North Pacific Groundfish and Halibut Observer Program

2015 Annual Report

May 2016

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

National Marine Fisheries Service, Alaska Regional Office
Sustainable Fisheries Division
709 W. 9th Street, Juneau, Alaska 99802

Cover photos provided by National Marine Fisheries Service, Alaska Fisheries Science Center, Fisheries Monitoring and Analysis Division.

Table of Contents

EXECUTIVE SUMMARY

This annual report provides information, analysis, and recommendations based on the deployment of observers by the North Pacific Groundfish and Halibut Observer Program (Observer Program). The Observer Program provides the regulatory framework for NMFS-certified observers to obtain information necessary to conserve and manage the groundfish and halibut fisheries in the Gulf of Alaska (GOA) and the Bering Sea and Aleutian Islands (BSAI) management areas. Data collected by well-trained, independent observers are a cornerstone of management of the Federal fisheries off Alaska. These data are needed by the North Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS) to comply with the Magnuson–Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, the Endangered Species Act, and other applicable Federal laws and treaties.

Each year NMFS releases an Annual Deployment Plan (ADP) that describes how NMFS plans to deploy observers to vessels and processors in the partial observer coverage category in the upcoming year. The following year, the agency provides an Annual Report with descriptive information and scientifically evaluates the deployment of observers. The ADP and Annual Report process provides information to assess whether the objectives of the Observer Program have been met and a process to make recommendations to improve implementation of the program to further these objectives. This Annual Report provides information and recommendations based on deployment of observers in 2015.

Fees, budget, and costs

- The budget for observer deployment in 2015 in the partial coverage category was $5,758,268 and 5,318 days.
- The budget for 2015 was made up of $3,058,036 in fees (from 2014 landings) and $2,700,232 in federal funds.
- Fee billing statements for all landings that occurred in 2015 were mailed to approximately 100 processors in January, 2016, for a total of $3,775,956.
- The breakdown in contribution to the 2015 observer fee liability by species was: 35% halibut, 23% sablefish, 21% Pacific cod, 19% pollock, and 2% all other groundfish species.
- Since 2013, NMFS has spent $17,295,810 to procure 16,146 observer days for an average cost per observer day of $1,071 per day. For 2015, NMFS spent a total of $5,758,268 to procure 5,318 observer days for an average cost of $1,083 per day.
- In April 2015, NOAA awarded a new 5-year contract to A.I.S., Inc. for the procurement of observers in the partial coverage category of the North Pacific fishing fleet.
- The detailed breakdown of costs under the contract is confidential and NMFS can only release information on the amount of services (observer days) after services have been procured. Future annual reports will continue to provide information and funds spent, days procured, and the average cost per day under the new contract. However, NMFS anticipates that the average cost per observer day is likely to be reasonably stable over the next 5 years and not vary dramatically from average costs we have seen thus far in the program. During the first two years of the program, the partial coverage costs have been on par with partial coverage, government-contracted observer costs in other regions.

Deployment Performance Review

The deployment of observers in 2015 relative to the intended sampling plan and goals of the Observer Program was reviewed. A set of performance metrics were used to assess the efficiency and effectiveness of observer deployment, with emphasis on the partial coverage category. These metrics provide a method to evaluate the quality of data being collected under the restructured Observer Program. These metrics fall into three broad categories:

- **Deployment rate metrics** that evaluated whether achieved sample rates were consistent with intended sample rates (i.e., did we get the coverage rates we planned to get).
- **Sample frame metrics** that quantify differences between the population for which estimates are being made and the sample from which those estimates are derived (i.e., were the trips and vessels that we sampled similar to the rest of the fleet). If the trips and vessels that are sampled (the sample population) are not "representative" of the entire fleet (the whole population), it can result in incorrect conclusions being drawn about the population based on the sample.
- **Sample size metrics** analysis to determine whether enough samples were collected to ensure adequate spatial and temporal coverage.

Did we meet anticipated deployment goals?

<u>Costs</u>

- Based on simulations of 2013 fishing data made in December 2014, NMFS expected observed fishing effort to be 5,518 days at the end of 2015. In 2015, NMFS deployed observers for 5,318 days, or 96% of our anticipated budget.

<u>Observer Declare and Deploy System (ODDS) overview and performance</u>

- Random selection of trips in the trip selection stratum is facilitated by the ODDS. Users of the system are given flexibility to accommodate their fishing operations; up to three trips may be logged in advance of fishing and trips can be cancelled to accommodate changing plans. Once a trip has been completed, logged trips must be closed by a vessel operator.

- If a trip is selected for observer coverage and cancelled by the user, then the vessel's next logged trip is automatically selected for coverage. The "inherited" trips preserve the *number* of selected trips in the year, but cannot prevent the *delay* of selected trips during the year. Evidence of this delay behavior was found in 2015.
    - Of 7,046 trips logged in 2015, a total of 931 trips were cancelled (13.2%-- 552, or 7.8% by ODDS) and 12 trips were waived (0.2%). The cancellation rate (calculated from the number of trips cancelled by the user divided by the number of trips not cancelled by the ODDS) ranged from 2.8 to 3.8% for non-selected trips, and 23 to 13% for selected trips from the small vessel trip selection stratum (*t*) and large vessel trip selection (*T*) strata respectively.

<u>Evaluation of at-sea strata</u>

- Among all fishing in Federal fisheries of Alaska, 4,859 trips (39.1%) and 498 vessels (42.1%) were observed.
- The selection rates programmed were 12% for the small vessel trip-selection stratum (*t*) and 24% for the large vessel trip-selection stratum (*T*). After trips were closed and cancelled, the

expected rate of coverage was 12.6% for *t* stratum and 25.4% for *T* stratum. Actual coverage rates were 11.2% in the *t* stratum and 23.4% in the *T* stratum.

- The 2015 Observer Program had 5 different deployment strata to be evaluated. With one possible exception, the program met expected rates of coverage for all of these strata. Observer coverage was higher than expected from within the EM voluntary stratum. This was because within this stratum one vessel agreed to simultaneously carry EM and an observer on two trips so that resulting data from the two methods could be compared.

Dockside Monitoring

- In the GOA, offloads of pollock trawl catcher vessels delivering to shoreside processors were observed 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. In addition to at-sea duties, observers monitor of the deliveries of trawl pollock from catcher vessels at shoreside processing plants. In the full-coverage category of the fleet, this task is performed by dedicated plant observers, whereas in partial coverage only trips that are observed at sea are also monitored at the plant.
- The sampling design used for dockside monitoring in 2015 remained unchanged from that used since 2014. Tissue samples obtained from samples of pollock deliveries provide data to estimate of salmon stock of origin. A random sample of tissue samples all pollock deliveries was not achieved in 2015 because of tendering activity. However, the impact of this tendering activity was limited, mainly to port of King Cove.

Was the Coverage Representative?

Temporal Patterns

- We evaluated the possibility for temporal bias in the both the small and large vessel trip selection strata. The number of observed trips achieved was outside of their expected values on only 2 days (0.6%) very early in the year and within only the *T* stratum. For comparison, the number of observed trips achieved was outside of their expected values on 15.3% of the year in 2014. Tests that the observed rate at the end of the year derived from a binomial distribution sampled at the expected selection rates for each stratum were 0.273 for the *t* stratum and 0.338 for the *T* selection stratum. Based on these combined results, no evidence of temporal bias was found in 2015.

Spatial Representativeness

- In 2015, spatial bias occurred in the small vessel trip-selection stratum. Within this stratum there were four NMFS areas that had less than expected observer coverage and did not have low fishing effort. There was no clear evidence of spatial bias within the large vessel trip-selection stratum.

Trip Metrics

Six trip metrics were examined in each permutation test to answer the following four questions. These metrics include: the number of NMFS areas visited in a trip, trip duration (days), the weight of the landed catch (in Metric Tons), the vessel length (m), the number of species in the landed catch, and the proportion (0 to 1) of the landed catch that was due to the most predominant species (pMax).

The four questions and this year's trip metric findings are:

- *Are observed trips identical to unobserved trips?*
    - There was some evidence of an observer effect within both the small and large vessel trip selection strata. In the small vessel trip-selection stratum, observed trips were 13.6% shorter in duration than unobserved trips. For the large vessel trip-selection, stratum observed trips were 8.4% shorter in duration and landed catch was 1% less diverse than unobserved trips. Shorter trips in both strata is evidence of a behavior shift when observed, since catch statistics are similar but durations are shorter when observed, this implies observed trips have greater catch per unit effort than unobserved trips.

- *Are tendered trips identical to non-tendered trips?*
    - A tendering effect was evident using 2015 and 2016 (gear type) trip-selection strata definitions.

- *Are observed tendered trips identical to unobserved tendered trips*?
    - There is only some evidence of an observer effect within trips that delivered to tenders in 2015. Observed trips in the small vessel trip-selection stratum that delivered to tenders landed catch with 24.7% fewer species than unobserved trips that delivered to tenders. Observed trips in the large vessel trip selection stratum that delivered to tenders were 50.8% shorter than unobserved trips that delivered to tenders.

- *Are observed non-tender trips identical to unobserved non-tender trips?*
    - Evidence of an observer effect was found in 2015.Observed non-tendered trips in the small vessel trip selection stratum fished in 3.4% fewer NMFS areas and for 13.1% fewer days than unobserved non-tendered trips. Observed trips in the large vessel trip selection stratum that did not deliver to tenders were 5.2% shorter and 1.2% less diverse than unobserved trips that did not deliver to tenders. Shorter trips in both strata is evidence of a behavior shift when observed- since catch statistics are similar but durations are shorter when observed, this implies observed trips have greater catch per unit effort than unobserved trips.

Compliance and Enforcement

- In 2015 there were 1,029 complaints filed by observers. AKD Fisheries Enforcement Agents and Officers dedicated 4,854 hours to directly support the Observer Program including outreach, education, and compliance assistance activities. This total does not capture investigative hours or outreach and compliance assistance conducted during routine enforcement boardings and contacts.

Outreach

- NMFS conducted 15 public outreach events in 2015. The agency found the meetings with industry associations to be a valuable way to share information with fishery participants, to answer their questions, and to get their input on areas of concern and potential solutions.

NMFS RECOMMENDATIONS

Recommendations to improve the 2017 ADP

Dockside monitoring

- NMFS recommends maintaining the current dockside monitoring sampling for pollock deliveries. Observers on trawl vessels that deliver to tenders cannot collect genetic samples from all Chinook salmon in the delivery. However, in 2015 this issue was mainly limited to the port of King Cove. Increasing genetic sampling for salmon or modifying the protocols would require a shifting of staff and resources away from other sampling and data collection duties.

No selection pool

- Recognizing the challenging logistics of putting observers on small vessels, NMFS continues to recommend that vessels less than 40ft be in the no selection pool for observer coverage. However, NMFS also recommends that vessels less than 40ft be considered for testing of electronic monitoring since NMFS has no data from this segment of the fleet.
- NMFS recommends continuing to allow hook-and-line and pot vessels <57.5 ft LOA where taking an observer is problematic an opportunity to 'opt-in' to the EM selection pool to participate in the EM cooperative research under the 2017 EM pre-implementation plan that is being developed by the EM workgroup. NMFS also recommends that vessels participating in the EM selection pool be required to log trips in ODDS. This will improve the ability of NMFS to determine which vessels are in the EM selection pool, when they are fishing, and provides a necessary compliance monitoring tool.

Trip-selection pool

- NMFS recommends maintaining 3 sampling strata defined by gear (pot, hook-and-line, and trawl) for the 2017 ADP and continuing to evaluate the optimal allocation to determine deployment rates in each stratum. Within budget constraints, NMFS recommends that sampling rates be high enough in each stratum to reasonably expect three observed trips in each NMFS Area.
- Although Chapter 3 of this report found differential cancellation rates in ODDS, and this led the OSC to recommend a change in cancellation policy be explored, a temporal bias in realized trips was not found in 2015. Therefore, NMFS recommends continuing to allow vessels to log three trips in ODDS. NMFS also recommends continuing to automatically release vessels 40-57.5 feet in length from observer coverage if the two previous trips were observed trips (i.e., if two trips in a row were observed and a third trip is selected, then the third trip will be released from coverage).
- NMFS recommends evaluating 2 additional strata for the 2017 ADP:
  - Separate strata for vessels delivering to tenders. Based on analyses in this report and that from 2014, NMFS continues to see differences in the characteristics of tendering and non-tendering vessels. Establishing a separate stratum (or strata) for vessels delivering to tenders would enable NMFS to adjust sampling rates to provide the necessary data to manage fisheries.
  - Separate strata for partial coverage catcher-processors. Given the potential expansion in the number of catcher-processors in partial coverage in 2016, establishing a separate stratum (or strata) for partial coverage vessels would enable NMFS to adjust sampling rates.

1 INTRODUCTION

This Annual Report provides information, analysis, and recommendations based on deployment of observers in the North Pacific Groundfish and Halibut Observer Program (Observer Program). The Observer Program provides the regulatory framework for NMFS-certified observers to obtain information necessary to conserve and manage the groundfish and halibut fisheries in the Gulf of Alaska (GOA) and the Bering Sea and Aleutian Islands (BSAI) management areas. Data collected by well-trained, independent observers are a cornerstone of management of the Federal fisheries off Alaska. These data are needed by the North Pacific Fishery Management Council (Council) and NMFS to comply with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the Marine Mammal Protection Act, the Endangered Species Act, and other applicable Federal laws and treaties.

Observers collect biological samples and fishery-dependent information used to estimate total catch and interactions with protected species.[1] Managers use data collected by observers to manage groundfish and prohibited species catch within established limits and to document and reduce fishery interactions with protected resources. Scientists use observer data to assess fish stocks, to provide scientific information for fisheries and ecosystem research and fishing fleet behavior, to assess marine mammal interactions with fishing gear, and to assess fishing interactions with habitat. Although NMFS is working with the Council and industry to develop methods to collect some of these data electronically, currently much of this information can only be collected independently by observers.

All vessels and processors that participate in federally managed or parallel groundfish and halibut fisheries off Alaska are assigned to one of two categories: (1) the full observer coverage category (full coverage), where vessels and processors obtain observer coverage by contracting directly with observer providers; and (2) the partial observer coverage category (partial coverage), where NMFS determines when and where observer coverage is needed as described in the annual deployment plan (ADP) developed in consultation with the Council. Some vessels and processors may be in full coverage for some of the fisheries in which they participate and in partial coverage in other fisheries. Funds for deploying observers on vessels in the partial coverage category are provided through a system of fees based on the gross ex-vessel value of retained groundfish and halibut. This observer fee is assessed on all landings by vessels that are not otherwise in full coverage.

The current Observer Program structure was first implemented in 2013 when the previous Observer Program was restructured to address sampling issues associated with non-random observer deployment on some vessels and fisheries[2]. At that time, observer coverage was

[1] Additional information about the data collected by observers is described in the 2015 Observer Sampling Manual sampling manual (AFSC 2014) and summarized in Appendix D of the electronic monitoring strategic plan (Loefflad et al. 2014).

[2] Restructuring of the Observer Program was implemented under Amendment 86 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area and Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska (Amendments 86/76). The final rule for Amendments 86/76 was published in the Federal Register on November 21, 2012 (77 FR 70062).

expanded by including vessels that were previously unobserved, and expanding the full observer coverage category with the overall goal of improving estimates of catch and bycatch. The Observer Program complies with the Magnuson-Stevens Act requirement that the program gather reliable data by stationing observers on all or a statistically reliable sample of fishing vessels and processors necessary for conservation, management, and scientific understanding of the fisheries covered by the fisheries research plan (16 U.S.C. 1862(b)(1)(A)). The previous Observer Program did not distribute observer coverage using well-established random sampling methods because fishermen could choose when to take an observer to fulfill their observer coverage requirement. The previous ad-hoc deployment method prevented representative sampling across all fishing trips, resulting in sampling effort that did not correspond with fishing effort and that resulted in consistent problems with under or over coverage in some fisheries and vessel categories.

This report is part of the annual observer program analytical process, explained in more detail in Section 1.2. Annual review is an integral component of observer deployment in the partial coverage category and allows the sampling plan to be adjusted on an annual basis in response to changing fisheries and scientific data needs.

1.1 Observer Coverage Categories and Coverage Levels

Under the Observer Program, all vessels and processors in the groundfish and halibut fisheries off Alaska are assigned to one of two observer coverage categories (1) a full coverage category; or (2) a partial coverage category.

1.1.1 Full Coverage

In 2015, vessels and processors in the full observer coverage category are identified in regulation at 50 CFR § 679.51(a)(2). The full coverage category includes:

- catcher/processors (with limited exceptions),
- motherships,
- catcher vessels while participating in programs that have transferable prohibited species catch (PSC) allocations as part of a catch share program,
- inshore processors when receiving or processing Bering Sea pollock.

Independent estimates of catch, at-sea discards, and PSC are obtained aboard all catcher/processors and motherships in the full observer coverage category. At least one observer on each catcher/processor eliminates the need to estimate at-sea discards and PSC based on industry provided production and discard data or observer data from other vessels.

Catcher vessels participating in programs with transferable PSC allocations as part of a catch share program also are included in the full coverage category while they are participating in these programs. These programs include Bering Sea pollock (both American Fisheries Act and Community Development Quota [CDQ] programs), the groundfish CDQ hook-and-line and trawl fisheries (CDQ fisheries other than halibut and fixed gear sablefish), and the Central GOA Rockfish Program.

Under catch share programs, quota share recipients are prohibited from exceeding any allocation, including, in many cases, transferable PSC allocations. All allocations of exclusive

harvest privileges create some increased incentive to misreport as compared to open access or limited access fisheries. Transferable PSC allocations present challenges for accurate accounting because these species are not retained for sale and they represent a potentially costly limitation on the full harvest of the target species. To enforce a prohibition against exceeding a transferable target species or PSC allocation, NMFS must demonstrate that the quota holder had catch that exceeded the allocation. Supporting a quota overage case for target species or PSC that could be discarded at sea from an unobserved vessel requires NMFS to rely on either industry reports or estimated catch based on discard rates from other similar observed vessels. These indirect data sources create additional challenges to NMFS in an enforcement action. Inshore processors taking deliveries of Bering Sea pollock are in the full coverage category because of the need to monitor and count salmon under transferable PSC allocations.

1.1.2 Partial Coverage

In 2015, the partial observer coverage category included:

- catcher vessels designated on a Federal Fisheries Permit when directed fishing for groundfish in federally managed or parallel fisheries, except those in the full coverage category;
- catcher vessels when fishing for halibut individual fishing quota (IFQ) or sablefish IFQ (there are no PSC limits for these fisheries);
- catcher vessels when fishing for halibut CDQ, fixed gear sablefish CDQ, or groundfish CDQ using pot or jig gear (because any halibut discarded in these CDQ fisheries does not accrue against the CDQ group's transferable halibut PSC allocation);
- catcher/processors that met criteria that allowed assignment to the partial observer coverage category;
- shoreside or stationary floating processors, except those in the full coverage category.

The 2015 ADP (NMFS 2014b), assigned vessels in the partial coverage category to a stratum (statistical subgroup) in either the trip selection pool or no selection pool; each stratum is associated with a specific selection rate. The requirements associated with the trip selection pool are defined in regulation at 50 CFR § 679.51(a)(1) and details how to notify NMFS of fishing plans using the Observer Declare and Deploy System (ODDS). Vessels in the no selection pool were not selected for observer coverage and have not been required to log trips to date. Additional information about the specific strata and the coverage rates set in the 2015 ADP are described in Section 1.3.

1.2 Annual Planning and Reporting Process

Amendments 86/76 established an annual process of 1) developing an ADP that describes plans and goals for observer deployment in the partial coverage category in the upcoming year, and 2) preparing an annual report providing information and evaluating performance in the prior year.

> The Annual Deployment Plan (ADP) describes how NMFS plans to assign observer coverage to vessels and processors in the partial observer coverage category in the upcoming year. The ADP provides flexibility to adjust deployment to meet scientifically based estimation needs while accommodating the realities of a dynamic fiscal environment. NMFS' goal is to achieve a representative sample of fishing events, and to do this without exceeding funds available through the observer fee. This is accomplished by the random deployment of observers in the partial coverage category. See Section 1.3

for more detail about the 2015 ADP.

The Annual Report provides descriptive information, analysis, and recommendations based on observer deployment in the previous year. An important component of the annual report is chapter 3, the "deployment performance review" chapter, which scientifically evaluates the deployment of observers on vessels in the partial coverage category in the previous year. The purpose of the deployment performance review is to evaluate whether observer deployment goals detailed in the ADP were achieved and to identify recommendations for observer deployment in order to promote the collection of data necessary to conserve and manage the groundfish and halibut fisheries. The Annual Report is an important source of information in developing the proposed ADP for the upcoming year.

The annual planning and reporting process is described below:

- January – June: NMFS staff compile the annual report for the previous year. The Observer Science Committee prepares Chapter 3 (the observer deployment performance review), and a detailed description of the Observer Science Committee is included in Section 3.1.

- June: NMFS presents the Annual Report to the Council (including the Council's Observer Advisory Committee, Advisory Panel and Scientific and Statistical Committee) and to the public. The Council and the public provide input to NMFS on the Annual Report. This input may be factored into the draft ADP, the next Annual Report, or other reports or analyses for the Council.

- June – August: Using information from the prior year's Annual Report and Council recommendations, NMFS prepares a draft ADP for the upcoming year.

- September: NMFS releases the draft ADP by early September each year to allow review by the Groundfish and Crab Plan Teams. The Plan Teams discuss the draft ADP during September and may provide written recommendations to the Council through the Plan Team reports. The Council's Observer Advisory Committee also reviews the draft ADP and Plan Team recommendations prior to the Council's October meeting and provides written recommendations to the Council.

- October: The Council and its Advisory Panel and Scientific and Statistical Committee review the revised draft ADP and Plan Team and Observer Advisory Committee recommendations. The Council also seeks input from the public on the draft ADP. The Council may recommend adjustments to observer deployment to prioritize data collection based on conservation and management needs. NMFS reviews and considers these recommendations; however, extensive analysis and large-scale revisions to the draft ADP are not feasible between October and December. This constraint is due to the short period before the December Council meeting and practical limitations on planning for observer deployment and associated processes that need to be in place by January 1.

December: After final analysis of the Council recommendations, NMFS makes any necessary adjustments to finalize the ADP and release it to the public. Ideally the final ADP will be released to the public prior to the December Council meeting.

1.3 Summary of the 2015 Annual Deployment Plan

The 2015 ADP outlined the sampling plan for 2015 (NMFS 2014b[3]). The most important goal of the ADP is to randomize observer deployment in the partial coverage category. Sampling that incorporates randomization is desirable at all levels of the sampling design because 1) sampling theory dictates that randomization at all levels allows for unbiased estimation and 2) sampling is generally preferential over a census because it is more cost efficient, is less prone to bias than an imperfectly implemented census (one subject to logistical constraints), and can result in greater data quality (Cochran 1977). The sampling methods described in the 2015 ADP were designed to reduce bias in observer data, improve catch estimates, and lay the groundwork for cost-effective improvements to sampling methods implemented in future ADPs.

Since 2008 the Observer Program has employed a hierarchical (nested) sampling design (Cahalan et al. 2014). Starting in 2013, randomization of samples now occurs at all levels of sampling. The 2015 ADP sets forth the sampling plan with the goal of randomization of observer deployment at the first level of the sampling design — the trip or vessel level. The other sampling levels, including sampling the haul (or set) for species composition, and sampling individual fish to collect lengths, weights, and tissue samples, are achieved through the observer sampling methods that are described in the 2015 Observer Sampling Manual (AFSC 2014).

Stratified random sampling, such as is described in the ADP, requires that sample units (i.e. trips) be assigned to a single stratum and that within a stratum a single sampling design and estimation process is used. By definition, each tripmust be assigned to a stratum before any fishing occurs, the probability of selection must be based on the stratum, and this probability must be known for all observed and unobserved trips.

Following the NMFS recommendation put forth in the 2013 Annual Report (NMFS, 2014b), the 2015 ADP used "trip-selection" as the sole method of assigning observer coverage within the 'partial-coverage' category (i.e., the portion that is sampled) of the fleet. Trip-selection was accomplished through the Observer Declare and Deploy System (ODDS).

The partial coverage deployment pools in 2015 were defined as follows:

- No selection: The "no selection" pool was composed of two groups:
    - Catcher vessels less than 40 ft length overall (LOA), or vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear, or vessels that were conditionally released due to life raft capacity.

[3] Available on the Alaska Region website at: https://alaskafisheries.noaa.gov/fisheries/observer-program-reportshttps://alaskafisheries.noaa.gov/sites/default/files/final2015adp.pdf.

- Vessels that volunteered and were selected by NMFS to participate in the EM Cooperative Research were in the no selection pool while participating in such research. Decisions about vessel participation, sampling rates and methods for the EM cooperative research were done through Council's EM Workgroup (see EM Workgroup at http://www.npfmc.org/observer-program/ for more information).

- Small vessel trip-selection ("little t"): This pool was composed of catcher vessels fishing hook-and-line or pot gear and greater than or equal to 40 ft, but less than 57.5 ft in LOA. The vessels in this pool were in the "vessel-selection" pool in the 2013 and 2014 ADPs.

- Large vessel trip-selection ("big T"): This pool was composed of three classes of vessels: 1) all catcher vessels fishing trawl gear, 2) catcher vessels fishing hook-and-line or pot gear that are also greater than or equal to 57.5 ft LOA, and 3) catcher-processor vessels exempted from full coverage requirements (50 CFR 679.51(a)(2)(iv)). This pool was termed the "trip-selection" pool in the 2013 and 2014 ADPs.

The two strata within the trip selection pool, referred to as "little t" (*t*) and "big T" (*T*) respectively, were sampled at a set rate for the entire year with the goal to achieve a planned sampling rate while staying within the budget allocated for observer deployment. In their June 5th 2014 motion, the Council recommended retaining separate rates for two categories of vessels: a lower selection rate for the vessels in the "vessel-selection" pool small t stratum, and a higher selection rate for those vessels in the former "trip-selection" pool. Under the assumption that both of these groups of vessels will be assigned an observer using trip-selection, they are hereafter referred to as "little t" (*t*) and "big T" (*T*) respectively big T stratum.

In the 2015 ADP, fisheries were ongoing; therefore, NMFS did not know the actual budget available for deploying observers in 2015. Instead of projecting fee revenue for mid-July through December 2014, NMFS identified a target budget equal to that of 2014: 5,518 days. Sample size and resulting coverage rate estimates were generated through simulation using the general approach used for the 2013 and 2014 Annual Deployment Plans (NMFS 2013a and NMFS 2013b). The deployment rates (programmed into ODDS) under the 2015 ADP were 12% for *t* stratum, and 24% for *T* stratum. The realized deployment rates in each of the sampling strata are described in Chapter 3.

For the 2015 ADP, NMFS recommended and the Council supported a conditional release policy to allow only vessels in the small vessel trip-selection stratum to receive conditional releases. The Council motion in October 2014 requested that NMFS allow a conditional release under two scenarios: 1) vessels with insufficient life-raft capacity to accommodate an observer, or 2) vessels that were not released due to insufficient life-raft capacity would be released from observer coverage on their third trip if it is consecutive to two previously observed trios (i.e., two trips in a row were observed, resulting in the third trip being released from coverage).

The Council recommended and NMFS agreed to continue to allow trawl catcher vessels participating in the BSAI trawl limited access sector to volunteer for full observer coverage and carry an observer at all times while fishing in the BSAI in 2015. The Council reviewed an initial

draft Analysis on this topic in October 2015 and unanimously recommended a preferred alternative in February 2016 to initiate a regulatory amendment to allow the owner of a trawl catcher vessel to annually choose full observer coverage.

1.4 Changes that have been made since the 2015 ADP

This Annual Report focuses on evaluation of observer deployment in 2015. However, changes have been made to the partial observer coverage sampling plan that are being implemented in 2016. Here we provide a summary of the changes that have been made since the 2015 ADP.

Notable changes to observer deployment on vessels in the partial coverage category for 2016 include the specific strata definitions and associated selection rates and further restrictions of the conditional release policy. Based on recommendations from the Council in June 2015, NMFS evaluated 12 alternative sampling designs (Faunce 2015b). The 2016 ADP identifies three separate strata in the trip selection pool for 2016 (NMFS 2015a):

- Trawl trip-selection: This stratum is composed of all catcher vessels in the partial coverage category fishing trawl gear – 28% selection rate.
- Hook-and-line trip-selection: This stratum is composed of vessels in the partial coverage category that are greater than or equal to 40 ft length overall (LOA) and are fishing hook-and-line gear – 15% selection rate.
- Pot trip-selection: This stratum is composed of vessels in the partial coverage category that are greater than or equal to 40 ft, LOA and are fishing pot gear – 15% selection rate.

The "no selection pool" in 2016 is similar to that in 2015, including fixed gear vessels less than 40ft LOA and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear and vessels participating in the Electronic Monitoring (EM) selection pool. The EM selection pool has been expanded since 2015. For 2016, 58 fixed-gear vessels 40 to 57.5 ft LOA volunteered to participate in the EM selection pool to carry EM systems as described in the EM Pre-Implementation Plan[4]. An additional three vessels >57.5 ft volunteered to carry stereo camera equipment and are also in the no selection pool. Because of the expanded opportunity for additional vessels to participate in the EM selection pool with no requirement to carry an observer in 2016, NMFS will not grant conditional releases in 2016. Vessels that had received a conditional release or temporary exemption in previous years (2013, 2014, and 2015) had an opportunity to opt-in to the EM selection pool and were given priority to participate in the EM selection pool.

Since 2015 there has also been a change to the definition of vessels in full coverage. Amendment 109 to the BSAI Fishery Management Plan places catcher vessels less than 46 ft LOA that are fishing in the groundfish CDQ fisheries and using hook and line gear into the partial coverage category. The final rule became effective on June 3, 2016[5].

[4] Available at: http://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/EM2016Plan915.pdf
[5] https://alaskafisheries.noaa.gov/sites/default/files/81fr26738.pdf

2 FEES AND BUDGET

2.1 Budget for partial coverage category in 2015

Section 313(d) of the Magnuson-Stevens Act authorizes the creation of the North Pacific Fishery Observer Fund ("Observer Fund") within the U.S. Treasury. This was the third year that fees were collected from the partial coverage fleet. Fee billing statements for 2015 were mailed to 107 processors on January 7, 2016. All but twenty bills were paid in full by February 15. A total of $3,775,956 in observer fees will be collected once all bills are paid. In order to collect delinquent fees, six 30-day notices were mailed on March 28, 2016 and two 60-day notices were mailed on April 26. 90-day notices will be mailed as needed. Processors submitting late fee payments were charged an administrative fee of $25 plus interest on the observer fees with each notice. NMFS greatly appreciates the cooperation of processors in prompt payment of observer fees because collection of delinquent accounts is one of the more an expensive administrative costs of a fee collection program is collection of delinquent accounts.

The sequestration of funds initiated under the 2011 Budget Control Act continues to affect the Observer Fund. NOAA was authorized to transfer $3,098,235 to the Alaska Fisheries Science Center (AFSC) to fund the observer deployment contract and this transfer was made on June 10, 2015. At the direction of the Office of Management and Budget under sequestration procedures, the remaining $360,480 (7.3%) is being held in the Observer Fund. NMFS has been informed that these remaining funds will be transferred to the AFSC in fiscal year 2016. However, NMFS is uncertain how the actual application of the sequestration procedures to this fund will occur and so far none of the sequestered funds have been transferred to AFSC.

In addition to the $360,480 in sequestered funds, an additional $886,564 in unused observer funds were carried over from FY15 to FY16 (for a total of $1,247,044). The carryover funds will be used to fund the observer deployment contract in 2016. These two additional sources of funding bring the total observer funds available for the 2016 observer deployment contract to $5,023,000 (Table 2-1).

In 2015, the Council requested an additional $1.5M in funding from NMFS to account for the decline in groundfish prices and resulting shortage in fee collection revenues; ($1.1M for observer coverage and $400K for infrastructure). NMFS provided $2.7M in funding for observer coverage (Table 2-1). The $2.7M in NMFS funding was obligated to the partial coverage contract, and $1.2M in observer fees were carried over into 2016[6].

2.2 Fees Collected from 2015, Summarized by Species, Gear, and Area

Observer coverage for the partial coverage category is funded through a system of fees based on the ex-vessel value of groundfish and halibut, with potential supplements from Federal appropriations. The observer fee is assessed on all landings accruing against a Federal total

[6] NMFS funds are required to be spent in the fiscal year in which they are obligated, whereas observer fees can be carried over from one fiscal year to the next. For this reason, NMFS funds were obligated to the contract in FY2015 and observer fees were carried over for use in 2016.

allowable catch (TAC) for groundfish or a commercial halibut quota made by vessels that are subject to Federal regulations and not included in the full coverage category. Therefore, a fee is only assessed on landings of groundfish from vessels designated on a Federal Fisheries Permit or from vessels landing IFQ or CDQ halibut or IFQ sablefish. Within the subset of vessels subject to the observer fee, only landings accruing against the Federal TAC are included in the fee assessment[7].

A fee equal to 1.25% of the ex-vessel value is assessed on the landings of groundfish and halibut subject to the fee. Ex-vessel value is determined by multiplying the standard price for groundfish by the round weight equivalent for each species, gear, and port combination, and the standard price for halibut by the headed and gutted weight equivalent. The standard ex-vessel prices used for 2015 fee assessments were published in the Federal Register on December 16, 2014 (79 FR 74695)[8].

Table 2-2 through Table 2-4 summarize the observer fee liabilities that accrued for 2015.

[7] A table with additional information about which landings are and are not subject to the observer fee is in NMFS regulations at 679.55(c) and shown on page 2 of an informational bulletin titled "Observer Fee Collection" on the NMFS Alaska Region website at: https://alaskafisheries.noaa.gov/sites/default/files/observerfees.pdf.

[8] Available online at: https://alaskafisheries.noaa.gov/sites/default/files/79fr74695_0.pdf.

Table 2-1 Summary of the fees and Federal funding for partial coverage observers across the respective years.

	2013		**2014**		**2015**		**2016**	
	Fees	Federal	Fees	Federal	Fees	Federal	Fees	Federal
Funds at the start of the calendar year	$0		$0		$1,206,846		$1,247,044	
Funds deposited during the calendar year	$0		$4,251,452		$3,458,715		$3,775,956	
Funds paid out during the calendar year	$0	$2,115,166	$3,044,606	$1,892,808	$3,058,036	$2,700,232	$5,023,000[1]	
Observer Days at the start of the calendar year	0	4,535	0	2,915	2,679	239	2,708	203
Observer Days purchased during the calendar year	0	1,913	2,596	1,772	2,976	2,354	4,937[2]	
Observer Days used during the calendar year	0	3,533	125	4,448	2,928	2,390		

[1]These funds will be paid out to the contract in 2016 when all the funds have been received.
[2]The approximate number of days that will be purchased when the funds above are paid out.

Table 2-2. 2015 observer fee liability[9] by gear, vessel size category, and species or species group for *all areas combined*.

Gear	Vessel Length Category	Halibut	Sablefish	Pacific Cod	Pollock	All Other Groundfish	Total All Species
Hook and Line	<40	$227,703	$20,871	$13,884	$54	$1,924	$264,436
	40 - 57.5	$489,267	$274,645	$44,016	$185	$10,638	$818,751
	>57.5	$616,883	$543,834	$9,892	$22	$10,243	$1,180,874
	Gear Subtotal	$1,333,854	$839,350	$67,791	$261	$22,805	**$2,264,061**
Jig	<40	$365		$860	$7	$57	$1,289
	40 - 57.5	$1,418		$1,058	$34	$231	$2,741
	Gear Subtotal	$1,782		$1,918	$41	$288	**$4,030**
Pot	<40			$127		$38	$165
	40 - 57.5			$30,810	$4	$336	$31,151
	>57.5		$14,413	$319,390	$129	$3,627	$337,558
	Gear Subtotal		$14,413	$350,328	$133	$4,001	**$368,874**
Trawl	40 - 57.5			$2,509	$13,393	$86	$15,988
	>57.5		$9,761	$364,076	$713,801	$35,365	$1,123,003
	Gear Subtotal		$9,761	$366,585	$727,194	$35,451	**$1,138,991**
Total All Gear		**$1,335,636**	**$863,524**	**$786,622**	**$727,629**	**$62,546**	**$3,775,956**
		35%	**23%**	**21%**	**19%**	**2%**	**100%**

Rounding error sometimes results in slight differences in row and column totals.

[9] Administrative fees and interest charged for late fee payments are not included.

Table 2-3. 2015 observer fee liability[10] by gear, vessel size category, and species or species group in the *Gulf of Alaska*.[11]

Gear	Vessel Length Category	Halibut	Sablefish	Pacific Cod	Pollock	All Other Groundfish	Total All Species
Hook and Line	<40	$176,665	$17,283	$13,876	$54	$1,836	$209,714
	40 - 57.5	$418,967	$258,547	$43,335	$185	$10,438	$731,472
	>57.5	$479,703	$523,071	$4,934	$22	$9,926	$1,017,656
	Gear Subtotal	$1,075,335	$798,901	$62,146	$261	$22,200	**$1,958,842**
Jig	<40	$365		$712	$7	$57	$1,141
	40 - 57.5	$1,418		$986	$34	$218	$2,656
	Gear Subtotal	$1,782		$1,698	$41	$275	**$3,797**
Pot	<40			$127		$38	$165
	40 - 57.5			$19,840	$4	$336	$20,180
	>57.5			$137,859	$127	$3,509	$141,495
	Gear Subtotal			$157,826	$131	$3,883	**$161,840**
Trawl	40 - 57.5			$2,509	$13,393	$86	$15,988
	>57.5		$9,761	$149,637	$711,496	$35,293	$906,188
	Gear Subtotal		$9,761	$152,146	$724,889	$35,380	**$922,176**
Total All Gear		**$1,077,117**	**$808,662**	**$373,817**	**$725,322**	**$61,737**	**$3,046,655**
		35%	**27%**	**12%**	**24%**	**2%**	**100%**

Rounding error sometimes results in slight differences in row and column totals.

[10] Administrative fees and interest charged for late fee payment are not included.

[11] The Gulf of Alaska includes Pacific halibut regulatory areas 2C, 3A, and 3B; and sablefish regulatory areas Western GOA, Central GOA, West Yakutat, and Southeast Outside.

Table 2-4. 2015 observer fee liability[12] by gear, vessel size category, and species or species group in the *Bering Sea/Aleutian Islands*.[13]

Gear	Vessel Length Category	Halibut	Sablefish	Pacific Cod	Pollock	All Other Groundfish	Total All Species
Hook and Line	<40	$51,038	$3,588	$8		$88	$54,722
	40 - 57.5	$70,301	$16,098	$680		$200	$87,279
	>57.5	$137,180	$20,763	$4,957		$317	$163,219
	Gear Subtotal	$258,519	$40,449	$5,645		$606	**$305,219**
Jig	<40			$148			$148
	40 - 57.5			$72		$13	$85
	Gear Subtotal			$220		$13	**$233**
Pot	40 - 57.5			$10,970			$10,970
	>57.5		$14,413	$181,531	$2	$118	$196,064
	Gear Subtotal		$14,413	$192,501	$2	$118	**$207,034**
Trawl	>57.5			$214,439	$2,305	$72	$216,815
	Gear Subtotal			$214,439	$2,305	$72	**$216,815**
Total All Gear		**$258,519**	**$54,862**	**$412,806**	**$2,307**	**$809**	**$729,302**
		35%	**8%**	**57%**	**<1%**	**<1%**	**100%**

Rounding error sometimes results in slight differences in row and column totals

[12] Administrative fees and interest charged for late fee payment are not included.

[13] The Bering Sea/Aleutian Islands includes Pacific halibut regulatory areas 4A, 4B, 4C, and 4D; and sablefish regulatory areas Bering Sea and Aleutian Islands.

2.3 Costs

2.3.1 Programmatic Costs

The Fisheries Monitoring and Analysis Division (FMA) monitors groundfish and halibut fishing activities in the U.S. Exclusive Economic Zone off Alaska. Fishery observers collect data that are used for quota monitoring, stock assessments, ecosystem investigations, documenting incidental injury and mortality of marine mammals and other protected species, and various research investigations. FMA staff are responsible for a suite of activities that support the overall observer data collection enterprise on board commercial fishing vessels and at shoreside processing plants. FMA has a total of 51 staff located in: Seattle, WA (44), Anchorage, AK (4), Kodiak, AK (2), and Dutch Harbor, AK (1). The AFSC allocates a budget to FMA each fiscal year. Note that the Federal fiscal year runs from October 1 through September 30. In fiscal year 2015, FMA was allocated and spent $9,099,327 in Federal appropriations in support of the following activities:

FMA Division Leadership and Coordination emphasizes coordinating and prioritizing resources across programs and activities as well as managing links between the programs and overall costs. In addition, overall management and supervision of staff, budget, and contracting is required to ensure resources are appropriately allocated and staff have an understanding of their responsibilities and priorities. Staff also provide advice to support policy development, decision-making, and regulatory and program development by NMFS, the Council, and other regional and national bodies. They also provide guidance and advice on policy issues, monitoring programs, and related topics at the regional, national, and international level.

Fishery Dependent Data Analysis and Interpretation collaborates with scientists throughout the AFSC to ensure that observer data meet the needs of stock assessment and ecosystem-based fishery modeling efforts. In addition, analysts perform independent research aimed at identifying bias and variances associated with fishery-dependent sampling. Analysts also work closely with the Alaska Regional Office and Council staff to ensure that FMA provides relevant, high quality information for fisheries management and in support of requests from the Council and other constituents.

Application Development and Data Presentation develops custom software that supports the recording of fishing effort, location, species composition and biological data collected by fishery observers from the North Pacific commercial fisheries. This software enables the transmission, validation, and loading of those data; the editing and reporting of current and vetted data sets; observer logistics and contract management; and the recording of bird and marine mammal data collections for both internal and external use. In addition, together with FMA Analysts, staff working under this activity developed and continue to support the Observer Declare and Deploy System (ODDS) which allows vessel owners to register, edit, and close fishing trips. This application was developed with independent modules for FMA management, the observer coverage services provider which includes the ODDS call center, and each vessel owner.

In-season Operations activities include data entry, data validation, and observer support, as

well as industry, interagency, and interdivisional support. Staff members install and maintain custom software which is used to transmit observer information and data, ensure observers are trained on the use and configuration of the software, and provide near real time data quality control and guidance for observers using these systems. In addition, staff provide data entry support and verification for all non-electronic data submissions as well as providing technical support to the ODDS call center.

Observer Training and Curriculum Development ensures that observers are properly trained and equipped for their deployments. Observers are trained to follow FMA's established data collection procedures while deployed on commercial fishing vessels or stationed at processing facilities. Training materials are regularly updated and created in response to changes in regulations, data needs for stock assessment and ecosystem-based fishery modeling efforts. Training methods are updated to best convey the complex topics and concepts to the observer work force.

Debriefing and Quality Control ensures FMA's established data collection procedures were properly followed during observer deployments to commercial fishing vessels and processing facilities. Staff members assist at-sea observers through communications (referred to as in-season advising) available through custom software for answering questions, correcting data errors, and ensuring safety concerns are addressed. In addition, they document and evaluate each observer's data collection methodologies through interviews, electronic vessel surveys, and written descriptions submitted by an observer. Staff conduct data quality control checks on data collected by fishery observers; verifying the accuracy of recorded data, identifying errors, and ensuring observers make the necessary corrections.

Anchorage Field Office ensures FMA's established data collection procedures were properly followed during observer deployments to commercial fishing vessels and processing facilities as well as provide observers with support in the field during their deployment. Staff assist at-sea observers through in-season advising and mid-cruise debriefings. In addition, they document and evaluate each observer's data collection methodologies through interviews, electronic vessel surveys, and written descriptions submitted by observers as well as conduct data quality control checks to verify data accuracy by identifying errors and ensuring the observer makes the necessary corrections. Staff conduct 1- and 2-day briefings at this field office and maintain an inventory of complete sampling and safety gear sets for observers redeploying directly from the Anchorage office.

Kodiak Field Office provides support to observers primarily assigned to vessels in the Gulf of Alaska. Support includes conducting pre-cruise briefings with vessel representatives and observers prior to the observer's first trip aboard; conducting mid-cruise debriefings with observers to address any safety concerns on their vessels, and review their data collection methodology and recorded data, providing in-situ problem resolution, and issuing sampling and safety equipment. In addition, staff receive, track, and ship biological samples that are collected by observers in support of resource management, scientific research, and observer training. Staff also serve as the primary FMA contact for observed vessels and processing facilities in the Gulf of Alaska. In 2016 FMA filled a long standing vacancy in the Kodiak field office, bringing the total number of FMA staff in Kodiak to two.

Dutch Harbor Field Office provides support primarily to observers assigned to vessels in the Bering Sea and Aleutian Islands. Support includes conducting pre-cruise briefings with vessel representatives and observers prior to the observer's first trip aboard, conducting mid-cruise debriefings with observers to address any safety concerns on their vessels, and review data collection methodology and recorded data, providing in-situ problem resolutions, and issuing sampling and safety equipment. In addition, staff conduct observer sample station and scale inspections on board commercial fishing vessels to ensure the sample stations meet the standards required in federal regulations. Staff also serve as the primary FMA contact for observed vessels and processing facilities in the Bering Sea and Aleutian Islands. FMA plans to fill a long standing vacancy in the Dutch Harbor field office in 2016 bringing the total number of FMA staff in Dutch Harbor to two.

Observer Gear Inventory and Deployment staff ensure there is sufficient gear inventory to supply the observers deployed throughout the year. They also ensure the field offices in Anchorage, Dutch Harbor, and Kodiak have sufficient gear to supplement observer needs and provide for losses or the exchange of observer gear during deployment. In addition, staff develop inventory control systems and policies to maintain safety equipment, ensure sampling equipment readiness, and monitor equipment losses.

Partial Coverage Deployment and Funding ensures the infrastructure and contracts are in place to meet the observer deployment requirements of BSAI Amendment 86 and GOA Amendment 76. Staff provide oversight of the fishery observer services provider contract; serving as the primary point of contact for the contracted provider and FMA. They coordinate with NOAA's Acquisition and Grants Office to develop future Requests for Proposals. Staff also coordinate with industry, schedule vessel inspections as needed, and participate in decision- making for partial coverage vessels that are selected for coverage but request a release from the requirement. In 2015 a total of $2,700,232 in NMFS funds were spent on partial observer coverage deployment.

Electronic Monitoring (EM) was formed as a unique activity within FMA starting in 2013 and has continued to dedicate staff time to the development and integration of electronic technologies in Alaskan fisheries. In April 2014, the Council convened an EM Workgroup to develop alternatives for EM in the small hook-and-line fleet. Several FMA staff participated in the workgroup and have a lead role in planning and executing coordinated research activities that will advance the science of EM and increase efficiencies in interpreting resulting data. In 2015 a total of $1,153,618 in FMA funds were spent on EM.

2.3.2 Contract Costs for Partial Coverage

NOAA's Acquisition and Grants Office (AGO) secures and administers contracts for NMFS. FMA staff participate in contracting by initiating requirements documents, providing funding, and participating in the contract review and award process through formal source evaluation boards. The processes for Federal contracts follow the Federal Acquisition Regulations (FAR). NMFS receive legal guidance on the FAR through NOAA contract attorneys and AGO staff.

The detailed costs on the Federal contract are protected by confidentiality as they contain

competitive information. NMFS has been advised that it can only release information on the amount of services (observer days) after the contract task order is awarded and services have been procured. Note that detailed information on costs for all NOAA observer contracts were requested in a 2013 Freedom of Information Act request and this request is currently in litigation.

After a contract is awarded by NOAA, FMA staff participate by assigning a Contracting Officer Representative (COR) to the contract. The COR provides direct technical oversight of the contract by monitoring contract performance, identifying and resolving operational issues, and reviewing and approving invoices. While FMA is directly involved in day to day contract management through its assigned COR, NOAA retains full authority over the contract through their appointed Contract Officer (CO). The NOAA CO can modify, extend, cancel, and award contracts.

In September 2012, NOAA awarded a 2-year contract to A.I.S., Inc. (http://aisobservers.com/) for the provision of fishery observer services to the partial coverage component of the Alaskan fleet. The contract expired in September 2014, but was extended for an additional 6 months until March 30, 2015. Observer provider services continued beyond the expiration date on existing task orders that had been purchased on the 2-year contract. On October 2, 2014 a solicitation for a new observer services contract for the North Pacific was released on FedBizOpps.gov. All proposals were due by November 3, 2014. In April 2015, NOAA awarded a 5-year contract to A.I.S., Inc.

Federal contracting procedures and milestones were discussed in the Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for restructuring the Observer Program (NPFMC 2011). Additional information can also be found at http://www.easc.noaa.gov/APG/. Although the contract is confidential and not made public, the Request for Proposals for the currently awarded contract is available to the public.[14] Funding for observer deployment in the partial coverage component of the restructured Observer Program in 2015 was provided through a combination of Federal funds and observer fee collections. Additional Federal funds were allocated in 2014 to continue 2015 coverage until fee proceeds were available from the U.S. Treasury for NMFS spending. Future observer funding in the partial coverage component of the Observer Program will largely be dependent on fee proceeds. Additional funds were added in 2015 to make up for a shortfall of anticipated funds from the fee collection proceeds of 2014.

In 2015, a total of $5,758,268 ($3,058,036 in observer fees and $2,700,232 in Federal funds) was used to purchase 5,330 observer days (2,976 with observer fees and 2,354 with Federal funds; Table 2-1). There is some uncertainty regarding when the fee proceeds will be available from the Treasury for spending. The fee proceeds were transferred to the AFSC on June 10, 2015, and Task Orders on the contract were used to allocate these fees to sea days. At the close of 2015, NMFS had used 5,318 observer days and carried 2,708 observer days already

[14] Available online at: https://www.fbo.gov/index?s=opportunity&mode=form&id=a39e12eac42aaa4b0d10e98388792339&tab=core&_cview=1

procured with observer fess and Federal funds into 2016 (Table 2-1).

Estimated cost per day for partial coverage

In 2015, NMFS spent $5,758,268 to procure 5,318 observer days for an average cost per observer day is $1,083 per day. The cost is a combination of a daily rate, which is paid for the number of days the observer is on a vessel or at a shoreside processing plant, and reimbursable travel costs. The contractor also must recoup their total costs and profit through the daily rate, which includes the costs for days the observers are not on a boat. These days include training, travel, deployed in the field but not on a boat, and debriefing.

The observer coverage under the first two years of the program fell under a 2-year contract awarded to A.I.S., Inc. A second contract was awarded to A.I.S. in April, 2015, for the next 5 years of the program (see Section 2.5 and Section 2.6.1). The detailed breakdown between daily rate and travel is confidential and NMFS has been advised that it can only release information on the amount of services (observer days) after services have been procured. Table 2-1 provides a summary of funds spent and the number of days procured so far in the program, which result in the average cost of $1,071 per day. Future Annual Reports will continue to provide information and funds spent, days procured, and the average cost per day under the new contract. NMFS anticipates that the average cost per observer day is likely to be reasonably stable over the next 5 years and not vary dramatically from average costs we have seen thus far in the program.

It is worth noting that during the first two years of the program, the partial coverage costs in the North Pacific have been on par with partial coverage, government-contracted observer costs in other regions (e.g., $1,227/day in the Northeast region[15]).

2.3.3 Costs for Full Coverage

The costs associated with the full coverage component are the direct costs that industry pays to certified observer providers, sometimes referred to as "pay as you go." The services observer providers carry out include paying observers, deploying observers to vessels and shoreside processors, recruiting, training and debriefing. . There are currently four active certified providers in Alaska and they compete for the business of industry. Since 2011, certified observer providers have been required to submit copies of all invoices for observer coverage under 50 CFR part 679 (75 FR 69016; November 10, 2010). The invoices are submitted to and compiled by FMA staff. Regulations governing the submission of observer invoices are at § 679.52(b)(11)(viii). These regulations require the submission of:

- vessel or processor name,
- dates of observer coverage,
- information about any dates billed that are not observer coverage days,
- rate charged for observer coverage in dollars per day (the daily rate),
- total amount charged (number of days multiplied by daily rate),

[15] See: http://www.nefsc.noaa.gov/fsb/SBRM/2015/2015_SBRM_Annual_Discard_Report_and_Observer_Sea_Day_Allocation_using_Apr16budget_05132015v2_rev.pdf

- the amount charged for air transportation, and
- the amount charged for any other observer expenses with each cost category separated and identified.

These invoices provided the data used to calculate the average cost of observer coverage in the full coverage category for 2015. The observer invoice data are confidential under section 402(b)(1) of the Magnuson-Stevens Act. Therefore, summarized information may be provided in this report only when the data used in the summary statistic derives from invoices submitted by at least three observer providers. This confidentiality requirement limits the detail of the average cost data that may be reported to the public, as noted below.

The total cost billed to 177 vessels and processing facilities for observer coverage in the full coverage category in 2015 was $15,012,480. The total number of observer days represented by these invoices was 40,004. Based on this information, the average cost per day of observer coverage in the full coverage category in 2015 was $375. This average combines invoiced amounts for the daily rate per observer day (variable cost) plus all other costs for transportation and other expenses (fixed costs). The average cost per day in 2015 compares with an average cost of $367 in 2013 and $371 in 2014.

Figure 2-1 summarizes the average costs to fishing and processing vessels in the full coverage category by sector and gear type in 2015. These sector and gear type categories are fixed gear catcher/processors, trawl catcher/processors, and trawl catcher vessels. Invoice data for hook-and-line and pot catcher/processors are combined into a fixed gear category to protect confidentiality. Shoreside processors that take deliveries of Bering Sea pollock are in the full observer coverage category, however, they are not included in Figure 2-1 protect confidentiality. Days may include days by more than one observer in a year, and person days of coverage for an operation may exceed 365 days in a year if multiple observers were present.

Figure 2-1, part (a) shows the average number of observer days per vessel in the three vessel categories[16] , and the average daily rate observer providers charged for observer coverage[17]. The average daily observer rate (variable costs only) was similar across all gear and sector categories at approximately $340. Figure 2-1, part (b) shows the estimated average variable and fixed costs for observer coverage for vessels and processors. Variable costs equal the product of the daily rate for an observer and the number of days of observer coverage. Fixed costs equal total invoiced expenses minus the variable costs, and are primarily costs of transporting observers to and from their stations. Across gear and sector categories fixed costs as a percentage of total costs are similar at approximately 10%.

To enhance the broad aggregate costs data provided in this report, researchers attempted to stratify costs by region (BSAI and GOA), program (BS AFA pollock, GOA Rockfish Program,

[16] The average number of observer days per vessel is calculated by dividing total observer days in each vessel category by the total number of vessels in that category.

[17] For a vessel's activity within a gear and sector category, the vessel's annual daily observer rate is calculated by dividing the costs paid for observers (excluding airfare and other incidental costs) by the number of observer days. The average daily observer rate is calculated by as a simple average of each vessel's annual daily observer rate.

and the BSAI trawl catcher vessels that volunteered for full coverage), and observer deployment duration. A couple of factors prevented presentation of these more detailed data in this report. First, many of the results are confidential because after stratification results contain only two of the four observer providers. Second, the fields currently recorded in the invoice dataset prevent us from fully reconciling differences between the billing period and the time of deployment, resulting in a number of cases where there was ambiguity regarding the incidence of costs to a specific region, program or deployment duration. Bearing in mind these difficulties, analysis of stratified results indicate that (1) the average cost per day of observer coverage is highest for the trawl CV sector particularly in the Gulf of Alaska, and (2) based on sampled invoices where deployment durations were 5 days or less, the average cost per day of shorter duration trips could be significantly higher than the average cost per day for the trawl CVs as a whole. The higher costs in these strata are the result of higher fixed costs (airfare and other incidental expenses) and fewer days of coverage. The higher fixed costs are likely attributable to the fact that the scale of CV fishing activities requiring full coverage is smaller in the Gulf of Alaska with fewer days of coverage per vessel.

More information about the comparison of costs per observer day for full and partial coverage is described in section 2.4.3.

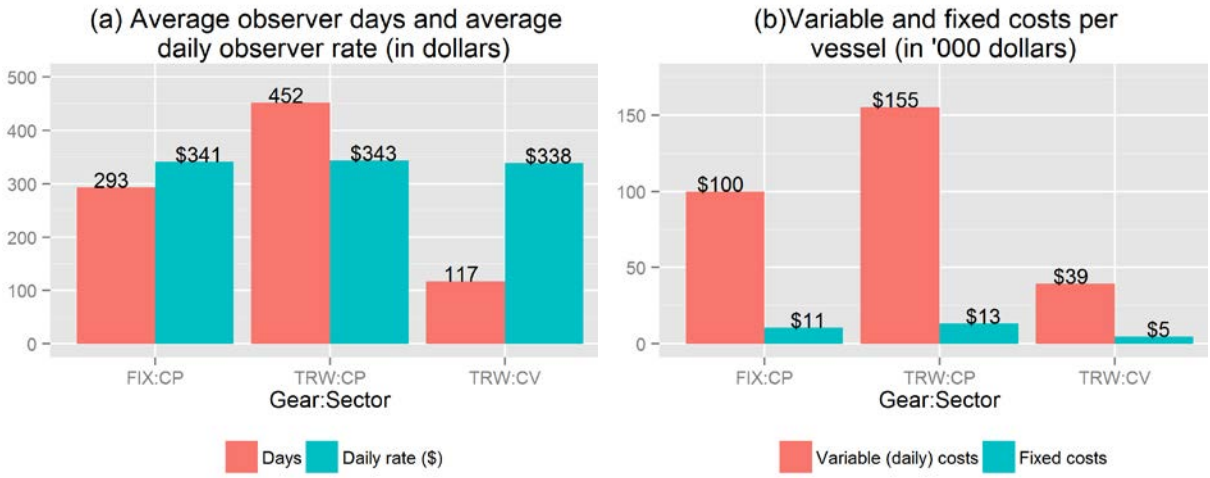

Figure 2-1. Variable costs (a, b) and fixed costs (b) to vessels and processors for observer coverage in the full coverage category in 2015, by gear type (FIX = fixed gear which includes hook & line and pot gear, TWL = trawl) and sector (CP=catcher processor, CV = catcher vessel, note the costs for shoreside processing sector is excluded from this figure for confidentiality.)

2.4 Cost Savings and Efficiencies

2.4.1 Partial Coverage

The new observer service provider contract was awarded on April 22, 2015. The rates that NMFS currently pays the observer services contractor were established through a competitive bidding process. The new contract has several components designed to improve efficiency

and reduce costs. For example, the new contract requires that a partial observed sea day completed by the contractor are paid at an amount equal to one-half the daily rate. A partial observed sea day is one in which the vessel leaves port after 1200 (noon) or returns to port before 1201. The lower rate applies to all days in which an observed vessel leaves or arrives in port before or after the designated times.

The costs associated with the partial coverage component are a daily fee NMFS pays for each sea day, and a reimbursable cost for travel as defined in the NOAA contract. Because NMFS only pays for sea days, the daily rate charged to NMFS must factor in an estimate for the contractor's fixed costs for unobserved days. Increasing the proportion of time spent at sea would increase the efficiency of the overall program since it would lower fixed costs to the contractor and allow for a newly negotiated lower daily rate charged to NMFS.

Similar to the last contract, NMFS included the provision for observers to participate in NMFS fishery-independent surveys using funds made available through Federal appropriations. This allows A.I.S. Inc. to provide additional work to their employees during the summer season when observer opportunities as part of the Annual Deployment Plan are more limited. This provides their employees continuity in employment, additional experience, and may help to reduce employee turnover, thereby increasing their overall efficiency. The NMFS benefits from trained observers with sea experience to help to conduct their survey fieldwork.

2.4.2 Full Coverage

NMFS has implemented regulations that limit deployment, set minimum qualifications, require specific experience for observers assigned to certain deployments, and require specific reporting. Efficiencies could potentially be gained by increasing competition, reducing constraints, or increasing efficiency of NMFS supporting activities.

The majority of business is conducted by three of the four NMFS certified observer providers. This pool is down from a high of 10 certified providers in 1991. It is NMFS's understanding that the pool was reduced due to competition, so it is uncertain if a new provider could be competitive, or if the impact would result in substantial increases in efficiency.

NMFS received an observer provider permit application from AIS Inc. to become an observer provider for operations requiring full observer coverage in the North Pacific groundfish fisheries. As described in the regulations, the Regional Administrator is responsible for establishing an observer provider permit application review board. A review board comprised of staff from the AFSC and AKRO has been established and the application is currently being reviewed.

2.4.3 Comparing cost efficiencies between full and partial coverage categories and observation methods

There are several factors that impact the costs in partial coverage, particularly when compared to costs in full coverage:

- The partial coverage contract is a Federal contract between NMFS and the observer

provider company whereas the full coverage observer providers do not operate under a Federal contract. Instead, full coverage observer providers are certified by NMFS and contract observer services directly with vessels;

- Federal contracts are subject to Federal Acquisition Regulations, Fair Labor Standards Act, and Service Contract Act requirements, and applicable Department of Labor Wage Rate Determination which establish, among other things, minimum wage and benefits for observers, including overtime;
- Partial coverage observers deploy out of many small, remote port locations which increases travel and lodging costs;
- The average trip duration for partial coverage observers is significantly shorter (3 to 5 days) than for full coverage observers (60 to 90 days), requiring more travel between vessels.
- All travel costs and expenses incurred in partial coverage are reimbursed in accordance with the Government's Travel Regulations. These include specified per diem rates which are paid regardless of actual expenses;
- Partial coverage by its very nature is inefficient on a cost per unit basis compared to full coverage. This is because partial coverage samples the fleet, such that gains are made in overall costs in monitoring. However, predicting where observers will be deployed and in what amount is difficult with random selection procedures. This risk and uncertainty regarding the number of unobserved days are solely borne by the partial coverage observer provider, and increase costs on a per unit (daily rate) basis.

It is difficult to compare the costs of an observed day in full and partial coverage in the previous sections of this chapter to evaluate the relative efficiency of deployment between these coverage types, but calculating a 'fully loaded' daily rate is the easiest and perhaps only way to do this comparison. A fully loaded rate is calculated from the total funds expended divided by the number of observed days. This calculation incorporates both travel and infrastructure costs.

For the partial coverage contract in 2015, the fully loaded rate is \$5,758,268 / 5,318 days = \$1083 day^{-1}. This calculation is appropriate for partial coverage since all trips in this category have a similar duration. For example, trip durations range between 1 and 5 days (Figure 3-10; NMFS 2015a; Figure B-3).

The Council has tasked NMFS with implementing Electronic Monitoring (EM) technology for the purposes of catch estimation on fixed gear vessels 40-57' in length and actively participates in its development through the EM Workgroup and EM Pre-Implementation plans. A simplified fully-loaded daily rate can be calculated for the EM program in 2015. In 2015 the base cost of the EM contract was \$250,000 with a review cost of \$140 day^{-1} was expended for 259 days of review.[18] A comparable fully loaded rate for EM in 2015 is therefore is 250,000 + (140 x 259) = \$286,260 / 259 days = \$1,106 day^{-1}.

[18] http://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/NMFS2016EMDeploymentCostAnalyses.pdf [19] The exception to this rule is that any trips selected for observer coverage that were cancelled by the users are inherited on the first trip(s) logged in the new year.

Compared to a partial coverage observer that may be deployed onto multiple vessels for 1-5 days at a time during a month, an observer deployed onto a full coverage vessel boards once and may stay on that vessel for a month or greater. Assuming the costs of paying an observer for a day and maintaining an observer provider infrastructure are constant, the fixed costs are likely to be dominated by travel and temporary housing. These fixed costs as a proportion of the total cost for an observer deployment will decline with increased deployment duration. Therefore, the fully loaded rate of an observer day will also decline with an increase in the number of invoiced days for a given vessel in a given month. We can illustrate this phenomenon using the 2015 full-coverage invoice database maintained by FMA. The per-day base rate for observer coverage per contractor is known. Therefore, this value multiplied by the total number of invoiced days yields the total base invoice cost. Since the total invoice amounts are known, a subtraction of the total base invoice from the total invoice amount will either yield a zero, or a positive value. Only those invoices that included travel costs and therefore "fully loaded" and were considered further. The fully loaded invoice value was divided by the number of days on the invoice, yielding a fully loaded daily rate for each invoice. The fully loaded rate as a function of the total number of observed days in the invoice does in fact decline as expected (Figure 2-2).

The results from Figure 2-2 illustrate the need to examine fully loaded full coverage cost rates over trip durations that are comparable to those in partial coverage. A closer look at these data for trips lasting less than six days is shown in Figure 2-3. Although fully loaded costs per day rapidly decline for each additional day of invoice duration, the average for trips that were 1-5 days was \$773 day^{-1}. This value is comparable to those metrics already calculated for partial coverage since the trips have similar duration. Therefore, in terms of the fully loaded daily rates calculated here, in 2015, partial coverage rates were comparable and greater than for full coverage; EM partial coverage was 43% greater than full coverage, and observer partial coverage was 40% greater than full coverage.

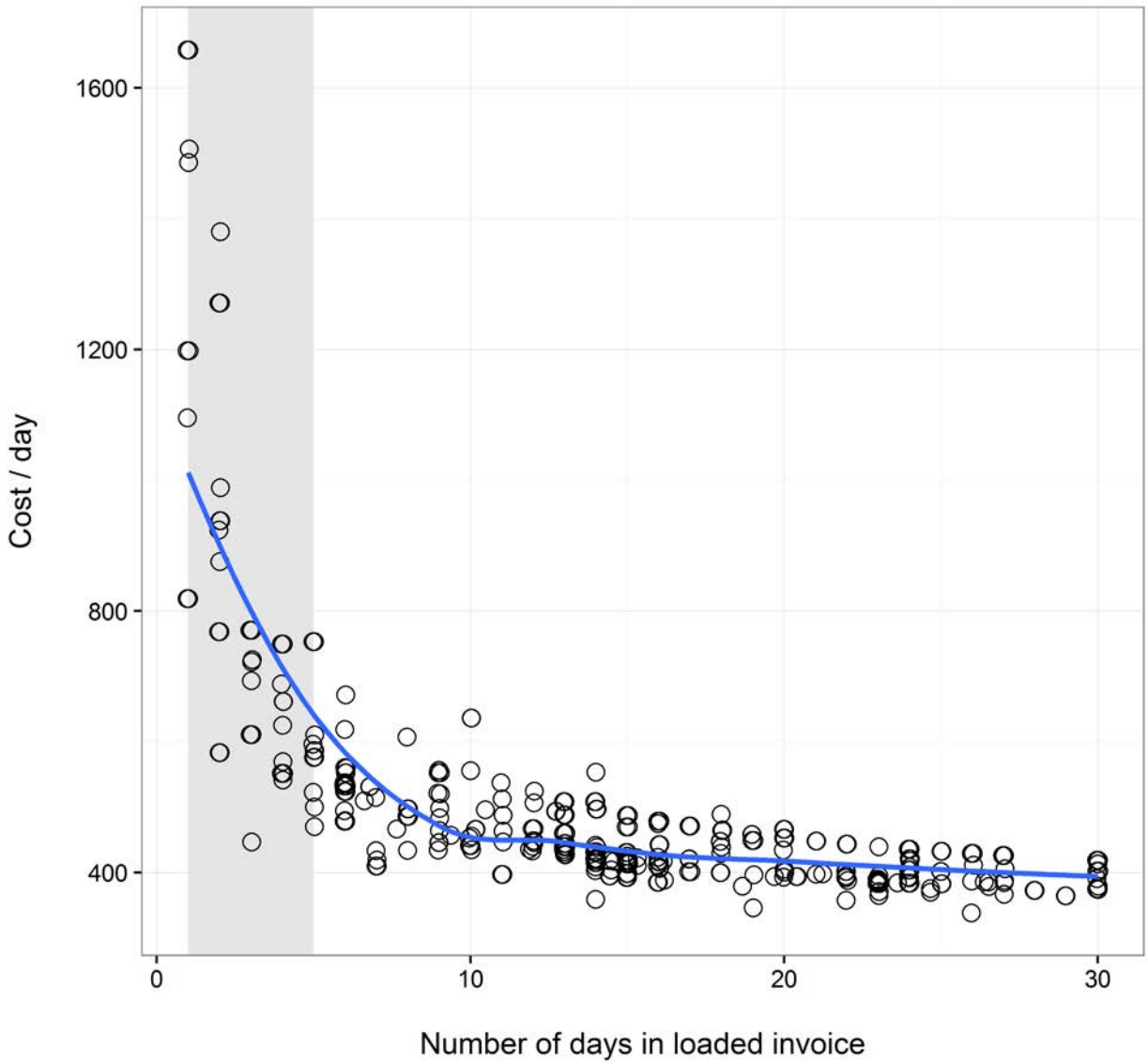

Figure 2-2. Relationship between the fully loaded cost per day for full observer coverage as a function of the number of days in the loaded invoice. A smoother functions has been fit to data (line). The area that corresponds to partial coverage trip duration is shaded grey.

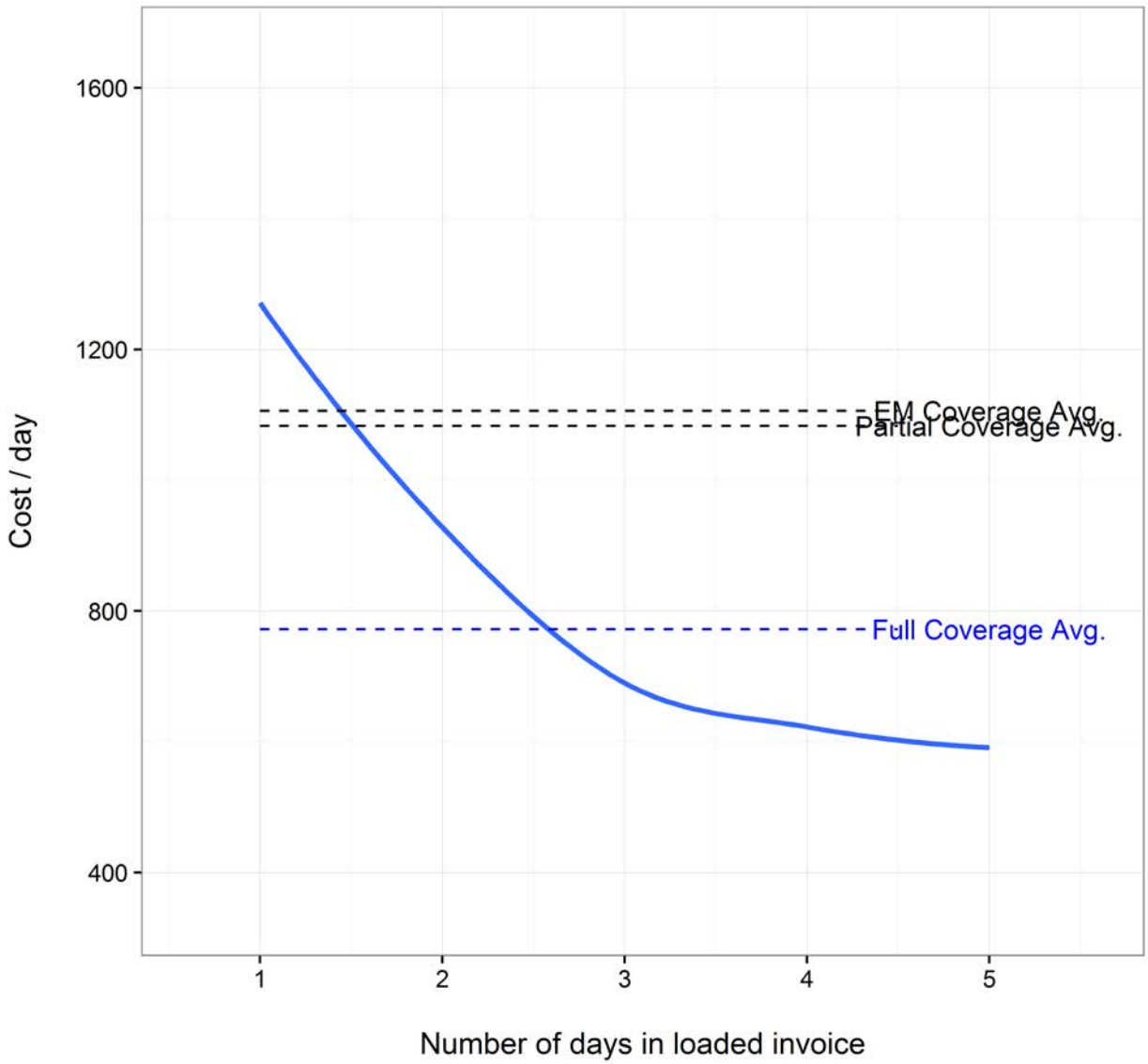

Figure 1-3. Detail of smoother function fit on data from Figure 2-2 for invoices on observer deployments lasting less than six days. The averages for EM, partial coverage, and full coverage for a comparable trip duration are denoted as dashed horizontal lines and text.

3 DEPLOYMENT PERFORMANCE REVIEW

3.1 Introduction

Each year the Alaska Fisheries Science Center's (AFSC) Fisheries Monitoring and Analysis (FMA) Division establishes an *ad hoc* Observer Science Committee (OSC) for the Observer Program. The OSC is intended to provide scientific advice in the areas of regulatory management, natural science, mathematics, and statistics as they relate to observer deployment and sampling in the groundfish and halibut fisheries of the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA). OSC members must have practical, analytical and scientific expertise relating to the observer sampling of groundfish and halibut fisheries of the BSAI and GOA and/or the use of the resulting data. If possible, the OSC is represented by at least one member of the AFSC/FMA (Observer Program) Division, one member of the AFSC/Stock Assessment and Multispecies Assessments Program, one member of the Alaska Regional Office/ Sustainable Fisheries Division (SF), and one member of the International Pacific Halibut Commission (IPHC).

This chapter contains the OSC review of the deployment of observers in 2015 relative to the intended sampling plan and goals of the 2015 ADP (NMFS 2014a). This review identifies where possible biases exist and provides recommendations for further evaluation, including potential improvements to the observer deployment process that should be considered during the development of the 2017 ADP.

The goal of sampling under the restructured program is to randomize the deployment of observers into fisheries to collect representative data used to estimate catch and bycatch, assess stock status, and determine biological parameters used in population and ecosystem modeling efforts in addition to salmon bycatch stock-of-origin determinations. Therefore, this evaluation focuses on the randomization of observer deployments (primary sampling units) under the restructured Observer Program, and how departures from a random sample affect data quality.

3.1.1 Observer Deployment Performance Metrics

Performance metrics have been developed to assess whether the trip-selection process (through the implementation of the 2015 ADP) provides a representative sample of the catch in the North Pacific in 2015. These metrics reflect four mechanisms that can impact the quality of the data: sample frame discrepancies, non-response, trip differences, and sample size. In cases where the vessel is the sampling unit, sample frame discrepancies (under- and over-coverage of the sample frame) were used to quantify the differences between the sampled population and the population for which estimates (inferences) are made, as well as to identify possible mechanisms of bias. Non-response assessments are made to quantify the differences between the selected sample (selected trips or vessels expected to be observed) and the actual observed sample (observed trips or vessels after non-response drivers such as releases) that may lead to bias in the resulting data.

The performance metrics used in this evaluation are as follows:

1. Deployment rates for each stratum: This is the basic level of evaluation comparing sampling rates targeted and achieved. Implementation challenges can be identified in this

step, such as: sample frame inadequacy (vessel-selection only), selection biases, and issues with sample unit definitions (e.g., tendered trips). Specifically, this section assesses the following:

a. Sample rates and number of samples relative to intended values.

b. (Vessel-selection strata only) Quantification of under- and over-coverage rates (sample frame discrepancies). Over-coverage of a population occurs when the sample frame includes elements (trips or vessels) that are not part of the target population. When these elements are included in the random sample, effort (time, cost) is expended needlessly. Under-coverage results from having a sample frame that does not include a portion of the target population which can lead to biased data if that portion of the population differs from the population included in the sample frame.

c. (Vessel-selection strata only) Non-response rates. Non-response occurs when randomly selected elements (trips or vessels) are not actually sampled. If these trips or vessels have different fishing behavior (e.g., catch, areas fished) than the rest of the population, the data collected will not represent the entire fleet (non-response bias).

2. Representativeness of the sample: Randomized sampling is a method used to ensure that the results of sampling reflect the underlying population. Departures from randomization can lead to non-representative data and hence potential bias in estimators of parameters of interest. A randomized sample design is expected to achieve a rate of observed events that is similar across both space and time. The hypergeometric distribution is used to construct several of these metrics. This distribution describes the probability of selecting sample units (e.g., trips) with specific characteristics (e.g., NMFS Reporting Area) based on a sample taken from a population with known characteristics (e.g., trips that occurred in a NMFS Reporting Area). Representativeness of the sample was divided into three separate components:

   a. Temporal representativeness

      i. Effort plots: plots of expected and actual observed effort over time. Areas where these two lines deviate from each other are indicative of periods with differential realized sample rates (and potential temporal bias).

   b. Spatial representativeness

      i. Maps: Maps provide a visual depiction of the spatial distribution of observer coverage relative to effort in each partial coverage stratum, as well as where low or high coverage rates occurred.

      ii. Probability of selecting a sample and observing a fewer or greater number of trips within an area than would be expected given the implemented sample rates. These data are used to identify departures from anticipated sampling rates.

   c. Representativeness of trip characteristics

      i. Consistency of trip characteristics for observed and unobserved portions of the stratum. Attributes include:

- Trip duration
- Vessel size
- The number of NMFS Areas visited during the trip
- The amount of landed catch (t)
- The number of species in the landed catch (also known as species richness)
- The proportion of the total landed catch that was due to the most prevalent species (pMax, an inverse measure of species diversity – in increase in pMax indicates a decline in diversity).

3. Adequacy of sample size: A well-designed sampling program will have a sample large enough to reasonably ensure that the entire target population is sampled (represented in the data). This determination was made through an examination of the probability of selecting a sample and having cells (e.g., defined by NMFS Reporting Area and strata) with no observer coverage.

3.2 Changes to this chapter from last year

Deployment Strata

- Vessels could volunteer to carry Electronic Monitoring (EM) in 2015. These vessels were placed into the zero-selection category during 2015 for as long as they continued to volunteer.
- The vessel-selection method of deployment that uses vessel:time periods as a sample unit to deploy observers within the partial coverage category was suspended in 2014 and was not in use during 2015 (Note however, that this method was reintroduced for EM Voluntary vessels starting in 2016).

Methodological changes

- The methodology used to define full-coverage trips changed between past Annual Reports and this version. In the past, full-coverage trips were defined in the data from vessel:week combinations. In this report, the field TRIP_SEQ from observer data were used to define trips in this coverage category, since all trips are observed. Trip counts and durations in this coverage category now reflect actual fishing trips rather than the unit of a week that is used in quota monitoring. Hence comparisons between the number of trips in this coverage category from this report are not comparable to past reports.
- In this report, considerable effort was made to make use of VMS using geo-fencing algorithms to define trip durations for unobserved partial coverage trips that delivered to a tender vessel.
- Tables with the number of trips for each condition used in permutation tests (i.e., sample size) are now included.
- A permutation test to examine whether observed trips were different from unobserved trips for all partial coverage activity (tendered and non-tendered trips combined) by stratum is now included.
- Permutation tests to examine whether partial coverage trips delivering to a tender are different from those that did not deliver to a tender were performed using 2015 and 2016

stratum definitions (i.e gear type; NMFS 2015a). In 2014 these tests were conducted on all partial coverage strata combined.

- Permutation tests to examine whether observed trips were different from unobserved trips within tendered and non-tendered trips are now conducted for each partial coverage stratum. In 2014 tests for an observer effect within tendered trips were conducted on all partial coverage strata combined, and tests for an observer effect within non-tendered trips were conducted by strata:gear combinations.

3.3 Evaluation of observer deployment in 2015

The deployment of observers into the 2015 Federal fisheries in Alaska needs to be evaluated at the level of the deployment stratum because each stratum is defined by a different sampling rate. Following the June 5th 2014 Council Motion that the *t* stratum (2014 vessel-selection stratum) have a lower selection rate than the *T* stratum (2014 trip-selection stratum), a suite of possible combinations of rates for these two stratum were evaluated in the 2015 ADP. Possible rates were determined by iteratively increasing the selection rate for the *t* stratum from 12 to 19% and determining the corresponding rate for *T* that maximized the expenditure of available funds. This translates to a set of selection rates that was anticipated to result in about a 1 in 2 chance of going over budget.

Following the 2015 ADP, the ODDS was programmed to randomly select observer coverage for 12% of logged trips in the *t* stratum and 24% of logged trips in the *T* stratum. These rates were the expected rates of observer coverage in these strata.

3.3.1 Evaluating Effort Predictions

Each year the NMFS sets an annual budget in terms of observer days. Therefore how close anticipated observed effort is to actual invoiced effort in each ADP is a function of how well the NMFS predicts effort and how well the NMFS achieves its sampling rate. The observer day budget for 2015 was set at 5518 days for the 2015 ADP (NMFS 2014a). In 2015, NMFS set coverage rates to maximize the likelihood of expending the available observer days. This resulted in coverage rates with a 50% chance of exceeding the available sea-day budget, and a 50% chance of expending less than the available sea-day budget (NMFS 2014a). Based on simulations of 2013 fishing data made a year in advance of deployment, the FMA predicted it would observe 5517 fishing days at the end of 2015. In 2015, the FMA paid for 5318 observer days-- 936.5 days were paid in the *t* stratum and 4381.5 days were paid in the *T* stratum. This total observer day budget was 3.6% lower than predicted (Figure 3-1). For comparison, in 2014 the expended budget was 7.4% less than predicted in the 2014 ADP (NMFS 2015b).

3.4 Performance of the Observer Declare and Deploy System in Trip Selection

Random selection of trips in the trip selection stratum is facilitated by the ODDS. The ODDS generates a random number according to pre-determined rates and assigns each logged trip to either "selected to be observed" (selected) or "not selected to be observed" (not selected) categories. The NMFS observer provider has access to all selected trip information necessary to schedule observer logistics. Industry users of the system are given flexibility to accommodate their fishing operations; up to three trips may be logged in advance of fishing.

Logged trips have different dispositions. They may be closed by a vessel operator after fishing

or cancelled prior to fishing. Trips can be cancelled by the user or the observer provider. A NMFS waiver is issued in cases where the observer provider cannot provide an observer for a selected trip in time. Any remaining trips that have not been closed at the end of the calendar year are automatically cancelled by the ODDS to prevent 2015 ODDS trips from affecting the deployment rates set for the 2016 ADP[19]. The number of trips logged in the ODDS in 2015 and their dispositions is summarized in Table 3-1. Of 7,046 trips logged, a total of 931 trips were cancelled (13.2%-- 552, or 7.8% by ODDS) and 12 trips were waived (0.2%). The cancellation rate (calculated from the number of trips cancelled by the user divided by the number of trips not cancelled by the ODDS) ranged from 2.8 to 3.8% for non-selected trips, and 23 to 13% for selected trips from the *t* and *T* strata respectively.

The flexibility offered by the ODDS means that the outcome of random selection is known to the vessel operator for up to three logged trips. In the case where ODDS users disproportionately cancel selected trips, observer coverage is expected to be less than programmed selection rates. To reduce this potential bias, ODDS is programmed to automatically select the vessel's next logged trip if a previously selected trip was cancelled by the user. Although these "inherited" trips preserve the *number* of selected trips in the year, they cannot prevent the *delay* of selected trips during the year. Therefore the potential for temporal bias is still present.

The extent to which trip selections are changed from the time they are entered can be determined by comparing the rate of trip observation expected from 1) random selection of all logged trips (initial selection rate) and 2) random selection of remaining trips after they have had dates changed and are closed or cancelled (final selection rate). In either case, the proportion of trips selected to be observed should fall within what would be expected given the binomial distribution (since each trip is either selected or not selected). The rate obtained in the initial selection process was 11.6% for the *t* stratum and 23.8% for the *T* stratum. These values were well within the range of values expected from a binomial distribution (exact binomial test p-values = 0.595 and 0.770 for *t* and *T* respectively). This means that the ODDS was selecting trips according to the programmed rate. The final selection rate after trips were closed and cancelled was 12.6% for the *t* stratum and 25.4% for the *T* stratum. The fact that the final selection rates were greater than the initial selection rates results from the fact that cancelled trips that were originally selected for coverage are preserved through the inherit process, while cancelled trips that were not originally selected for coverage are not. These rates and the potential impact of trip selection waivers is presented in Table 3-2.

Differences in the initial and final selection rates were evident throughout 2015. Whereas the original selection rate approached the programmed rate within partial coverage strata after only a month, the final selection rate lagged that of the initial rate and did not approach the programmed selection rate until several months later (Figure 3-2). After several months, the final selection rate eclipsed that of the initial selection rate and remained the higher rate through the remainder of the year. These patterns are consistent with the hypothesis that trips selected for coverage are being delayed, and cancellation of selected trips results in a greater number of selected trips later in the year as the result of the inherit process. It is important to remember that ODDS only provides the *expectation* as to what levels of observer coverage

[19] The exception to this rule is that any trips selected for observer coverage that were cancelled by the users are inherited on the first trip(s) logged in the new year.

levels should be resulting from actual fishing events. While the 2015 ODDS provided users with a list of Report IDs from *e*Landings from which to close their logged trips, there is no way to know that such linkages between logged and realized trips are accurate.

3.5 Evaluation of Deployment Rates

This section compares the coverage rate achieved against the expected coverage rates. Unlike the earlier evaluation of the ODDS, data for this evaluation derive from a special database generated for this purpose that utilizes data within the Catch Accounting System (managed by the AKRO), the Observer Program database NORPAC (managed by the AFSC), and *e*Landings (under joint management by Alaska Department of Fish and Game – ADF&G; the International Pacific Halibut Commission – IPHC; and the NMFS). Separate rate evaluations are conducted depending on whether the unit of observer deployment was at-sea fishing trips or dockside deliveries of pollock.

3.5.1 At-Sea Deployments

Observers were deployed onto at-sea fishing trips undertaken by vessels designated as belonging to full or partial coverage categories. There are two deployment strata to evaluate in full coverage; trips belonging to vessels defined in regulation (e.g. AFA, termed regulatory full coverage), and those made by vessels that volunteered to carry full observer coverage when fishing in the BSAI (termed voluntary full coverage). Deployment strata in the partial coverage category include the *t* and *T* strata of the trip-selection pool, and the zero-selection pool. Although the EM voluntary vessels are contained within the zero-selection pool, they are separated in this Annual Report due to the pre-implementation status of EM in the North Pacific.

Rate evaluations are based on trips for the year (in 2016, the EM Voluntary stratum will contain four time periods). Evaluations for the full coverage category and the no selection pool are straightforward - either the coverage achieved was equal to 100% or 0%, respectively, or it was not. For partial coverage strata, observed rates were expected to fall between upper and lower bounds on the expected value that were generated from the 0.025 and 0.975 quantiles of a binomial distribution (aka a 95% "confidence bound"). Coverage levels were considered to have met expectation goals if the actual value was equal to one of the upper or lower confidence bounds, or fell within them. The expected coverage rate for partial coverage category strata in 2015 was the rate programmed into ODDS for each stratum.

The 2015 Observer Program had 5 different deployment strata to be evaluated. With one possible exception, the program met expected rates of coverage for all of these strata (Table 3-3). Observer coverage was higher than expected from within the EM Voluntary stratum. This was because within this stratum one vessel agreed to simultaneously carry EM and an observer on two trips so that resulting data from the two methods could be compared. Among all fishing in Federal fisheries of Alaska, 4,859 trips (39.1%) and 498 vessels (42.1%) were observed.

3.5.2 Coverage Rates for Dockside Monitoring

Observers were assigned to monitor deliveries of walleye pollock (*Gadus chalcogrammus*). The objective of this monitoring was to obtain a count of the number of salmon caught as

bycatch and to obtain genetic samples from these fish in each observed pollock delivery. There have been many iterations of the sampling design used to obtain genetic samples from salmon bycatch for the purposes of stock of origin (Faunce 2015a). The sampling design used for this objective in 2015 remained unchanged from that used since 2014; all deliveries of walleye pollock that are observed at sea were also observed dockside. While all Bering Sea pollock trips and deliveries are observed, this is not the case in the Gulf of Alaska (NMFS 2015b).

One issue that arises with the current dockside-monitoring objective is defining pollock deliveries. The problem facing the observer is that his or her sampling protocols need to be defined at the start of a trip and protocols are dictated by the answer given by the captain as to whether or not this trip will be a pollock trip. Asking the captain for the expected fishery is necessary since catch is not known before a trip begins. However, the fact that the captain told the observer this was a pollock trip is not recorded in landings records or the observer data. The assignment of a pollock delivery is necessarily made once the fish have been delivered and a landing report has been generated. One approach to analyzing the data is to label any delivery where the predominant species is pollock as a pollock delivery (i.e. trip target = pollock) while another is to use a minimum threshold of the landed catch that is comprised of pollock. The first method is referred to as the target definition, while the latter is the (minimum) ratio definition[20]. A minimum percentage in the delivery of 20% was used here to define the ratio method since that is the definition of directed pollock fishing used by the NMFS Office of Law Enforcement (OLE). Since there are different ways that a delivery can be assigned to the pollock fishery that are not known to the observer prior to monitoring the delivery, there is the potential for the observer to monitor a delivery that is not a pollock delivery, and to not monitor a delivery that is a pollock delivery.

Given this design, the level of dockside monitoring of walleye pollock should be 100% in the full coverage category, and within acceptable tolerance of the deployment rate of 24% in the partial coverage category (since all trawl catcher vessels in partial coverage participating in this fishery are within the *T* stratum). Unbiased estimates of salmon stock of origin should arise from samples of individual fish obtained from samples of pollock deliveries given randomization protocols. However, a random sample of pollock deliveries is not always possible from the partial coverage fleet because of tendering activity. This activity occurs when a vessel delivers caught fish to a tender and that tender vessel then delivers the fish to a shoreside processing plant. Since tender vessels can provide fuel and food, it is possible that a catcher vessel can remain at sea on a single trip for the entire season. If that trip were logged into ODDS and not selected, the vessels' entire season activity would not be observed (it is also possible the vessels' entire season activity is observed).

The relative impact of tendering activity on NMFS' ability to collect genetic samples from salmon can be illustrated by comparing the observer coverage rates by port for all pollock deliveries to those without tender deliveries. Very few pollock deliveries were unobserved in full coverage (1%). In contrast, the chance that the coverage rate in partial coverage resulted from a random deployment at the expected rate was extremely small (exact binomial test p-value = 0.016; Table 3-4). However, when deliveries of pollock from tender trips were

[20] The two methods for defining a pollock trip (target definition method and (minimum) ratio method) were compared in 2014 and very few differences were found (NMFS 2015b).

removed, this likelihood was dramatically increased (p-value = 0.796). The majority of pollock deliveries in the port of King Cove from the partial coverage category were tender deliveries and very few of these were observed (Table 3-4).

3.6 Sample quality

3.6.1 Temporal Patterns in Trip Selection

The cumulative number of fishing trips in each stratum was multiplied by their selection rate to obtain the expected number of observed trips, and acceptable bounds of the number of observed trips were obtained from the 0.025 and 0.975 quantiles from the normal approximation of the binomial distribution (the 95% "confidence bounds"). Under the assumption that there is no temporal bias in observer coverage, 5% or less of values should fall outside of upper and lower expected bounds. The number of observed trips achieved was outside of their expected values on 2 days (0.6%) very early in the year and within only one stratum (Figure 3-3). For comparison, the number of observed trips achieved was outside of their expected values on 15.3% of the year in 2014 (NMFS 2015b). Tests that the observed rate at the end of the year derived from a binomial distribution sampled at the expected selection rates for each stratum were 0.273 for *t* and 0.338 for *T* (Figure 3-3). Based on these combined results, no evidence of temporal bias was found in 2015.

3.6.2 Spatial Representativeness

Under a strictly random selection of trips and with a large enough sample size, the spatial distribution of selected trips should reflect the spatial distribution of all trips. However, the interpretation of results when the number of observed trips deviates from expected values is not straightforward. The hypergeometric distribution was used to calculate the probability of having a given number of items with a certain characteristics (e.g., *t* strata trips in NMFS Area 610) in a sample taken from a population (all trips in a stratum) where the number of items with that same characteristic is known (the number of trips in a NMFS Reporting Area based on landings data). The expected number of trips based on this distribution is the number of trips selected divided by the total number of trips (= sample rate) multiplied by the number of trips that fished in an area. This evaluation does not test whether the resulting coverage rate in a NMFS Area for a stratum is equal to the stratum selection rate, but instead tests whether the resulting coverage rate in a NMFS Area for a stratum is unexpected compared to the stratum-wide actual realized observation rate.

Using this method, the expected number of trips with the observed number of trips in each NMFS Reporting Area and stratum combination were compared (Figure 3-4). The size of the data points in Figure 3-4 represent the probability of observing that number of sample units or a number of sample units farther from the expected number (more extreme). Small data points indicate an observed number of trips or vessels that is unlikely ($p < 0.05$) given randomized observer deployment.

The t stratum

Given that there were 18 NMFS Areas fished in *t*, we would expect there to be 0.05 x 18 = 1 small data points for this stratum. There were 5. Coverage rates among NMFS Areas for this stratum ranged from 0% to 50% (median = 10.8). The likelihood of this amount of coverage in this stratum is depicted in Figure 3-5. The probability of these coverage rates in each

NMFS area are depicted in Figure 3-6.

Although there were no observed trips in the *t* stratum in NMFS Areas 542 and 543 (Western and Central Aleutian Islands), 513 and 514 (Western Alaska) and 518 (Bogoslof Islands), this outcome was not unexpected given the low amount of fishing effort in all of these areas but 518. Low fishing effort can result in more than expected observer coverage as well, for example NMFS Area 524 in the Bering Sea. The fact that there were only three observed trips in the Aleutian Islands FMP (Areas 541:543) and no observed trips in Western Alaska (Areas 513:514) is a consequence of a low selection rate and low fishing effort in these stratum: location combinations. While not entirely unexpected, these results mean that there was little information on at-sea discards or biological tissues collected to support in-season quota management or stock assessment from trips in these areas undertaken on vessels within the *t* stratum.

Within the *t* stratum there were four NMFS Areas that had less than expected observer coverage and did *not* have low fishing effort. These results are more powerful than those already discussed associated with low fishing effort. In the Bering Sea, NMFS Area 518 was also under-represented in observer coverage during September - October vessel-selection period of 2014 (NMFS 2015b). This NMFS Area is exhibiting an annual pattern of lower observer coverage than expected. In addition, under-sampling of trips was also evident in the Western and Central Gulf of Alaska (NMFS Areas 610-620), while higher than expected coverage resulted in the Eastern Central Gulf (630).

These results indicate that spatial bias occurred in the partial coverage *t* stratum during 2015.|

The T stratum

Given that there were 19 NMFS Areas fished in *T*, we would expect there to be 0.05 x 19 = 1 small data points for this stratum. There were two. Coverage rates among NMFS Areas in this stratum ranged from 0% to 40% (median = 24.1). The likelihood of this amount of coverage in this stratum is depicted in Figure 3-7. The probability of these coverage rates in each NMFS area is depicted in Figure 3-8.

Although no trips in this stratum were observed within NMFS Areas 649 (Prince William Sound) and the Western Aleutians (543), this outcome was not surprising given that fewer than five trips occurred within these areas.

In general, there was a trend towards outcomes with lower probabilities in Western Alaska in the Bering Sea and Southeast Alaska in the Gulf of Alaska. However, only NMFS Areas 519 in the Bering Sea and Area 542 in the Aleutian Islands had substantially less observer coverage than expected from within the *T* stratum. There were no consistent patterns between 2014 and 2015.

Taken together, there is no clear evidence of spatial bias within the *T* stratum.

3.6.3 Trip Metrics

This section is focused on answering four questions related to the deployment of observers: 1) are observed trips identical to unobserved trips, 2) are tendered trips identical to non-tendered trips, 3) are observed tendered trips identical to unobserved tendered trips, and 4) are observed non-tender trips identical to unobserved non-tender trips.

Permutation tests (a.k.a randomization tests) were used to answer each question. Each test

evaluates the question "How likely is the difference we found, given these two groups have the same distribution (in the metric we are comparing)?" Permutation tests compare the actual difference found between two groups to the distribution of many differences derived by randomizing the labels defining the two groups (e.g. observed and unobserved). Difference values in all permutation tests were calculated by subtracting the mean metric value for the "No" condition from the mean metric value for the "Yes" condition. For example, the difference between vessel lengths in a permutation test for a tendering effect would be the mean value for non-tendered trips subtracted from the mean value for tendered trips. By randomizing group assignments, the combined distribution of randomized differences represents the sampling distribution under the null hypothesis that the two groups are equal. In this report 1,000 randomized trials are run for each test. The p-value from the test is calculated as the number of randomized trials with greater absolute differences than the actual difference divided by the number of randomized trials. Similar to the other statistical tests used in this report, low p-values indicate rare events and provide evidence to reject the null hypothesis of equality. Five values are calculated in each test: 1) the difference between groups, 2) the mean difference between groups from randomized trials, 3) #1 expressed as a percentage of the mean value of the metric being tested, 4) #2 expressed as a percentage of the mean value of the metric being tests, and 5) the p-value of the test. However, in an attempt to improve clarity, only values for 1, 3 and 5 are presented in relevant tables.

Six trip metrics were examined in each permutation test. These metrics include: the number of NMFS Areas visited in a trip, trip duration (days); the weight of the landed catch (t); the vessel length (m); the number of species in the landed catch; and the proportion (0 to 1) of the landed catch that was due to the most predominant species (pMax). The metric vessel length is used to help interpret the results from landed weight of catch, since fishing power positively correlated to vessel length. Specifically, differences in weight *and* length are interpreted as a failure to achieve a random sample of vessels of different sizes, whereas differences in weight only lend more evidence that there is an observer effect. The number of species within the landed portion of the catch is a measure of species richness. Our pMax metric follows the concepts behind Hill's diversity number N1 that depicts the number of abundant species (Hill 1973) and is a measure of how "pure" catch is, since a value of 1 would indicate that only the predominant (and presumed desirable) species was landed. Total catch is comprised of retained and discarded portions. While it may be desirable to compare discarded catch or total catch between groups, there is a problem with this logic since discarded catch from catcher boats is not available from unobserved trips. Therefore retained catch represents the only "apples to apples" comparison available.

Since there are six metrics within each permutation test, and each is evaluated to be unusual if the p-value is < 0.05, we would expect by random chance to have $0.05 \times 6 = 0.3$ tests to have low p-values.

Are observed trips identical to unobserved trips?

This comparison is the basis for examining if there is an observer effect (i.e., differential behavior when observed compared to when not observed) within all partial coverage trips. Sample sizes for this test are presented in Table 3-5.

Of the six metrics compared in the *t* stratum, 1 had low p-values. Observed trips in this stratum were 13.6% shorter in duration than unobserved trips (Table 3-6).

Of the six metrics compared in the *T* stratum, 2 had low p-values. Observed trips in this stratum were 8.4% shorter in duration and landed catch that was 1% less diverse than unobserved trips (Table 3-6).

A visual depiction of individual results of this permutation test is given in Figure 3-9 for illustration purposes. In both strata, observed trips were shorter than unobserved trips. Taken together, there was some evidence of an observer effect within the *t* stratum and evidence of an observer effect within the *T* stratum.

Are tender trips identical to non-tender trips?

This comparison is the basis for examining if there is a tendering effect (i.e., differential trip characteristics when vessels use tenders compared to when they do not) under the null hypothesis tendered and non-tendered trips are the same. Two separate evaluations were conducted. In the first, the 2015 stratum definitions were used. In the second, the 2016 stratum definitions were used.

Using 2015 Stratum Definitions

Sample sizes for this test are presented in Table 3-7. Of the six metrics compared in the *t* stratum, 4 had low p-values. Trips in this stratum that delivered to tenders were 9.3% longer in length, landed catch with 20.1% fewer species and was 8.8% less diverse, and weighed 389.9% more than trips that did not deliver to a tender (Table 3-8).

Of the six metrics compared in the *T* stratum, 6 had low p-values. Trips in this stratum that delivered to tenders occurred in 8.3% fewer areas, lasted 22.2% longer, occurred on vessels 17.4% shorter in length, landed catch that contained 16.3% fewer species and was 6% less diverse, and weighed 27.6% more than trips that did not deliver to a tender (Table 3-8). Tendered and non-tendered trips were not the same in 2015.

Using 2016 Stratum Definitions

Trips from 2015 were re-coded according to the stratum definitions used in the 2016 ADP. These new codes denote three gear types: Hook and Line (HAL), Pot (POT) and Trawl (TRW).

Sample sizes for this test are presented in Table 3-9.

Of the six metrics compared in the HAL 2016 stratum definition, 1 had low p-values. Trips in this stratum that delivered to tenders landed 149.4% more catch than trips that did not deliver to a tender (Table 3-10).

Of the six metrics compared in the *POT* 2016 stratum, 4 had low p-values. Trips in this stratum that delivered to tenders lasted 37.7% longer, occurred on vessels 9.5% shorter in length, landed catch that contained 22.8% more species and weighed 43.9% more than trips that did not deliver to a tender (Table 3-10).

Of the six metrics compared in the *TRW* 2016 stratum, 5 had low p-values. Trips in this stratum that delivered to tenders fished in 9.2% fewer areas, lasted 52.6% longer, occurred on

vessels 30% shorter in length, landed catch that contained 12.9% less species and was 5.1% less diverse than trips that did not deliver to a tender (Table 3-10).
Taken together, a tendering effect was evident within all gear types during 2015. In *HAL*, only one metric had a low p-value, however this could be due to a low number of tendered trips (n) in this gear type (n = 12, N = 3145). Nonetheless, the magnitude of the effect size (OD%) for landed catch cannot be ignored.

Are observed tendered trips identical to unobserved tendered trips?
The finding that tendered trips are different from non-tendered trips necessitates separate examination of an observer effect within tendered and non-tendered trips. This comparison is the basis for examining if there is an observer effect (i.e., differential behavior when observed compared to when not observed) within tendered trips. Sample sizes for this test are presented in Table 3-11.

Of the six metrics compared in the *t* stratum, 1 had low p-values. Observed trips in this stratum that delivered to tenders landed catch with 24.7% fewer species than unobserved trips that delivered to tenders. We also note that the magnitude of the difference in landed catch (101% less on observed trips) was large, and therefore, despite the fact that the associated p-value was greater than 0.05 (Table 3-12), such a difference should not be ignored.

Of the six metrics compared in the *T* stratum, 1 had low p-values. Observed trips in this stratum that delivered to tenders lasted 50.8% shorter than unobserved trips that delivered to tenders. We also note that the magnitude of the difference in landed catch (33% less on observed trips) was large, and therefore, despite the fact that the associated p-value was greater than 0.05 (Table 3-12), such a difference should not be ignored.

From the above results, we conclude that there is some evidence of an observer effect within trips that delivered to tenders in 2015.

Are observed non-tendered trips identical to unobserved non-tendered trips?
This comparison is the basis for examining if there is an observer effect (i.e., differential behavior when observed compared to when not observed) within non-tendered trips. Sample sizes for this test are presented in Table 3-13.

Of the six metrics compared in the *t* stratum, 2 had low p-values. Observed non-tendered trips in this stratum fished in 3.4% fewer NMFS Areas and for 13.1% fewer days than unobserved non-tendered trips (Table 3-14).

Of the six metrics compared in the *T* stratum, 2 had low p-values. Observed trips in this stratum that did not deliver to tenders lasted 5.2% fewer days and were 1.2% less diverse than unobserved trips that did not deliver to tenders (Table 3-14).

The fact that both strata fished for shorter durations but had similar catches is evidence of an observer effect within non-tendered trips in 2015.

Gear, Tender, and Observed status combinations

One of the first analyses presented in the 2013 Annual Report was a comparison of trip durations for combinations of observed and tendered status by stratum (NMFS 2014b). The rationale for this plot and focus on this metric was because of the concern that tendered trips were longer than non-tendered trips and therefore were being avoided for observer coverage. Frequency distributions showed that tendered trips had a long right tail compared to non-tendered trips, and that there were few observed trips in that long right tail (NMFS 2014b; Fig. 14). The OSC concluded that there were no major differences between observed and unobserved tendered trips based on the fact that there were observed trips (however few) in those long duration tendered trips. Since 2013, permutation tests have replaced these frequency plots. However, these permutation tests do not visually map the data for observed and tendered states together. To accomplish this, a plot of the trip durations for these states is included as Figure 3-10. While tendered trips can be as long as a month, there appears to be a lack of observed tendered trips with Pot and Trawl Gear longer than ten days. Whether this is due to an observer effect through intentional manipulation of trips (facilitated by the flexibility in ODDS and the current trip definitions), is due to the structure of the data (observed trips and trips with VMS are shortened since all unobserved non-VMS deliveries to a tender are lumped into the same trip), or simply low sample size is unknown.

3.7 Adequacy of the Sample Size

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. The Catch Accounting System post-stratifies data into groups of fishing activities with similar characteristics (gear, NMFS Area, trip targets) within weekly periods. At low numbers of trips and low sampling rates, the probability of no observer data within a particular post-stratum is increased and may result in expansions of bycatch rates from one type of fishing activity against landings for a different type of fishing activity. For this reason it is important to have a large enough sample (observed trips and vessels) to have reasonable expectation of observing all types of fishing.

Over the course of an entire year, some NMFS Areas have low fishing effort and as a result have a relatively high probability of being missed by the simple random sampling represented by observer deployments. The fishing effort data for each stratum and the number of observed trips over the course of 2015 was used to illustrate their combined effect on the probability of a NMFS Area containing observer data using the hypergeometric distribution (Figure 3-11). From this figure it can be seen how 1) the likelihood of at least one observation is increased with fishing effort and 2) is also increased with an increase in the selection rate. Given our sampling rates in the two partial coverage trip selection stratum, there is a low expectation that any trips will be observed unless more than 20 trips occur in a NMFS area for the t stratum and over 40 trips within a NMFS Area for the T stratum. Including additional factors such as week, gear, and target will decrease cell size and increase the probabilities of obtaining no observer data in the random sample. Sample size requirements to ensure data are present in all cells of interest will be evaluated during the planning process for 2017.

3.8 Response to SSC Comments

The SSC has requested that a specific section with responses to SSC comments be provided in the written report, as is done for SAFE documents. This section address comments made by

the SSC (in italics) in response to the presentation of the 2014 Annual Report made at the June 2015 Council meeting.

- *The SSC recommends developing the necessary procedures for calculating the variances associated with point estimates. There is a critical need to calculate the variances associated with the point estimates (e.g., target catch, bycatch, PSC) to aid with optimization of the observer deployment sampling design and to assess uncertainty in estimates of catch. Consider, as a first-step, the calculation of variance using standard multi-stage cluster sampling (Thompson 2012), wherein the stage-specific variance is calculated along with the mean.*

The purpose of this chapter is to assess whether or not the goals of the Observer Program to obtain a representative sample was achieved at the deployment level of the design. The catch estimation process is evaluated and summarized in separate documents (Cahalan et al. 2014). The development of methods to calculate variances will be presented at the June 2016 Council Meeting (SSC only) as a separate agenda item.

- *In addition to sample size needs for spatial and temporal coverage, develop accuracy and precision objectives for catch, PSC, and bycatch.*

The purpose of this chapter is to assess whether or not the goals of the Observer Program to obtain a representative sample was achieved at the deployment level of the design. Setting of precision objectives for catch, PSC, and bycatch are outside the scope of this chapter. Further response to this recommendation is provided in chapter 7.

- *The SSC recommends that an appropriate level of stratification for sampling beyond, or as a replacement for, vessel length be investigated.*

With the exception of the strata within the zero coverage pool of vessels, the 2016 ADP defines sampling strata based on gear and not vessel length (NMFS 2015a). This decision was reached after examining 12 alternative designs that defined strata based on alternative factors than vessel length (however holding to the requirement that stratum definitions be based on factors known before fishing begins; Faunce 2015b).

- *The SSC recommends that sampling issues with tendered trips be addressed. There is a critical need that regulatory action be considered. Our primary concerns are with the potential for bias, caused by trips that are tendered versus those that are not, and the inability to collect a representative sample of salmon PSC from tendered trips.*

We found evidence that trips delivering to tenders were different from trips that did not deliver to tenders, and these differences were present in both 2015 and 2016 strata definitions. However, there was only some evidence of an observer effect within tendered trips when considering retained catch of groundfish. This means that with respect to groundfish, there is not overwhelming evidence that observer data was biased because of tendering activity.

Tendering activity has however affected the ability of the observer program to achieve a random sample of trips to obtain samples of salmon caught as bycatch within the partial coverage portion of the trawl pollock fishery. Evidence of a substantial impact on the observer

program sampling of genetics within the pollock fishery was only found at King Cove during 2015. The creation of a new sampling strata may allow flexibility in observer sampling methodology to accommodate tendering activity. However, tendering activity would need to be known prior to deployment and sampling methods would still need to be developed. This approach does not require regulatory action and does not unnecessarily expose human lives to increased safety risk.

- *The SSC recommends that the policy of allowing trip cancellation and logging multiple trips prior to sailing be reevaluated.*

For the October 2015 Council meeting, the NMFS proposed reducing the number of 'open' trips (i.e., the number of trips in which the disposition of the trip had not yet been recorded by the vessel operator) from three to two as part of the draft 2016 ADP, citing temporal bias and that trips selected to be observed were cancelled at a much higher rate than trips that had not been selected to be observed. The Council heard public testimony that the differential cancelation rate was a function of how the ODDS operates- selected trips must be cancelled or dates changed whereas non-selected trips can remain open and closed at any time. Based on this testimony, the Council did not support the request to change the number of open trips in ODDS for 2016. We again point out that disproportionate cancellation of selected trips compared to non-selected trips occurred in 2015, and offer that the ability to cancel trips in ODDS be re-evaluated (see recommendations section below).

- *Evaluate performance relative to the success of observer deployments. For example, report on those statistic associated with numbers of successfully completed trips versus total observed trips, and differences in trip metrics associated with trips where there were observer complaints versus those without complaints.*

Numerous tables in this chapter contain the information on the number of total vessels and trips and the number of observed vessels and trips. The observer statement database is not readily useful for analytics, and essentially stores data in a single open text field. Multiple potential violations of a given nature are grouped into a single statement organized by an observer cruise, which includes multiple trips that are not linked to those definitions used in this Chapter. In addition, some categories used for statements are not intuitive (e.g., AFA, A80, Miscellaneous Violations). Considerable work is required to conduct the analyses suggested in the latter part of this comment, and it may be supplemental to the contents of this chapter, the purpose of which is to assess whether or not the goals of the Observer Program to obtain a representative sample was achieved at the deployment level of the design.

- *Examine the potential association of prohibited species catch (PSC) with trip attributes on observed vessels. If associations are found, PSC rates in shoreside offloads from unobserved vessels could be compared for evidence of bias.*

The purpose of this chapter is to assess whether or not the goals of the observer program to obtain a representative sample was achieved at the deployment level of the design for vessels in the partial coverage fleet. The comparison of PSC rates in shoreside offloads from unobserved vessels is outside the scope of this report. Dockside monitoring by observers only

occurs within the trawl pollock fishery. In the Bering Sea, all trips are observed, hence, there are no comparisons between observed and unobserved deliveries. Shoreside sampling for PSC in the partial coverage fleet only occurs in the Gulf of Alaska trawl pollock fishery and only for salmon. Further, the SSC comment indicates that a comparison of PSC rates between observed and unobserved vessels should be undertaken; however, if the intent was to compare CAS rates, we note that rates from observed vessels are applied to unobserved vessels in CAS, therefore, this would not be a valid comparison.

3.9 Recommendations to Improve Data Quality

The Observer Science Committee made the following recommendations in its 2014 review of observer deployment to be considered in developing the 2016 ADP (NMFS 2015b, Faunce et al. 2015). Following each italicized recommendation is the outcome 'to-date' of that recommendation.

3.9.1 Recommendations from the 2014 Annual Deployment Review

- *Providing vessel operators the flexibility in ODDS to log 3 trips also provides vessels with the ability to delay observer coverage and potentially bias observer data. The current protocols of 1) allowing selected trips to be cancelled in ODDS and 2) allowing multiple trips to be logged prior to sailing should be re-evaluated. Changing these protocols should reduce the time lag in observer coverage and temporal bias exhibited in trip-selection during 2013 and in 2014.*

The Council did not support the recommendation that the number of ODDS trips be reduced from three to two.

- *The ability of a Catcher Processor to retain product for more than several days without spoilage means that trip durations and landed catch per trip are likely to be larger from catcher vessels that cannot freeze their catch. An expansion of the number of Catcher Processors in the partial coverage class would necessitate their treatment as a separate stratum with a potentially different selection rate in ODDS.*

See our recommendation on this issue.

- *The use of metrics known before a trip begins is necessary for the designation of deployment strata. Each trip must be assigned to one and only one deployment strata at the time it is logged. The merits of deploying observers by gear and FMP should be explored in future ADPs. There are FMPs and gear types for example that have low effort and are highly likely to be missed in random selection procedures without high selection rates*

The 2016 ADP removed the vessel length definitions from the partial coverage strata with the exception of those strata within the zero selection pool.

- *The assumption used in the ADP that effort in the following year will be equal to that two years prior should be improved upon. The NMFS should develop better tools such as models to predict fishing effort.*

The 2016 ADP utilized relationship models between the number of invoiced days and fishing days throughout the year to project the expected number of fishing days until the end of the year, and then used the relationship between past fishing activity as a proportion of the quota over the past three years to account for expected fishing effort in one stratum (NMFS 2015a).

- *The practice of granting releases whereby vessels are sometimes subject to human observer coverage and sometimes not subject to human observer coverage should be discontinued. We recommend that a list of vessels that cannot carry an observer be generated. The list should be updated each calendar year. This list defines a new strata to be observed with alternatives to human monitoring, and should be included in the annual deployment plan and annual review.*

A list of vessels unable to accommodate an observer has not been made. To accommodate the ephemeral nature of vessels participation in the EM voluntary pool, strata are defined by vessel: date combinations and can be changed upon notification by the vessel of their intent to no longer participate in the program (wherein they are returned to the partial coverage stratum specified in the 2016 ADP).

- *We repeat our 2013 recommendation that the linkage between ODDS and eLandings be strengthened through the use of a trip identifier.*

In 2016 a voluntary field was added to *e*Landings to accommodate the entry of the ODDS trip number.

- *Tender vessel activities are problematic for the observer program for several reasons. First, the regulatory definition of a trip means that an operator of a vessel in partial coverage can use an unselected logged trip to deliver to a tender for an extended duration of time unobserved. In the extreme, the vessel could take a single trip that encompasses the entire fishing effort by the vessel. Second, vessels that act as tenders are not covered under the safety requirement of the MSA, meaning that they cannot be used to deploy or house observers. Third, the catch that is delivered to a tender is not accessible to an observer. Finally, the tender vessel, by its very nature, mixes catch from multiple deliveries, meaning that salmon bycatch if identified by an observer dockside could not be attributed to a catcher vessel trip. The ability of the observer program to obtain a representative sample of salmon bycatch from the GOA pollock fishery for genetic stock composition analysis is compromised by three factors. In increasing magnitude these factors are: 1) the fact that observers are dependent on the response of the captain on whether or not the trip is a pollock trip, 2) insufficient resources to ensure perfect detection of salmon in the delivery at the processing facility, and 3) the inability to be deployed to or monitor tender deliveries. We do not see an easy solution to #1; deployment into fishery is problematic since catch that determines fishery has not yet occurred at the time of deployment. The GOA Chinook stock compositions have been remarkably stable between the years of 2010-2015 (Guyon et al. 2015, slide 12). Alternatives to the status quo monitoring of pollock deliveries include: 1) the collection of genetic tissues by citizen or third party other than the observer program or 2) providing additional funds to institute a more rigorous dockside monitoring by the observer*

program. Of these, the former is cost effective to the observer program while the latter is more expensive. Costs to the observer program to obtain genetic bycatch material reduces the available revenue for at-sea observer coverage; it is this at-sea observer coverage which should be the primary deployment objective of the observer program since observers are the only source of discard at-sea information for NMFS to use in fisheries management.

The Council initiated a discussion paper on this subject at its February 2016 meeting (NPFMC 2016). In addition to evaluating the impacts of Council motion alternatives, this discussion paper focused on a where, when, and how many tendering trips occur in the fleet and their trends over time. These data should not be confused with the results in this review that examine the differences between tendered and non-tendered; observed and unobserved trip states within a single year. For example, an increase or decrease in the proportion of the catch landed to tenders in a given NMFS Area or FMP over time does not equate to a change in the observer effect or bias. In this report, we found only some evidence for an observer effect within tendered trips. Notwithstanding, we did find substantial differences between tendered and non-tendered trips.

3.9.2 OSC Recommendations to improve data quality and guide the 2017 ADP

We appreciate the efforts made by the NMFS and the Council to address all of the recommendations made in the 2013 version of this report (ODDS rates should remain constant in time, revisions to conditional release policies, and improvements to vessel-selection; NMFS 2014b, Faunce et al. 2014). The Observer Science Committees recommendations to improve the 2017 ADP are as follows:

- **The OSC recommends that tendered vessels be addressed differently in future ADPs.** In any proposed solution to this issue, particular attention must be paid to ensure the safety of observers.
  - Tendered trips should be evaluated as separate strata in future ADPs.
  - There is not a way to identify the duration of fishing trips made by catcher boats delivering to tenders without an observer or VMS on-board. The OSC recommends that NMFS and Council address this data gap. The OSC supports the continued expansion and implementation of *t*Landings.
- **The OSC reiterates our 2014 recommendation that the expansion of the pool of partial coverage catcher-processors warrants their treatment as separate strata in future ADPs**.
- Three observed trips are needed to calculate variance. **The OSC recommends that sampling rates in future ADPs be high enough in each stratum to maximize the probability of achieving three observed trips in each NMFS Area.** In simulated sampling evaluations of 2014 data, most observer data gaps disappeared or were severely minimized at deployment rates greater than or equal to 15% (relative to a 50% probability of a post-strata being empty; NMFS 2015c, p.98). In 2015, selection rates in the *t* stratum were 12%, and an actual observation rate of 11.2% was achieved. At this level of coverage numerous NMFS Areas without any observer coverage resulted. The temporal bias present in the *T* stratum in 2014 when selection rate was 15% was no longer present in 2015 when selection rates were set at 24%.

- **The OSC recommends that NMFS should work with its partial coverage contractor and the OAC to explore the possibility of eliminating the ability to cancel a trip in ODDS**, since the ability to change dates is already facilitated.

Table 3-1. Disposition of trips in the ODDS for 2015. “Paper” indicates trips that were logged when the ODDS was not available.

Strata	Random Selection	Logged	Cancelled by System	Cancelled by User	Waived	Paper
T	Not Selected	3534	248	125	1	0
T	Selected	1104	0	146	3	0
Vol. EM	Not Assigned	83	4	3	0	0
Vol. 100%	Not Assigned	178	2	0	0	0
t	Not Selected	1898	298	46	1	0
t	Selected	249	0	59	7	0
Total		7046	552	379	12	0

Table 3-2. Number of logged trips in each trip-selection strata (t and T) that were selected using the initial random number generator (Random Selection Only) and those that remained after user manipulation (Final Expected). The relative impact of waivers in trip selection is also shown (No Waivers).

Variable	t	T
Random Selection Only: Selected	249	1104
Random Selection Only: Total	2147	4638
Random Selection Only: Selection Rate	11.6	23.8
Final Expected: Selected	220	1047
Final Expected: Total	1744	4119
Final Expected: Selection Rate	12.6	25.4
Final Expected No Waivers: Selected	228	1051
Final Expected No Waivers: Total	1744	4119
Final Expected No Waivers: Selection Rate	13.1	25.5

Table 3-3. Number of total vessels (*V*), sampled vessels (*v*), total trips (*N*), sampled trips (*n*) for each observer deployment stratum in 2015. The number of vessels are not additive – total vessels are unique. Expected coverages are in percent for trip selection. EM: Electronic Monitoring.

Coverage	Strata	V	v	N	n	% Trips Observed	Expected Coverage	Expected Coverage (min)	Expected Coverage (max)	Meets Expectations?
Full	Full	170	170	3524	3522	99.9				
Partial	EM Voluntary	13	1	92	2	2.2				
Partial	t	354	138	2148	241	11.2	12	9.9	12.6	Yes
Partial	T	289	234	4676	1094	23.4	24	22.2	24.6	Yes
Partial	Zero Selection	415	0	2001	0	0.0				
Total	Total	1184	498	12441	4859	39.1				

Table 3-4. The number of pollock deliveries by observation and tendering status. IFP: Inshore Floating Processor, Hbr: Harbor.

FMP	Coverage Category	Port	Total Trips (*N*)	Observed Trips (*n*)	% Observed	p-value Trips Observed	% Tender Trips	% Observed no Tenders	p-value Trips Observed no Tenders
Bering Sea	Full	Akutan	723	722	100		0	100	
Bering Sea	Full	Dutch Hbr.	830	830	100		0	100	
Bering Sea	Full	IFP	299	298	100		0	100	
Bering Sea	Full	King Cove	69	69	100		0	100	
Bering Sea	Full	Sand Point	15	15	100		0	100	
Bering Sea	Partial	IFP	1	0	0		0	0	
Gulf of Alaska	Full	Kodiak	8	0	0		0	0	
Gulf of Alaska	Partial	IFP	5	1	20		0	20	
Gulf of Alaska	Partial	King Cove	204	6	3		92	35	
Gulf of Alaska	Partial	Kodiak	1294	306	24		0	24	
Gulf of Alaska	Partial	Sand Point	360	90	25		4	26	
Total	Full		1944	1934	99		0	99	
Total	Partial		1864	403	22	0.016	11	24	0.796

Table 3-5. Number of trips by observation status in the 2015 trip-selection strata.

Strata	Observed	Unobserved
t	241	1907
T	1094	3582

Table 3-6. Results of permutation tests between observed and unobserved trips in the 2015 trip-selection strata. OD: Observed Difference.

Strata	NMFS Areas	Days Fished	Vessel Length	Species Landed	pMax Species	Landed Catch	Metric
t	-0.033	-0.561	0.379	-0.009	0.013	-0.994	OD
T	0.000	-0.311	1.050	-0.189	0.009	-2.156	OD
t	-3.1	-13.6	0.8	-0.2	1.4	-14.1	OD (%)
T	-0.0	-8.4	1.4	-4.5	1.0	-4.0	OD (%)
t	0.053	0.000	0.306	0.964	0.124	0.196	p-value
T	1.000	0.000	0.135	0.064	0.031	0.213	p-value

Table 3-7. Number of trips by tendered status in the 2015 trip-selection strata.

Strata	Tendered	Non-tendered
t	64	2084
T	313	4363

Table 3-8. Results of permutation tests between tendered and non-tendered trips in the 2015 trip-selection strata. OD: Observed Difference.

Strata	NMFS Areas	Days Fished	Vessel Length	Species Landed	pMax Species	Landed Catch	Metric
t	-0.044	0.234	4.419	-0.719	0.079	27.417	OD
T	-0.092	0.819	-13.217	-0.685	0.056	15.039	OD
t	-4.1	5.7	9.3	-20.1	8.8	389.9	OD (%)
T	-8.3	22.2	-17.4	-16.3	6.0	27.6	OD (%)
t	0.182	0.393	0.000	0.006	0.000	0.000	p-value
T	0.000	0.000	0.000	0.000	0.000	0.000	p-value

Table 3-9. Number of trips by tendered status in the 2015 trip-selection strata re-coded as 2016 trip-selection strata.

2016 Strata	Tendered	Non-tendered
HAL	12	3133
POT	185	1027
TRW	180	2287

Table 3-10. Results of permutation tests between tendered and non-tendered trips in the 2015 trip-selection strata re-coded as 2016 trip-selection strata. OD: Observed Difference.

2016 Strata	NMFS Areas	Days Fished	Vessel Length	Species Landed	pMax Species	Landed Catch	Metric
HAL	0.056	1.142	0.121	-0.794	0.027	11.600	OD
POT	0.003	1.344	-6.635	0.411	0.000	14.240	OD
TRW	-0.101	1.432	-24.891	-0.701	0.048	0.538	OD
HAL	5.0	23.9	0.2	-21.4	3.1	149.4	OD (%)
POT	0.3	37.7	-9.5	22.8	0.0	43.9	OD (%)
TRW	-9.2	52.6	-30.0	-12.9	5.1	0.6	OD (%)
HAL	0.651	0.104	0.980	0.205	0.465	0.001	p-value
POT	1.000	0.000	0.000	0.000	0.905	0.000	p-value
TRW	0.000	0.000	0.000	0.002	0.000	0.901	p-value

Table 3-11. Number of tendered trips by observation status in the 2015 trip-selection strata.

Strata	Observed	Unobserved
t	17	47
T	45	268

Table 3-12. Results of permutation tests between observed and unobserved tendered trips in the 2015 trip-selection strata. OD: Observed Difference.

Strata	NMFS Areas	Days Fished	Vessel Length	Species Landed	pMax Species	Landed Catch	Metric
t	0.059	-1.189	1.618	-0.711	-0.007	-34.103	OD
T	-0.026	-2.261	3.498	-0.516	0.007	-22.792	OD
t	5.8	-27.4	3.1	-24.7	-0.7	-101.4	OD (%)
T	-2.6	-50.8	5.5	-14.5	0.7	-33.3	OD (%)
t	0.263	0.264	0.066	0.036	0.824	0.081	p-value
T	0.507	0.005	0.097	0.216	0.123	0.092	p-value

Table 3-13. Number of non-tendered trips by observation status in the 2015 trip-selection strata.

Strata	Observed	Unobserved
t	224	1860
T	1049	3314

Table 3-14. Results of permutation tests between observed and unobserved non-tendered trips in the 2015 trip-selection strata. OD: Observed Difference.

Strata	NMFS Areas	Days Fished	Vessel Length	Species Landed	pMax Species	Landed Catch	Metric
t	-0.037	-0.538	0.087	0.070	0.010	-0.281	OD
T	-0.002	-0.189	0.466	-0.198	0.011	-0.632	OD
t	-3.5	-13.1	0.2	2.0	1.2	-4.5	OD (%)
T	-0.2	-5.2	0.6	-4.7	1.2	-1.2	OD (%)
t	0.046	0.001	0.826	0.674	0.219	0.480	p-value
T	0.869	0.008	0.510	0.063	0.010	0.698	p-value

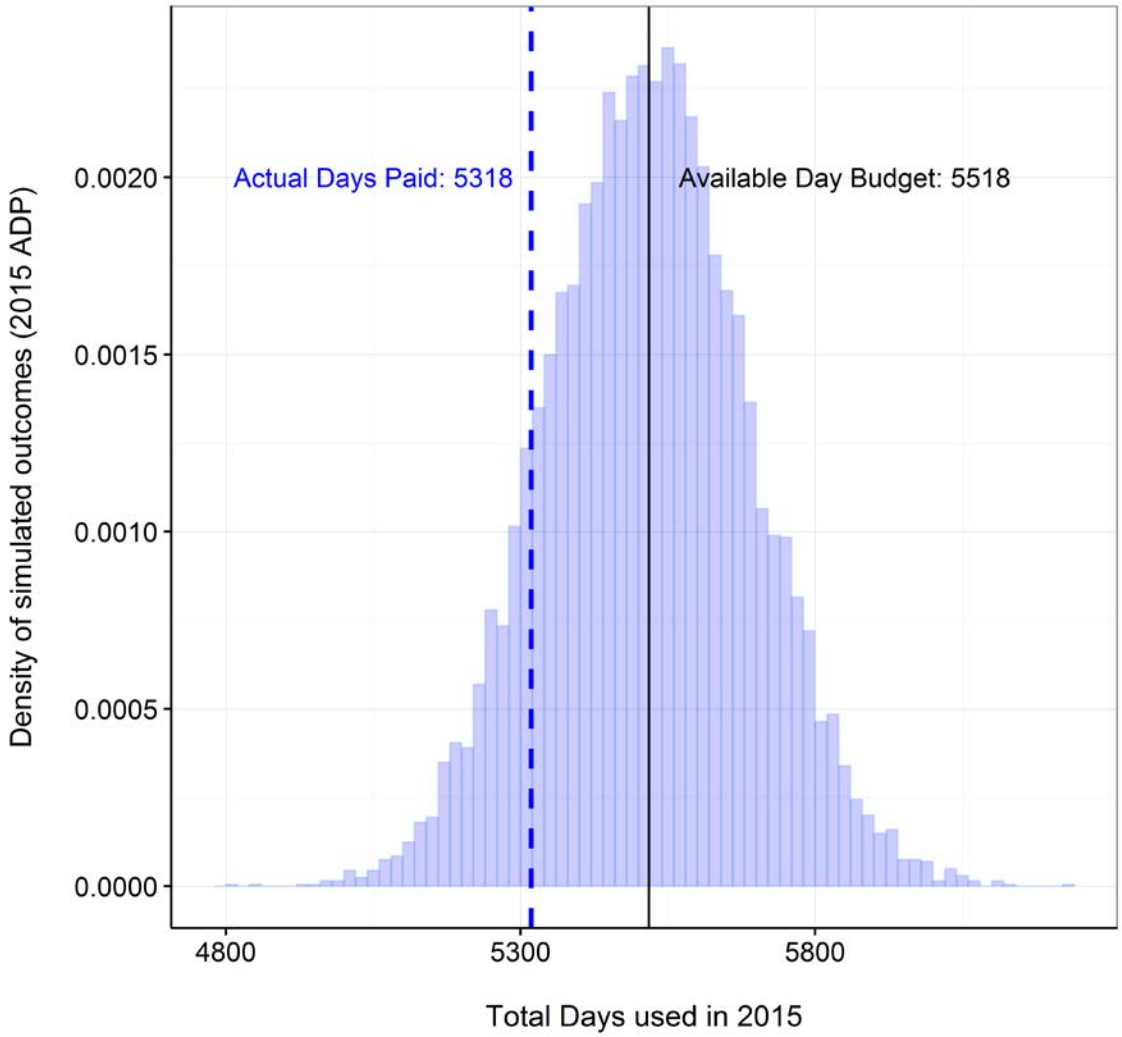

Figure 3-1. Actual paid sea-days in 2015 (dotted line) in relation to the range of potential budgetary outcomes estimated in December 2014 for the Final 2015 Annual Deployment Plan (vertical bars).

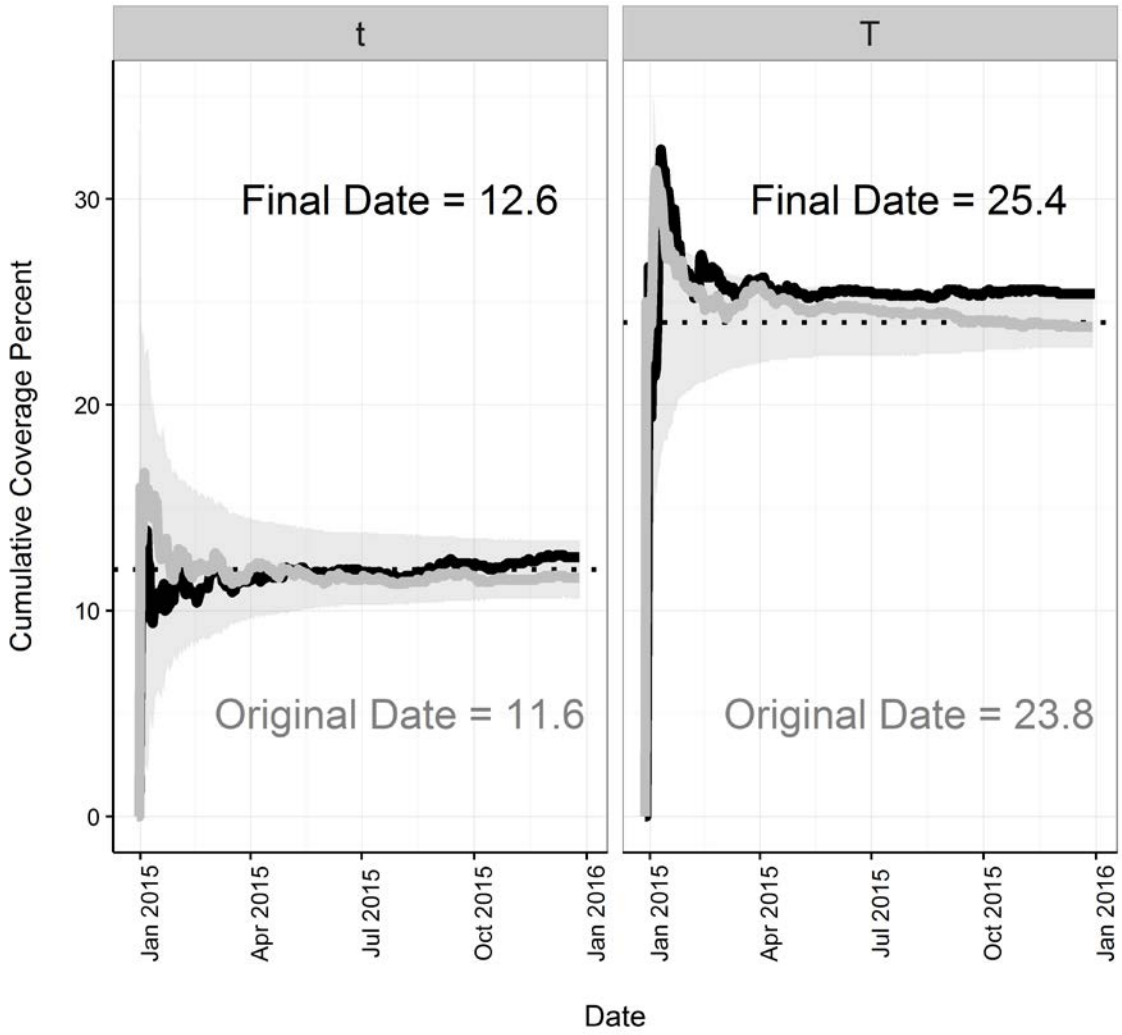

Figure 3-2. Rate of selected trips logged into ODDS organized by original date entered for all trips (grey line and grey text), and final date considering only non-cancelled trips (black line and black text). The programmed selection rate is depicted as the dotted line. Grey shaded areas denote the range of coverage rates corresponding to the 95% 'confidence intervals' expected from the binomial distribution. The final coverage rate was higher than if trip dates had not been altered and / or cancelled.

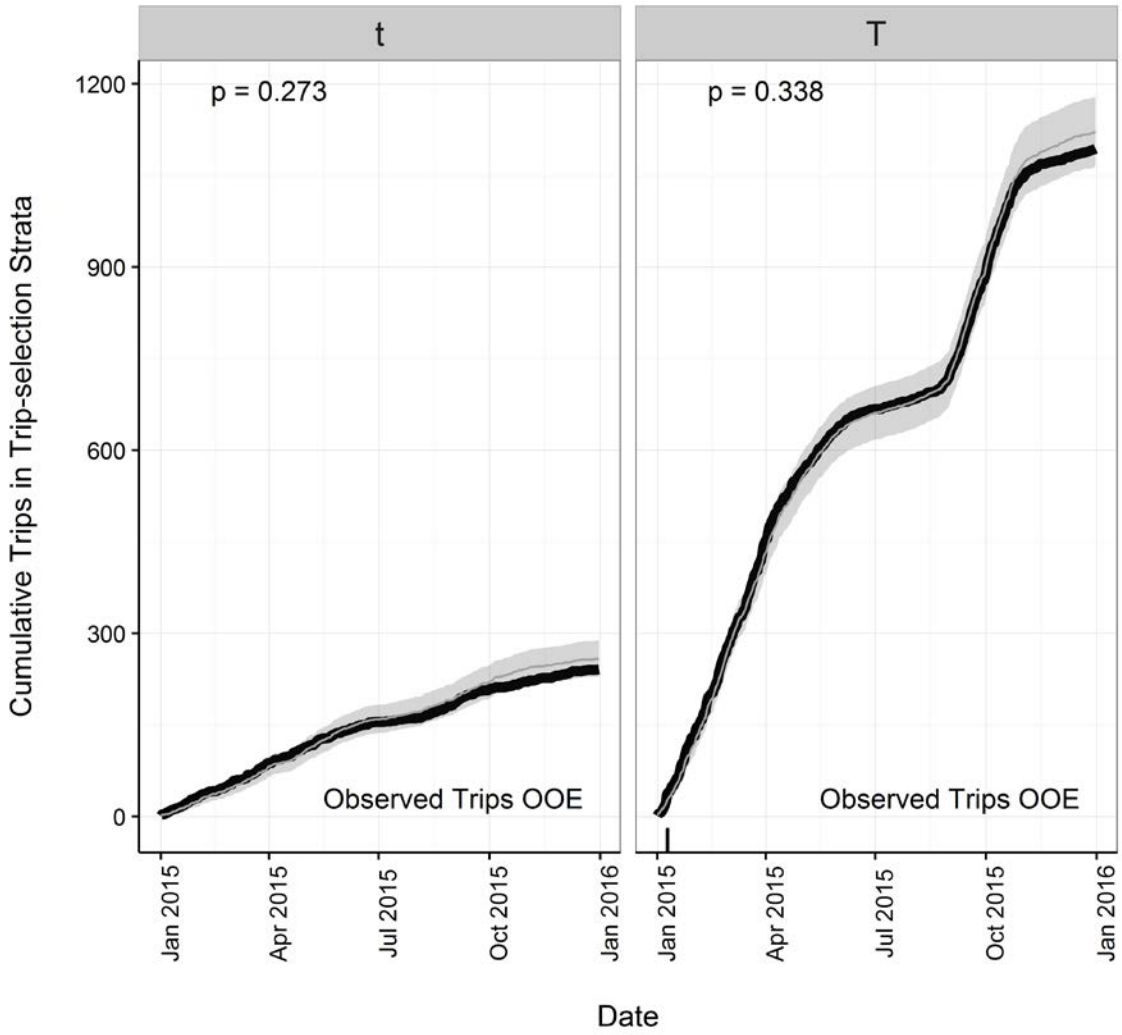

Figure 3-3. Cumulative number of trips observed during 2015 (black line) compared to the expected range of observed trips (shaded area) given fishing effort and sampling rates. Dates where the observed number of trips is outside of expected (OOE) range (either less or more than the range) are depicted as tick marks on the horizontal x-axis. The results of tests that the observed rate derived from a binomial distribution sampled at the selection rate are denoted as p-values.

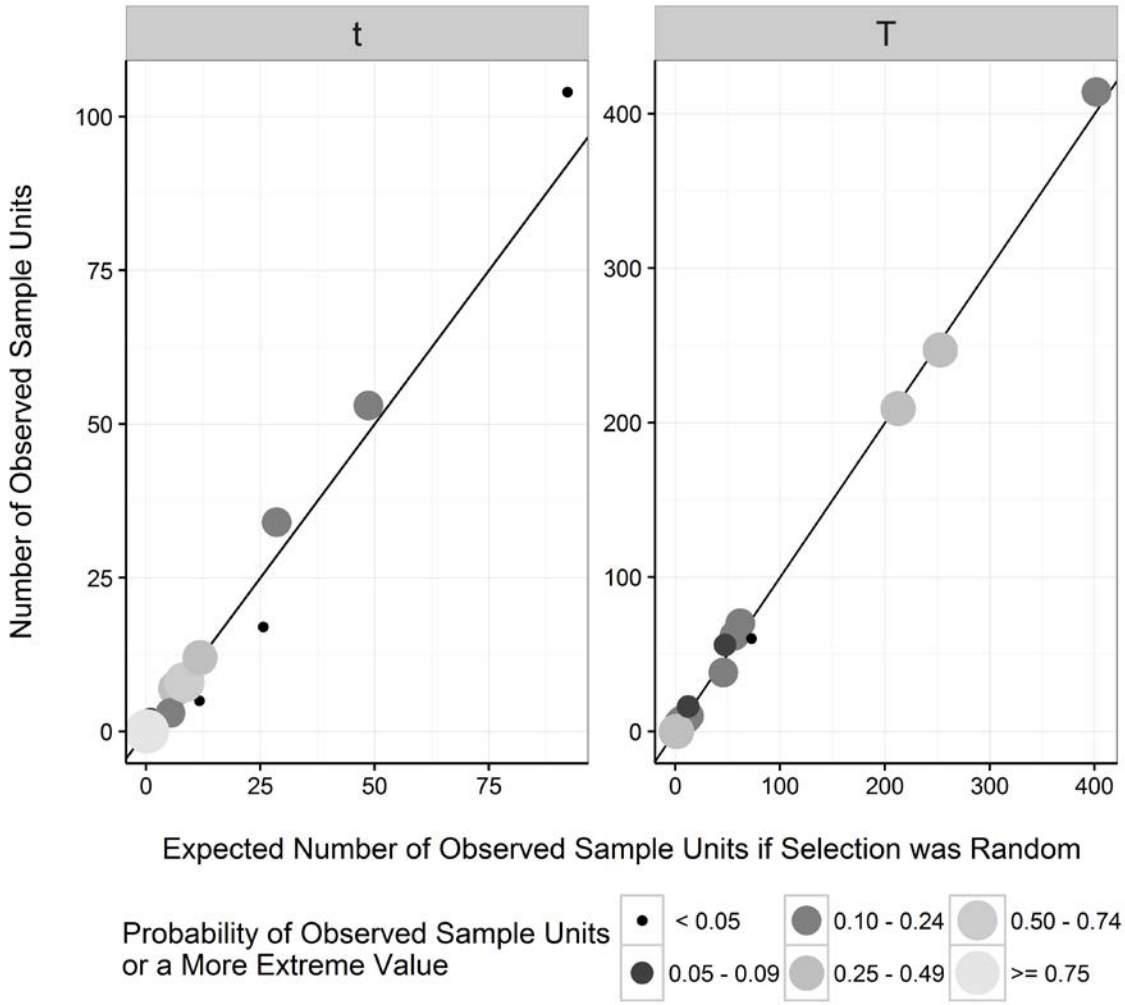

Figure 3-4. Comparison plots depicting the number of observed sample units compared to the number of expected observed sample units for each partial coverage stratum. Each point on a plot represents a NMFS Area. The smaller the point, the more unusual the result.

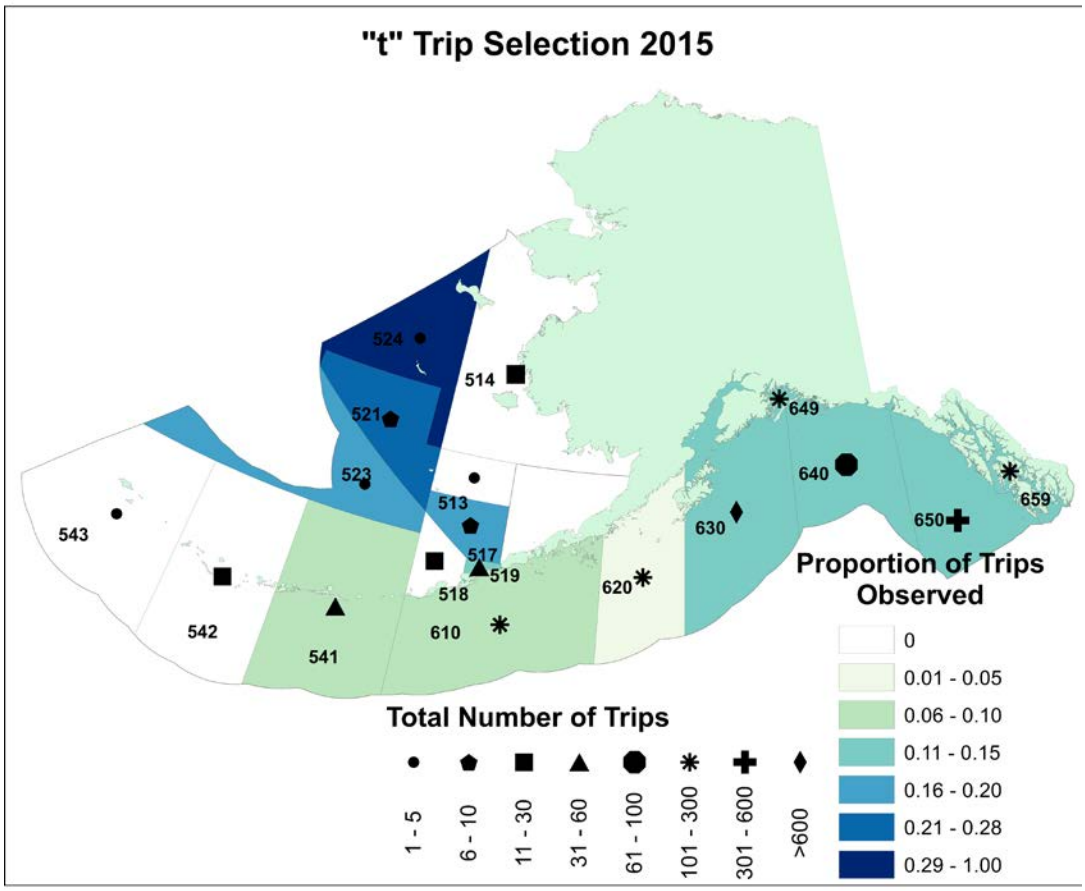

Figure 3-5. Proportion of trips observed in each NMFS Reporting Area in the 'small t' stratum. The color of the Reporting Area reflects the proportion of trips that were observed while the symbol indicates the total number of fishing trips that occurred in that area.

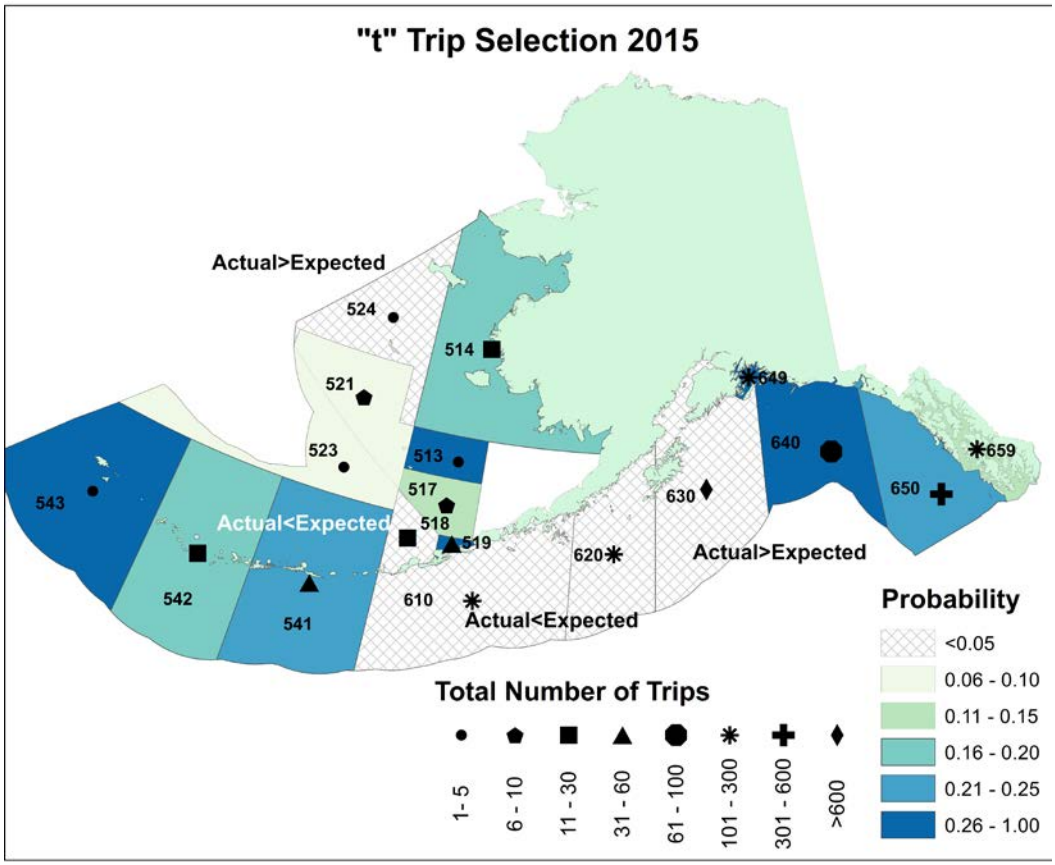

Figure 3-6. The probability of observing a number of trips in the 'small t' stratum as far or farther from expected values (probability of observing a more extreme value). The symbol indicates the total number of fishing trips that occurred in that area.

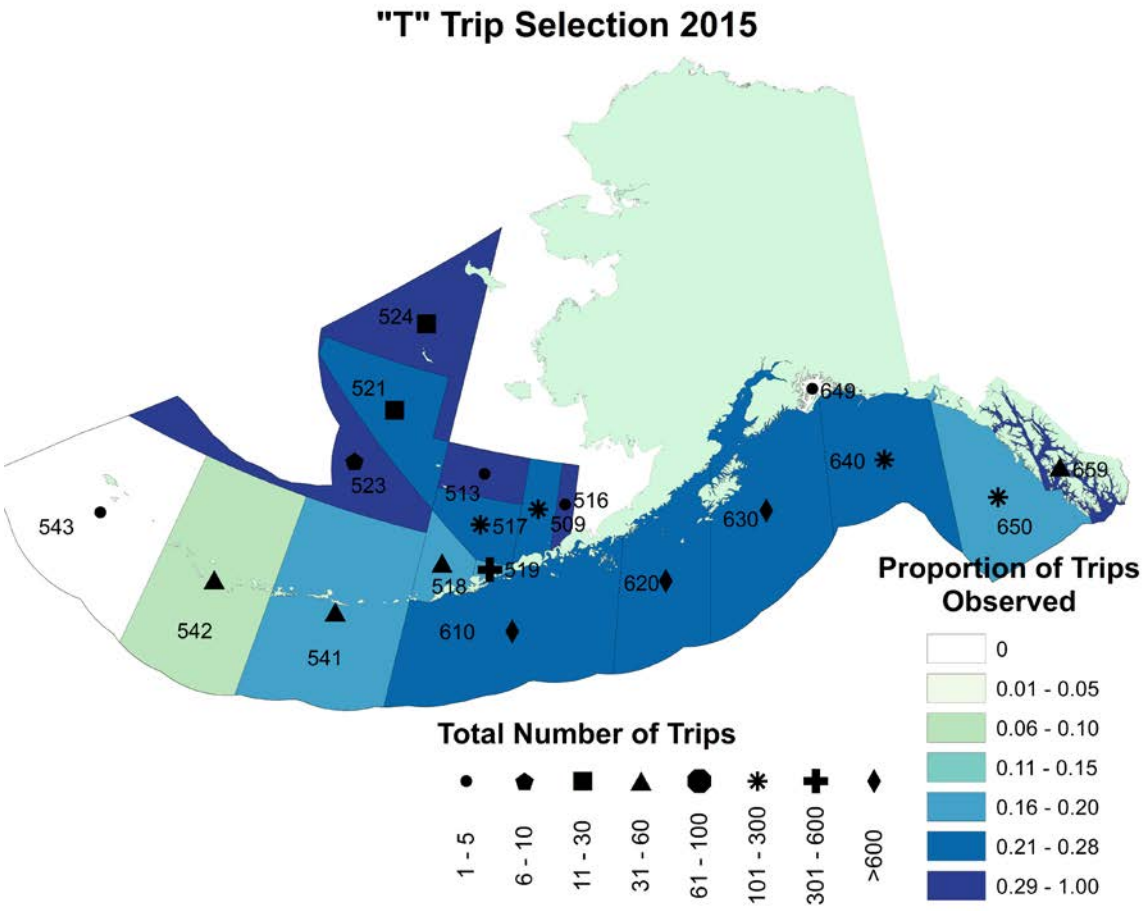

Figure 3-7. Proportion of vessels observed in each NMFS Reporting Area in the 'large T' stratum. The color of the Reporting Area reflects the proportion of trips that were observed while the symbol indicates the total number of trips that occurred in that area.

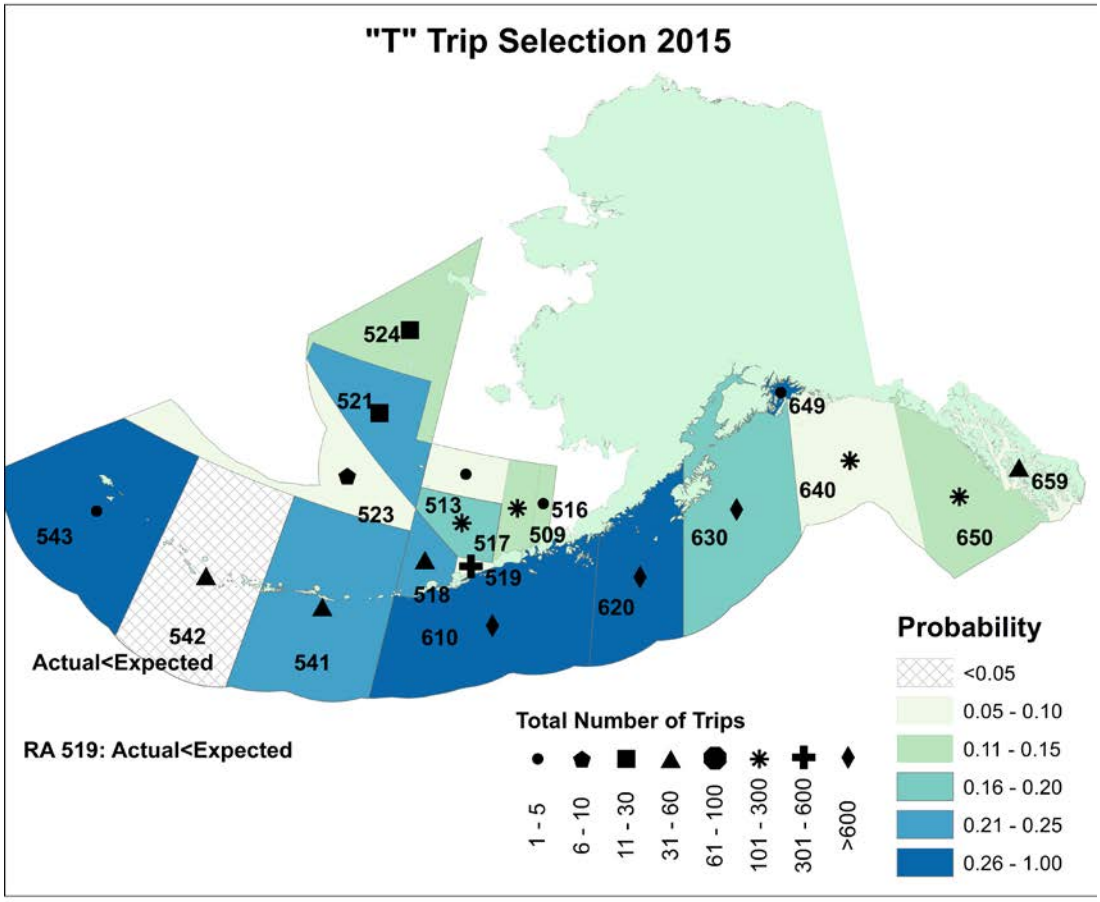

Figure 3-8. The probability of observing a number of trips in the 'Large T' stratum as far or farther from expected values (probability of observing a more extreme value). The symbol indicates the total number of fishing trips that occurred in that area.

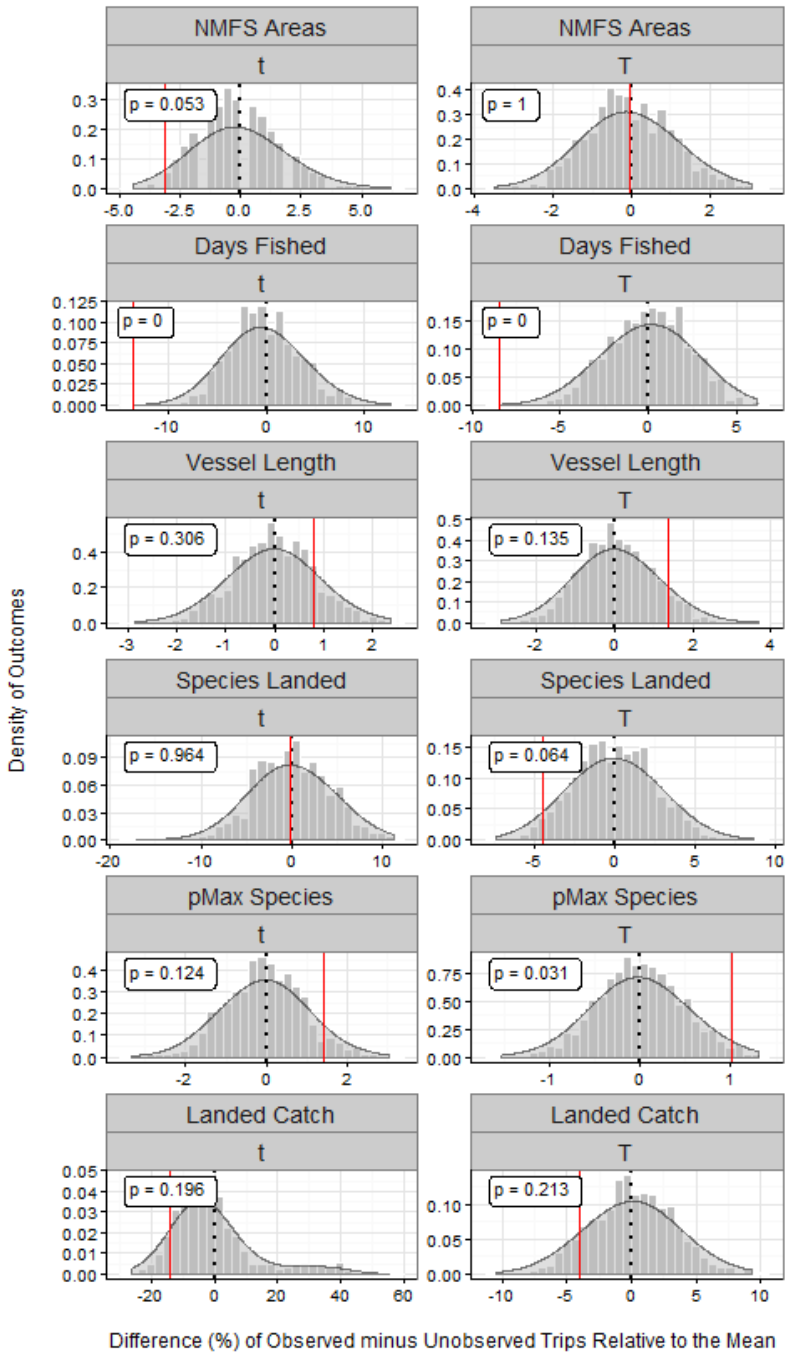

Figure 3-9. Results of permutation tests between observed and unobserved trips for each strata in the partial coverage category of the 2015 ADP. In each panel, the grey bars depict the distribution of differences between observed and unobserved trips where the assignment of observed status had been randomized (this represents the sampling distribution under the null hypothesis that observed and unobserved trips are the same). The vertical line denotes the actual difference between observed and unobserved trips. Values on the x-axis have been scaled to reflect the relative (%) differences in each metric. The corresponding p-value for each test is denoted in the upper left corner. Low p-values are reason to reject the null hypothesis and conclude that there is an observer effect.

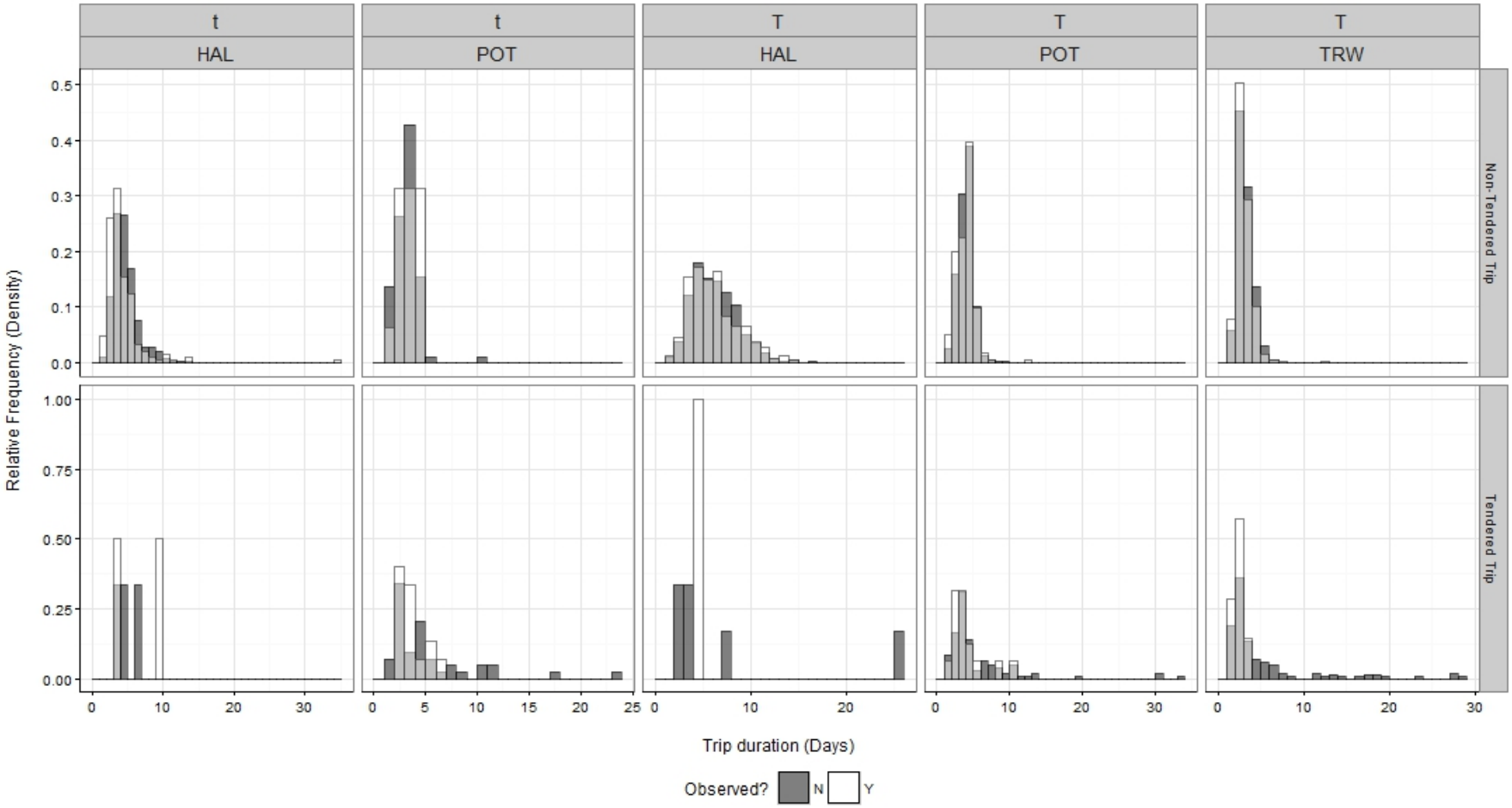

Figure 3-10. Distribution of trip duration for vessels in the partial coverage category by stratum, gear, and observation status. Observed trips are depicted as translucent white bars overtop of solid black bars for unobserved trips. Trip durations where both observed and unobserved status exist are depicted as gray (This is not the same as 'stacked bars', in which the height of the bar would reflect observed and unobserved on top of one another- this plot is has each observation status in front of the other).

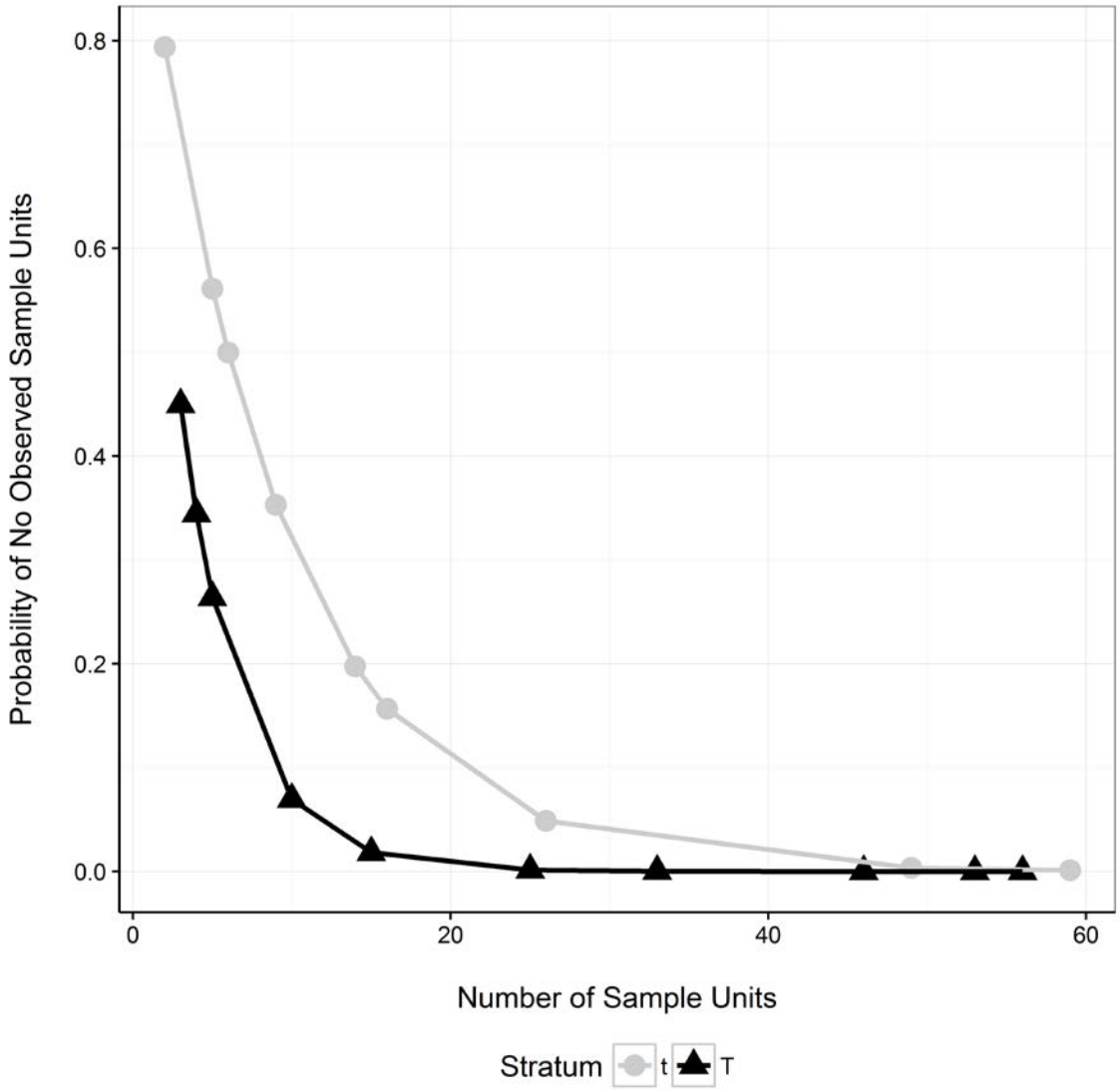

Figure 3-11. Probability of selecting a sample and observing no trips as a function of the number of sample units and selection rate that occurred in a NMFS Area, time period, and stratum. The x-axis has been truncated to increase resolution at smaller numbers of sampling units. The likelihood of having no observer data decreases with increasing total fishing effort and selection rate. The little t stratum has a selection rate of 12%. The Big T stratum had a selection rate of 24%.

4 DESCRIPTIVE INFORMATION

This chapter describes information that has been requested but is not specifically related to the annual performance of observer deployment.

4.1 Number of trips and vessels by gear and FMP area

Table 4-1 provides a summary of the number of vessels and trips by strata, FMP area, and gear type within the partial coverage category. Trips are summarized as the number of observed trips and the total number of trips. Also included is the percent of trips that were observed, by strata, gear, and FMP area. Vessels and trips may be counted more than once in a stratum if a vessel fishes in more than one FMP area or utilizes more than one gear type on a trip or within the year. The table row titled “Total Unique” includes the number of unique vessels and unique trips in each stratum where each vessel or trip is counted only once.

4.2 Total Catch and Discards and Amount of Catch Observed

Total catch of groundfish and halibut (retained and discarded) was summarized by gear and area for 2015 (Table 4-2 through Table 4-8) from the NMFS catch accounting system. The ADP does not deploy observers into fisheries (because the fishery is not defined before fishing occurs) and instead deploys to trips and vessels across all fisheries, however there is interest in comparing observer coverage across resulting fisheries, defined by area and gear type. This section includes these comparisons for the metric of catch weight derived from the Catch Accounting System (CAS). Catch estimation methods are described in detail in Cahalan et al. 2014.

The table rows titled "Observed" indicate catch that occurred on trips[21] where an observer was present. The rows titled "Total" represents estimates of all catch from all trips regardless of whether it was observed. The columns title "Retained" indicate catch that was offloaded (minus dockside discard). The columns titled "Discard" are estimated at-sea discard.

All catch and discard information, including halibut[22], is presented in round weight metric tons. If species were landed in a condition other than round weight then standard product recovery rates (PRRs) were used to obtain round weight. Halibut that were landed in ice and slime were additionally corrected for ice and slime. A standard 2% correction was made for ice and slime.

The retained and discard catch information in the Gulf of Alaska (GOA) presented in Table 4-4 and Table 4-5 was derived from Table 4-2 in that the same information is broken down by species. Species groupings can be found in Appendix A. The same is true for tables 4-6 through 4-8 in that they provide more detail of the Bering Sea/Aleutian Islands (BSAI) information that is summarized in Table 4-3. The catch of each species is simply the summation of the amount of catch for that species by each gear type. This is not the same as "fishery" and instead shows the total catch of that

[21] Trips for catcher/processors are generally defined as when a vessel leaves port to when the vessels enters port. Trips for catcher vessels are defined as the time period between when a vessel started fishing and all fish were offloaded (including split deliveries).

[22] Note that IPHC use net weight when reporting on catch limits and biomass for halibut. The conversion of halibut from round weight to net weight is: Net Weight = Round Weight x 0.75.

species across all fisheries using a particular gear type.

A time series showing the percentage of retained catch on trips where an observer was onboard the vessel under the restructured Observer Program is presented for the GOA (Table 4-9) and BSAI (Table 4-10). These tables compile information from Table 4-2 and Table 4-3 in this report and from comparable tables in each of the preceding Observer Program Annual Reports.

Halibut that are incidentally caught in federally managed groundfish trawl, hook-and-line, and pot fisheries are required by regulations to be discarded, regardless of whether the fish is living or dead. Halibut bycatch is tracked in the groundfish fisheries using prohibited species catch (PSC) limits. PSC limits are applied to specific target fisheries, gear types, and seasons. In the halibut IFQ fishery there is as a length retention requirement of 32 inches below which fish must be discarded.

To increase the survival of incidentally caught halibut that are released, regulations require that halibut be returned to the sea following careful release methods. However, despite careful handling, some fish die from being caught and handled and the probability of mortality depends on the target fishery and gear. For example, there is higher survival of discarded halibut caught with longline gear then that caught with trawl gear. The International Pacific Halibut Commission (IPHC) uses viability (injury and condition) data collected by observers to generate halibut discard mortality rates (DMRs) in Alaskan groundfish fisheries (Williams 2013a).

DMRs are applied to halibut discard information when NMFS tracks PSC limits for the groundfish. However, DMRs are not applied to raw observer data prior to expansion to the entire fishery. Therefore, in order to present observed and unobserved catch, the data are presented without DMRs. As such, these data represent total catch - not total mortality; it is important to recognize that not all of the halibut that were discarded would have died. The IPHC uses a combination of estimated discard and DMR to assess total halibut mortality across the groundfish fisheries (Williams 2013b) and in its assessment and management of the halibut stock, IPHC uses a DMR of 0.16 for halibut fishery discards.

The at-sea discard of Pacific halibut in fisheries where halibut are retained (i.e. halibut IFQ fisheries) may be overestimated in Tables 4-2 through Table 4-8. As with all longline data observer collections, observers collect fish weights used to estimate the mean weight per fish from the unsorted (retained and discarded) catch. Because there is a minimum size limit in the halibut IFQ fishery, smaller fish (less than 32 inches) are required to be discarded while larger fish are required to be retained. Hence, basing the mean weight per fish on observer data may overestimate the mean weight of discarded fish and underestimate the weight of retained fish. Thus the haul-specific estimates of at-sea discards of halibut in the IFQ fishery may be biased; however, how this bias impacts the final discard estimates is not yet known. Initial analyses suggest that some bias may persist in the fishery-level estimates of weight of at-sea discard of halibut in the IFQ fishery.

Table 4-1. Number of vessels, observed trips, and total trips in 2015 in each FMP area (BSAI and GOA) and gear type for ‘t’ and ‘T’ strata of the partial coverage category. Vessels and trips may be counted more than once in a stratum if a vessel fishes in more than one FMP area or utilizes more than one gear type. A count of total unique vessels and unique trips by strata are also included as “Total Unique.” These unique counts may be less than the sum of the vessels or trips within each column.

		Trip Selection Pool								**No Selection Pool**			
		Small Vessel ('t')				**Large Vessel ('T')**				**Zero Selection**			
FMP Area	**Gear**	**Total Vessels**	**Obs. Trips**	**Total Trips**	**% Trips Observed**	**Total Vessels**	**Obs. Trips**	**Total Trips**	**% Trips Observed**	**Total Vessels**	**Obs. Trips**	**Total Trips**	**% Trips Observed**
BSAI	Hook and Line	25	9	128	7.0	44	30	154	19.5	64	0	476	0
	Jig									2	0	6	0
	Pot	3	4	28	14.3	43	99	450	22.0				
	Trawl					22	57	228	25.0				
GOA	Hook and Line	337	202	1,854	10.9	167	238	1,040	22.9	333	0	1,431	0
	Jig									29	0	91	0
	Pot	15	27	150	18.0	59	139	587	23.7	1	0	5	0
	Trawl					68	538	2,239	24.0				
Total Unique		354	241	2,148	11.2	289	1,094	4,676	23.4	415	0	2,001	0

Table 4-2. Total catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in 2015 in the *Gulf of Alaska*. Empty cells indicate that no catch occurred.

	Trip	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Disposition**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**
Catcher/Processor	Observed	5,944	2,193			30,218	4,380			631	7
	Total	6,174	2,207			30,226	4,381			631	7
Catcher Vessel	Observed	3,418	1,732			4,762	517	3,794	146	38,719	259
	Total	24,983	13,736	204	<1	34,832	4,462	18,265	884	157,037	1,063
Catcher Vessel:	Observed					9,701	349			2,916	212
Rockfish Program	Total					9,701	349			2,916	212

Table 4-3. Total catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in 2015 in the *Bering Sea/Aleutina Islands*. Empty cells indicate that no catch occurred.

	Trip	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Disposition**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**
Catcher/Processor	Observed	141,782	29,586			336,931	21,392	7,989	439	597,752	2,526
	Total	142,409	29,608			336,931	21,392	7,991	439	597,752	2,526
Mothership	Observed					23,313	1,245			115,258	258
	Total					23,313	1,245			115,258	258
Catcher Vessel	Observed	405	234			16,449	861	5,107	112	577,884	1,390
	Total	2,851	1,349	24		27,402	1,504	21,670	504	577,957	1,391

Table 4-4. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2015 by *catcher/processors in the Gulf of Alaska*. Empty cells indicate that no catch occurred. See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line Retained	Hook and Line Discard	Jig Retained	Jig Discard	Non-Pelagic Trawl Retained	Non-Pelagic Trawl Discard	Pot Retained	Pot Discard	Pelagic Trawl Retained	Pelagic Trawl Discard
Catcher/ Processor	Deepwater Flatfish	Observed	21	51			11,774	853				
		Total	21	51			11,778	853				
	Halibut	Observed		779				533				
		Total		792				533				
	Other Groundfish	Observed	<1	123			855	347				<1
		Total	<1	123			855	347				<1
	Pacific Cod	Observed	5,245	118			1,234	575				
		Total	5,383	118			1,235	575				
	Pollock	Observed	68	7			1,125	218			2	<1
		Total	68	7			1,126	218			2	<1
	Rockfish	Observed	61	147			13,799	1,372			629	7
		Total	71	147			13,799	1,372			629	7
	Sablefish	Observed	388	15			446	41				
		Total	471	15			446	41				
	Shallow water Flatfish	Observed	<1	9			878	41				
		Total	<1	9			878	41				
	Skates	Observed	159	917			105	317				
		Total	161	917			108	317				
	Sharks	Observed		26				83				
		Total		26				83				

Table 4-5. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2015 by *catcher vessels in the Gulf of Alaska*. Empty cells indicate that no catch occurred. See Appendix A for species grouping definitions.

	Species	Trip	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Caught**	**Disposition**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**
Catcher Vessel	Deepwater Flatfish	Observed	<1	31			1,109	275		<1	213	3
		Total	<1	196			8,367	1,176	<1	1	822	10
	Halibut	Observed	1,089	956			7	249		22	<1	17
		Total	8,648	8,270	8		9	1,610		96	1	24
	Other Groundfish	Observed	1	33			26	70	48	98	75	7
		Total	10	331			70	387	258	580	321	39
	Pacific Cod	Observed	501	85			3,053	18	3,737	21	178	1
		Total	6,401	540	188	<1	19,234	233	17,977	179	935	4
	Pollock	Observed	5	5			1,288	56	9	3	38,456	340
		Total	69	60	2		5,568	166	31	15	154,910	779
	Rockfish	Observed	154	90			8,299	47		2	2,697	12
		Total	889	499	6		8,468	166	<1	8	2,789	24
	Sablefish	Observed	1,632	119			320	15		<1	2	1
		Total	8,395	634			400	134		2	24	7
	Shallow water Flatfish	Observed		2			290	39		<1	6	
		Total	<1	10			1,983	324		2	109	
	Skates	Observed	37	298			69	81		<1	5	2
		Total	572	2,275			429	512		<1	25	6
	Sharks	Observed		113			1	15		<1	3	89
		Total	<1	921			3	104		<1	16	382

Table 4-6. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2015 by *catcher/processors in the Bering Sea/Aleutian Islands*. Empty cells indicate that no catch occurred. See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line Retained	Hook and Line Discard	Jig Retained	Jig Discard	Non-Pelagic Trawl Retained	Non-Pelagic Trawl Discard	Pot Retained	Pot Discard	Pelagic Trawl Retained	Pelagic Trawl Discard
Catcher/ Processor	Atka Mackerel	Observed	<1	13			49,212	547		<1	54	9
		Total	<1	13			49,212	547		<1	54	9
	Flatfish	Observed	41	2,402			177,543	4,622		313	2,556	841
		Total	41	2,402			177,543	4,622		313	2,556	841
	Halibut	Observed	42	3,460				1,907		9		93
		Total	42	3,482				1,907		9		93
	Other Groundfish	Observed	4	1,916			13	2,376	8	108	154	207
		Total	4	1,916			13	2,376	8	108	154	207
	Pacific Cod	Observed	127,331	2,411			31,839	308	7,978	4	3,209	1
		Total	127,942	2,411			31,839	308	7,980	4	3,209	1
	Pollock	Observed	6,372	629			29,785	8,244	3	4	590,292	277
		Total	6,372	629			29,785	8,244	3	4	590,292	277
	Rockfish	Observed	92	179			33,351	780		<1	1,000	607
		Total	93	180			33,351	780		<1	1,000	607
	Sablefish	Observed	105	8			27	5			<1	<1
		Total	120	8			27	5			<1	<1
	Turbot	Observed	1,156	737			14,417	1,234		1	257	79
		Total	1,157	737			14,417	1,234		1	257	79
	Skates	Observed	6,639	17,785			744	1,362		<1	229	377
		Total	6,639	17,786			744	1,362		<1	229	377
	Sharks	Observed	<1	45				6			1	35
		Total	<1	45				6			1	35

Table 4-7. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2015 by *catcher vessels delivering to motherships in the Bering Sea/Aleutian Islands*. Empty cells indicate that no catch occurred. See Appendix A for species grouping definitions.

	Species	Trip	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Caught**	**Disposition**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**
Mothership	Atka Mackerel	Observed					3,176	116			1	<1
		Total					3,176	116			1	<1
	Flatfish	Observed					10,520	437			138	51
		Total					10,520	437			138	51
	Halibut	Observed						138				2
		Total						138				2
	Other Groundfish	Observed					1	185			<1	44
		Total					1	185			<1	44
	Pacific Cod	Observed					5,538	96			652	1
		Total					5,538	96			652	1
	Pollock	Observed					1,360	69			114,393	<1
		Total					1,360	69			114,393	<1
	Rockfish	Observed					2,314	52			59	72
		Total					2,314	52			59	72
	Sablefish	Observed					1				<1	<1
		Total					1				<1	<1
	Turbot	Observed					222	77			14	2
		Total					222	77			14	2
	Skates	Observed					181	75			<1	77
		Total					181	75			<1	77
	Sharks	Observed						1				9
		Total						1				9

Table 4-8. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2015 by *catcher vessels in the Bering Sea/Aleutian Islands*. Empty cells indicate that no catch occurred. See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line Retained	Hook and Line Discard	Jig Retained	Jig Discard	Non-Pelagic Trawl Retained	Non-Pelagic Trawl Discard	Pot Retained	Pot Discard	Pelagic Trawl Retained	Pelagic Trawl Discard
Catcher Vessel	Atka Mackerel	Observed		<1				1	<1	2	34	96
		Total		<1			<1	3	<1	8	34	96
	Flatfish	Observed		2			2	281	<1	<1	808	1
		Total		4			8	450	1	3	808	1
	Halibut	Observed	252	99				158		7	18	44
		Total	1,821	614			<1	298		27	18	45
	Other Groundfish	Observed		10			1	123	8	87	1,231	750
		Total	1	96			5	203	44	382	1,231	750
	Pacific Cod	Observed	136	33			16,057	15	5,071	8	4,158	1
		Total	639	181	24	<1	26,737	25	21,503	57	4,231	1
	Pollock	Observed		2			380	154	1	4	570,748	138
		Total	<1	3			634	249	3	18	570,748	138
	Rockfish	Observed	3	10			<1	2	<1	<1	706	339
		Total	33	38			<1	8	<1	3	706	339
	Sablefish	Observed	13	1				<1	26	<1	<1	<1
		Total	355	5				<1	120	<1	<1	<1
	Turbot	Observed	1	6			<1	54	<1	2	75	<1
		Total	1	43			1	139	<1	7	75	<1
	Skates	Observed	<1	71			9	74		<1	105	15
		Total	2	362			17	128		<1	105	15
	Sharks	Observed		1				<1		<1	1	6
		Total		2				<1		<1	1	6

Table 4-9. Retained catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *Gulf of Alaska* and the percentage of retained catch on observed trips, 2013-2015.

			Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Year**	**Trip Disposition**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**
Catcher/ Processor	2013	Observed	3,770	96.3			24,976	100				
	2013	Total	3,916				24,976					
	2014	Observed	6,388	96.7			40,326	96.5			1,817	100
	2014	Total	6,605				41,793				1,817	
	2015	Observed	5,944	97.1			30,218	100			631	100
	2015	Total	6,174				30,226				631	
Catcher Vessel	2013	Observed	2,966	9.8			5,807	13.2	335	2	12,996	15.6
	2013	Total	30,129		522		43,968		16,968		83,226	
	2014	Observed	3,406	13.3			3,404	7.4	3,021	14.9	19,340	14.8
	2014	Total	25,594		1,099		45,998		20,290		130,608	
	2015	Observed	3,418	13.3			4,762	13.4	3,794	20.6	38,719	24.7
	2015	Total	24,983		204		34,832		18,265		157,037	
Catcher Vessel: Rockfish Program	2013	Observed					8,129	96.5			2,044	100
	2013	Total					8,423				2,044	
	2014	Observed					10,222	97.1			1,930	93.3
	2014	Total					10,527				2,068	
	2015	Observed					9,701	100			2,916	100
	2015	Total					9,701				2,916	

Table 4-10. Retained catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *Bering Sea/Aleutian Islands* and the percentage of retained catch on observed trips, 2013-2015.

			Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Year**	**Trip Disposition**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**	**Retained Catch**	**Percent Observed**
Catcher/ Processor	2013	Observed	131,540	98.4			374,998	100	6,793	100	579,526	100
	2013	Total	133,671				375,027		6,793		579,633	
	2014	Observed	133,899	98.8			374,177	100	7,627	100	580,677	100
	2014	Total	135,459				374,229		7,627		580,818	
	2015	Observed	141,782	99.6			336,931	100	7,989	100	597,752	100
	2015	Total	142,409				336,931		7,991		597,752	
Mothership	2013	Observed					23,599	100			111,181	100
	2013	Total					23,599				111,230	
	2014	Observed					19,630	100			111,734	100
	2014	Total					19,630				111,734	
	2015	Observed					23,313	100			115,258	100
	2015	Total					23,313				115,258	
Catcher Vessel	2013	Observed	290	7.4			29,285	77	764	3.2	543,883	98.3
	2013	Total	3,904		40		38,016		23,848		553,028	
	2014	Observed	365	8.1			26,145	73.7	3,829	13.8	551,484	98.4
	2014	Total	4,489		3		35,486		27,681		560,423	
	2015	Observed	405	15.2			16,449	59.9	5,107	23.5	577,884	100
	2015	Total	2,851		24		27,402		21,670		577,957	

4.3 Observer Training and Debriefing

For the 2015 fishing year, approximately 478 individual observers were trained, briefed, and equipped for deployment to vessels and processing facilities operating in the Bering Sea and Gulf of Alaska groundfish and halibut fisheries. These observers collected data on board 500 fixed gear and trawl vessels and at seven processing facilities for a total of 46,640 observer days.

New observer candidates are required to complete a 3-week training class with 120 hours of scheduled class time and additional training by FMA staff as necessary. The FMA Division conducted training for 192 new observers to deploy in 2015 (Table 4-11).

Returning observers are required to attend an annual 4-day briefing class prior to their first deployment each calendar year. These briefings provide observers with annual updates regarding their responsibilities for the current fishing season. Additionally, observers are required to demonstrate their understanding and proficiency by passing exams on fish, crab and bird identification, and successfully completing various in-class activities.

In 2015, the 4-day briefing included a comprehensive hands-on marine safety training component intended to fulfill the National Observer Program standards of safety refresher training for all active observers. This intensive refresher training reviews and builds on the skills learned during the 3-week initial training. During the refresher training, observers had the opportunity to don their immersion suits and practice survival skills in the water such as entering the water from a height, board a life raft from the water, climb a Jacobs ladder, and in-water life-saving skills such as swimming in an immersion suit and methods to stay together to facilitate rescue.

All staff responsible for providing safety training to observers are required to attend a USCG approved Marine Safety Instructor course, have experience at sea, and complete regular refresher training and co-training. In order to meet this rigorous training demand, the FMA Division utilized additional Western Regional Center facility resources and worked with the National Observer Program to train two additional certified safety trainers by hosting a Marine Safety Instructor Training in Seattle.

Prior to subsequent deployments, all observers must attend a 1-day, 2-day, or 4-day briefing based on the training recommendation received in their last debriefing evaluation. In rare cases when an observer has demonstrated major deficiencies in meeting program expectations, they may be required to attend another 3-week training.

Prior to the 2015 fishing season, differences in deployment characteristics within the partial coverage sector where identified. For 2015, improvements in the debriefing process were implemented to take advantages of these differences. These changes improved efficiencies in both partial coverage and full coverage debriefings. It was noted by all providers that the debriefing process appeared to improve in a positive manner. These improvements could have cost improvements to observer wait time and expedited the availability of observer return to the field.

During the first two deployments, observers are required to complete a mid-cruise debriefing while still in the field. This preliminary debriefing provides the opportunity for both the observer and FMA staff to assess the data collected up to that point, methods used, challenges encountered, and future vessel assignments. After successfully completing two contracts, mid-cruise debriefings are only required on an individual as-needed basis if recommended by FMA

staff. Mid-cruise debriefings can be completed in person, over the phone, electronically, or via fax. In 2015 there were 20 mid-cruise debriefings in Anchorage, 216 in Dutch Harbor, 39 in Kodiak, and 37 in Seattle.

After each deployment, observers meet with an FMA staff member for debriefing where their sampling and data recording methods are reviewed and the data are finalized. There were 103 debriefings in Anchorage completed by four FMA staff, one in Dutch Harbor, and 698 debriefings in Seattle completed by 21 FMA staff. Many observers deploy multiple times throughout the year and debrief after each contract, followed by a briefing for re-deployment. Since observers are required to attend more than one briefing annually, the total number of briefings and debriefings for 2015 do not represent a count of individual observers.

Table 4-11. Number of observer training classes and number of observers trained/briefed from November 18, 2014 through November 19, 2015[20].

Training Classes	**Number of Classes**	**Number of Observers Trained/Briefed**
3 week training	10	192
4-day briefing	19	322
4-day partial coverage briefing	5	23
2-day briefing	5	5
1-day briefing	54	349
TOTAL	**93**	**891**

[20] The dates were selected based on observers being trained in December to deploy at the beginning of the fishing year in January; i.e., counting observers trained from December through December would not have represented the actual number trained for deployment in the 2015 fishing year.

4.3.1 Availability of Lead Level 2 Observers

The requisite experience to obtain a lead level 2 endorsement includes the following: at least 60 days of successful sampling experience, deployment on a vessel fishing non-trawl gear at least twice for more than 10 days each, and sampled at least 30 sampled fixed-gear hauls s. Currently, longline catcher/processors that engage in directed fisheries for Pacific cod in the BSAI are required to choose between two options for accounting for their total Pacific cod catch: 1) a NMFS certified flow scale and one lead level 2 observer or 2) two observers, one of which must have a lead level 2 endorsement. Regardless of the option selected, one lead level 2 observer must be aboard the vessel at all times when the vessel is operating in either the BSAI or GOA groundfish fisheries when directed fishing for Pacific cod is open in the BSAI or while the vessel is groundfish CDQ fishing. Since 2013, observer provider companies whose clients include vessels with the need for a lead level 2 observer, have expressed concern regarding their ability to provide their observers the opportunity to earn a lead level 2 endorsement.

NMFS, full coverage observer service providers, and industry have taken non-regulatory measures to increase the number of lead level 2 observers, including modifying the crediting of the number of hauls sampled and deploying voluntary second observers. While NMFS, the full coverage

providers, and the Freezer Longline Coalition all reported on successful implementation of non-regulatory measures during the Observer Advisory Committee meeting in September 2015, the Council still felt it was important to examine regulatory and non-regulatory measures to ensure availability of lead level 2 observers to the hook-and-line fleet. At the October 2015 Council meeting, there was a motion to initiate a discussion paper examining the availability of lead level 2 observers to the hook-and-line catcher/processor fleet. NMFS, full coverage observer service providers, and industry have taken non-regulatory measures to increase the number of lead level 2 observers, including modifying the crediting of the number of hauls sampled and deploying voluntary second observers.

To inform this issue, NMFS queried the Observer Program database to assess how many certified observers in the workforce have the requisite experience to serve as a lead level 2 observer on longline catcher/processors. Observers who have debriefed within the last 18 months indicates they have been recently active in the workforce and still maintain their current observer certification. The results are summarized in Table 4-12.

It is recognized that the observer providers manage their observer availability on a much more finite basis and the number of certified observers that possess a lead level 2 endorsement may be much larger than providers actually consider available to work. The reasons that a certified lead level 2 observer might not be available to work are varied and could include: getting a new job outside of the observer work force; attending graduate school; or simply choosing to no longer to work as an observer for personal reasons.

Table 4-12. Comparison of Lead Level 2 observers prior to restructuring and subsequent years.

Category	2012	2013	2014	2015
Lead Level 2 observers in Full Coverage	227	209	170	177
Lead Level 2 observers in Partial Coverage	N/A	14	33	43
Overall number of Lead Level 2 observers	227	223	203	220

5 COMPLIANCE AND ENFORCEMENT

This chapter provides information about observer reported compliance data and the cooperative relationship between the NOAA Office for Law Enforcement's (OLE), Alaska Division (AKD) and the North Pacific Groundfish and Halibut Observer Program.

5.1 Observer Program and Fisheries Enforcement

5.1.1 NOAA Office for Law Enforcement

The AKD maintains a cooperative partnership with the North Pacific Observer Program (Observer Program). The OLE mission is to support resource management by enforcing the laws and regulations that protect living marine resources. The OLE works to protect observers and their ability to collect the scientific data used to manage Alaskan fisheries. Reports of assault, sexual harassment, tampering, interference/sample bias, intimidation, coercion and hostile work environment are among the highest OLE investigative priorities.

AKD Agents and Officers frequently engage with industry and the Observer Program to support outreach, education, and compliance assistance. Agents and officers in all AKD field offices respond to industry questions about compliance with Observer Program regulatory requirements and participate in outreach meetings to discuss fishery management programs. In 2015, AKD dedicated 4,854 hours to directly support the Observer Program including outreach, education, and compliance assistance activities. This total does not capture investigative hours or outreach and compliance assistance conducted during routine enforcement boardings and contacts.

AKD dedicates a full time liaison to support observer program compliance reporting in Seattle. Duties of the liaison include: receive, organize, and distribute compliance statements; provide resources and support to observer victims of crime; develop and edit manuals, reports, and training materials; provide training to Observer Program staff and observers; serve as liaison with Observer Program staff; distribute AKD outreach materials to industry; provide observer related administrative and investigative support to agents and officers.

AKD also maintains a full-time liaison Special Agent. Duties include: conduct and assist with complex observer related investigations, liaison with Observer Program staff, provide agency analysis on observer related topics, provide compliance monitoring portions of observer training and program staff updates, attend meetings and outreach events, and assist industry to comply with fishery management regulations.

5.1.2 U.S. Coast Guard

It is a high U.S. Coast Guard (USCG) priority to promote compliance with observer regulations and ensure that observers can effectively and accurately collect and report unbiased data. During at-sea boardings, the USCG seeks to detect and deter violations involving observers including failure to carry a required observer, observer harassment, gear tampering, presorting of catch, or otherwise biasing observer samples.

5.2 Compliance Measures

The observer compliance monitoring role is identified in the Magnuson-Stevens Act and implementing regulations. Observers are expected to accurately record sampling data, write complete reports, and report any observations of suspected violations relevant to the conservation of marine resources. Observers monitor and document vessel activities and report compliance information to the Agency. Additionally, observers play an important voluntary compliance role by assisting the industry with observer safety and access to catch requirements. Observers may discuss additional violation types with the vessel captain and crew.

Observers and the Observer Program document and report compliance information relevant to marine resources, safety, observer deployment, observer accommodations and assistance, observer work environment, and/or the performance of required duties. Prior to deployment, observers are trained on their compliance monitoring role during 3-week observer training and during 4-day annual briefings.

5.2.1 Outreach Events

The AKD, with Sustainable Fisheries and the Observer Program, participated in several observer program outreach meetings in various ports. Outreach topics included changes to deployment selection, Observer Declare and Deploy System (ODDS) instruction, electronic monitoring pre-implementation, and challenges of observer deployment in the 40-57' fleet. Additionally, the public was invited to ask questions and provide input and recommendations.

5.2.2 Outreach Letters

The AKD detected an upward trend of potential record keeping and recording violations. Between January and June 2014 there were 61 potential record-keeping and reporting violations, compared to 181 potential violations between January and June 2015. On December 1, 2015 an Information Bulletin was published reminding owners, operators, and managers of the record keeping requirements, and to improve voluntary compliance.

5.2.3 Compliance Reports to the USCG

During U.S. Coast Guard boardings where observers are present, boarding officers will discreetly invite the observer(s) to discuss concerns about their work environment or ability to perform duties. Reports from observers describing harassment, intimidation, and safety issues are of particular concern. All reports of suspected offenses are passed to the AKD.
NOAA Fisheries regulations establish national safety standards for commercial fishing vessels carrying observers. These regulations require that any commercial fishing vessel, not otherwise inspected, must pass a Coast Guard dockside safety examination before carrying an observer. Further, an observer may conduct an independent review of the fishing vessel major safety items and determine whether deficiencies exist. Observer reports or statements of potential safety violations are reported to the U.S. Coast Guard and considered for action on a case by case basis in accordance with current Coast Guard policy.

The Coast Guard may receive requests to assist the AKD or Observer Program to help determine the presence of a safety concern. Where possible the Coast Guard will attempt to locate the vessel and conduct a commercial fishing vessel safety boarding at-sea or dockside. A US Coast Guard commercial fishing vessel safety examiner may require actions to correct

safety concerns in accordance with regulations and current Coast Guard policy. These situations are coordinated with AKD and/or the Observer Program to ensure observer safety.

5.3 Reports of Potential Violations

Each statement received by AKD is evaluated and prioritized according to divisional priorities available on the web: www.nmfs.noaa.gov/ole/priorities/priorities.html. AKD Officers and Agents investigate complaints to identify if a violation has occurred and to determine the appropriate level or response. Many first offences and low level infractions may be handled by compliance assistance or issuance of a warning. AKD also utilizes observer compliance information to track compliance trends. Trend analysis helps the AKD to focus, and prioritize enforcement effort. Table 5.1 summarizes Observer Program complaints received by coverage sector and Table 5.2 summarizes the status of complaints received and associated AKD incidents and cases.

The AKD works closely with the Observer Program and observer providers to address high priority compliance areas that affect observer safety, sampling and work environments. AKD is best able to address high priority compliance concerns when complaints are received in a timely manner. More immediate reporting provides the AKD the best ability to address significant violations more immediately and efficiently. This may also aid industry compliance by drawing immediate attention to violation trends and/or by addressing regulations that may be relatively new.

Table 5-1. Observer Program complaints received by AKD by coverage sector and subject matter in 2014.

Complaint Type	Partial Coverage		Full Coverage		Total**	
	2014	2015	2014	2015	2014	2015
Assault or Sexual Harassment	4	0	8	6	12	6
Harass, Intimidate, Interfere	25	13	69	56	94	69
Safety - NMFS	43	11	55	29	98	40
Sampling Accommodations	37	29	85	77	122	106
Observer Accommodations	2	3	9	7	11	10
Record Keeping and Reporting	84	129	104	140	188	269
Limited Access Programs*	0	0	274	148	274	148
Gulf of Alaska Salmon	27	24	0	0	27	24
Retention/Discard	54	49	28	28	82	77
Prohibited Species	36	28	74	61	110	89

Seabirds	38	24	10	6	48	30
Marine Mammal	1	0	2	0	3	0
Miscellaneous Violations	8	4	16	13	24	17
Contractor Problems	0	0	16	5	16	5
Observer Coverage	85	139	0	0	85	139
Total	**444**	**453**	**750**	**581**	**1194**	**1029**

* Excludes IFQ fisheries.
** Total includes both partial and full coverage in 2014 compared to 2015

Figure 5-1. Observer Program statements received by AKD by subject matter in 2014 and 2015.

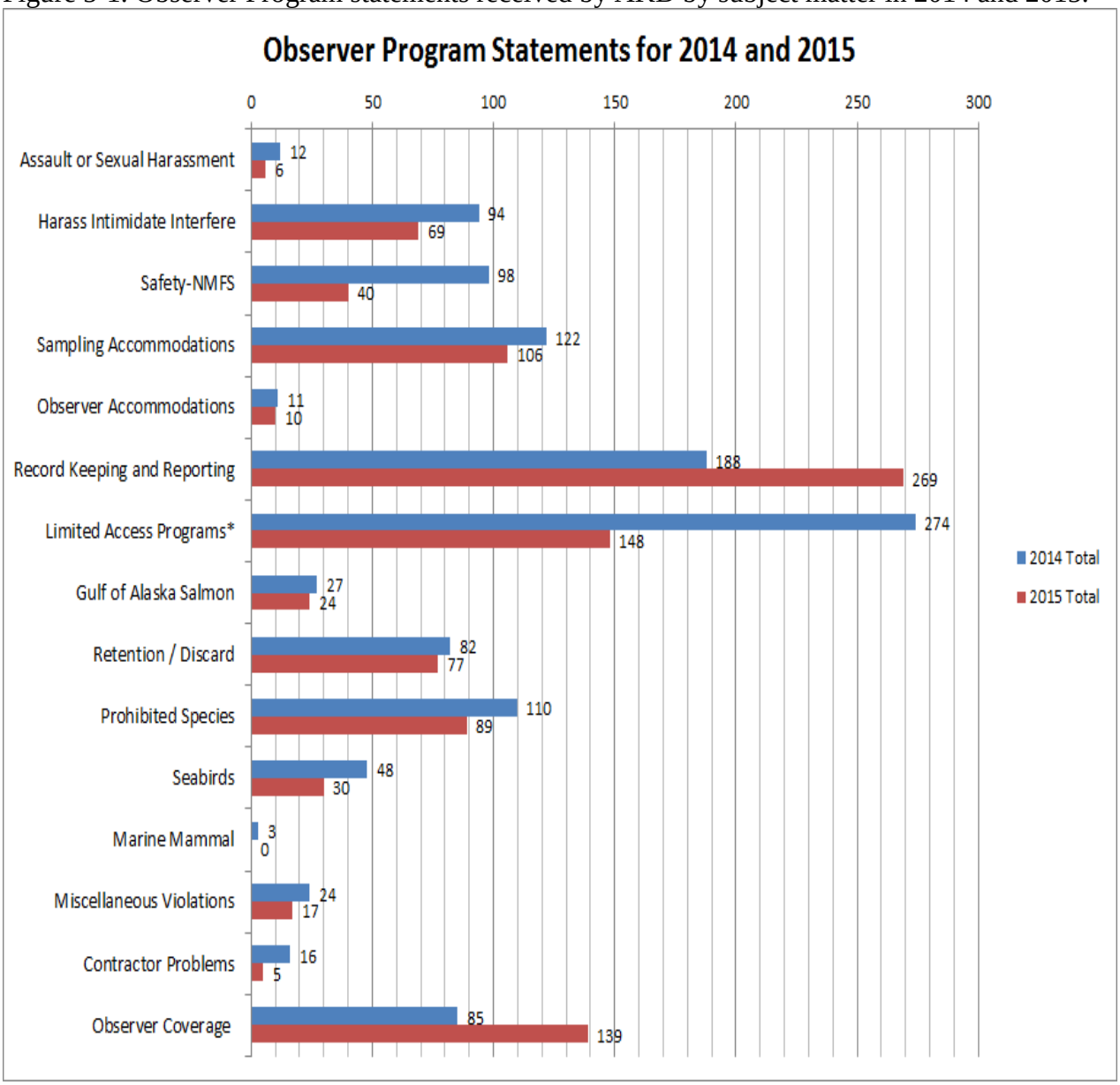

Table 5-2. Status of complaints received by AKD in 2015 from the North Pacific Groundfish and Halibut Observer Program*

Statements	Incidents		Cases	
890 Statements received and reviewed in 2015	483 Incidents forwarded to agents and officers	Ongoing 208	91 Cases created from incidents	Ongoing 55
		Enforcement Action taken 148		Enforcement Action taken 29
		Closed 127		Closed 8
Excludes the 139 complaints received from Agency staff	*Multiple statements may be combined into a single incident if the same vessel and company is involved*		*A case may include more than one incident number*	

*Current as of April 2016.

5.3.1 Observer Coverage Complaints

Observer coverage and ODDS complaints are identified and reported by NMFS staff; 139 complaints were received in 2015 involving 86 distinct vessels in the partial coverage category. 118 of the 139 complaints were for vessel operator failures to log a fishing trip or trips into ODDS. This is an increase from 2014; in 2014, 85 complaints were received involving 71 distinct vessels. The increase in the number of complaints may be due to attributed to the large number of vessels added into the trip selection pool in 2015.

5.3.2 Observer Safety Complaints

In 2015, AKD received 40 statements alleging safety issues compared with 98 complaints in 2014. A variety of safety issues were reported, including failure to maintain a lookout while at-sea, open watertight doors during inclement weather, blocked passageways, and unsafe living and working conditions. Of the 40 complaints received, 23 were referred for investigation; 11 involved partial coverage and 29 involved full coverage vessels. 2 complaints were transferred to another agency for investigation. Alcohol or drug use by vessel personnel was a factor in 4 safety reports received.

5.3.3 Observer Victim Complaints

During 2015, reports of assault, sexual harassment, and complaints involving harassment, intimidation, and interference declined. AKD and the USCG will not tolerate harassment of observers. Observers have the right to feel safe and secure in their work environment and should not be subjected to abuse of any kind. Reporting victimizations of any kind is challenging for anyone. This is true especially for observers who may feel isolated and remote at sea. AKD will continue to investigate observer victim crimes as the highest priority. It is the collective goal of the AKD, USCG, and FMA to stop all egregious cases involving observer victims through outreach, education, and enforcement.

5.4 Enforcement Actions

Investigations can be complex and often take time from complaint to prosecution. Egregious violation types are forwarded to NOAA General Counsel Enforcement Section (GCES) or the United States Attorney's Office (USAO) for civil prosecution or criminal prosecution. AKD Agents and Officers may resolve complaints through other methods without forwarding a case for civil or criminal prosecution. In 2015, 121 incidents were closed through the issuance of COPPS letters, which is meant to educate and remind owners and operators of the requirements; approximately 18 verbal and written warnings were issued;; and 8summary settlements were issued. Summary Settlement is an immediate penalty option that can be issued for many common violation types. Summary settlements are routinely issued for coverage and observer safety issues. Many additional complaints reported in 2015 are still currently under investigation.

A full list of enforcement actions issued by GCES is available on the web at http://www.gc.noaa.gov/enforce-office7.html.

5.4.1 NOAA General Counsel - Settlement Agreements

Settlement agreements and charges filed listed in the following paragraphs include cases initiated from observer or the observer program complaints received.

AK1102634A; F/V Alliance - Operator was charged in two counts under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) for harassing observers by conduct that had the effect of interfering with the observers' work performance. A $30,000 NOVA was paid.

AK1102634B; United States Seafoods LLC and Alaska Alliance LLC - Companies were charged under the Magnuson-Stevens Act for negligently supervising an employee and the operator of the F/V Alliance, who harassed an observer by conduct that had the effect of interfering with the observer's work performance. A $27,000 NOVA was paid.

6 OUTREACH

NMFS continued to hold outreach meetings throughout 2015, focusing on general Observer Program questions and addressing the objectives of quality data collection and management. This report focuses specifically on the outreach activities that were conducted in the fall of 2014 (in preparation for the 2015 fishing year) and throughout the 2015 calendar year. The outreach meetings were held in various locations in Washington and Alaska, and via telephone (Table 6-1) with a variety of information disseminated at the meetings (Table 6-2).

Many agency staff contributed to outreach efforts including: NMFS (Observer Program and Sustainable Fisheries), Office of Law Enforcement, United States Coast Guard, and AIS Inc. Meeting attendance included vessel owners, operators, fish processors, industry representatives, observers, and local newspapers and public radio stations. NMFS would like to thank everyone who participated and attended the meetings and provided valuable information and feedback.

The goals of the late fall 2014 and early 2015 public outreach meetings were to continue the dialogue with industry members and inform them about the program, vessel responsibilities, electronic monitoring, the objectives of quality collection of data and management, and changes to the conditional release policy and temporary exemptions. The late fall 2015 public outreach meetings on the transition to the 2016 ADP, the changes to the selection process for the upcoming 2016 fishing year and selection rates by gear type, the use of ODDS by processors and catcher vessels, and the elimination of temporary exemptions due to life raft capacity.

Topics highlighted by the Agency at these meetings included: the continued success of the industry logging in trips to ODDS, meeting the expectations in the selection pools in terms of deployment and representative data for management, the successful collaboration between the Agency and industry within the EM working group and the forward momentum with the EM pre-implementation plan, the limited number of requests for temporary exemptions, and observer coverage on tendering vessels. Questions discussed involved a variety of topics including quality of data collected; purpose of the observer data; observer coverage rates; the safety logistics of deploying observers to tendering vessels, electronic monitoring; Observer Program cost efficiencies; and various topics related to the logistics of having an observer on board, such as, trip length and space considerations. Some people were interested in the uses of the data collected and its role in fisheries management and observer coverage levels on Gulf of Alaska trawlers.

In addition to the public outreach meetings, the observer program was invited by various industry groups to speak specifically about regulations guiding employment policies of observers, observer coverage on tendering vessels, the use of ODDS, and to assist with safety training for fishermen.

NMFS plans to continue providing outreach meetings to interested communities. The use of technology combined with periodic in-person meetings provides valuable interaction and communication between NMFS staff and the fishing communities. NMFS strives to use

resources efficiently so in person meetings may be prioritized in future years to communities with ongoing interest and engagement.

NMFS would like to recognize the important contributions of observer providers. Their day-to-day interactions with many participants in the commercial fisheries off Alaska and their effort to provide factual information are integral to the overall success of observer deployment in the Alaskan fisheries.

Table 6-1. Outreach activities related to the Observer Program in fall of 2014 and throughout 2015.

Date	**Location**	**Description**
Nov 13, 2014	Seattle, WA	Alaska Freezer Longline Coalition to discuss availability of lead level 2 observers
Nov 19-21, 2014	Seattle, WA	Pacific Marine Expo
November 19, 2014	Seattle, WA	Aleutians East Borough Fishermen meeting
Dec 2, 2014	Kodiak, AK	Public outreach meeting
Dec 4, 2014	Homer, AK	Public outreach meeting
February 26, 2015	Sitka, AK	Public outreach meeting
March 12, 2015	Seattle, WA	Fishing Industry Professionals of Washington
Apr 2-4, 2015	Kodiak, AK	ComFish 2015 Public outreach meeting; presentation on ODDS
May 15, 2015	Seattle, WA	Seattle Fishermen's Memorial Fishermen's Safety Fair
May 19, 2015	Seattle, WA	Freezer Longline Coalition Symposium
July 2, 2015	Seattle, WA	Fishing Vessel Owners Association
Aug 20, 2014	Seattle, WA	Alaska Seafood Cooperative & Groundfish Forum meeting
November 18-20, 2015	Seattle, WA	Pacific Marine Expo
November 20, 2015	Seattle, WA	Alaska Fishermen's Tendering Association Annual Meeting
December 2, 2015	Phone	Webex outreach meeting on Observer Program for processors and vessels

Table 6-2. Summary of the outreach information distributed on the Observer Program in 2015.

Handout type	How Distributed	Link
What is a North Pacific Groundfish Observer?	Handout at meetings; available online	http://www.afsc.noaa.gov/FMA/PDF_DOCS/What%20is%20a%20NPG%20Observer%20small%206-6-14.pdf
North Pacific Groundfish Observer Program	Handout at meetings; available online	http://www.afsc.noaa.gov/FMA/PDF_DOCS/NPG%20observer%20program%20brochure%20small%206-6-14.pdf
Summary of the restructured North Pacific Groundfish and Halibut Observer Program	Handout at meetings; available online	https://alaskafisheries.noaa.gov/sites/default/files/observer-prog-summary2016.pdf
Observer Program Frequently Asked Questions	Handout at meetings; available online	https://alaskafisheries.noaa.gov/sites/default/files/2016-observer-prog-faq.pdf
Observer Declare and Deploy Frequent Asked Questions	Handout at meetings; available online	https://chum.afsc.noaa.gov:7104/apex/wwv_flow_file_mgr.get_file?p_security_group_id=1437919156609270&p_flow_id=140&p_fname=ODDS%20FAQ.pdf
Adding Observer Declare and Deploy Systems-ODDS- trip number to *e*Landings	Handout; available online	https://elandings.atlassian.net/wiki/display/doc/Adding+Observer+Declare+and+Deploy+System+-ODDS-+trip+number+to+elandings
EM Implementation Plan	Handout at meetings; available online	http://www.npfmc.org/wp-content/PDFdocuments/conservation_issues/Observer/EM/EM2016Pre-impPlanJan16.pdf
2015 Annual Deployment Plan	Handout at meetings; available online	https://alaskafisheries.noaa.gov/sites/default/files/final2016adp.pdf
2014 Annual Report	Handout at meetings; available online	https://alaskafisheries.noaa.gov/sites/default/files/annualrpt2014.pdf
Partial coverage contacts	laminated card handed out at meetings	

7 NMFS RECOMMENDATIONS

7.1 Recommendations to improve the 2017 ADP

Dockside monitoring

- NMFS recommends maintaining the current dockside monitoring sampling for pollock deliveries. Observers on trawl vessels that deliver to tenders cannot collect genetic samples from all Chinook salmon in the delivery. However, in 2015 this issue was mainly limited to the port of King Cove. Increasing genetic sampling for salmon or modifying the protocols would require a shifting of staff and resources away from other sampling and data collection duties.

No selection pool

- Recognizing the challenging logistics of putting observers on small vessels, NMFS continues to recommend that vessels less than 40ft be in the no selection pool for observer coverage. However, NMFS also recommends that vessels less than 40ft be considered for testing of electronic monitoring since NMFS has no data from this segment of the fleet.

- NMFS recommends continuing to allow hook-and-line and pot vessels <57.5 ft LOA where taking an observer is problematic an opportunity to 'opt-in' to the EM selection pool to participate in the EM cooperative research under the 2017 EM pre-implementation plan that is being developed by the EM workgroup. NMFS also recommends that vessels participating in the EM selection pool be required to log trips in ODDS. This will improve the ability of NMFS to determine which vessels are in the EM selection pool, when they are fishing, and provides a necessary compliance monitoring tool.

Trip-selection pool

- NMFS recommends maintaining 3 sampling strata defined by gear (pot, hook-and-line, and trawl) for the 2017 ADP and continuing to evaluate the optimal allocation to determine deployment rates in each stratum. Within budget constraints, NMFS recommends that sampling rates be high enough in each stratum to reasonably expect three observed trips in each NMFS Area.

- Although Chapter 3 of this report found differential cancellation rates in ODDS, and this led the OSC to recommend a change in cancellation policy be explored, a temporal bias in realized trips was not found in 2015. Therefore, NMFS recommends continuing to allow vessels to log three trips in ODDS. NMFS also recommends continuing to automatically release vessels 40-57.5 feet in length from observer coverage if the two previous trips were observed trips (i.e., if two trips in a row were observed and a third trip is selected, then the third trip will be released from coverage).

- NMFS recommends evaluating 2 additional strata for the 2017 ADP:
  - Separate strata for vessels delivering to tenders. Based on analyses in this report and that from 2014, NMFS continues to see differences in the characteristics of tendering

and non-tendering vessels. Establishing a separate stratum (or strata) for vessels delivering to tenders would enable NMFS to adjust sampling rates to provide the necessary data to manage fisheries.

- Separate strata for partial coverage catcher-processors. Given the potential expansion in the number of catcher-processors in partial coverage in 2016, establishing a separate stratum (or strata) for partial coverage vessels would enable NMFS to adjust sampling rates.

7.2 Update to previous recommendations

In the 2014 Annual Report (NMFS 2015a) NMFS made a series of recommendations. Here we provide an update to the previous recommendations (Previous recommendations *in italics*).

Vessel Selection:

- *Based on the 2013 and 2014 Annual Reports, NMFS recommended that participants in the vessel selection category be placed in the trip selection category in 2015.*

This recommendation was implemented in 2015. Vessels that were in vessel selection were placed in the small-vessel trip selection strata in 2015. NMFS continues to recommend trip-selection method for all vessels in 2017.

- *NMFS recommended allowing vessels in the small vessel category where taking an observer is problematic an opportunity to 'opt-in' to the EM selection pool to participate in the EM cooperative research. To implement the Observer Science Committee's (OSC's) recommendation that vessels not be moved in and out of the coverage strata, NMFS recommended that any vessels put in the no selection pool and the EM selection pool be in that pool for the entire year.*

This recommendation was implemented in 2016. As of December 2015 a total of 58 vessels had opted-in to the EM selection pool. The vessels are required to follow procedures outlined in the Final 2016 EM Pre-Implementation Plan. Vessels participating in the EM selection pool are not required to carry an observer for the entire year and vessels are not required to log trips in ODDS.

No selection pool:

- *Recognizing the challenging logistics of putting observers on small vessels, NMFS recommends that vessels less than 40ft continue to be in the no selection pool for observer coverage. However, NMFS also recommends that vessels less than 40ft be considered for testing of electronic monitoring since NMFS has no data from this segment of the fleet.*

NMFS reiterates this recommendation for 2017.

Trip Identifiers:

- *NMFS staff will consider and identify the best approach to develop a trip identifier tied to landing data to provide linkage between ODDS and eLandings and improve data analysis. Identification of tender trips through electronic reporting on tenders (via tLandings) would also facilitate analysis.*

NMFS implemented modifications to the eLandings system that enables the ODDS trip number to be entered on a groundfish landing reports in eLandings beginning in 2016. When landing reports are entered in eLandings at the end of the trip, the vessel operators will provide their ODDS trip number so that it can be entered on the landing report. Having ODDS trip numbers entered on groundfish landing reports will facilitate data analysis and provide better linkage between ODDS and eLandings. Identification of tender trips has also been improved by requiring vessels delivering to tenders to identify whether they plan to do a tender delivery trip by checking a box in ODDS.

Additional Recommendations:

At their June, 2014 meeting, the Council's SSC recommended that:

> *In addition to sample size needs for spatial and temporal coverage, develop accuracy and precision objectives for catch, PSC, and bycatch.*

NMFS does not recommend that specific precision objectives for catch, PSC, and bycatch be used to determine deployment of observers. In the development of the 2016 ADP, NMFS compared alternative sampling designs by simulated observer deployments and estimating the relative precision of total retained and discarded groundfish. The alternative designs were evaluated using a gap analysis and ranked based on the results from the simulations. NMFS agrees that as the program continues to develop, understanding the sources of variation provides additional information and aids in decisions about sample design. Recognizing that funds are limited, NMFS uses its ADP process to make annual adjustments to observer deployment that maximizes expenditures while considering risk of exceeding budgets. NMFS is continuing work to and developing methods to assess variance of the catch estimates will provide an update to the SSC in June, 2016. Once developed, these variance estimates can be considered in stock assessments, the ADP, and management actions.

8 LITERATURE CITED

AFSC (Alaska Fisheries Science Center). 2014. 2015 Observer Sampling Manual. Fisheries Monitoring and Analysis Division, North Pacific Groundfish Observer Program. AFSC, 7600 Sand Point Way N.E., Seattle, Washington, 98115. Available online at http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2015.pdf.

Cahalan, J., Mondragon, J., and J. Gasper. 2014. Catch Sampling and Estimation in the Federal Groundfish Fisheries off Alaska: 2015 Edition. NOAA Tech. Memo. NMFS-AFSC-286, 46 p. Available online at: http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-286.pdf

Cahalan, J., Gasper J., and J. Mondragon. 2015. Catch estimation in the Federal trawl fisheries off Alaska: A simulation approach to compare the statistical properties of three trip- specific catch estimators. Can. J. Fish. Aquat. Sci. Web published March 26 2015. DOI 10.1139/cjafs-2014-0347

Cochran, W. G. 1977. Sampling techniques. John Wiley and Sons, Inc. New York. 428 p.

Faunce, C. H. 2015a. Evolution of observer methods to obtain genetic material from Chinook salmon bycatch in the Alaska pollock fishery. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-288, 28 p.

Faunce, C. H. 2015b. An initial analysis of alternative sample designs for the deployment of observers in Alaska, U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-307, 33 p.

Faunce, C., Gasper, J., Cahalan, J., Lowe, S., Webster, R., and A'mar, T. 2015. Deployment performance review of the 2014 North Pacific Groundfish and Halibut Observer Program. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-302. 55 p.

Faunce, C., Cahalan, J., Gasper, J., A'mar, T., Lowe, S., Wallace, F. and Webster, R. 2014. Deployment performance review of the 2013 North Pacific Groundfish and Halibut Observer Program. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-281. 74 p.

Faunce, C. H., and Barbeaux, S. J. 2011. The frequency and quantity of Alaskan groundfish catcher-vessel landings made with and without an observer. ICES J. Mar. Sci. 68:1757-1763.

Guthrie, C.M. III, Hv. T. Nguyen, and J. R. Guyon. 2016. Genetic stock composition analysis of the Chinook salmon bycatch samples from the 2014 Gulf of Alaska trawl fishery. 32p. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-291. At http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-311.pdf

Guyon, J. R., C. M. Guthrie III, A. R. Munro, J. Jasper, and W. D. Templin. 2015. Genetic stock composition analysis of the Chinook salmon bycatch in the Gulf of Alaska walleye pollock (*Gadus chalcogrammus*) trawl fisheries. 26 p. U.S. Dep. Commer., NOAA Tech. Memo.
NMFS-AFSC-291. At http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-291.pdf

Hill, M.O. 1973. Diversity and evenness: A unifying notation and its consequences. Ecology 61: 225-236.

Loefflad, M. R., F. R. Wallace, J. Mondragon, J. Watson, and G. A. Harrington. 2014. Strategic plan for electronic monitoring and electronic reporting in the North Pacific. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-276, 52 p. Available at: http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2014_2.pdf .

Nelson Jr., R., R. French, R. and J. Wall. 1981. Sampling by U.S. observers on foreign fishing vessels in the eastern Bering Sea and Aleutian Island region, 1977-78. Mar. Fish. Rev. 43:1-19.

NMFS (National Marine Fisheries Service). 2015a. 2016 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available online at: https://alaskafisheries.noaa.gov/sites/default/files/final2016adp.pdf.

NMFS. 2015b. North Pacific Groundfish and Halibut Observer Program 2014 Annual Report. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. 101106 p. plus appendices. Available online at http://alaskafisheries.noaa.gov/sites/default/files/annualrpt2014sustainablefisheries/observers/annualrpt2013.pdf.

NMFS. 2015c. Supplement to the Environmental Assessment for Restructuring the Program for Observer Procurement and Deployment in the North Pacific. NMFS, Alaska Regional Office, Juneau. May 2015. Available online at https://alaskafisheries.noaa.gov/sites/default/files/analyses/finalea_restructuring0915.pdf.

NMFS 2014a. 2015 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available online at https://alaskafisheries.noaa.gov/sites/default/files/final2015adp.pdf.

NMFS 2014b. North Pacific Groundfish and Halibut Observer Program 2013 Annual Report. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available online at https://alaskafisheries.noaa.gov/sites/default/files/annualrpt2013.pdf.

NMFS. 2013a. 2013 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. 39 p. plus appendices. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available online at http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_Final_2013.pdf

NMFS. 2013b. 2014 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska 99802. Available online at: http://alaskafisheries.noaa.gov/sustainablefisheries/observers/adp2014.pdf.

NPFMC (North Pacific Fishery Management Council). 2016. Deployment of Observers on Catcher Vessels Delivering to Tender Vessels Discussion Paper. 40 p. Available online under agenda item C-9 at http://legistar2.granicus.com/npfmc/meetings/2016/2/934_A_North_Pacific_Council_16-02-01_Meeting_Agenda.pdf.

NPFMC. 2011. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Proposed Amendment 86 to the Fishery Management Plan for Groundfish of the Bering sea/Aleutian Islands Management Area and Amendment 76 to the Fishery Management Plan for Groundfish of the Gulf of Alaska: Restructuring the Program for Observer Procurement and Deployment in the North Pacific. March 2011. 239 pages plus appendices. Available online at http://alaskafisheries.noaa.gov/analyses/observer/amd86_amd76_earirirfa0311.pdf.

Wall, J., R. French, and R. Nelson Jr. 1981. Foreign fisheries in the Gulf of Alaska, 1977-78. Mar. Fish. Rev. 43:20-35.

Williams, G. H. 2013a. Recommendations for Pacific halibut discard mortality rates in the 2013-

2015 groundfish fisheries off Alaska. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2013:337-354. Available at: http://www.iphc.int/publications/rara/2013/rara2013_17_2013incidentalcatchmortality.pdf

Williams, G. H. 2013b. Incidental catch and mortality of Pacific halibut, 1962-2013. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2013:389-310. Available at: http://www.iphc.int/publications/rara/2013/rara2013_17_2013incidentalcatchmortality.pdf

9 LIST OF PREPARERS AND CONTRIBUTORS

Chapter 3 was written and reviewed by the 2016 **Observer Science Committee:**

Craig Faunce, Alaska Fisheries Science Center (AFSC)
Jennifer Cahalan, AFSC/Pacific State Marine Fisheries Commission (PSMFC)
Jason Gasper, Alaska Regional Office (AKRO)
Steve Barbeaux, AFSC
Sandra Lowe, AFSC
Ray Webster, International Pacific Halibut Commission (IPHC)

All other sections of the document were prepared by:

Sally Bibb, AKRO
Jennifer Cahalan, PSMFC/AFSC
Craig Faunce, AFSC
Ben Fissel, AFSC
Jason Gasper, AKRO
Nathan Lagerwey, NOAA Office of Law Enforcement (OLE)
Brian Mason, AFSC
Alicia Miller, AKRO
Jennifer Mondragon, AKRO
Chris Rilling, AFSC
Gwynne Schnaittacher, AFSC
Jaclyn Smith, NOAA Office of Law Enforcement (OLE)
Cathy Tide, AKRO
Heather Weikart, AFSC

With contributions from:

Gretchen Harrrington, AKRO
Josh Keaton, AKRO
Glenn Merrill, AKRO

APPENDIX A

Appendix A presents the definitions of the species groupings that were used in total catch and discard tables in Chapter 4. The groupings were done to simplify the tables and are based on categories that make sense from a management standpoint.

Table A-1. Description of the individual species that were combined into species groups in the Gulf of Alaska for Table 4-4 and Table 4-5.

Deep water Flatfish	**Other Groundfish**	**Rockfish**	**Shallow Water Flats**	**Skates**	**Sharks**
Arrowtooth flounder	Atka Mackerel	Dusky	Alaska plaice	Alaska	Other sharks
	Octopus	Northern	Butter sole	Aleutian	Salmon shark
Deepsea sole	Sculpin	Other rockfish	English sole	Big	Sleeper shark
Dover sole	Squid	Pacific Ocean Perch	Other flounder	Longnose	Spiny dogfish
Flathead sole			Rock sole	Other skates	
Greenland Turbot		Rougheye	Sand sole	Whiteblotched	
		Shortraker	Starry flounder		
Kamchatka flounder		Thornyheads	Yellowfin sole		
Rex sole					

Table A-2. Description of the individual species that were combined into species groups in the Bering Sea/Aleutian Island for Table 4-6, Table 4-7, and Table 4-8.

Flatfish	**Other Groundfish**	**Rockfish**	**Skates**	**Sharks**	**Turbot**
Alaska plaice	Octopus	Northern	Alaska	Other sharks	Arrowtooth flounder
Butter sole	Sculpin	Other rockfish	Aleutian	Salmon shark	Greenland turbot
Dover sole	Squid	Pacific Ocean Perch	Big	Sleeper shark	Kamchatka flounder
English sole		Rougheye	Longnose	Spiny dogfish	
Flathead sole		Shortraker	Other skates		
Other flounder		Thornyheads	Whitebloched		
Petrale sole					
Rock sole					
Starry flounder					
Yellowfin sole					