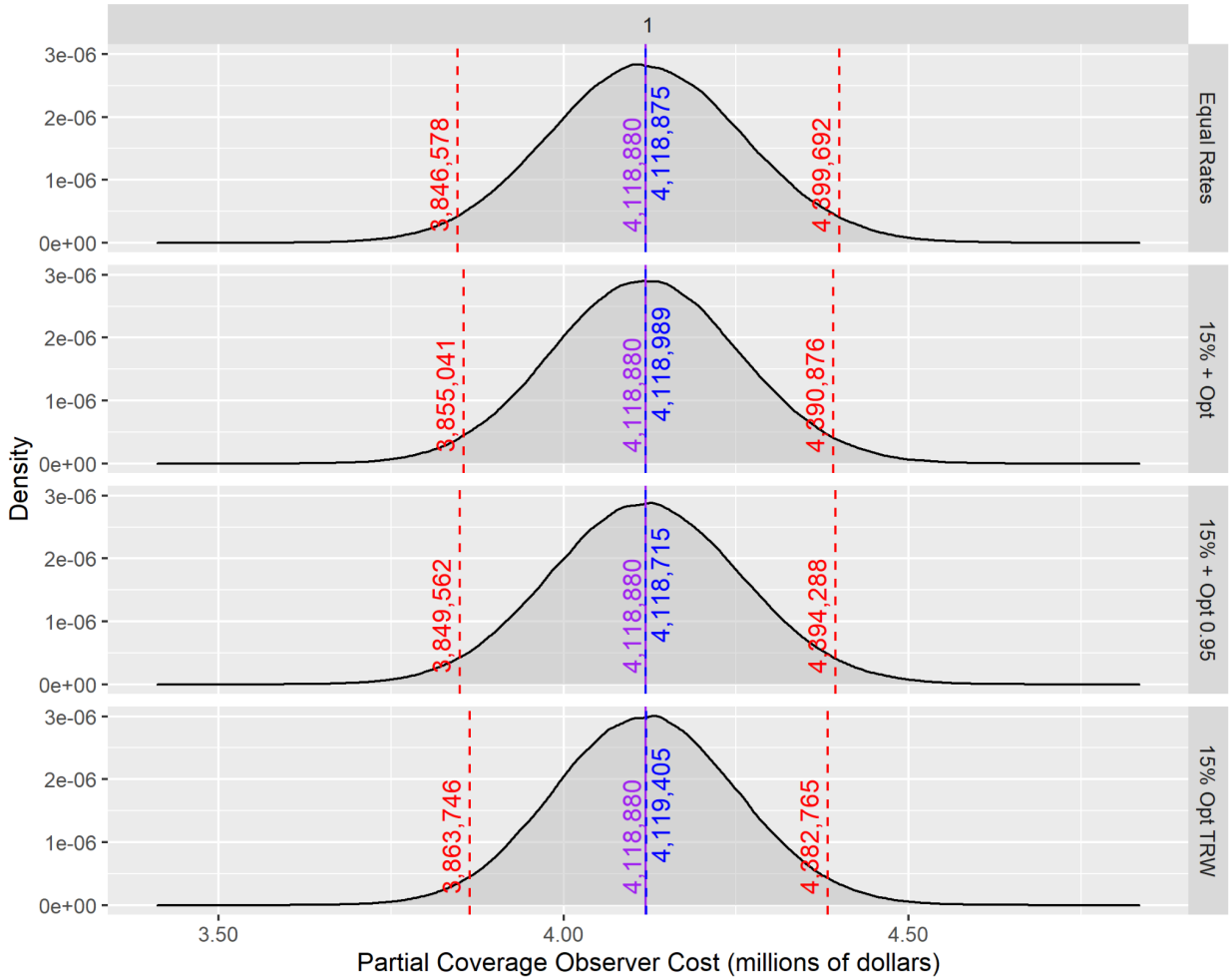


Figure B-4. Similarity of observed trips to unobserved trips in the HAL stratum for major Gear + Target Species + FMP combinations (height of the colored bar) with 95% confidence bounds. Vertical axis scores as described in Table B-1. Black numbers represent the average number of trips in the domain and blue numbers represent the average number of observed trips in the domain.

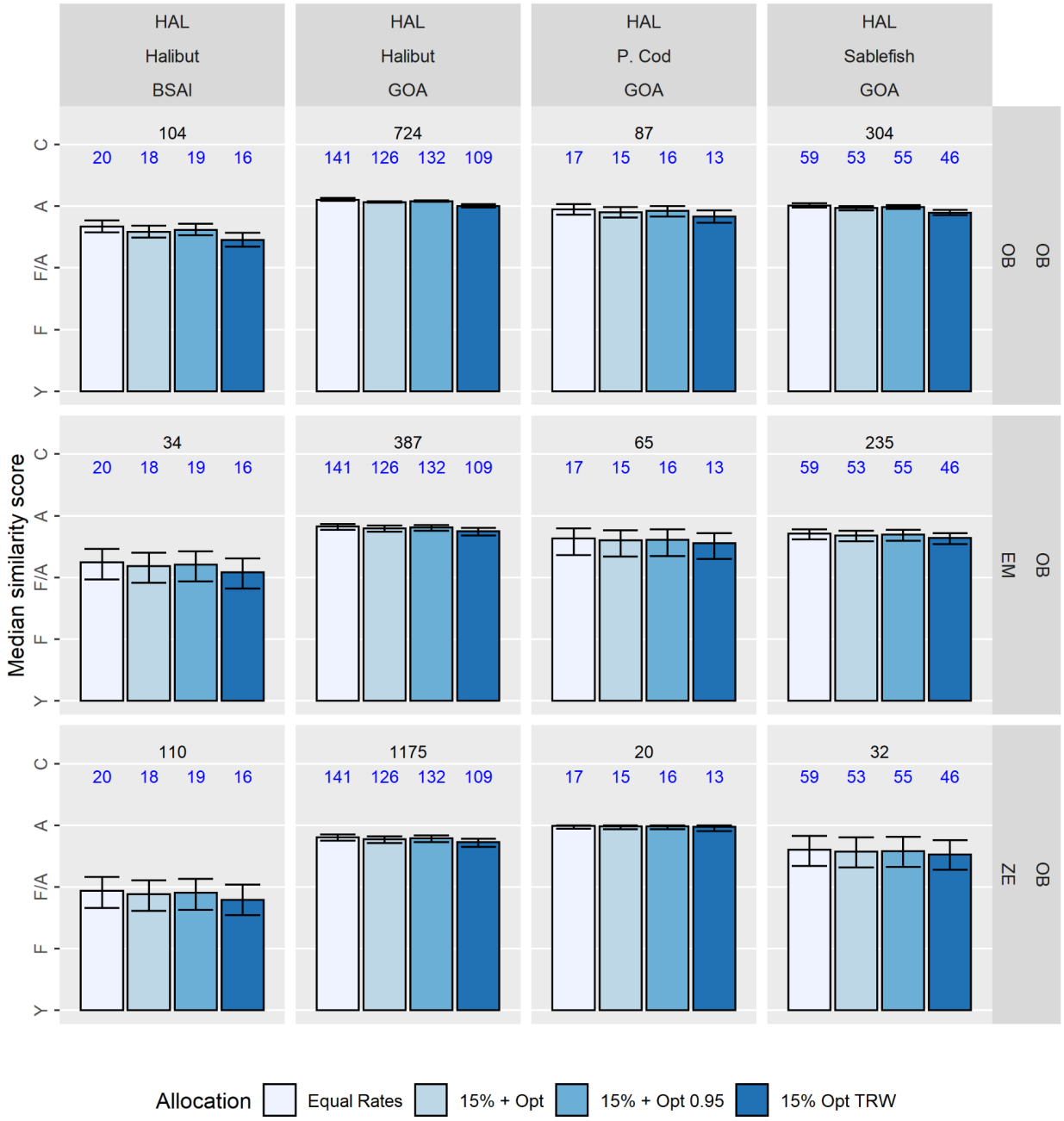


Figure B-5. Similarity of observed trips to unobserved trips in the POT stratum for major Gear + Target Species + FMP combinations (height of the colored bar) with 95% confidence bounds. Vertical axis scores as described in Table B-1. Black numbers represent the average number of trips in the domain and blue numbers represent the average number of observed trips in the domain.

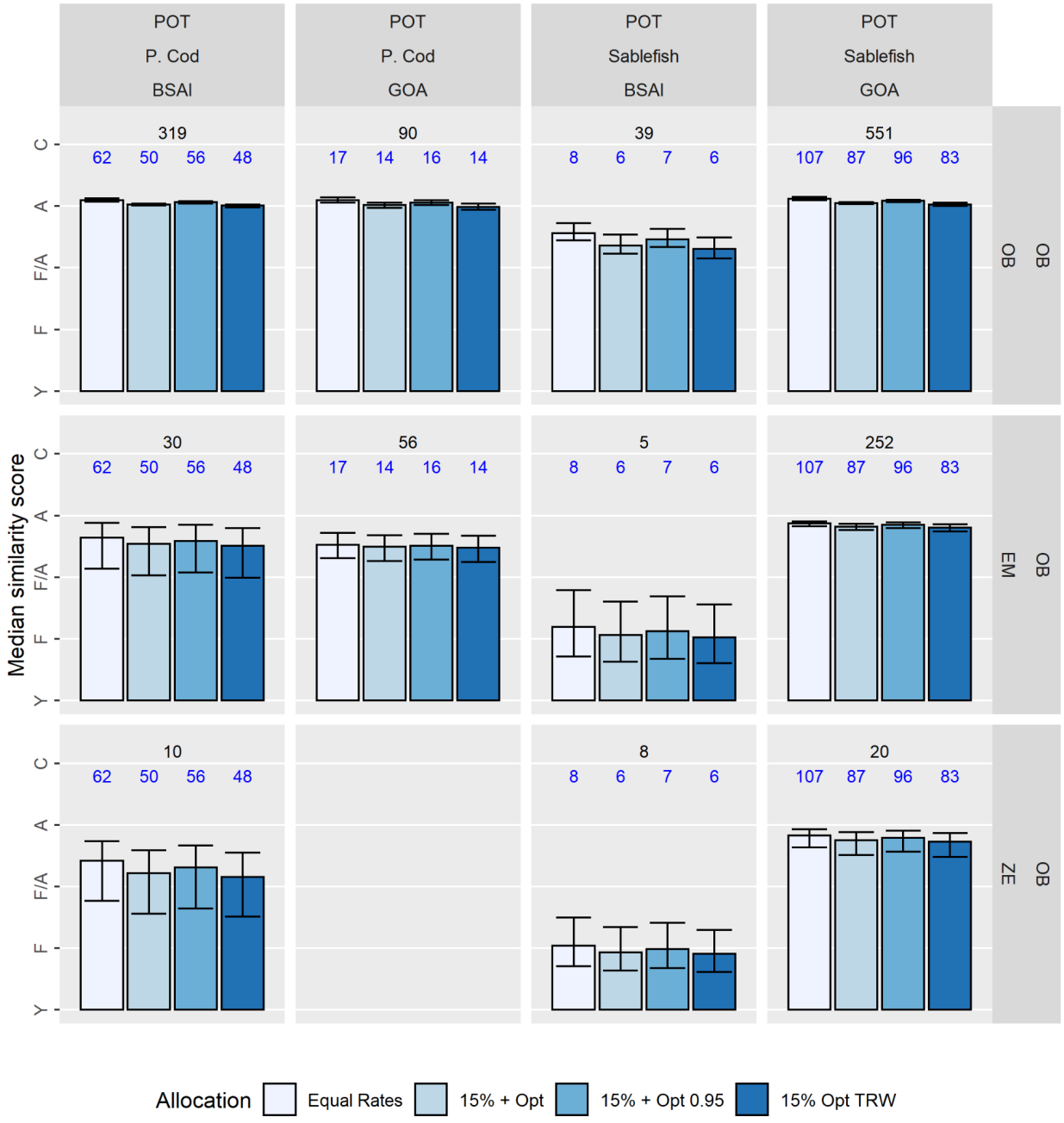


Figure B-6. Similarity of observed trips to unobserved trips in the TRW stratum for major Gear + Target Species + FMP combinations (height of the colored bar) with 95% confidence bounds. Vertical axis scores as described in Table B-1. Black numbers represent the average number of trips in the domain and blue numbers represent the average number of observed trips in the domain.

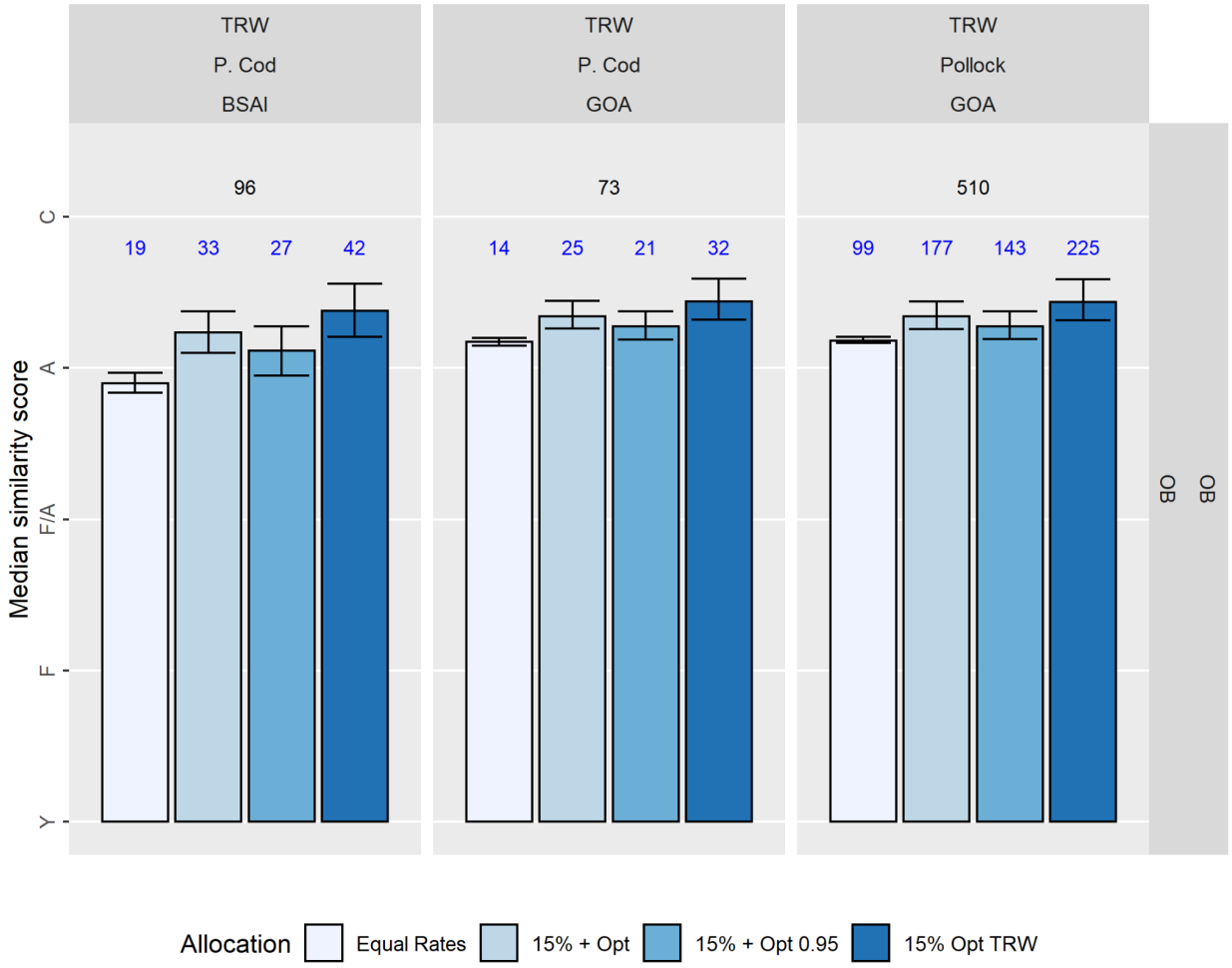
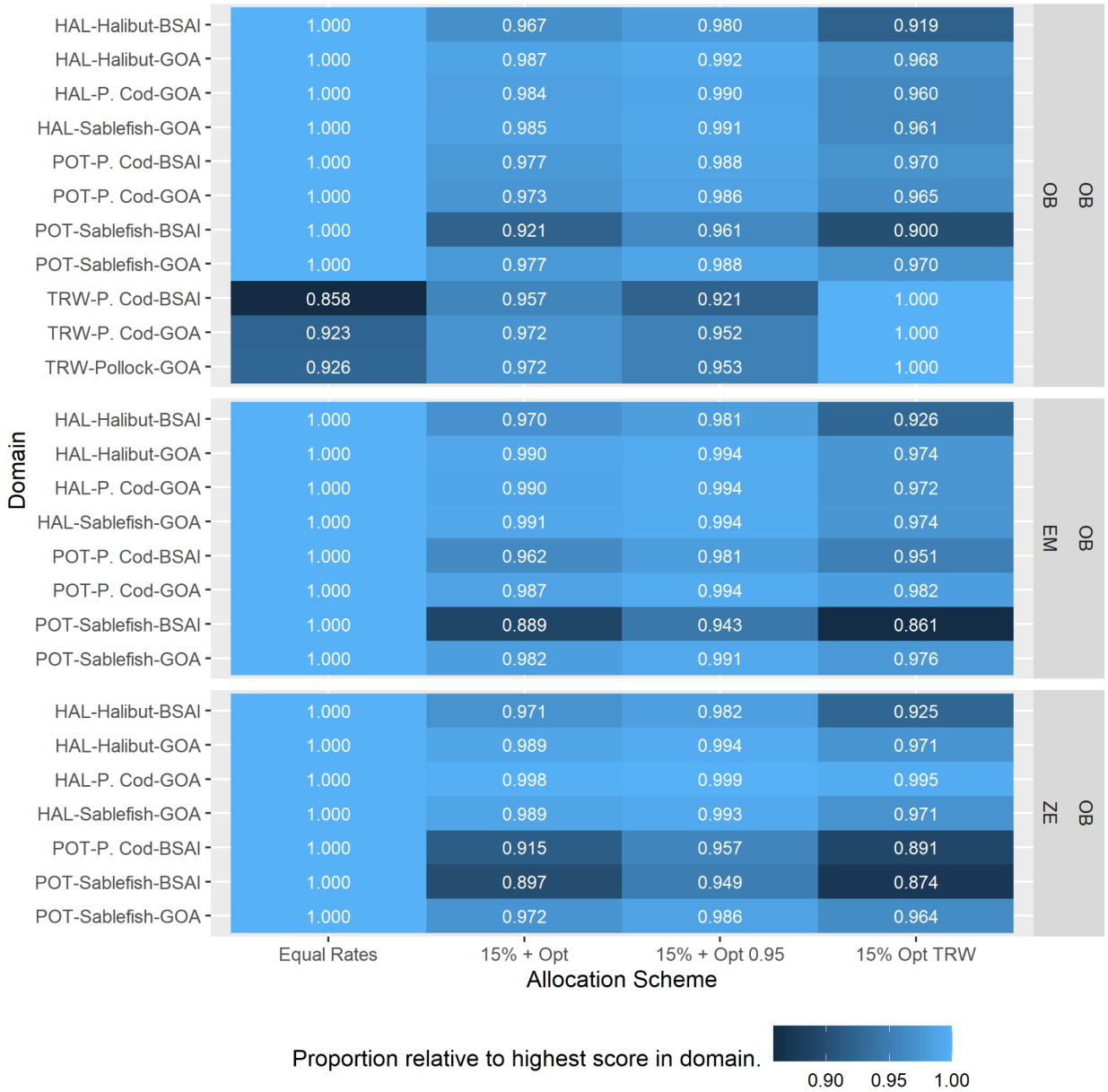


Figure B-7. Similarity of observed trips to unobserved trips for major Gear + Target Species Codes + FMP combinations. Values in each cell of each row in each panel have been coded as a color where the greatest index value in each row gets a value of 1 and all other values in each row are scored relative to that score of 1. Consequently, darker colors represent worse similarity index values (less similarity in time and space among trips), and all rows have the same color scheme. The performance of each allocation scheme can be gauged by the number of dark cells in each column within each panel.



Appendix C: 2022 EM Vessel Monitoring Plan Description

Introduction

A Vessel Monitoring Plan (VMP) describes how fishing operations on the vessel are conducted, including how gear is set, how catch is brought on board, and where catch is retained and discarded. It also describes how the EM system and associated equipment is configured to meet the data collection objectives and purpose of the EM program, including camera locations to cover all fishing activities, any sensors to detect fishing activities, and any special catch handling requirements to ensure the data collection objectives can be met. The VMP also includes methods to troubleshoot the EM system and instructions for ensuring the EM system is functioning properly.

Vessel operators will meet with the EM service provider to develop their VMP using a VMP template that is available on the NMFS Website: https://www.fisheries.noaa.gov/alaska/resources-fishing/electronic-monitoring-north-pacific.

Each VMP must be approved annually by NMFS. Once the VMP is complete and the vessel operator agrees to comply with the components of the VMP, the vessel operator must sign and submit the VMP to NMFS for approval. If changes are needed to the VMP after approval, vessel operators should work with an EM service provider to make those changes and sign and submit those changes to NMFS. Once submitted the vessel operators may begin a fishing trip.

If a vessel operator has repeat problems with EM system reliability or video quality or have failed to comply with the requirements in this VMP, NMFS may disapprove a VMP for the following calendar year and the vessel may be removed from the EM pool the following calendar year.

Excerpt from VMP template - Operator Responsibilities

Here we provide an excerpt of the VMP so that vessel operators can preview the sections that describe vessel operator responsibilities and troubleshooting instructions. When selected for coverage, you must comply with operator responsibilities listed below and in Appendix B - Guide for Vessel Operators of the VMP.

Prior to Trip

- ✔ **Complete Function Test:** Prior to leaving port, you must turn the system on and conduct a system function test following the instructions provided in *Appendix B – Guide for Vessel Operator*. If the function test identifies a malfunction, you must follow the guidance in the malfunction matrix and the troubleshooting guidelines listed in *Appendix B – Guide for Vessel Operator.*
- ✔ **Confirm Hard Drive Storage Space:** Ensure that the system has enough storage to record the entire trip.

Each Trip

✔ **Power:** Maintain uninterrupted power to the EM unit while the vessel is underway.

✔ **Maintain Equipment:** Make certain that EM system components are not tampered with, disabled, destroyed, or operated or maintained improperly unless directed to make changes by NMFS, the EM service provider, or as directed in the troubleshooting guide of the VMP.

Each Day

✔ **Logbook:** You must complete ***one*** of the following:

- If you are required to complete a NMFS or IPHC logbook then you can use that logbook ***and add in the comments section:***
  - the ODDS trip number
  - whether the vessel fished at night during the trip
  - any EM malfunctions encountered during the trip
  - each set that marine mammals were observed feeding on the catch as it was brought aboard.
- If you ***are not*** required to complete a NMFS or IPHC logbook then you must complete the EM Effort Logbook found in either *Appendix D – 2022 Longline EM Effort Logbook* of the VMP or *Appendix E – 2022 Pot EM Effort Logbook of the VMP*.

Prior to Each Haul or Set

✔ **Verify System Is Running Correctly**

- Verify that all cameras are recording and all sensors and other required EM system components are functioning as instructed in *Appendix B – Guide for Vessel Operator*.
- Check the monitor and verify that the camera views are consistent with the images provided in *Appendix A - Vessel Installation Details*.

✔ **Clear Camera Views**: Clean cameras to maintain video quality and make sure camera views are not blocked.

Catch Handling Requirements for LONGLINERS:

✔ Deployment of pot and hook/line gear in the same set is prohibited.

✔ All catch must be handled within view of the cameras as defined in the camera descriptions and deck diagram in *Appendix A - Vessel Installation Details*.

✔ All catch processing from the previous set must be complete prior to hauling the next set.

✔ **Seabirds**: Hold seabirds up to the camera for 3 seconds and show certain key parts of the animal, such as the beak, to the hauler view camera. When showing a seabird to the camera:

- Grasp by the outermost bend in wing, with wings out-stretched and show the bird to the hauler camera showing the front and back sides;
- For albatross, show a profile of the bill by holding the bird by the neck against the side of the boat. Ensure that the view is not obstructed; and
- If possible, hold the bird beak near a scaled reference item (e.g., measurement board with large grid) to assist with identification.

✔ **Marine Mammal Depredation:** Note in the logbook each set where marine mammals were feeding on the catch.

Catch Handling Requirements for POT Gear (includes SLINKY POTS):

✔ Deployment of pot and hook/line gear in the same set is prohibited.

✔ All catch must be handled within view of the cameras as defined in the camera descriptions and deck diagram in *Appendix A - Vessel Installation Details*.

✔ On retrieval of a pot, ALL catch must be emptied from the pot onto the sorting table. Any catch left in the pot or that land on the deck must be placed on the sorting table.

✔ Process all retained catch and leave discards on the sorting table until after the retained catch are placed in the fish hold.

✔ If there is no sorting table, all catch must be sorted in view of the cameras and discards left on deck in view of camera after retained fish are placed in the fish hold.

✔ Completely clear all catch, especially Pacific cod, off the table and deck before the next pot is dumped (so that catch from 2 pots is not mixed).

- If the entire table is covered with catch, then Pacific cod should be cleared from the table a few at a time (to allow EM reviewer to count the retained catch).
- If all of the snails and sea urchins cannot be cleared off the table or deck before the next pot is dumped, they should be cleared by the next pot or as soon as feasible.

Owners of pot vessels may propose alternatives to these procedures by submitting plans to NMFS for approval. This alternative catch handling protocol may not be used until approved by NMFS.

Trip End

✔ **Mail hard drive and logbook**
- Mail hard drives and a copy of the trip's **logbook** (IPHC or NMFS logbook or EM effort logbook, as appropriate) and the ODDS trip number **within 2 business days** after the EM selected trip to the contact provided in *Appendix B – Guide for Vessel Operator*.
- **EM selected trips ending in ports with limited postal service**: Notify NMFS using the contacts on first page of the VMP to inform of the expected delay.

✔ **Close fishing trip in ODDS:** Prior to logging another trip or within 2 weeks of the end of the fishing trip selected for EM coverage, you must close the fishing trip in ODDS.

✔ **EM selected trips ending at a tender:**
- You must manually turn on the EM system and trigger recording during the offload to allow the EM reviewer to verify the end of the trip
- Record the location of the offload in your logbook.

- Mail hard drives and a copy of the trip's **logbook** (IPHC or NMFS logbook or EM effort logbook, as appropriate) and the ODDS trip number **within 2 business days** after the tender's arrival in a port with regular postal service.

Vessels Using the Exemption at § 679.7(f)(4) to Fishing IFQ in Multiple Areas

You must meet all the requirements for use of an EM system on every trip when fishing using the exemption at § 679.7(f)(4) to fishing IFQ in multiple areas.

- ✔ The EM system must be powered continuously during the fishing trip. If the EM system is powered down during periods of non-fishing, you must describe alternate methods, such as VMS, to make sure the vessel's location information is available for the entire trip in *Appendix A - Vessel Installation Details*.
- ✔ If an EM system malfunction identified as "high" priority in the malfunction matrix occurs during a fishing trip, ***you must cease fishing immediately***; follow the troubleshooting guidelines listed in *Appendix B – Guide for Vessel Operator*, and contact NOAA OLE immediately.
    - If a "high" priority malfunction occurs, every effort should be made to contact OLE while at sea, but if you are unable to contact OLE while at sea, you are not required to abandon fishing gear. You should also contact the EM service provider to facilitate the repair.
    - You may contact OLE using a cell phone or satellite phone, or you may contact the U.S. Coast Guard via VHF or single side band radio to request the Coast Guard contact OLE.
    - You **must not set additional gear** once a "high" priority malfunction is detected and must return to port immediately if unable to contact OLE at sea.
- ✔ You may purchase additional equipment, such as cameras or control centers, at you own expense to reduce lost fishing time. This additional equipment and its purpose must be described in *Appendix A - Vessel Installation Details of the VMP*.

EM Equipment Malfunction Tables

Equipment Malfunction Discovered During Pre-Departure EM System Function Test

If the function test identifies a malfunction, follow the troubleshooting guidelines listed in *Appendix B – Guide for Vessel Operators.*

Malfunction Type	High/Low Priority	Potential Solution	Action if Malfunction Not Resolved
Monitor	***High***	Connect a different monitor	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip is selected for EM coverage. Repair must occur prior to departing on the next trip.
GPS	***High***	Restart system	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip for EM coverage. Repair must occur prior to departing on the next trip.
Insufficient Storage	***High***	Replace with spare data drive[11]	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip is selected for EM coverage. Repair must occur prior to departing on the next trip.
Control Center	***High***	Restart system	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip is selected for EM coverage. Repair must occur prior to departing on the next trip.
Insufficient Lighting	***High***	Replace lights	May fish but cannot retrieve gear at night.
Hauling Camera(s)	***High***	Restart system; replace with spare camera[1]	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip is selected for EM coverage. Repair must occur prior to departing on the next trip.
Discard Camera(s)	***High***	Restart system; replace with spare camera[1]	Must remain in port up to 72 hours to allow for repairs. After 72 hours, may depart on trip and the next trip is selected for EM coverage. Repair must occur prior to departing on the next trip.
Streamer line Camera	Low	Restart system; replace with spare camera[1]	May depart on trip. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Rotation Sensor	Low	Carry spare rotation equipment[1]	May depart on trip, but must trigger video manually. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Hydraulic Sensor	Low	Restart system	May depart on trip, but must trigger video manually. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Keyboard/Mouse	Low	Replace with another keyboard/mouse[1]	May continue fishing provided that the sensors are properly triggering automatic recording. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.

[11] Vessels may choose to purchase additional spare parts, such as cameras or sensors but these items will not be provided by NMFS

Equipment Malfunction at Sea

- If the system passed the function test, and remains continuously powered during the trip, you are NOT required to return to port in the event of a breakdown. Follow the instructions provided in *Appendix B – Guide for Vessel Operators*.
- If the malfunction cannot be resolved following the troubleshooting guide and/or with remote support, continue to run the system with all functional parts, and contact the service provider immediately (from sea if possible) to assist with scheduling service at the time of landing.

Malfunction Type	High/Low Priority	Potential Solution	Action if Malfunction Not Resolved
Monitor	***High***	Connect a different monitor	Attempt to repair prior to retrieving gear. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
GPS	***High***	Restart system	Attempt to troubleshoot issue prior to retrieving gear. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
Insufficient Storage	***High***	Replace with spare data drive	Perform a data retrieval and swap data drive with a new blank data drive. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
Control Center	***High***	Restart system	Attempt to repair prior to retrieving gear. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
Insufficient Lighting	***High***	Replace lights	May fish but cannot retrieve gear at night.
Hauling Camera(s)	***High***	Restart system; replace with spare camera[1]	Attempt to repair prior to retrieving gear. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
Deck/Discard Camera(s)	***High***	Restart system; replace with spare camera[1]	Attempt to repair prior to retrieving gear. If cannot repair must contact EM service provider at end of trip. Repair must occur prior to departing on the next EM selected trip.
Streamer line Camera	Low	Restart system; replace with spare camera[1]	May continue on trip. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Rotation Sensor	Low	Carry spare rotation equipment[1]	May continue trip, but must trigger video manually. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Keyboard/Mouse	Low	Replace with another keyboard/mouse[1]	May continue fishing provided sensors are triggering automatic recording properly. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Hydraulic Sensor	Low	Restart system	May continue trip, but must trigger video manually. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.

Equipment Malfunctions for Vessels Fishing IFQ in Multiple Areas using the Exemption at §679.7(f)(4)

For any malfunction identified as "High" priority, the vessel operator must cease fishing immediately, follow the troubleshooting guidelines listed in *Appendix B – Guide for Vessel Operators*, and contact NOAA OLE immediately.

Malfunction Type	High/Low Priority	Potential Solution	Action if Malfunction Not Resolved
Continuous Power to System	***High***	Check power supply to system	Cease fishing and contact OLE or you may not embark on trip using exemption. If system powered down during non-fishing, VMP must describe alternative methods to record location information
Monitor	***High***	Connect a different monitor[1]	Cease fishing and contact OLE or you may not embark on trip using exemption.
GPS	***High***	Restart system	Cease fishing and contact OLE or you may not embark on trip using exemption unless vessel has operating VMS and hauling and discard cameras are functioning.
Insufficient Storage	***High***	Replace with spare data drive	If vessel does not have a spare data drive, cease fishing and contact OLE or you may not embark on trip using exemption.
Control Center	***High***	Restart system	Cease fishing and contact OLE or you may not embark on trip using exemption.
Insufficient Lighting	***High***	Replace lights	May fish but cannot retrieve gear at night
Hauling Camera(s)	***High***	Restart system; replace with spare camera[1]	Cease fishing and contact OLE or you may not embark on trip using exemption.
Deck/Discard Camera(s)	***High***	Restart system; replace with spare camera[1]	Cease fishing and contact OLE or you may not embark on trip using exemption.
Streamer line Camera	Low	Restart system; replace with spare camera[1]	May depart on trip or continue trip. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Rotation Sensor	Low	Restart system. Carry spare sensor[1]	May depart on trip or continue trip, but must trigger video manually. Before departing on another trip selected for EM coverage, must contact EM service provider to schedule repair.
Hydraulic Sensor	Low	Restart system. Carry spare sensor[1]	May depart on trip or continue trip, but must trigger video manually. Must contact the EM service provider to schedule repair before departing on another trip where EM is required.
Keyboard/Mouse	Low	Replace with another keyboard/mouse[1]	May continue fishing provided sensors are triggering automatic recording properly. Before departing on another trip selected for EM coverage, must contact the EM service provider to schedule repair.