2019 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska

December 2018

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Contents

Executive Summary

This 2019 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 2019.

- Trip selection will be the sole method of assigning both observers and EM to at-sea fishing events for vessels in the partial observer coverage category in 2019. Trip selection is facilitated through vessels logging their trips into the Observer Declare and Deploy System (ODDS) and being notified by the system if the trip is selected for coverage.

- ***No-selection pool*:** As in previous deployment plans, the no-selection pool will be composed of: 1) fixed-gear vessels less than 40 ft LOA and vessels fishing with jig gear; 2) four fixed-gear vessels voluntarily participating in EM innovation and research.

- ***EM trip-selection pool***:
    - Under regulations at § 679.51(f) vessels fishing with non-trawl gear may submit a request to NMFS through ODDS before November 1, 2018, to opt into or out of the EM selection pool. Any vessel that did not request to participate by this deadline is not be eligible for the 2019 EM selection pool and will be in the observer trip-selection pool for the duration of the year.
    - A total of 168 vessels either requested to be in the EM selection pool or did not request to be out of the EM selection pool in 2019.
    - The funds available for EM deployment in 2019 are the combination of federal funding ($600,000) and anticipated funding from external sources such as the US National Fish and Wildlife Foundation. Based on these funds, NMFS estimates that it can support all of the 168 vessels that requested to participate.
    - NMFS approved the 168 vessels in the EM selection pool for 2019 and vessel owner/operators receive notification of this approval by logging into ODDS.

- ***Observer trip-selection pool* –** in 2019, the following sampling strata for the deployment of observers:
    - Trawl vessels
    - Hook-and-line vessels greater than or equal to 40 feet(ft) length overall (LOA)
    - Pot vessels greater than or equal to 40 ft LOA
    - Trawl vessels delivering to tender
    - Pot vessels greater than or equal to 40 ft LOA delivering to tenders
- NMFS will implement an observer deployment allocation strategy of 15% plus optimization based on discarded groundfish and halibut PSC, and Chinook PSC. This allocation strategy provides a balance between minimizing the variability of discard estimates, prioritization of PSC-limited fisheries, and the need to reduce gaps in observer coverage in the partial coverage category.
- The NMFS budget for observer deployment in 2019 is $4.45M. This budget is comprised on $3.2M in observer fees, $650K of NMFS supplementary funds (which were received in 2018), and $600K in carryover funds from the previous contract option period.

- NMFS estimates 3,109 observer days can be deployed in 2019 and expects that 721 trips will be observed in the partial coverage category. This represents a net decrease in observer days between 2018 (4,394 observer days expected) and 2019 (3,109 observer days expected). However, deployment rates are expected to rise for all but the Pot and Tender Pot strata. This can be explained by the expected decrease in effort between 2018 and 2019. While the observed trips are expected to decrease 32%, the total number of trips is also expected to decrease by 35% in 2019.
- The deployment rates (rounded to the nearest whole number) for strata in 2019 are—
    - No Selection – 0%
    - EM – 30%
    - Trawl – 24%
    - Hook-and-line – 18%
    - Pot – 15%
    - Tender trawl – 27%
    - Tender pot – 16%
- As expected, coverage rates included in this final ADP are higher for all strata compared to the draft 2019 ADP. This is due to the fact that the number of trips predicted to occur decreased 28% from 5,049 to 3,652 between the draft and final ADP. The draft 2019 ADP used 2017 effort to predict rates, this analysis used an adjusted combination of 2017 and 2018 effort.
- NMFS will continue to collect genetic samples from salmon caught as bycatch in groundfish fisheries to support efforts to identify stock of origin. For vessels delivering to shoreside processors in the GOA pollock fishery the sampling protocol will remain unchanged; trips that are randomly selected for 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 that are delivered to tender vessels and trips outside of the pollock fishery, NMFS recommends that salmon counts and tissue samples will be obtained from all salmon found within observer at-sea samples of the total catch.

1. Introduction

Purpose and Authority

This 2019 Annual Deployment Plan (ADP) describes how the National Marine Fisheries Service (NMFS) intends to assign at-sea and shoreside fishery observers and electronic monitoring to vessels and processing plants engaged in halibut and groundfish fishing operations in the North Pacific. This plan is developed under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), 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. 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). Details on the integration of EM deployment into the ADP process are found in the final rule to integrate electronic monitoring (EM) into the North Pacific Observer Program (82 FR 36991).

The ADP describes the science-driven method for observer deployment to support statistically reliable data collection. The ADP is a core element in implementation of section 313 of the MSA (16 U.S.C 1862), which authorizes the North Pacific Fishery Management Council (Council) to prepare a fisheries research plan that requires the deployment of observers into the North Pacific fisheries and establishes a system of fees. The purpose of the research plan is to collect data necessary for the conservation, management, and scientific understanding of the groundfish and halibut fisheries off Alaska.

Data collection by observers contributes to the best available scientific information used to manage the fisheries in the North Pacific. Information collected by observers 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. Observers collect biological samples such as species composition, weights, and tissue samples and information on total catch, including bycatch, and interactions with protected species. Managers use data collected by observers to manage groundfish catch and bycatch limits established in regulation and to document fishery interactions with protected resources. Managers also use data collected by observers to inform the development of management measures that minimize bycatch and reduce fishery interactions with protected resources. Scientists use observer-collected data for stock assessments and marine ecosystem research. Much of this information is expeditiously available (e.g., daily or at the end of a trip, depending on the type of vessel) to ensure effective management.

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.

The ADP specifies the selection rate—the portion of trips that are sampled—and NMFS and the Council recognized that selection rates 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 2019 ADP is as follows:

- **June 2018:** NMFS presented the 2017 Annual Report (AFSC/AKR 2018) 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 2017 Annual Report provided a comprehensive evaluation of Observer Program performance including costs, sampling levels, issues, and potential changes for the 2019 ADP.

- **September 2018:** Based on information and analyses from the 2017 Annual Report and Council recommendations, NMFS prepared and released a draft 2019 ADP containing recommendations for deployment methods in the partial coverage category.

- **September – October 2018:**
    - *Review of the draft ADP*: The Council and its Scientific and Statistical Committee reviewed the draft 2019 ADP and associated Plan Team and Fishery Monitoring Advisory Committee recommendations. Based on input from its advisory bodies and the public, the Council provided recommendations for the final 2019 ADP (Appendix A). NMFS reviewed and considered these recommendations; however, extensive analysis and large-scale revisions to the draft 2019 ADP are not feasible. This constraint is due to the short time available to finalize the 2019 ADP prior to the December 2018 Council meeting, and practical limitations on planning for deployment and associated processes that need to be in place by January 1, 2019.
    - *Requests to participate in EM selection pool*: The deadline for vessels in the partial coverage category using fixed to request to be in the 2019 EM selection was November 1, 2018.
- **December 2017:** NMFS finalizes and releases the 2019 ADP to the public prior to the Council meeting.

The analysis and evaluation of the data collected by observers and the ADP development is an ongoing process; in June 2019, NMFS will present the 2018 Annual Report that will form the basis for the 2020 ADP.

2. Annual Report Summary

As described in the previous section, NMFS releases an annual report in June of each year that evaluates observer deployment under the ADP and includes an overview of the fees and budget associated with deployment, enforcement of the Observer Program regulations, a summary of public outreach events, and a scientific evaluation of observer deployment conducted by the Observer Science Committee (OSC) (e.g. Ganz et al. 2018). NMFS has released five annual reports starting with the 2013 Annual Report (NMFS 2014), which was presented to the Council in June 2014, and most recently the 2017 Annual Report (AFSC/AKR 2018), which was presented to the Council in June 2017. This 2019 ADP builds on NMFS recommendations in the annual reports and input from the Council (Appendix A).

The sampling design used for dockside monitoring in 2017 remained unchanged from previous years. All vessels participating in the BSAI pollock fisheries are in the full coverage category and dedicated plant observers monitor all deliveries to account for salmon bycatch. In the GOA, all pollock trawl catcher vessels are in the partial coverage category and observers deployed on selected trips monitor the delivery at the shoreside processors to obtain counts of salmon caught as bycatch within the trawl pollock fishery and to obtain tissue samples to enable stock of origin to be determined using genetic techniques. When an observed trawl vessel in the GOA delivers its pollock catch to a tender vessel instead of a shoreside processor, the observer is unable to monitor the delivery and collect additional tissue samples. In this situation, the trip would be

monitored, but there is no offload monitoring. Subsequently, NMFS used this sampling design in 2018 and recommended maintaining the status quo for dockside monitoring in 2019. NMFS also recommended that the reconstituted EM workgroup consider longer-term solutions for monitoring salmon bycatch in the trawl fisheries, including how to monitor tender deliveries.

Nine partial coverage deployment strata were evaluated in the 2017 Annual Report: six observer strata defined by gear and tender designation, one EM stratum, one zero coverage stratum, and one zero coverage EM research stratum. Observer coverage rates met expected values in four of the six partial coverage strata with coverage rates higher than expected within the pot (non-tendered) and trawl (non-tendered) strata. Coverage rates in the EM selection pool were lower than expected, because not all video submitted was reviewed due to the pre-implementation status of the EM strata and video review resources were allocated to higher priority projects.

In a well-designed sampling program, the observer coverage rate should be large enough to reasonably ensure that the range of fishing activities and characteristics are represented in the sample data. NMFS uses a sample size with a gap analysis to determine whether enough samples were collected to ensure adequate spatial and temporal coverage.

In 2017, the observation rate was greater than expected for the majority of the year in the hook-and-line, trawl, and pot strata. This was likely a result of the ODDS inherit process, which created a greater number of selected trips later in the year. ODDS is programmed to automatically select a vessel's next logged trip if a previously selected trip is cancelled by the user. This process of inheriting trips preserves the *number* of selected trips in a year, but it allows selected trips to be *delayed* to later in the year. For strata in which there were differences, a separation between initial and final selection rates tended to appear early and then persist throughout the remainder of the year.

Because of the potential temporal bias observed in 2017, NMFS recommended the formation of an Agency subgroup to explore ways to improve the linkages between ODDS and eLandings and ways to reduce the impact of cancellations of trips selected for observer coverage, while still maintaining flexibility for vessels to plan in advance and accommodate changes in fishing plans.

To evaluate spatial representativeness, NMFS used the hypergeometric distribution method (gap analysis), to compare the expected number of trips and the observed number of trips in each NMFS Reporting Area and stratum combination. In most cases, the sampling result is close to the expected result; larger differences tend to be associated with lower numbers of trips within a NMFS Area. There was some evidence of clustering of observed trips among NMFS Areas that was different from expected in all strata evaluated.

Six trip metrics evaluated to compare if observed trips were similar to unobserved trips and identify potential observer effects. No observer effects were detected in the tender pot and tender trawl strata. Observed trips were 11.1% (0.4 days) shorter in duration than unobserved trips in the pot stratum.

In the hook-and-line stratum, four trip metrics identified potential observer effects. Observed hook-and-line trips in this stratum were 15.9% (0.8 days) shorter in duration, landed 7.6% (0.3) more species, landed catch that was 2.8% more diverse, and landed catch that weighed 17.7%

(1.2 t) less than unobserved trips. In the trawl stratum, four trip metrics identified potential observer effects. Observed trips were 10.1% (0.2 days) shorter in duration, landed 15% (0.8) fewer species, landed catch that was 2.4% less diverse, and landed catch that weighed 4.2% (4.2 t) less than unobserved trips.

Based on the results in the 2017 Annual Report, NMFS recommended evaluating the suite of trip metrics used to evaluate the observer effect. In particular, evaluating how they relate to at-sea data collections and, to the extent feasible, providing additional context regarding the interpretation of effect sizes and p-values (e.g., consideration of sample sizes).

NMFS recommended continuing trip-selection in the EM pool for 2019 where trips will be selected prior to departure, and for selected trips, the vessel will be required to use the EM system. NMFS will continue to evaluate the monitoring effect in the EM selection pool and, in the future, may recommend post-selection of trips. NMFS recommended that priority for placing vessels in the EM selection pool in 2019 be given to 1) vessels that are already equipped with EM systems and 2) vessels which are wired for EM systems but are not yet fully equipped, and 3) vessels 40-57.5 ft length overall (LOA) where carrying an observer has been problematic due to bunk space or life raft limitations.

Recognizing the challenging logistics of putting observers on small vessels, NMFS continued to recommend that vessels less than 40 ft be in the no selection pool for observer coverage. The agency recognizes that the Council's next priority for EM research has shifted to trawl vessels, so the evaluation of data collected on fixed-gear less than 40 ft will not begin immediately. However, since there is no monitoring data from this segment of the fleet, NMFS does continue to recommend that vessels less than 40 ft LOA could be considered for the EM selection pool in the future.

3. 2019 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 consists solely of conducting complete enumerations of salmon bycatch within the pollock fishery.

At-Sea Deployment Design

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

Selection Method

Trip selection will be the sole method of assigning both observers and EM to at-sea fishing events in 2019. 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. Trips must be logged by contacting the ODDS call center at 1-855-747-6377 or using the web at: http://odds.afsc.noaa.gov/.

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).

Selection Pools (Stratification Scheme)

Electronic Monitoring (EM) Selection Pool:
Vessels in the partial coverage category using fixed gear had the opportunity to request to be in the 2019 EM selection pool using ODDS. Any vessel in the EM selection pool in 2018 remains qualified to be in the EM selection pool unless a request is submitted to leave the EM selection pool for 2019 or NMFS has disapproved the vessel's 2018 VMP. All these requests, to be in or out of the EM selection pool for 2019, must have be received by November 1, 2018. Any vessel that did not request to participate by this deadline will not be eligible for placement in the 2019 EM selection pool and will be in the partial coverage trip selection pool for observer coverage.

A total of 172 vessels requested EM for 2019. Of these vessels, 4 are participating in EM innovation and research and have been placed in the No-selection pool; 141 participated in the EM selection pool in 2018 and will remain in this pool for 2019; and 27 requested to participate in the EM selection pool for 2019 for the first time.

If funding was available, the Council recommended the increase of the EM selection pool to 165 vessels total (Appendix A). The funds available for EM deployment in 2019 are the combination of federal funding ($600K) and anticipated funding from external sources such as the US National Fish and Wildlife Foundation. NMFS estimates the budget would support the inclusion of all 168 vessels that requested to participate in the EM selection pool.

NMFS approved the 168 vessels in the EM selection pool for 2019 and vessel owner/operators receive notification of this approval by logging into ODDS. Once approved, that vessel will remain in the EM selection pool for the duration of the calendar year. Vessels in the EM selection pool are required to submit and follow an NMFS-approved Vessel Monitoring Plan[1].

EM system installations will be scheduled in the primary ports of Homer, Kodiak, and Sitka. Secondary ports such as Juneau, Petersburg, Sand Point, King Cove, and Dutch Harbor may have periodic EM installation services available. Vessels not available during scheduled dates of EM installation in a secondary port will be required to travel to a primary port for EM installation services prior to the date of their first logged trip in ODDS. Primary and secondary port services apply to EM equipment installation and servicing only, there are no restrictions on where a vessel may make landings associated with this program. Once installed, the EM sensors and cameras will remain on the vessel until either 1) the boat opts out of the EM pool for the following year; or 2) NMFS determines that the vessel will not be eligible to participate in the EM selection pool the following year.

[1] The 2019 VMP template is available at: https://alaskafisheries.noaa.gov/fisheries/electronic-monitoring

Trip-Selection Pools for Observer Deployment:
The observer trip selection strata that were implemented in 2018 remain the same for 2019. This follows the Observer Science Committee (OSC) and the Scientific and Statistical Committee (SSC) recommendation to stabilize the sampling design across years. For 2019 there will be five trip-selection strata for observer deployment: 1) Trawl; 2) Hook-and-line; 3) Pot; 4) Trawl vessels delivering to tenders; and 5) Pot vessel delivering to tenders.

Summary of 2019 Deployment Strata:
The following deployment strata will be in place for vessels in the partial coverage category for deployment of observers (50 CFR 679.51(a)) and electronic monitoring ((50 CFR 679.51(f)) in 2019:

- ***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 2019 fishing season. These vessels are:
    - fixed-gear vessels less than 40 ft LOA[2] and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear; and
    - four fixed-gear vessels voluntarily participating in EM innovation and research (Appendix D).

- ***Electronic monitoring (EM) trip-selection pool:*** The EM selection pool in 2019 will be composed of 168 fixed gear vessels that were approved by NMFS. Once NMFS approves a vessel for the EM selection pool, that vessel will remain in the EM selection pool for the duration of the year. Prior to fishing, each vessel must have a NMFS-approved VMP.
- ***Observer Trip-Selection Pool:*** There are 5 sampling strata in the trip-selection pool for the deployment of observers:
    - **Trawl**: This pool is composed of all catcher vessels in the partial coverage category fishing trawl gear.
    - **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 vessels delivering to tenders:** This pool is composed of all catcher vessels in the partial coverage category that are fishing trawl gear and are delivering to tendering vessels.
    - **Pot vessels delivering to tenders:** 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 and are delivering to tendering vessels.

[2] 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. In 2018, the NMFS implemented the observer allocation strategy of 15% hurdle plus optimization where observer sea days are first allocated equally up to a threshold coverage rate and the remaining sea-days are allocated using an optimal allocation algorithm that maximizes precision for chosen metrics (such as discards or retained catch) for the least cost.

The draft ADP provided more information on the hurdle approach and the methods used to evaluate the chances of data being available to inform inseason management under varying observer coverage levels (NMFS 2018). The draft ADP also provided an evaluation of hurdle thresholds to evaluate whether the 15% threshold that was implemented in 2018 would be appropriate for all gear-specific strata. The analysis showed that while 15% coverage would be sufficient to meet a 50% probability of observing three trips or more per year in most areas for the hook-and-line and trawl strata, it would not achieve this probability of observation in the other strata[3]. Over the course of a year, some NMFS Areas will have low fishing effort and even at a 15% threshold, there is a relatively high probability that there will be no observed trips for those area. While it is possible to pool data across areas to produce bycatch estimates, these estimates suffer from lower resolution and variance estimates are not able to be produced. Based on these results, NMFS will implement a 15% minimum level of sampling for the hurdle approach for all strata in 2019. This approach is precautionary with respect to avoiding bias and increasing the chance of getting data across all gear types and areas.

For optimization strategy, the draft ADP provided an evaluation of two sets of metrics: 1) discards of groundfish, halibut PSC and Chinook salmon PSC; 2) discards of crab PSC in addition to discards of groundfish, halibut PSC, and Chinook salmon PSC. In the draft ADP NMFS recommended the optimization that included crab PSC (NMFS 2018). In their review of the draft ADP in October, both the SSC[4] and the Council (Appendix A) recommended that the optimization be based on Chinook and halibut PSC, rather than optimization that included crab.

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

Estimated Deployment Rates

The trip selection rate for vessels in the EM selection pool is based on recommendations from the Council (Appendix A) and the selection rate will be 30% of trips in 2019.

To determine the deployment rates for the observer-deployment strata, NMFS uses the available sea-day budget and estimates of anticipated fishing effort. The NMFS budget for observer

[3] Note that the 15% minimum threshold does not guarantee that all areas will have at least 3 observed trips. Instead, it represents the point at which many (but not all) areas have a greater than 50% chance of at least 3 observed trips in a year.

[4] SSC meeting minites available at: http://meetings.npfmc.org/CommentReview/DownloadFile?p=8aa16852-f357-4e23-80b2-73bd6804b915.pdf&fileName=SSC%20Report%20Oct%202018%20FINAL.pdf

deployment in 2019 is $4.45M. This budget is comprised on $3.2M in observer fees, $650K of NMFS supplementary funds, which were received in 2018), and $600K in carryover funds from the previous contract option period. Used this updated budget information, the at-sea budget for deployment of observer is set at 3,109 days for 2019.

The second piece of information used to determine deployment rates is an estimate of anticipated fishing effort. The most recent data (2017 and 2018) were used as a proxy for future fishing effort. The data set was then adjusted to account for declines in effort that are anticipated in 2019. Most of the effort in the partial coverage observer program is driven by fisheries targeting halibut, Pacific cod, pollock, and sablefish; therefore NMFS focused on these species when making the effort adjustments (Appendix B). The ratios of Acceptable Biological Catch (ABC) between 2018 and 2019 were used to adjust the predicted effort for Pacific cod, pollock, and sablefish. For example, the 2018 and 2019 ABCs for GOA Pacific cod, as listed in the Stock Assessment and Fishery Evaluation (SAFE) report published in December 2017, are 18,000 tons and 17,000 tons, respectively (Barbeaux et al. 2017). This represents a decrease of 5.6%. NMFS therefore predicted that the number of trips targeting Pacific cod in the GOA would be 5.6% fewer in 2019 than in 2018 (Appendix B).

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

NMFS estimates 3,109 observer days can be deployed in 2019 (Appendix B) and expects that 721 trips will be observed in the partial coverage category (Table 1). This represents a net decrease in observer days between 2018 (4,394 observer days expected; NMFS 2017) and 2019 (3,109 observer days expected; Appendix B). However, observation rates are expected to rise for all but the Pot and Tender Pot strata. This can be explained by the expected decrease in effort between 2018 and 2019. While the observed trips are expected to decrease 32%, the total number of trips is also expected to decrease by 35%, from 5,591 trips in 2018 (NMFS 2017) to 3,652 trips in 2019 (Appendix B).

As expected, coverage rates included in this final ADP are higher for all strata compared to the draft 2019 ADP. This is due to the fact that the number of trips predicted to occur decreased 28% from 5,049 to 3,652 between the draft and final ADP (Table B- 1). While the draft 2019 ADP used 2017 effort to predict rates, this analysis used the adjusted combination of 2017 and 2018.

The deployment rates (rounded to the nearest whole number) for strata in 2019 are—

- No Selection – 0%
- EM – 30%
- Trawl – 24%

- Hook-and-line – 18%
- Pot – 15%
- Tender trawl – 27%
- Tender pot – 16%

Table 1. Summary of allocation weights, deployment rates, and the number of trips expected to be observed in each observer-sampling stratum in 2019.

Stratum	Allocation Weight	Deployment Rate (%)	Number of trips expected to be observed
Trawl	0.70	23.70	341
Hook-and-line	0.27	17.71	285
Pot	0.01	15.43	84
Tender trawl	0.01	27.12	6
Tender Pot	0.00	16.11	5
Total	1		721

Chinook Salmon Sampling in the Gulf of Alaska

For vessels delivering to shoreside processors in the in the GOA pollock fishery the sampling protocol for Chinook salmon will remain unchanged. Trips that are randomly selected for 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 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.

Conditional Release Policy

For 2019, NMFS will not grant any conditional releases or temporary exemptions to any vessels subject to observer coverage. The integration of EM into the Observer Program in 2019 is a mitigating factor in not granting any conditional releases. Vessels in the EM selection pool will carry EM equipment as described in the Vessel Monitoring Plan and will not be subject to carrying an observer.

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[5] to NMFS. Six catcher/processors requested, and NMFS approved, placement in the partial coverage category for the 2019 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[6] prior to October 15, 2018 for the 2019 fishing year. The list of catcher vessels that have been approved to be in the full coverage category at: https://alaskafisheries.noaa.gov/fisheries/observer-program.

Observer Declare and Deploy System (ODDS)

For 2019, the user experience in ODDS will not change for a vessel operator. As in 2017 and 2018, there will be a selection box to indicate whether the vessel will be delivering to a tender. 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. Any observed trip that is canceled would automatically be inherited on the next logged trip. As described in the 2017 Annual Report, 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 A.I.S., Inc., through the ODDS call center (1-855-747-6377). NMFS has identified an improvement to the programming in ODDS that would allow vessels to change the dates for future observed trips, rather than having the current cancel and inherit process. This modification is a priority for NMFS and the Council (Appendix A), and NMFS will consider whether it is feasible to include this programming change to ODDS in 2019.

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 A.I.S., Inc., through the ODDS call center (1-855-747-6377).

4. Communication and Outreach

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

- Information about the Observer Program and Frequently Asked Questions about EM and Observer deployment are available at https://alaskafisheries.noaa.gov/fisheries/observer-program

[5] The form for small catcher/processors to request to be in partial coverage is available at: https://alaskafisheries.noaa.gov/sites/default/files/obspartialcovreq.pdf

[6] Instructions for catcher vessels to request to be in full coverage using ODDS are available at: https://alaskafisheries.noaa.gov/fisheries/observer-program

- For Frequently Asked Questions regarding ODDS go to http://odds.afsc.noaa.gov/ and click the "ODDS FAQ" button.

Observer Program staff are available for outreach meetings upon request by teleconference and/or WebEx 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.

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6. List of Preparers and Contributors

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Appendix A. Council motions on the Annual Report and ADP

Agenda Item C-1: Observer Program Annual Report & OAC Report
June 7, 2018

1. The Council supports the NMFS recommendations for the draft 2019 Annual Deployment Plan that are listed in section 7.1 (pg. 102) of the 2017 Annual Report.

2. Based on input from the OAC and AP, the Council also recommends the following:

    - In the draft 2019 ADP, include an evaluation of a gear-specific hurdle that reduces the impact of NMFS regulatory areas with low fishing effort in determining the observer coverage rates for the hurdle.
    - For the EM selection pool in 2019, the Council recommends:
        - If funds are available, expand the EM selection pool up to a maximum of 165 vessels.
        - Continue to implement a 30% trip-selection rate, using the pre-trip selection method.
    - In the 2018 Annual Report (to be presented in June, 2019), the Council recommends that NMFS:
        - Include an evaluation of observer effects at finer resolution than gear-level strata, so that observer effects in pelagic and non-pelagic trawl can be investigated.
        - Continue to provide details on EM in Chapter 4 and also include information in the report about the number of EM trips selected, the number monitored, and the number reviewed, for clarification.
        - Add an appendix that describes details of cost calculations for EM and observer days over time.
    - The Council also recommends that NMFS communicate with the OAC on the results from the proposed ODDS agency subgroup.

3. The Council supports the continued participation of the OAC Subgroup in the development of the fee analysis, including the opportunity for OAC review of the analysis before Initial Review at the Council.

4. The Council appreciates the preliminary survey report from OLE and acknowledges the evidence of disparate work environment for female and male observers. The Council encourages efforts to further understand these work conditions and develop solutions.

Agenda Item C-3, Annual Deployment Plan
October 4, 2018

The Council supports NMFS' recommendations for the deployment strata and allocation scheme of 15% plus optimized allocation based on discarded groundfish and halibut PSC and Chinook PSC as described in the Draft 2019 Annual Deployment Plan (ADP).

The Council recommends that if additional funds become available that NMFS expand the EM trip selection pool up to 165 vessels using the order of priority as presented in the Draft 2019 ADP. The Council also requests that NMFS include Sitka as a primary port for EM deployment in 2019.

The Council requests that the Agency prioritize staff time to engaging with the Council's EM Committee to develop EM for compliance monitoring and for salmon accounting on pelagic trawl catcher vessels fishing in the BSAI and the GOA as well as vessels delivering to tender vessels.

The Council requests NMFS provide additional information about the cost structure under the observer contract and how costs may be expected to fluctuate at different funding levels.

The Council requests that NMFS provide an update on the following analytical tasks to the FMAC in May 2019:

1) an evaluation of how the observer fee will be split between EM and Observers for the draft 2020 ADP; and
2) an evaluation of Observer Program performance metrics in the annual report

Agenda Item C-3, Observer ADP
October 4, 2018

The Council supports the FMAC and AP recommendations to write two letters to NMFS. First, a letter to the National Observer Program in support of solutions to observer safety issues on a regional specific level. Second, a letter to NMFS HQ to request additional Federal funding to supplement observer deployment in the partial coverage category.

Agenda Item C-3, Observer ADP
October 4, 2018

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

Appendix B. Calculation of the Selection Rates for 2019

Introduction

The sampling design hierarchy used by the North Pacific Observer Program has several levels. The deployment of observers or Electronic monitoring equipment (EM) as specified in Annual Deployment Plans (ADP) only apply to the first, and top-most level of this hierarchy. The 2019 ADP specifies that the method known as "trip-selection" be the sole method of assigning observers and EM within the 'partial-coverage' category of the fleet. In this analysis, the partial-coverage fleet is defined to only include those vessels for which sampling rates will be greater than zero and less than 100% (i.e., the portion that is sampled at the trip-level).

Trip-selection is accomplished through the Observer Declare and Deploy System (ODDS). Partial coverage trip-selection participants are sent a letter prior to the start of the calendar year with their username and password so that they may access the ODDS and log planned fishing trips. Each logged trip is assigned a random number of four digits ranging from 0 to 1. This random number is evaluated against a pre-programmed selection rate in ODDS. If the random number is below or equal to the selection rate, then a trip is selected for observation. For this reason, two key elements of the sampling design are required to be known before fishing begins in a given calendar year: (1) how fishing activities are divided into groups for the purposes of observer or EM deployment (hereafter termed stratification schemes), and (2) how available funds are to be used to divide sampling effort among participants (hereafter termed allocation strategy). In addition, a representation of fishing activity that is thought to represent the upcoming year needs to be developed in order for selection rates to be calculated known in advance of the upcoming calendar year.

Alternative deployment designs are evaluated in draft versions of the ADP. The draft 2019 ADP contained an evaluation of three alternative designs for the deployment of observers into the partial-coverage fleet (NMFS 2018). While the draft ADP analysis is focused on comparing alternative designs, analyses in support of the final version of the ADP are focused on creating a representation of future fishing activity and determining what selection rates for the upcoming year result from the preferred design. The analysis that follows is based on the decisions made by NMFS after consultation with the North Pacific Fishery Management Council (NPFMC or Council) at their October 2018 meeting regarding the Draft 2019 ADP.

Deployment design in 2019

EM Coverage

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

The selection rate for EM was not determined by analysis. The selection rate for EM for 2019 was instead guided by the EM Workgroup of the Council and is set at 0.3, or 30% of trips. In the draft 2019 ADP, coverage rates for observers were calculated under the assumption that the number of vessels participating in EM would remain at the 2018 level of 141 vessels (NMFS

2018). For the final 2019 ADP, funding ultimately allowed for 168 vessels to participate in EM (Appendix C). In addition, four vessels volunteered for participation in federally funded EM Research (Appendix D) and will be placed in zero selection. Since the EM selection rates have been set and an analysis of their costs considered in Appendix C, this analysis only considers selection rates for observers.

Observer coverage

Separate regulations govern which fishing activities receive mandatory full coverage and those activities are not the focus of this analysis. The sampling design used for partial coverage in this analysis consists of five strata:

1. TRW: Trawl vessels
2. POT: Pot vessels greater than or equal to 40 ft LOA
3. HAL: Hook-and-line vessels greater than or equal to 40 feet (ft) length overall (LOA)
4. Tender POT: Pot vessels greater than or equal to 40 ft LOA delivering to tenders
5. Tender TRW: Trawl vessels delivering to tenders

The sample allocation strategy in this design follows that recommended by NMFS in the draft 2019 ADP. Sample sizes are determined from a "15% + Optimization" allocation. In this method, only available sample days above those needed to achieve 15% coverage are allocated through an optimization routine. The optimization routine is a blended or compromise one (Cochran 1977). Allocations arise from an equally weighted blend of three optimal allocations among strata that each consider trip cost and variance in either discarded groundfish, Pacific halibut Prohibited Species Catch (PSC), or Chinook salmon PSC.

Methods and Results

Data preparation

All analyses were performed using the R language for statistical computing (R Core Team 2018). A dedicated dataset developed by the staff of the Sustainable Fisheries Division of the Alaska Regional Office (AKRO) and the Fisheries Monitoring Division (FMA) of the Alaska Fisheries Science Center was used in this analysis. Briefly, these data consist of species-specific catch amounts, fishing dates, locations, catch disposition, observation status, and associated ADP strata from 1 January 2013 to 17 October, 2018.

As in past ADPs, trip data were altered to reflect the expected fishing under partial coverage in the upcoming year. As in prior versions of the ADP these alterations include: (1) adding an additional day to trips that occurred in the trawl pollock fishery to account for the additional cost of monitoring associated offloads for salmon bycatch and genetic tissue collections;[7] (2) fishing activity by four 'historical low volume' Catcher-Processors were labeled as belonging to the partial-coverage category; (3) trawl vessels that have opted into full coverage for 2019 were removed; and (4) vessels with no probability of observer selection were removed from the analysis (i.e., all trips corresponding to hook and line and pot gear on vessels < 40' LOA, vessels fishing jig gear, and vessels that volunteered to participate in electronic monitoring in 2019).

[7] More details on observer sampling methods for salmon bycatch in Faunce (2015).

Estimation of fishing effort in 2019

To estimate fishing effort for the upcoming year, trends in cumulative effort were examined by gear type (HAL, POT, or TRW), Fishery Management Plan (FMP) area (GOA or BSAI), and target species (halibut, Pacific cod, pollock, or sablefish). Effort for sablefish was combined across the GOA and BSAI and is termed AK here. Although 2018 fishing effort is used to predict effort for 2019, at the time of completing the final 2019 ADP, only data through 17 October, 2018 was available. In order to project 2018 fishing effort to the end of the year, we used the average ratio of total effort to effort through mid-October from previous years, and projections were made for each gear type, FMP, and target species combination. For instance, to predict total effort for POT Pacific cod in the BSAI, the cumulative number of trips through 17 October, 2018 was multiplied by 1.33, since effort at the end of the year was, on average, 33% higher than effort through mid-October for that gear-type, FMP, and species combination. For HAL Pacific cod in the GOA and POT sablefish in AK, only the ratio for 2017 was used to project 2018 effort, since 2017 effort was so starkly different from other years. For other groups, a ratio of 1 was applied, since those fisheries were finished before 17 October. In order to predict how many POT and TRW trips would be tendered, we used the proportion of trips that were tendered within those gear types in 2017.

Once effort was projected through 2018, that effort was adjusted in order to predict effort in 2019. Since most effort in the partial coverage observer program is driven by fisheries targeting halibut, Pacific cod, pollock, or sablefish, we focused on these species when making this adjustment. At the time of completing the final 2019 ADP, estimates of Acceptable Biological Catch (ABC) in 2018 and 2019 were available for Pacific cod, pollock, and sablefish. Much like the ratios used to adjust 2018 effort to the end of the year, we used the ratios of ABCs between 2018 and 2019 to adjust the predicted effort for Pacific cod, pollock, and sablefish. For example, the 2018 and 2019 ABCs for GOA Pacific cod, as listed in the Stock Assessment and Fishery Evaluation (SAFE) report published in December 2017, are 18,000 tons and 17,000 tons, respectively (Barbeaux et al. 2017). This represents a decrease of 5.6%. We therefore predicted that the number of trips targeting Pacific cod in the GOA would be 5.6% fewer in 2019 than in 2018.

Stock assessments for halibut are conducted by the International Pacific Halibut Commission (IPHC) and are not published before the final ADP. With no estimate of stock sizes available for halibut, we made the ad hoc decision to decrease effort for halibut by 10%. Effort for species other than halibut, Pacific cod, pollock, and sablefish was kept constant between 2018 and 2019.

Once we had an expected number of trips for each gear type, FMP area, and species, we created a simulated population of trips for 2018. We did this by appending 2017 trips that occurred after October 17th to 2018 trips that occurred before or on October 17th. Once this simulated population of trips was created for 2018, we sampled from it in order to create 100 simulated trip populations for 2019. To do this, we drew with replacement the expected number of trips by each gear type, FMP area, and target species. The main purpose of creating simulated populations is to obtain trip lengths. By creating 100 simulated populations, we create multiple distributions of trip lengths within each stratum.

Determining deployment rates for 2019

The selection rate that can be afforded in the coming year depends on several factors. These include the amount of fishing that is expected to occur and the available budget. The available budget for observer deployment in 2019 was set to $4,452,623.

It is important to note that, while effort was predicted by stratum, FMP area, and target species, observers are only deployed by stratum. The optimal sample allocation weightings for each stratum were recalculated using the updated 2015 - 2018 data set by following the methods detailed in the draft 2018 ADP for the preferred design described in previous sections (NMFS 2018). As in past ADPs, the analysis of potential deployment rates was conducted through iterative simulated sampling of proxy trips representing the upcoming year. Stratified random sampling without replacement of the '2019' trip data constituted one trial of one simulation. Sample sizes among strata for all trials and simulations were set in terms of fishing trips and were set equal to the sum of two elements: the base rate of 15% multiplied by the total number of trips in the stratum, and the allocation weighting multiplied by the total number of trips available for optimal allocation after the days available for base-rate coverage had been accounted for among all strata. The total cost of the program was calculated using the cost of an observer day ($1,431.71) and the distribution of trip lengths. Total cost was then compared to the total budget available for the year ($4,452,623). A total of 10,000 trials were conducted: 100 samples for each of the 100 simulated populations.

In comparing the distribution of program costs to the available budget, the total cost of the program was over budget in 85% of the initial 10,000 trials. To bring the program within budget, the total number trips available to be optimized was reduced by 1 until the total cost of the program was over budget less than 50% of the time. The number of trips available for optimization ultimately had to be reduced by 34 trips, resulting in a program that was over budget in 49% of trials (Figure B- 1).

It is estimated that 721 trips totaling 3,109 days will be observed in 2019. This compares with 758 trips and 3109 days estimated in the Draft 2019 ADP (Table B- 1). The average and most likely sea-day expenditure for 2019 is expected to be $2,380 under budget with a 95% confidence interval of being between $289,210 under budget and $293,532 over budget.

Discussion

A net decrease in observer days is expected between 2018 (4,394 observer days expected; NMFS 2017) and 2019 (3,109 observer days expected; this analysis). However, observation rates are expected to rise for all but the POT and Tender POT strata. This can be explained by the expected decrease in effort between 2018 and 2019. While observed trips are expected to decrease 32%, the total number of trips is expected to decrease 35%, from 5,591 trips in 2018 (NMFS 2017) to 3,652 trips in 2019 (this analysis).

As expected, coverage rates included in this analysis are higher for all strata compared to the draft 2019 ADP. This is due to the fact that the number of trips predicted to occur decreased 28% from 5,049 to 3,652 between the draft and final ADP (Table B- 1). While the draft 2019 ADP used 2017 effort to predict rates, this analysis used the adjusted combination of 2017 and 2018 effort described previously.

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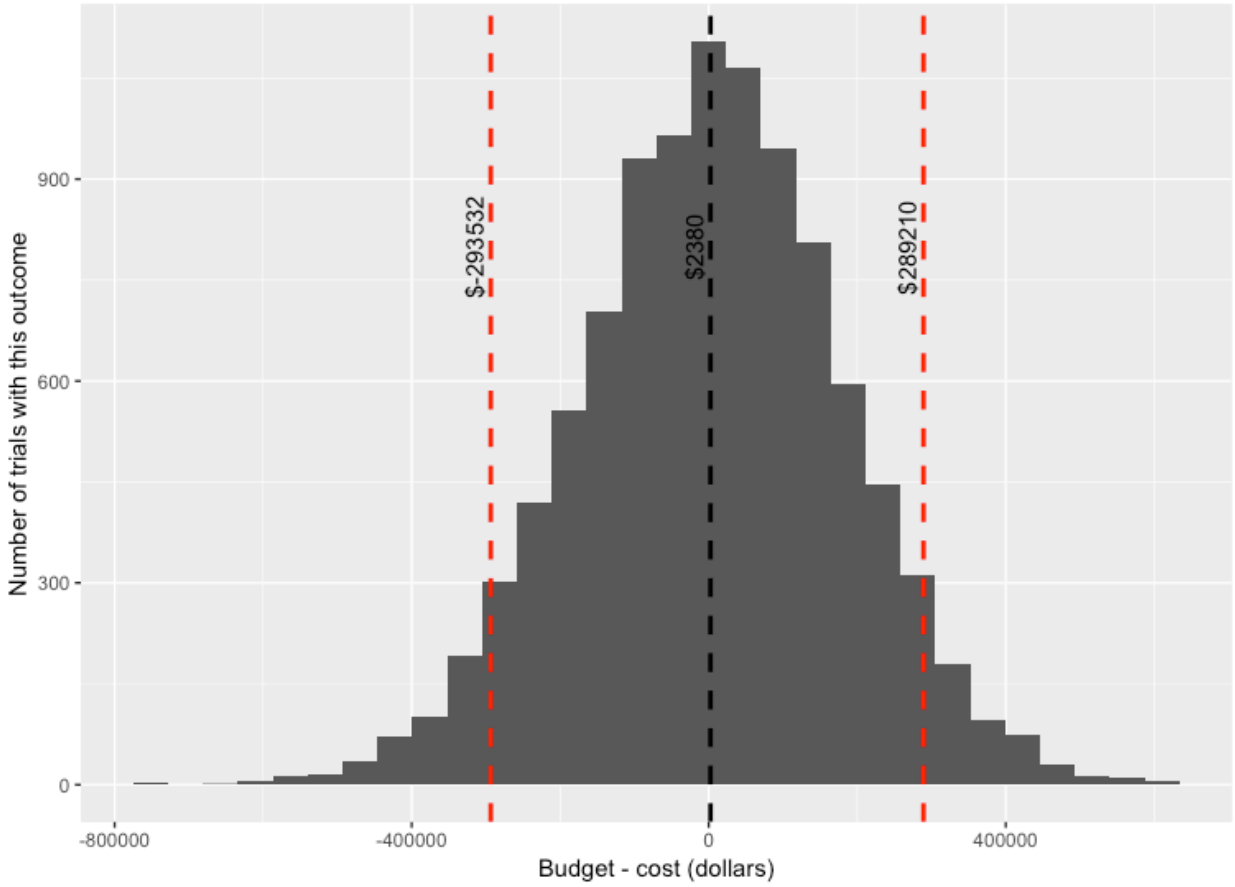
Table B- 1. Comparison of the number of trips in a stratum (N_{h2018}), the optimal sample weighting (W_{hopt}), preliminary predicted observed trips (n_h), days (d_h), and coverage rates (r_h) resulting from the deployment sampling design described in the text.

Stratum (*h*)	N_{h2018}	W_{hopt}	n_h	d_h	r_h (%)
Draft 2019 ADP					
TRW	2,085	0.72	313	1,014	15.00
HAL	2,013	0.23	302	1,530	15.00
POT	811	0.02	122	450	15.00
Tender TRW	69	0.03	10	52	15.00
Tender POT	71	0.00	11	63	15.00
Total	5,049	1.00	758	3,109	
Final 2019 ADP					
TRW	1,441	0.70	341	1,128	23.70
HAL	1,612	0.27	285	1,516	17.71
POT	547	0.01	84	381	15.43
Tender TRW	22	0.01	6	41	27.12
Tender POT	30	0.00	5	43	16.11
Total	3,652	1.00	721	3,109	

Figure B- 1. Summary of 10,000 outcomes of simulated sampling showing the total cost of the program expected for 2019 subtracted from the available budget. Vertical lines depict the mean difference (dashed black line) and 95% confidence limits (dashed red lines).



Appendix C. Evaluation of Potential Electronic Monitoring Vessels

Introduction

On August 8, 2017, NMFS published a final rule to integrate electronic monitoring (EM) into the North Pacific Observer Program (82 FR 36991). For the first time, EM was incorporated into the at-sea deployment design in 2018 and is being used to collect data to account for retained and discarded catch for fixed-gear vessels. Trip logging and registration for EM vessels is facilitated by the Fisheries Monitoring and Analysis Division of the Alaska Fisheries Science Center (FMA). To be considered for EM in 2019, a vessel operator or owner must request to participate using the Observer Declare and Deploy System (ODDS) by November 1, 2018 if they are new to the monitoring tool. Vessel owners or operators of vessel that had participated in EM during 2018 and have not elected to leave the EM pool for 2019 by November 1 are automatically enrolled into EM for 2019.

Since EM and observer funds are limited, the amount of afforded coverage must be determined. Two methods have emerged in recent ADPs as the result of NMFS and Council input. In the first method, the deployment rate is determined from the maximum number of observed trips that can be afforded given available funds. In the second method, the maximum number of vessels that can be included in the program and trip monitoring rates are determined by policy. In the draft and final ADP for 2019, observer coverage is determined using the first strategy, while EM coverage is determined by the second strategy.

The Council recommended expanding EM participation to 165 vessels for the 2019 ADP at its June 2018 meeting. If funding was insufficient to achieve this metric, then NMFS recommended and the Council supported prioritizing deployment in the EM pool as follows:

1) vessels that are already equipped with EM systems;
2) vessels that are wired for EM systems but are not yet fully equipped; and
3) vessels 40-57.5 ft LOA where carrying an observer is problematic due to bunk space or life raft limitations.

A total of 141 vessels were apporved to be in the EM Selection Pool in 2018. Three other vessels participated in EM Innovation and were placed in the No Selection Pool. As of November 8th, 2018, all but seven of the 141 vessels had a NMFS-apporved Vessel Monitoring Plan and were allowed to log EM trips during 2018. Two EM vessels from 2018 opted out of the EM program for 2019, and 30 new vessels requested to be in the program. This brought the total number of vessels that requested EM for 2019 up to 172. Of these vessels, 4 are expected to participate in EM Innovation for 2019 and will be placed into the No Selection Pool and 168 vessels requested to be in the EM Selection Pool.

Following recommendations from the Council and NMFS, the list of requesting vessels was placed in the following order of hierarchy: (1) Vessels that participated in EM for 2018 and were pre-wired, (2) Vessels that participated in EM for 2018 and were not pre-wired, (3) New EM vessels ordered by increasing vessel length. Vessels of the same length were placed in descending order according to their total Hook and Line and Pot fishing trips during 2015-2017. It was originally expected that the ordered vessel of boats would be used to limit the number of EM vessels for 2019. However, since the total number of vessels requesting EM for 2019 was so

close to 165 and sufficient funding was anticipated, the decision was made to evaluate the potential impact of including all 172 vessels that requested in EM for 2019.

This appendix conducts this evaluation.

Methods

A dataset developed by the staff of the Sustainable Fisheries Division of the Alaska Regional Office (AKRO) and the Fisheries Monitoring Division (FMA) of the Alaska Fisheries Science Center was used to calculate past fishing effort by EM requesting vessels in this analysis. Briefly, these data consist of species-specific catch amounts, fishing dates, locations, catch disposition, observation status, and associated ADP strata from 1 January 2013 to 7 January, 2018. Data from 2015-2017 were used in this analysis.

Fishing histories of all EM requesting vessels were tabulated by gear type and year. Unlike in 2018, when any vessel that had used trawl gear from 1 January 2016 to 11 November 2017 were excluded from consideration for EM, here all vessels that had any history of Hook and Line and/or Pot fishing were considered EM eligible for 2019.

No cost estimates or considerations were made following direction from FMA under the assumption that there are or will be sufficient funds to support the number of vessels that requested EM.

Evaluation of the potential effects of EM expansion was conducted through two analyses. In the first, past fishing activities for a Year, Gear, NMFS Reporting Area, and Trip Target Code (a code that indicates the principal species caught on the trip) were summarized in terms of the percent of the total partial coverage trips that were EM using the 2018 list of EM vessels (labelled as “Current EM” and using the complete 2019 list of EM vessels (labelled in Figures as “Everybody EM”). Data were summarized in terms of ‘heat maps’ and cumulative distributions.

In the second analysis, an experimental approach was used that roughly mimics the Catch Accounting System (CAS). The CAS borrows data from hauls with observer/EM data in order to generate estimates for hauls that were not covered by observer/EM data. This borrowing is performed at the smallest spatial and temporal units possible, but the scope progressively increases until an adequate amount of data can be used to generate estimates. The CAS is too complex to perfectly simulate, but a simplified version of the CAS routine may be useful for performing gap analyses for differing scenarios, e.g. varying deployment rates or number of vessels in the EM pool.

This analysis used partial-coverage fleet fishing data from 2017 and simulated trip selection for observer/EM monitoring prior to performing a gap analysis. Selection rates follow the 2019 draft ADP and selected trips were assumed to be perfectly monitored (i.e. there are no observer effects or cancelled trips in simulated sampling). A selected and monitored trip must be defined differently for discard and biological data (e.g., otoliths, lengths, genetic tissues, stomach contents, sexual maturity assessments) since the former may be obtained from observers and EM, while the latter is only available from observers. Consequently, separate gap analyses were performed for discard and biological data collections. Trips not selected for observer or EM

monitoring were categorized into three groups. Any trip not selected for observer/EM monitoring had its trip start and end date (date range) compared with those of all selected trips with the same trip target and NMFS area. If the date range was within 15 days of any selected trip, the trip was labelled as 'Area' data. This means that Area specific data from monitored trips could be used in lieu of data from that unmonitored trip. Unmonitored trips that did not have a matching selected trip at the area-level had their trip date ranges compared to all selected trips with the same trip target and FMP designation. If the date range was within 45 days of any covered trip within the same FMP, the trip was labelled as 'FMP'. This means that only data from selected trips at the FMP were available in lieu of data from the unmonitored trip. Finally, any remaining trips that could not be monitored at the area or FMP level were labelled as 'Year-to-Date' data level (YTD), meaning that only data from selected trips using the entire year were available in lieu of data from the unmonitored trip.

The trip-selection and gap analysis were performed 100 times and the average result over all iterations are presented.

Results

A total of 172 vessels requested EM for 2018. Of these, 139 have been pre-wired. The proportion of total trips for different past fishing activities accounted for by current and future EM vessels is shown in Figure 1. For fishing activities with more than three vessels participating (Figure C- 1) past Pacific Cod Pot Gear fishing trips in the Central Gulf of Alaska Area 630 would be expected to be monitored more with EM than with observers (Proportion EM > 50%). Adding all 2019 EM Request vessels does not change much with the exception that more Pacific cod Pot cod trips fishing in the Central Gulf of Alaska area 620 would also have been monitored with EM than observers, although this outcome is limited to 2016.

The proportion of trips monitored by EM in heat maps was also expressed as a cumulative distribution plot (Figure C- 2). A simple explanation of these plots is derived by looking at the proportion of EM among trips that represents the value that half of the fishing activities fall below or above. This point is termed the median, and is commonly used when referring to home prices. This median proportion of EM trips can be found by following the dashed line in Figure 2. The Proportion of trips in EM that is represented by the colored line that intersects the dashed line is the appropriate median. From these plots, the shift in median proportion of EM trips to the right is evident, but its magnitude is relatively minor. For example the median proportion of trips in EM in Hook and Line gear in 2017 was 0.1651697 compared to 0.2051618 (Figure C- 2 lower left panel).

The results of an experimental analysis of the potential impact of EM on discard estimation and biological data collection are shown in Figure C- 3 and Figure C- 4. From visual inspection of these plots, the impact of adding EM vessels for 2019 appears to be relatively minor for both discard estimation and biological data collection. The greatest number of trips impacted (not shown here) is expected to be within the Halibut hook and line fishery, where both types of data are expected to be less available at the Area, FMP, and YTD levels.

Conclusions

The consequences of adding all vessels that requested EM for 2019 to the already existing pool of EM vessels appears relatively minor. Therefore, it is recommended that the EM eligible pool of vessels be extended from 141 to 168 and the number of EM innovation vessels be expanded from 3 to 4. This change results in an increase in the total number of EM vessels from 144 to 172. A reminder of caution is warranted here: EM eligible vessels may not log trips and are not considered by FMA to be in the EM pool until an approved Vessel Monitoring Plan is enacted for 2019.

Literature Cited

NMFS. 2017. Draft 2018 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Accessed 1 December and available online at: https://alaskafisheries.noaa.gov/sites/default/files/draft_2018_adp.pdf.

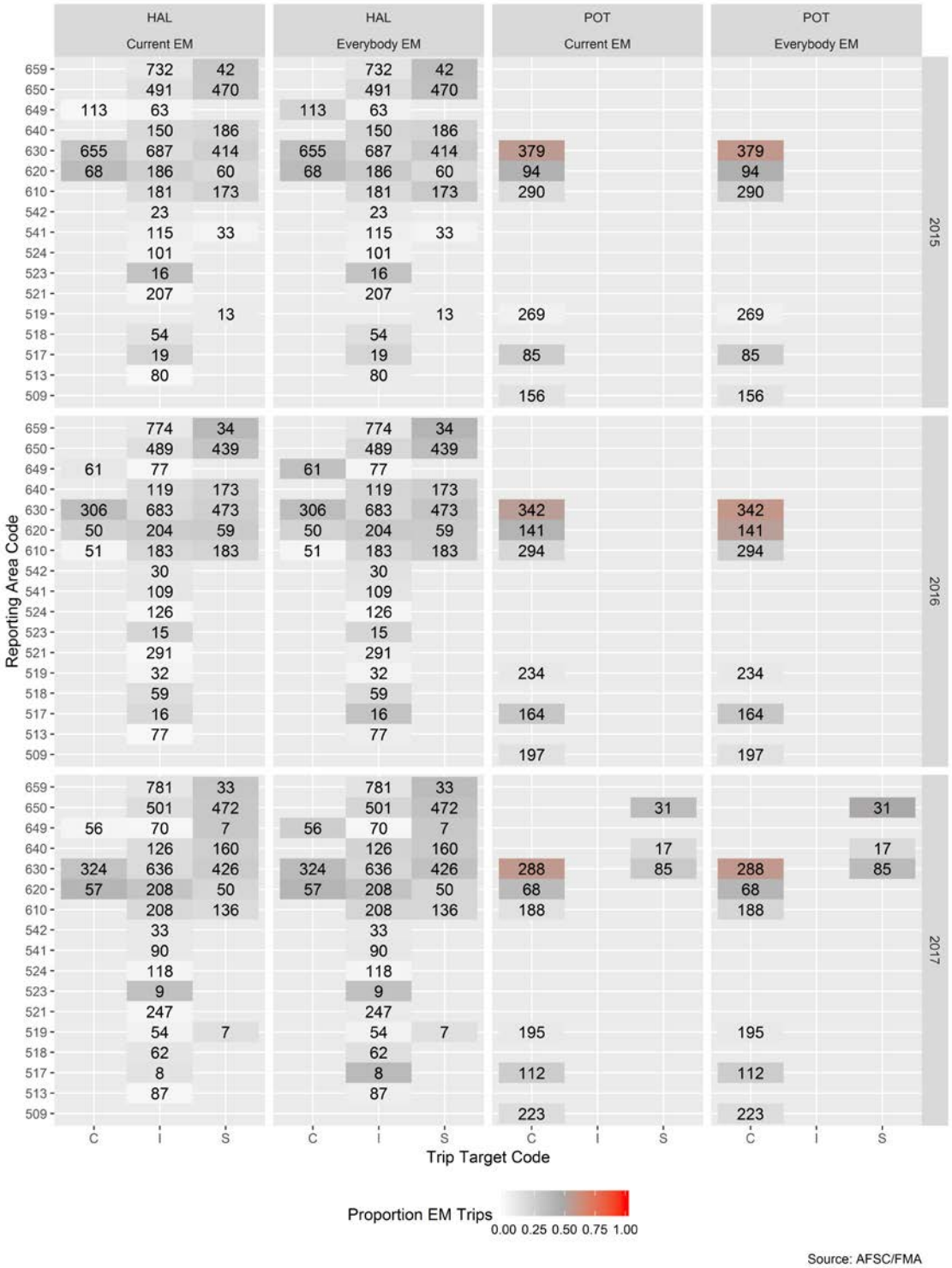


Figure C- 1. The amount of fishing activity in terms of trips (depicted as numbers) and the proportion of those trips that are accounted for by EM defined by the Current (2018) list, or the Everybody EM list (2019 requesting vessels - denoted as shading). Past fishing activities are divided by Trip Target Code that broadly denotes the principal species landed, and NMFS Reporting Area Code. C = Pacific Cod, I = Halibut, S = Sablefish.

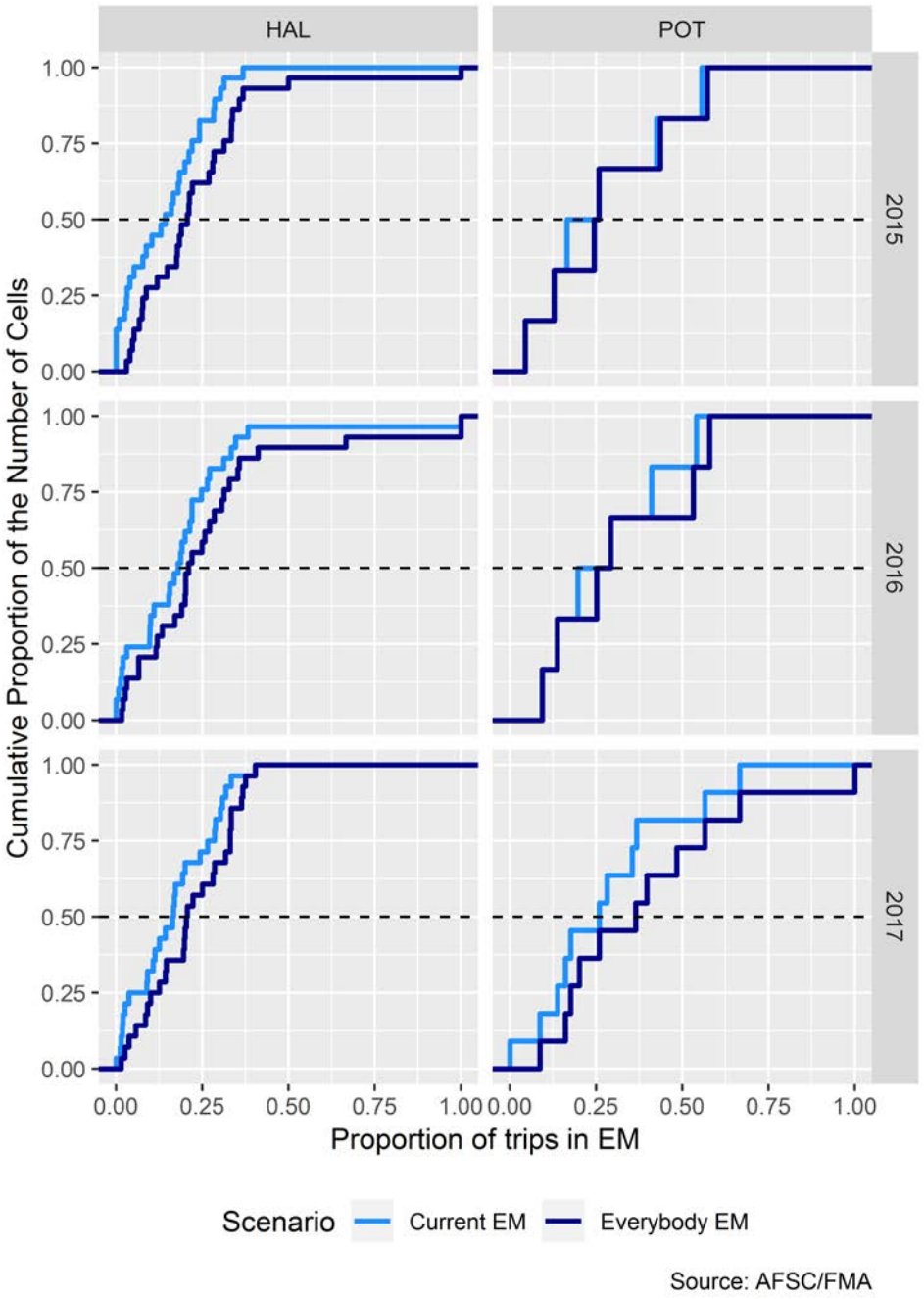


Figure C- 2. Cumulative distribution plots of the number of fishing activities accounted for by EM denoted in Figure 1 by gear type and past fishing year. Line colors denote whether the Current (2018) list of EM vessels or the Everbody EM (2019) lists are used. The median (50%) point is denoted by the horizontal dotted line. Curves to the right have greater proportions of trips in EM than lines to the left.

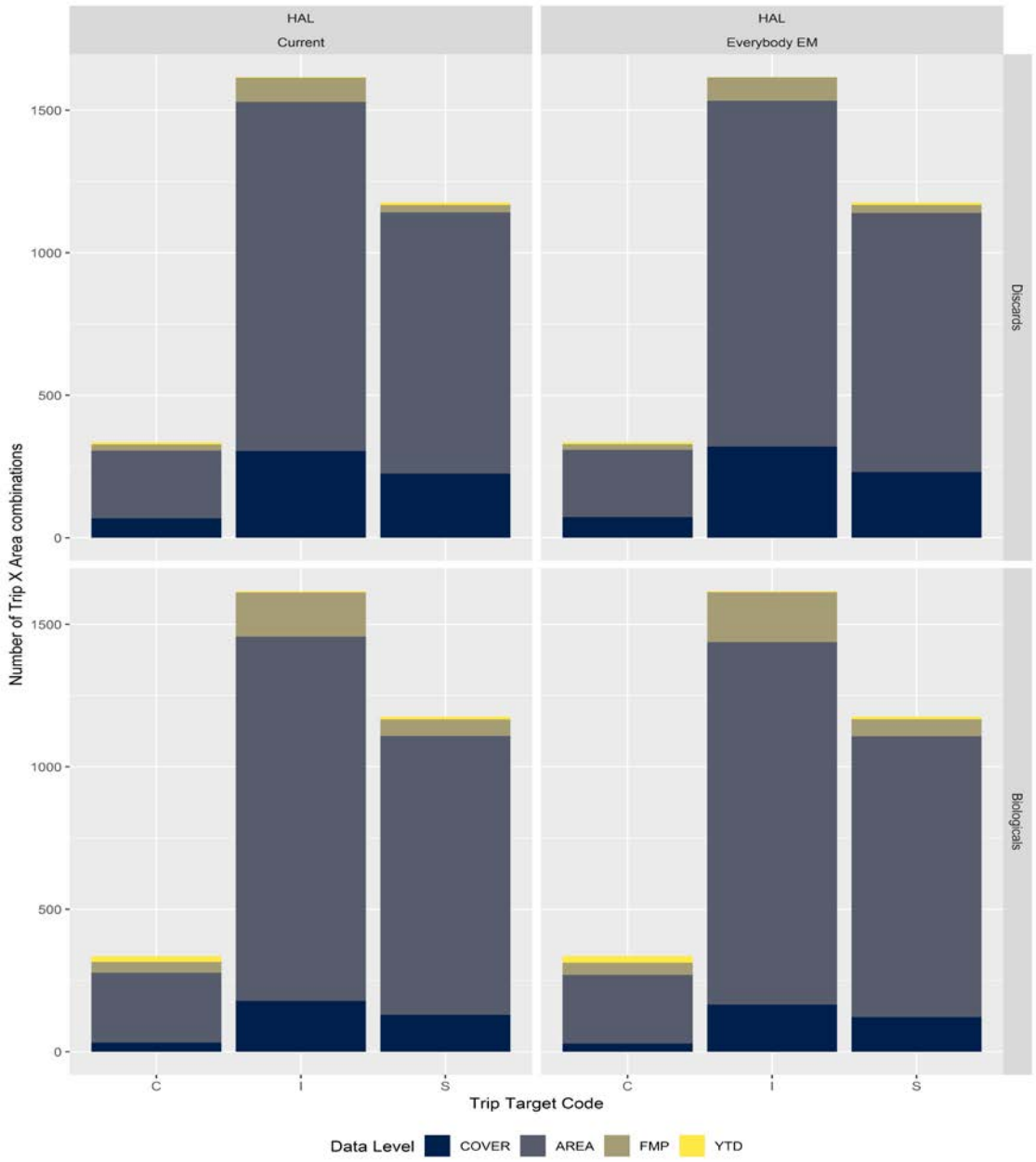


Figure C- 3. Results from simulated Catch Accounting System (CAS) gap analysis for hook-and-line (HAL) gear, displayed as the average number of trip by area combinations in each data level for each trip target over 100 iterations. The Current scenario used strata definitions with 141 vessels in the EM pool and the Everybody EM scenario used strata definitions with 168 vessels in the EM pool. COVER defines trip x area combinations that have discard data (Observed/EM trips) or biological data (Observed trips only). AREA defines trip x area combinations that borrow data the area-level (within 15 days of at least one covered trip within the same NMFS area). FMP defines trip x area combinations that borrow data at the FMP-level (within 45 days of any covered trip within the same FMP). YTD defines any trip x area combinations that must borrow data from the year-to-date.

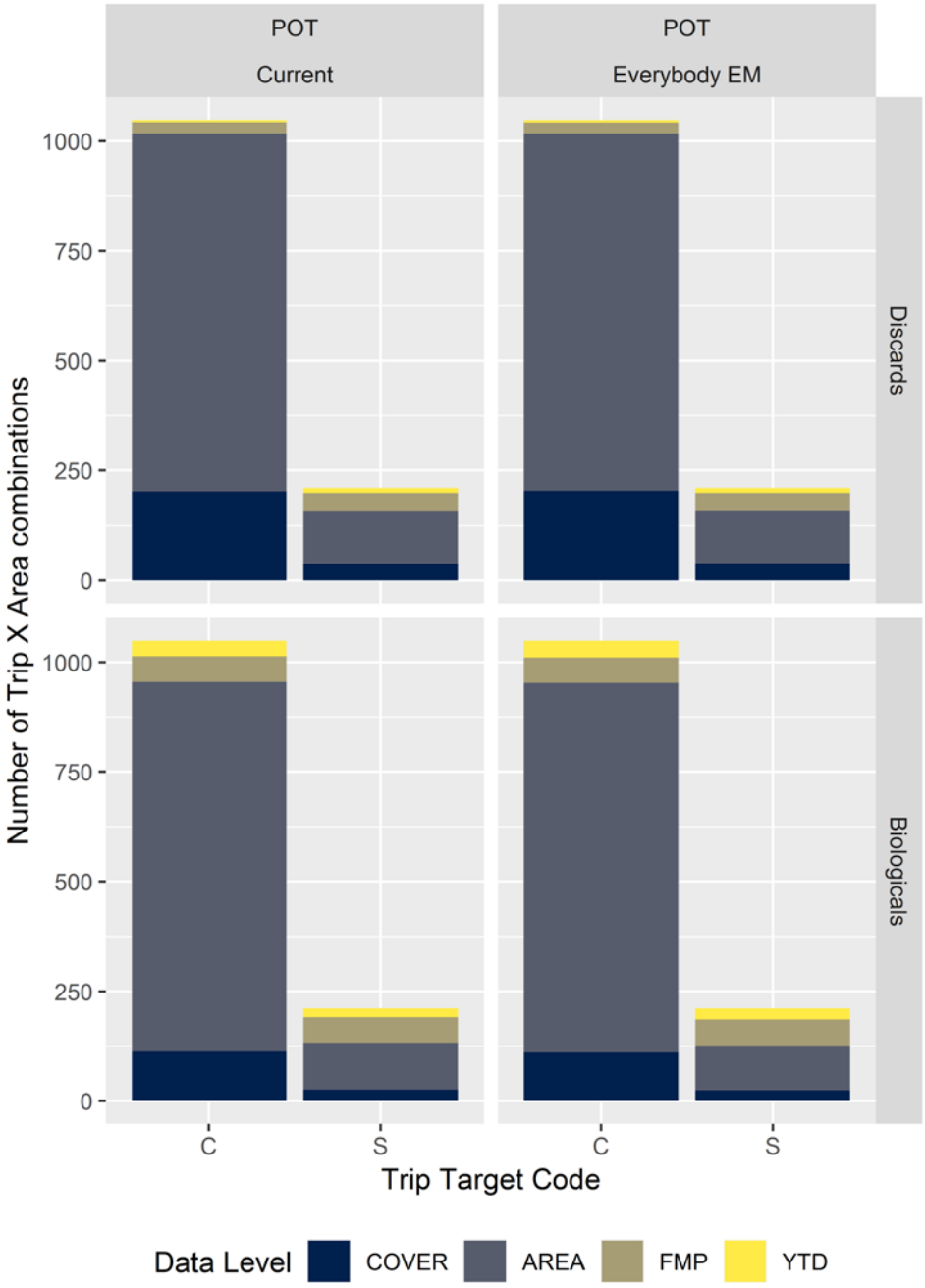


Figure C- 4. Results from simulated Catch Accounting System (CAS) gap analysis for pot (POT) gear, displayed as the average number of trip by area combinations in each data level for each trip target over 100 iterations. The simulation used 2017 effort data with 2018 deployment rates. The Current scenario used strata definitions with 142 vessels in the EM pool and the Everybody EM scenario used strata definitions with 172 vessels in the EM pool. COVER defines trip x area combinations that have discard data (Observed/EM trips) or biological data (Observed trips only). AREA defines trip x area combinations that borrow data the area-level (within 15 days of at least one covered trip within the same NMFS area). FMP defines trip x area combinations that borrow data at the FMP-level (within 45 days of any covered trip within the same FMP). YTD defines any trip x area combinations that must borrow data from the year-to-date.

Appendix D. Electronic Monitoring Innovation Research in 2019

Introduction

In 2019, the Fisheries Monitoring and Analysis Division of the Alaska Fisheries Science Center (AFSC) will continue research and development of innovative electronic monitoring (EM) technologies. This research supports NOAA Fisheries policy encouraging the development of electronic technologies for fishery dependent data collection to complement or improve existing data collection programs. The overall objective is to develop an intelligent monitoring system (IM) that incorporates machine-learning (ML) applications that automate the count, measurement and identification of fish at the source of data collection. The intent is to embed this functionality on the system at the source creating an "intelligent" monitoring system. Ideally, video/imagery would not necessarily have to be transferred, reviewed, and stored because an onboard application will complete the processing of both sensor and image data. This type of system would reduce time lags and costs associated with current electronic monitoring and post processing methods. The overall goal of the project is to help address challenges for collecting scientific data remotely to better support bycatch estimation and ecosystem based fisheries (EBFM) monitoring while reducing monitoring costs.

Deployment in 2019

EM research in 2019 will build upon previous work by improving system reliability and machine learning algorithms to provide greater accuracy for length estimation and species identification.

The 2019 EM research deployment plan will be:

- Deploy of Stereo IM on:
    - 3 of the volunteering fishing vessels (F/V *Middleton*, *Kariel*, and *Predator*)
    - AFSC sablefish survey and International Pacific Halibut Commission (IPHC) survey
- Deployment of an EM Lite system (no cameras) on 1 of volunteering fishing vessel F/V *Defender*
- Deployment of chute IM that on 4-8 trawl vessels that will be fishing under a halibut deck sorting Exempted Fishing Permit (EFP) and also potentially a fishing vessels and/or a NMFS survey vessel.
- Planning is also underway to deploy a system on IPHC survey vessels. A 'special project request' is currently under development and will likely be dependent on which vessels are contracted for the survey and/or whether or not there is space for another sea sampler.

The 2019 EM laboratory research will conduct truth-of-concept testing to support development of ML for:

- To estimate Pacific Cod weight, volume, and count on a sorting table
- Stereo length measurement accuracy for fish length measurement sliding down a ramp
- Bag (codend) volume measurement accuracy
- Accuracy of camera system (various configurations included structured light) to estimate count, measure, and weight of cod placed on a flow scale and conveyor belt

Additional laboratory work includes plans to complete the image library of seabirds and begin developing ML for species identification. This will help us identify how many more annotations will be necessary to better inform future collections of seabirds. The long-term goal is accurately ID seabird bycatch using imagery.

The image data collected in 2019 will be used to improve the current suite of machine learning algorithms to automated assessment of image quality, catch count, length measurement and species identification for both longline or pot gear applications.

Specific research objectives in 2019 include:

- Stereo Vision IM
    - Improve catch event detection reliability
    - Improve length measurement reliability and accuracy
    - Test wheel house monitor for real time image quality and system health checks
    - Incorporate satellite communications to automate system health checks in real time
    - Continue to build in image library training dataset for species identification
    - Evaluate image based real time sensing of haul-back (this approach will improve ease and cost of installation since we will no longer have to install hydraulic/drum sensors)
    - Integrate satellite communications to automate delivery of haul information and system health.

- EM Lite
    - Test a system that is designed to collect only sensor data (hydraulic pressure and RFID tags) to determine effort (number of hauls) and fishing area.
    - Integrate satellite communications to automate delivery of haul information and system health.

- Chute IMS
    - Improve length measurement reliability and accuracy
    - Test wheel house monitor for real time image quality and system health checks
    - Continue to build in image library training dataset for species identification
    - Potentially deploy belt system on a NOAA Fisheries survey vessels to collect training dataset for species ID and length measurement
    - Sablefish survey

- Integration with Observers
    - Improve/develop ML to distinguish between Blackspotted and Rougheye Rockfish
    - Begin development of phone/tablet application that will eventually be deployed with observers to aid in species identification

Develop automated image system to monitor offloads for PSC

The Innovation Team has collaborated on a project to assess options, including EM, to account for salmon bycatch in trawl rockfish catches delivered to Kodiak processing plants. Our main roles have been 1) to develop automated processing of video of catches entering plants to detect passing salmon, and 2) to adapt camera chute technology to distinguish Chinook Salmon from other species. Initial results from data collected in 2018 of both efforts indicate good potential, with needs for additional training imagery to achieve better performance.

This has led our team to widen our exploration of applications for automated video analyses to assess catches in other close-packed conveyor belt situations. Such situations are very common in onboard and shoreside fish-handling situations. The ability to detect particular species (especially salmon, crab, and halibut) could be very useful for bycatch monitoring. General development of such tools would also likely have significant applications in other regions and nations. Additional video collections are being planned to target shoreside pollock deliveries, and onboard processor catch handling.

Collaboration with the vessel crew is an important element of this project and we are grateful for their participation. Feedback from vessel operators will be used to improve system design for ease of use, ease of installation, and improve image quality.

Publications resulting from EM innovation project research

G. Wang, J. N. Hwang, C. Rose, and F. Wallace, "Uncertainty Based Active Learning via Sparse Modeling for Image Classification" IEEE 20th International Workshop (in press). IEEE, 2018.

T,. Huang, J.N. Hwang, Fellow, IEEE, S. Romain, and F. Wallace, 2018. Fish Tracking and Segmentation from Stereo Videos on the Wild Sea Surface for Electronic Monitoring of Rail Fishing. IEEE Transactions on Circuits and Systems for Video Technology (waiting for final citation).

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T. Huang, J.N. Hwang, J., S. Romain and F. Wallace. 2017. Live Tracking of Rail-Based Fish Catching on Wild. Will be published in the proceedings of the 2nd Workshop on Computer Vision for Analysis of Underwater Imagery. (CVAUI, 2017)

W. Goang, J.N. Hwang, K. Williams, F. Wallace, and C. Rose, 2017. Shrinking Encoding with Two-Level Codebook Learning for Fine-Grained Fish Recognition. In Computer Vision for Analysis of Underwater Imagery (CVAUI), 2016 ICPR 2nd Workshop on, pp. 31-36. IEEE, 2016.

F., Wallace, K. Williams, R. Towler, and K. McGauley. 2015. Innovative Camera Applications for Electronic Monitoring. In: G.H. Kruse, H.C. An, J. DiCosimo, C.A. Eischens, G.S. Gislason, D.N. McBride, C.S. Rose, and C.E. Siddon (eds.), Fisheries Bycatch: Global Issues and Creative Solutions. Alaska Sea Grant, University of Alaska Fairbanks. http://doi.org/10.4027/fbgics.2015.06

Appendix E. Factors That Impact Cost per Observer Sea-day

Observers in the North Pacific are procured in one of two ways: through the pay-as-you-go model for observers operating in the full coverage category and those under the federal contract for the partial coverage category. While much of the work associated with these two service delivery models are the same, there are differences which can cause variation in the cost per observer day in each category. These include: the structure of the government contract; travel costs; observer salary structure; the work performed by the observer provider; and the standards which the provider and observers must meet.

Contract Structure

The existing federal contract for the provision of observer services for the partial coverage category is split among guaranteed days, option days, and travel costs. Guaranteed days are set to the minimum number of days that the government will purchase under each year of the contract. Optional days are above and beyond the minimum. Travel costs are those actual costs incurred by the contractor to deploy observers to the ports necessary to complete the contract.

Guaranteed days are typically more expensive than option days. This is a common practice for contracting to ensure that the provider's fixed costs – including those that are mandatory under the contract – are largely covered by the minimum number of purchased units. This contract structure front loads fixed costs, and provides the government with a price break as the number of option days purchased increases. As a result, there is a relationship between the annual budget and the cost per day (Figure E- 1).

The term "observer sea day" is often used as a metric both for performance (e.g,, 2500 observer sea days were covered) and for cost (e.g., for an estimated cost of $1,400 per observer sea day). While this is a common metric, the term may be misleading particularly in regards to programmatic costs as far more than a single day of observer coverage is included in the metric.

Exact breakouts of costs for the current federal contract are proprietary and cannot be released. However, without specificity to the current federal contract, costs associated with the following are often included in the generic term of observer sea day:

- For new observers, salary and associated costs (e.g., lodging, benefits) for the three-week observer training course;
- For experienced observers, salary and associated costs (e.g., lodging, benefits) for the annual and intra-annual briefings conducted by NOAA Fisheries;
- Observer salaries and benefits while they are in a deployed status;
- Federal and State workers' compensation and employer's liability insurance;
- Applicable general liability insurance which may include insurance for bodily injury, property damage, automobile liability, aircraft and passenger liability, and/or vessel liability insurance;
- Costs associated with key personnel requirements including the Project Manager;
- Staffing associated with contractual reporting requirements including invoicing, monthly status reports on financial expenditures and on observer recruitment and retention, and maintaining records, materials, and other evidence for examination, audit, or reproduction for the period stipulated in the contract;

- Overhead and infrastructure costs, including physical infrastructure such as office and apartment leases as well as personnel, and administrative organizational costs;
- Creation and maintenance of a Quality Control Management program to ensure consistent quality of all work products and services;
- Required participation in outreach events with fishermen or their representatives;
- Observer personal gear allowance (e.g., raingear) and costs for mandatory observer equipment including laptop computers for data entry and transmission;
- Travel costs (see below) for all observer deployments; and
- Salary and associated costs (e.g., lodging, benefits) for debriefing and data quality control processes for each observer concluding a set of deployments.

This list is not all inclusive, and some - but not all - costs are also borne by the observer providers under the pay-as-you-go full observer coverage model. This list is meant to demonstrate both the costs that are included in the "observer sea day" metric and those which may be front-loaded into guaranteed days.

Travel Costs

Under the partial coverage category, observers are deployed under a random selection model, requiring the observer provider to send observers to a wide variety of ports across Alaska and to cover trips that tend to be quite short in duration. This is a marked difference from that of the full observer coverage model which tends to deploy observers from a handful of ports and for fairly lengthy periods of time, often for an entire fishing season.

Under the federal contract, the government reimburses the observer provider for travel costs incurred from the time the observer leaves their briefing location until they arrive at their debriefing location. The government does not reimburse the contractor for the cost of lodging, meals, and incidentals incurred during the time an observer or observer candidate is in training, briefing, or debriefing. For example, if an observer briefed in Seattle, deployed out of Kodiak, and debriefed in Anchorage the government would reimburse the contractor for travel costs incurred from the time the observer left Seattle (including the airfare to Kodiak) until the observer arrived in Anchorage (including the airfare to Anchorage).

Travel costs and expenses are reimbursed in accordance with the Federal Travel Regulations at actual costs incurred (without profit, administrative costs, or overhead). Also in accordance with Federal Travel Regulations, specific per diems are paid to observers based on when an observer is deployed to a vessel.

Observer Salary Structure

Under the pay-as-you-go full coverage category, most observers are paid a day rate rather than an hourly rate. Under the government contracted partial coverage catgory, the contractor must adhere to the requirements of the Service Contract Act (SCA) and applicable Department of Labor (DOL) Wage Rate Determination when calculating and paying salaries and benefits to observers. Overtime is paid to observers in accordance with the Fair Labor Standards Act (FLSA) and other applicable labor laws, whether work is performed inside or outside U.S. territorial waters or seaward of the U.S. Exclusive Economic Zone.

Work Performed by the Observer Provider

Because of the random deployment required under the partial observer coverage model, the contractor must be fully integrated into the Observer Declare and Deploy System (ODDS). Under the contract, the provider is required to serve as a backup to ODDS and receive calls for 16 hours per day, seven days per week, year-round, including all holidays. To provide this support, the contractor must maintain staffing for this requirement to ensure that they can receive and process trip registration information; receive and process trip delays, cancellations, and closings; and receive and process customer support calls.

ODDS support and backup is a requirement and cost borne only by the partial coverage observer provider.

Standards for Observer Provider and Observers

All observer providers and observers in both service delivery models are required to comply with applicable Federal Regulations, Acts, Executive Orders, Special Publications, Guidelines, NOAA Directives and Policies and standards, including those under the Magnuson-Stevens Fishery, Management, and Conservation Act (MSA); Marine Mammal Protection Act (MMPA); Endangered Species Act (ESA); Observer Health and Safety regulations; and Federal, state, and local regulations.

The contracted partial observer coverage provider is also required to abide by the Federal Acquisition Regulations (FAR); the Data Quality Control Act (P.L. 106-514); Information Technology Security Policy; Fair Labor Standards Act (FLSA); Service Contract Act (SCA); Department of Labor Wage Determinations; and applicable Federal and State labor laws.

Finally, there are specific requirements identified in the Performance Work Statement that add requirements. For example, partial coverage observers must possess current Cardio-Pulmonary Resuscitation (CPR) and First Aid certifications in order to be certified. Additionally, the contractor must recruit the most highly qualified candidates, as they are held to a standard of a 95 percent passing rate for the required training course (including safety training) and the physical examination.

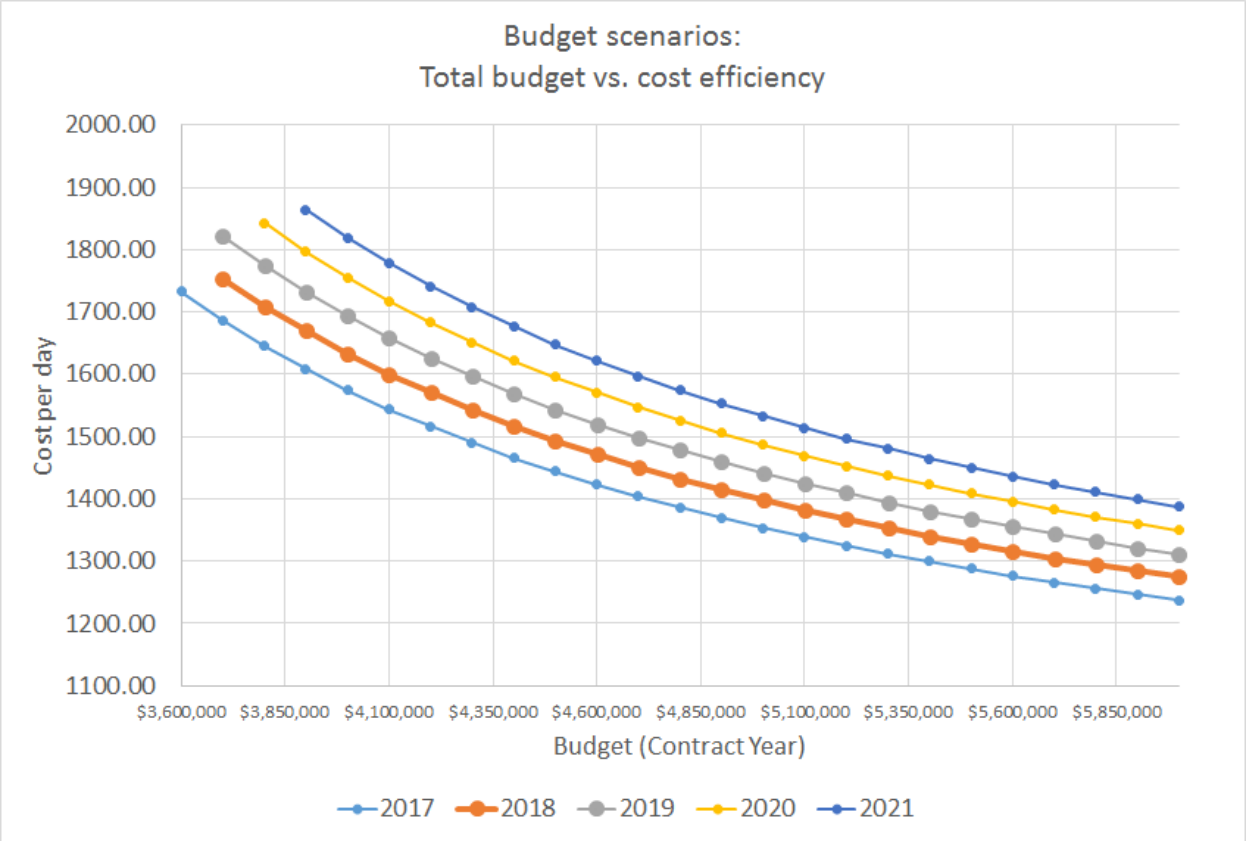

Figure E- 1. Anticipated cost per observer sea day in the partial coverage contract under varying budget scenarios. The cost incorporates the anticipated cost per day for guaranteed and optional days in the future (given the current contract year-over-year cost increases) and illustrates the relationship between the budget and the cost per day.