North Pacific Groundfish and Halibut Observer Program 2013 Annual Report

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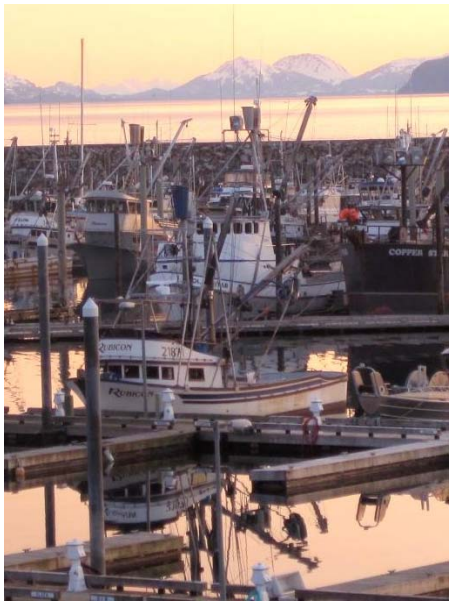

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EXECUTIVE SUMMARY

This annual report provides information, analysis, and recommendations based on the first year of restructuring of the North Pacific Groundfish and Halibut Observer Program (Observer Program). The Observer Program provides the regulatory framework for NMFS 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.

The purpose of restructuring the Observer Program was to:

- reduce the potential for bias in observer data,
- authorize the collection of observer data in fishing sectors that were previously not required to carry observers,
- allow fishery managers to provide observer coverage to respond to the management needs and circumstances of individual fisheries, and
- assess a broad-based fee to more equitably distribute the costs of observer coverage.

This report provides information to assess the degree to which the objectives of Observer Program restructuring have been met and includes recommendations about how to improve implementation of the program to further these objectives. In summary, NMFS highlights findings from chapters of the report and provides recommendations.

Fees & budget:

- Federal start-up funding was sufficient to pay for observer coverage until fees were collected and available for use.
- NMFS successfully implemented the ex-vessel based fee collection program recommended by the Council to fund observer coverage in the partial coverage category. Cooperation by processors and fishermen in the first year was instrumental to the success of the fee collection program. A total of $4,251,452 in observer fees was collected for 2013. The breakdown in contribution to the observer fee by species is: 38% halibut, 31% sablefish, 19% Pacific cod, 10% pollock, and 2% all other groundfish species.

Deployment Performance Review:

The report presents a review of the deployment of observers in 2013 relative to the intended sampling plan and goals of restructured observer program. One goal of the observer program restructuring action was to address longstanding concerns about statistical bias of observer-collected data. In evaluating the 2013 sampling plan for the deployment of observers, the review identified situations where bias may exist and recommendations for further evaluation are provided, including improvements to the deployment process that could be considered by NMFS for the 2015 Annual Deployment Plan. A set of performance metric were used to assess the

efficiency and effectiveness of observer deployment into the partial coverage strata. These metrics provide a method to evaluate the quality of data being collected under the restructured observer program. Specifically, the metrics fall into three broad categories:

- **Deployment rate metrics** that evaluated whether achieved sample rates were consistent with intended sample rates. In addition, the achieved sampling rate was evaluated against the anticipated sampling rates in terms of the tracking of costs and adjustments in sampling rates to ensure coverage across the entire year;
- **Sample frame metrics** that quantify differences between the population for which estimates are being made and the sample from which those estimates are derived. These differences can result in incorrect conclusions being drawn about the population based on the sample, especially if the characteristics of the sampled portion of the population are different from the population whole. Non-response errors, which arise when selected trips or vessels are different from the observed trips or vessels, were also evaluated. These errors can be a serious problem if the vessels or trips that are actually observed are different from those that were selected but not observed;
- **Sample size metrics** analysis to determine whether enough samples were collected to ensure adequate spatial and temporal coverage.

Did we meet anticipated deployment goals?

Costs and the Creation of Strata

- Evaluation of the deployment performance was conducted at the stratum level. Each stratum is defined by the sampling unit (i.e., vessels or trips) and/or rate of sampling. There were two strata under partial coverage: vessel selection and trip selection (the selection unit being vessels or trips, respectively). An adjustment was made to the trip selection stratum to reduce the sampling rate from approximately 0.15 to 0.11 for the period June 22- August 17. This adjustment was required because more fishing effort occurred during the first 20 weeks of the year than was anticipated under the 2013 ADP. A downward adjustment to the sampling rate was required to reduce the number of days observed (cost) to ensure the program did not go over budget before the end of 2013. The rate was increased to approximately 0.15 after August 17 until the end of 2013. The change in the sampling rate created three temporal strata under trip selection: January 1- June 21, June 22 – August 17, and August 18-Decemeber 31.

Trip Selection

- The realized rates of coverage for 2013 met the anticipated coverage goals for all trip selection strata.
- The Observer Declare and Deploy System performed as expected throughout the year and was unaffected by the government shutdown in October.

Vessel Selection

- Coverage levels in vessel selection were less than expected values during the first five selection periods (January - October). The random selection of vessels for observer coverage was abandoned and all eligible vessels were selected during the last period (November-December). During this selection period coverage levels achieved the anticipated number of vessels specified in the 2013 ADP.

- Vessels were selected for sampling based on whether they fished within a particular selection period in 2012. This meant that any vessels that did not fish in 2012 but did fish in 2013 were not part of the selection pool. This discrepancy between the selection list (sampling frame), and the list of vessels that actually fished (target frame), resulted in some vessels within the vessel selection stratum having no probability of selection. The number of vessels that fished in 2013, but not in 2012, ranged between 9 (January-February) and 49 (July-August) vessels. This problem was evident in all six vessel selection periods.The percent of non-response (vessels that were selected and fished, but were not observed, largely because of conditional releases) ranged between 13% and 71% with peak values between May and July.
- The combination of the conditional releases and a poorly defined list of vessels resulted in NMFS having to select a greater number of vessels in each selection period than desired to reach anticipated selection goals in 2013, decreased the sampling efficiency of the selection.

Dockside Sampling

- Coverage rates for dockside sampling did not meet the objective of deploying observers to complete salmon sampling during all pollock offloads in the Gulf of Alaska. The Observer Program sampled 91% of pollock deliveries. The sampling plan presented several challenges for obtaining a census of deliveries: notifications were not be always made, observers were not always be available when and where a pollock delivery was made, and salmon held by the processing plant may not have represented a census of all salmon from which the observer obtained his or her systematic sample.

Was the Coverage Representative?

Trip Selection

- No large differences in temporal patterns were apparent in the actual number of observed trips versus the anticipated number of observed trips throughout the year. Although small deviations from the anticipated number of observed trips were evident at the start and end of the year.
- Spatial analysis across federal reporting areas showed the anticipated coverage rates generally were as expected (e.g., consistent spatial patterns of extreme values).
- The OSC evaluated whether observed and unobserved trips had similar characteristics. The empirical distributions showed no large differences in trip length, weight of landed catch per trip, number of NMFS areas fished, or diversity of species caught during a trip. However, small sample sizes during some periods made determining inconsistencies difficult.
- No obvious pattern in trip duration for tender versus non-tender trips was apparent, but the number of observed tender trips was too low to examine on a fine temporal or spatial scale.

Vessel Selection

- The impact of non-response (i.e., a vessel that was selected to be observed but was not) on the spatial distribution of observer coverage on vessel-selected trips was large. In total, 52% of the vessels, and 50% of the trips resulting from these vessels were expected to be observed, but were not due to conditional releases. This high level of non-response,

coupled with a low sample size and using vessels as a selection unit likely resulted in systematic spatial coverage issues, with coverage levels being consistently different than expected in Federal reporting area 650 (Southeast Outside District) for much of the year (March and October).

- The small sample sizes per selection period made distinguishing differences in trip attributes between observed and unobserved portions of the fleet difficult. With this caveat in mind, we did not observe large differences in trip duration or landed catch weight. We did observe differences in the number of NMFS areas visited per trip and the diversity of species in landed catch (observed trips had landings with higher diversity).

Sample Size Metrics

- As expected, reporting areas and gear types that had more fishing effort had higher probabilities of having observer data in that gear/area/stratum combination. There were differences in the probability of an observed trip between gear types, with trawl generally having a higher probability of observation due to concentrated fishing in fewer areas (e.g. more trips in any given area) whereas hook-and-line was more disperse (e.g., fewer trips in an area) and more areas/stratum combinations had a higher probability of zero observer coverage.

Observer Availability:

- With few exceptions, observers for the partial coverage category were available to deploy on vessels in the trip and vessel selection pools. The restructured program resulted in observer coverage on many vessels less than 60 feet that had not previously been observed, and the contracted observer provider company was able to successfully deploy observers to many remote port locations.

Compliance and Enforcement:

- During 2013, AKD agents and officers engaged with industry and the Observer Program in 731 hours of observer related outreach, education, and compliance assistance. Agents and officers in all AKD field offices responded to industry questions and potential observer related violations and participated in industry outreach and Agency meetings. Outreach and a collaborative agency response resulted in good industry awareness of the restructured Observer Program and an overall high level of compliance.

Outreach:

- NMFS has found public outreach and 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. Feedback on the outreach meeting has been positive and several participants noted appreciation for having agency staff present in person in their communities.

NMFS Recommendations

Vessel Selection:

- **NMFS recommends that participants in the vessel selection category be placed in the trip selection category in 2015.** The trip selection process is working well whereas the vessel selection process has several problems that impact data quality. To expand the trip selection category successfully, the current policy of not considering conditional releases for vessels in trip selection might have to be evaluated to account for life raft capacity on some smaller vessels.

  Implementing the recommendation to move vessel selection participants into trip selection would improve several problem areas. First, it would correct the sample frame problem because all vessels making fishing trips would log them in advance, and NMFS can monitor landings to ensure these trips are being logged. Thus, all fishing effort would be included in the sampling frame. Second, the impact on any given operator would be reduced because only single trips would be selected. NMFS has heard testimony at the Council and in public outreach meetings that the 2 month selection period creates a substantial burden on vessel operators, whereas a single trip is considered less of a burden. Third, operators could not avoid coverage by delaying fishing within the year because the coverage requirement for any selected trip is carried over to the next trip if the selected trip is cancelled by the operator. NMFS believes the trip selection approach will be more workable for the fleet, will reduce NMFS workload to manage, and will improve the data quality for NMFS and the Council. NMFS is interested in Council input on this issue. This action would address several key recommendations from the Observer Science Committee (OSC) noted in chapter 3.

- The conditional release policy was applied to vessels that met the criteria of maximum crew or IFQ permit holder on board. This may have resulted in some vessels being subject to observer coverage under certain conditions but not others. If the vessel selection pool continues in 2015 and the releases are continued in the vessel selection pool, then they should apply to all fishing activities during a release period.

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 in 2015. 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.

Selection Rate:

- NMFS does not anticipate recommending coverage rate changes at this time, except that NMFS will scale coverage rates up if there is sufficient funding to do so. Trip selection rates should remain constant throughout the entire year and NMFS should use buffers in the budget to mitigate the risk of the rare event of a cost-overage.

Tenders:

- Analysis of trip length for vessels in the trip selection pool delivering to tenders did not show a systematic difference in trip length between observed and unobserved vessels (see Chapter 3 and Figure 3-14: Distribution of trip length for vessels in the trip selection strata delivering their catch at-sea to tenders.). The distribution of trip length was similar for both observed and unobserved trips, with a few longer trips occurring in both categories. The differences in trip length for the full year of 2013 were less pronounced than the differences noted in the June 2013 preliminary report for the first 16 weeks of 2013. However, the small number of observed trips in 2013 for vessels delivering to tenders may be insufficient to clearly capture any differences in trip length. In addition, NMFS continues to receive anecdotal information that vessel operators are taking longer trips when delivering to tenders to avoid ending a fishing trip, thereby delaying becoming subject to selection for observer coverage. Therefore, NMFS recommends that continued development of alternatives to deploy observers from or on tenders be considered in the context of other actions and priorities for Council and NMFS analysis.

Performance Metrics:

- NMFS envisions that future reporting will expand key performance metrics to improve our understanding of the observer program performance. NMFS has already noted progress on incorporating variances associated with catch estimates, and will continue to report as work progresses.

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.

1 INTRODUCTION

This annual report provides information, analysis, and recommendations based on the first year of restructuring of the North Pacific Groundfish and Halibut Observer Program (Observer Program).[1] The Observer Program provides the regulatory framework for NMFS 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.[2] Managers use data collected by observers to manage groundfish and prohibited species catch with 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 human observers.

In 2013, the Council and the NMFS restructured the Observer Program to place all vessels and processors in the groundfish and halibut fisheries off Alaska into one of two categories: (1) the full coverage category, where vessels and processors obtain observers by contracting directly with observer providers, and (2) the partial coverage category, where NMFS has the flexibility to deploy observers when and where they are needed based on an annual deployment plan (ADP) developed in consultation with the Council. Funds for deploying observers in the partial coverage category are provided through a system of fees based on the ex-vessel value of retained groundfish and halibut in fisheries and landings that are not in the full coverage category.

The purpose of restructuring the Observer Program was to:

- reduce the potential for bias in observer data,
- authorize the collection of observer data in fishing sectors that were previously not required to carry observers,
- allow fishery managers to provide observer coverage to respond to the management needs and circumstances of individual fisheries, and
- assess a broad-based fee to more equitably distribute the costs of observer coverage.

[1] 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).

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

The objective of addressing known sources of bias is critical to the quality of the data collected by observers and assessing the degree to which we are making progress on that goal is an important outcome of this annual report. NMFS's goal is to provide reliable estimates of the impacts of commercial fishing. Placing an observer on every vessel and in every processing plant in sufficient quantities to census and assess all aspects of commercial fishing is logistically and financially impractical and not necessary if an adequate sampling program exists. Sampling is collecting information from a subset of the total units in a population following prescribed methods. Sampling information is then extrapolated to describe the population of interest. Bias is introduced when the sample (i.e., observed trips) does not represent fishing activity to which it is expanded (i.e., population of all fishing trips). There were several issues associated with bias in the design of the Observer Program prior to restructuring:

- Non-representative samples: Prior to restructuring the Observer Program, vessel operators chose when to take observers to fulfill their observer coverage requirement. The ability for vessels to choose when data were collected was a fundamental flaw with the previous observer deployment and violated the assumption of representative sampling.

- Spatial and temporal bias: Since vessel operators were allowed choice in when they took an observer within the requirements of the "30 percent" observer coverage category, some vessel operators waited to deploy observers until the end of the quarter or when observers were available. This created patchy observer coverage that was not representative of fishing effort throughout the entire quarter or across all fisheries;

- Population not represented in sample: Vessels fishing for halibut and those less than 60 ft length overall were not required to carry observers so they were not included in the sampled population. These vessels comprise an important portion of the fishing fleet. Like all fishermen off Alaska, they fish in ecologically sensitive areas and harvest long-lived and vulnerable species that require accurate accounting to ensure long-term sustainability. In addition, these previously unobserved vessels harvest species that NMFS is responsible to assess and protect under annual catch limits and accountability measures required by the Magnuson-Stevens Act. It is important for NMFS to obtain some independent information about catch and bycatch by these vessels to ensure that data used to estimate total catch is representative of the fishing activity by these vessels.

- Incentives to bias data ("observer effect"): Alaska groundfish fisheries have limits on the amount of bycatch that is allowed to be caught, particularly for halibut, salmon, and crab. Since bycatch accounting relies on at-sea data collection from observers, incentives exist to fish differently when an observer is on board a vessel than when a vessel is unobserved (i.e., to fish in areas where bycatch is expected to be lower).

1.1 Observer Coverage Categories and Coverage Levels

Under the restructured 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

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.

NMFS recommended that all catcher/processors and motherships be placed in full coverage to obtain independent estimates of catch, at-sea discards, and PSC for these vessels. At least one observer on each catcher/processor eliminates the need to estimate at-sea discards and PSC based on industry provided 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 [AFA] and Community Development Quota [CDQ] programs), the groundfish CDQ fisheries (CDQ fisheries other than halibut and fixed gear sablefish), and the Central GOA Rockfish Program.

Under the 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. In addition, the smaller the pool from which to draw similar observed vessels and trips, the more difficult it is to construct representative at-sea discard and PSC rates for individual unobserved vessels.

Inshore processors taking deliveries of Bering Sea pollock are in the full coverage category because of the need to monitor and count salmon bycatch in the Bering Sea pollock fishery.

1.1.2 Partial Coverage

The partial observer coverage category includes:

- 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 meet criteria that allows assignment to the partial coverage category;
- shoreside or stationary floating processors, except those in the full coverage category.

Under the 2013 ADP, the partial coverage category consisted of vessels in three "strata" (statistical subgroups) or "pools" with differing requirements:

> No Selection Pool. This category applies to all vessels less than 40 ft and catcher vessels fishing with jig gear (which includes handline, jig, troll, and dinglebar troll gear). Inclusion in this pool is re-evaluated each year in the ADP and may change in the future. Eligible landings from vessels in the no selection pool are included in the observer fee assessment.
>
> Vessel Selection Pool. This category applies to catcher vessels fishing with hook-and-line and pot gear that are greater than or equal to 40 ft and less than 57.5 ft. Vessel owners or operators in this pool are not required to log trips into the Observer Declare and Deploy Systems (ODDS). However, a sub-set of vessels, randomly selected by NMFS, are required to take observers for every groundfish or halibut fishing trip that occurs during a specified 2-month period. Owners of selected vessels are contacted by NMFS at least 30 days in advance of the 2-month period.
>
> Trip Selection Pool. This category applies to all catcher vessels of any length fishing with trawl gear, and to hook-and-line and pot gear vessels that are greater than or equal to 57.5 ft. Each fall, owners of vessels placed in this pool receive a letter that lists their vessels assigned to this pool and describes how to access and log trips into ODDS. Owners or operators of vessels in this pool are required to log each fishing trip into ODDS. Upon logging a trip, the vessel owner or operator is immediately informed if the trip has been randomly selected for observer coverage. If the logged fishing trip is selected, then the vessel must take an observer on that trip. The observer will be provided by a NMFS contractor. Vessel owners or operators in this pool must log fishing trips at least 72 hours before anticipated departure.

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 2013 ADP was developed in 2012 and the annual report for 2013 was prepared in 2014.

The Annual Deployment Plan (ADP) describes how NMFS plans to deploy observers to vessels and processors in the partial observer coverage category in the upcoming year. The ADP

provides flexibility to optimize deployment to meet scientifically based estimation needs while accommodating the realities of a dynamic fiscal environment. NMFS's 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. Specific elements of the 2013 ADP are described in more detail in Section 1.3.

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 in 2013. The purpose of the deployment performance review is to evaluate whether actual deployment achieved the goals of the ADP and to identify areas where improvements are needed to collect the 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 next year.

The annual planning and reporting process is described below:

- January – June: NMFS staff compile the annual report for the previous year. Chapter 3 (the observer deployment performance review) is prepared by the Observer Science Committee, which is described in more detail in Chapter 3.

- 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 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 September 1 of 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 will review and consider 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

deployment (including contracting with an observer provider) and associated processes that need to be in place by January 1.

- December: After final analysis of the Council recommendations, NMFS will make 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. NMFS also evaluates whether the Environmental Assessment (EA) prepared for Amendments 86/76 needs to be supplemented for the ADP. To date, NMFS has prepared a Supplementary Information Report explaining why the EA did not need to be supplemented.[3]

1.3 Summary of the 2013 Annual Deployment Plan

The 2013 ADP outlined the detail in the sampling plan for 2013 (NMFS 2013[4]). The most important goal of the ADP was to achieve randomization of observer deployment in the partial coverage category. Sampling that incorporates randomization is desirable at all levels of the sampling design since: (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). Once fully implemented, random deployment will greatly improve NMFS's ability to evaluate the statistical properties of estimators and improve catch estimation procedures in the future. The sampling methods described in the 2013 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. 2010). Starting in 2013, randomization of samples now occurs at all levels of sampling. The 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 observer sampling manual (AFSC 2014).

Stratified random sampling, such as is described in the ADP, requires that sample units (trips or vessels) be assigned to a single stratum and that within a stratum a single sampling design and estimation process is used. Hence, the partial coverage trip selection stratum and the full coverage stratum are two separate strata and estimation calculations will reflect this. By definition, each trip (or vessel) must 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 (or vessels). An immediate benefit to assigning observers to trips with equal probability (within a stratum) is the ability to estimate the 'observer deployment' effect. Since observer coverage within a time/area/gear type/target designation should be

[3] The Supplementary Information Report for the 2013 ADP is on the NMFS Alaska Region website at: http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_SIR_2013.pdf

[4] Available on the Alaska Region website at http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_Final_2013.pdf

proportional to the actual fishing patterns within the same 'fishery' deviations of coverage proportions from the expected values given fishing patterns will be due to errors in reporting of trips (in ODDS) or catch (on landing reports). Regardless of the cause, identifying the magnitude of this potential problem will guide efforts to increase the effectiveness of observer deployment and catch estimation processes.

The 2013 ADP allocated observer effort between at-sea deployments on vessels and dockside sampling at shoreside and floating processors. For the at-sea deployment observers were allocated among trips in the trip selection stratum and among vessels in the vessel selection stratum so that these two strata were sampled at a set rate, and it was NMFS's intent to achieve the planned sampling rate while staying within the budget allocated for observer deployment.

The 2013 ADP used the most recent observer cost estimates and funding amount and a statistical method to deploy observers for 2013. Observer coverage rates were increased in the trip selection pool relative to the vessel selection pool to reflect the Council's recommendation to prioritize prohibited species catch (PSC) estimation. The anticipated deployment rate in the 2013 ADP was:

- approximately 11% of vessels for the vessel selection pool, and
- between 14% and 15% for the trip selection pool.

The realized deployment rates in each of the selection pools are described in Chapter 3.

The deployment period for vessels in the vessel selection pool was 2 months, which was expected to have a lower impact on vessels and conform more closely to fishery openings than the originally proposed 3-month deployment period. However, the 2-month deployment period increased the sampling efforts required by the NMFS and required the program contact a greater number of individual vessels than would have been necessary under a 3-month deployment period.

In its October 2012 recommendations about the draft 2013 ADP, the Council recommended that the ADP incorporate "Council intent that crew members should not be displaced by the requirement to have an observer onboard." NMFS developed a process through which owners or operators of vessels selected for observer coverage could apply for a release from observer coverage due to lack of bunk space or life raft capacity.

The Council identified the collection of salmon genetic and bycatch information as a priority for the 2013 deployment of observers to shoreside and floating processors. This priority followed promulgation of Amendment 93 the Fishery Management Plan for Groundfish of the Gulf of Alaska, which requires the retention of salmon at-sea and retention of salmon until an observer has been provided the opportunity to collect samples. Consequently, under the 2013 ADP, NMFS planned to deploy observers to shoreside and floating processors to complete salmon sampling during all pollock offloads in the Gulf of Alaska in 2013.

NMFS also incorporated into the ADP the Council's recommendations that trawl catcher vessels participating in the BSAI Pacific cod fishery to voluntarily opt-in to full coverage and carry an

observer at all times while fishing in the BSAI in 2013. This provision responded to industry requests to take full coverage to better manage their halibut PSC limits and to minimize bycatch to the extent practicable. Fifty-three catcher vessels using trawl gear participated in the 2013 BSAI Pacific cod fishery. Owners of 40 of these vessels requested to be allowed to voluntarily take full coverage for all of their fisheries in 2013, and to pay for this coverage in addition to their observer fee assessment. All of these vessels were AFA-qualified vessels and the owners were members of an AFA cooperative.

2 FEES AND BUDGET

2.1 The North Pacific Observer Fund

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. Although observer fee liabilities accrued through 2013, fees were not collected until January and February 2014. Fee billing statements were mailed to approximately 100 processors on January 13, 2014. A total of $4,251,452.17 was collected. All bills were paid in full and no further action was needed by NMFS to collect the 2013 observer fees. NMFS greatly appreciates the cooperation of processors in implementation of the new and complicated billing process and prompt payment of observer fees because one of the more expensive administrative costs of a fee collection program is collection of delinquent accounts.

The sequestration of funds initiated under the 2011 Budget Control Act affects the Observer Fund. NOAA was authorized to transfer $3,944,606 to the Alaska Fisheries Science Center (AFSC) to fund the observer deployment contract and this transfer was made on April 2, 2014. At the direction of the Office of Management and Budget under sequestration procedures, the remaining $306,846.17 (7.2%) is being held in the Observer Fund. The Alaska Region Office has been informed that these remaining funds will be transferred to the AFSC in fiscal year 2015. However, as this is the first year of deposits into and out of the Observer Fund, NMFS is uncertain how the actual application of the sequestration procedures to this fund will occur.

2.2 Fees Collected from 2013, 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 objective of the observer fee assessment is to levy a fee on all landings accruing against a Federal total 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.[5]

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 2013 fee assessments were published in the *Federal Register* on December 28, 2012 (77 FR 76459).

[5] 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 3 of an informational bulletin titled "Observer Fee Collection" on the NMFS Alaska Region website at http://www.alaskafisheries.noaa.gov/sustainablefisheries/observers/observerfees.pdf.

NMFS assesses each landing report submitted via eLandings and each manual landing entered into the IFQ landing database and determines if the landing is subject to the observer fee and, if it is, which groundfish in the landing are subject to the observer fee. All IFQ or CDQ halibut in a landing subject to the observer fee are assessed as part of the fee liability. For any groundfish or halibut subject to the observer fee, NMFS applies the appropriate standard ex-vessel prices for the species, gear type, and port, and calculates the observer fee liability associated with the landing.

The intent of the Council and NMFS is for vessel owners to split the fee liability 50/50 with the processor or registered buyer. While vessels and processors are responsible for their portion of the fee, the owner of a shoreside processor or a stationary floating processor and the registered buyer are responsible for collecting the fee, including the vessel's portion of the fee, and remitting the full fee liability to NMFS. Fee liability notices (fee billings) are sent in January of each year, and the fees are due to NMFS by February 15.

Table 2-1through Table 2-3 summarize the observer fee liabilities that accrued for 2013.

Table 2-1. 2013 observer fee liability 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	$274,842	$27,136	$11,619	$57	$1,017	$314,671
	40 - 57.5	$507,419	$359,133	$37,507	$133	$10,587	$914,779
	>57.5	$844,654	$871,662	$26,421	$67	$11,730	$1,754,534
	H&L Total	$1,626,915	$1,257,931	$75,547	$257	$23,333	**$2,983,983**
Jig	<40	$3,388		$494	$2	$110	$3,994
	40 - 57.5	$408		$2,478	$2	$125	$3,012
	>57.5	$3		$50		$11	$64
	Jig Total	$3,799		$3,022	$4	$246	**$7,071**
Pot	<40			$130		$22	$152
	40 - 57.5			$16,949	$1	$49	$16,999
	>57.5		$43,330	$306,767	$44	$2,040	$352,181
	Pot Total		$43,330	$323,846	$45	$2,111	**$369,332**
Trawl	40 - 57.5			$2,913	$9,333	$361	$12,607
	>57.5		$3,561	$390,125	$423,287	$61,486	$878,459
	Trawl Total		$3,561	$393,038	$432,620	$61,847	**$891,066**
Total All Gear		**$1,630,714 (38%)**	**$1,304,822 (31%)**	**$795,453 (19%)**	**$432,926 (10%)**	**$87,538 (2%)**	**$4,251,452 (100%)**

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

Table 2-2. 2013 observer fee liability by gear type, vessel size category, and species or species in the *Gulf of Alaska*[6].

Gear	Vessel Length Category	Halibut	Sablefish	Pacific Cod	Pollock	All Other Groundfish	Total All Species
Hook and Line	<40	$204,615	$21,369	$11,524	$57	$932	$238,497
	40 - 57.5	$441,122	$349,912	$30,658	$132	$10,444	$832,268
	>57.5	$690,523	$809,007	$24,890	$67	$10,875	$1,535,362
	H&L Total	$1,336,260	$1,180,288	$67,072	$256	$22,251	**$2,606,127**
Jig	<40	$345		$494	$2	$110	$951
	40 - 57.5	$408		$2,478	$2	$125	$3,012
	>57.5	$3		$50		$11	$64
	Jig Total	$756		$3,022	$ 4	$246	**$4,027**
Pot	<40			$130		$22	$152
	40 - 57.5			$16,194	$1	$49	$16,244
	>57.5			$113,078	$36	$2,022	$115,136
	Pot Total			$129,402	$37	$2,093	**$131,532**
Trawl	40 - 57.5			$2,913	$9,333	$361	$12,607
	>57.5		$3,561	$127,881	$416,196	$61,486	$609,124
	Trawl Total		$3,561	$130,794	$425,529	$61,847	**$621,731**
Total All Gear		**$1,337,016**	**$1,183,849**	**$330,290**	**$425,826**	**$86,438**	**$3,363,418**

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

[6] Includes Pacific halibut regulatory areas 2C, 3A, and 3B; and sablefish regulatory areas Western GOA, Central GOA, West Yakutat, and Southeast Outside.

Table 2-3. 2013 observer fee liability by gear type, vessel size category, and species or species group in the *Bering Sea/Aleutian Islands*[7].

Gear	Vessel Length Category	Halibut	Sablefish	Pacific Cod	Pollock	All Other Groundfish	Total All Species
Hook and Line	<40	$70,226	$5,768	$95		$84	$76,173
	40 - 57.5	$66,297	$9,221	$6,850		$142	$82,510
	>57.5	$154,132	$62,655	$1,531		$855	$219,172
	H&L Total	$290,655	$77,644	$8,476		$1,081	**$377,855**
Jig	<40	$3,043					$3,043
	Jig Total	$3,043					**$3,043**
Pot	40 - 57.5			$755			$755
	>57.5		$43,330	$193,690	$7	$19	$237,046
	Pot Total		$43,330	$194,445	$7	$19	**$237,801**
Trawl	>57.5			$262,244	$7,091		$269,335
	Trawl Total			$262,244	$7,091		**$269,335**
Total All Gear		**$293,698**	**$120,974**	**$465,165**	**$7,098**	**$1,100**	**$888,034**

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

[7] 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) oversees the Observer Program, which monitors groundfish 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 48 staff located in Seattle,WA (40), Anchorage, AK (4), Kodiak, AK (2), and Dutch Harbor, AK (2). 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 2013, FMA was allocated and spent $7,478,747 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 provides 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 at-sea sampling on commercial fishing vessels. Analysts also work closely with the Alaska Regional Office and Council staff ensuring the FMA provides relevant high quality information for fisheries management and in support of requests from the NPFMC and other constituents.

Application Development and Data Presentation develops custom software that supports the recording of 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; the recording of bird and marine mammal data collections for both internal and external use. In addition, together with FMA Analysts, staff under this activity developed and supports the Observer Declare and Deploy System (ODDS) which allows vessels to register, edit, and close trips. This application was developed with independent modules for management, the call center, the observer contractor, 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 install and maintain remote data capture information systems used by observers, ensure observers are trained on the use and configuration of the software, and provide near real time data error checking and guidance for observers using these systems. In addition, they provide data entry support and verification for

all non-electronic data submissions. They also provide 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 during their deployment on commercial fishing vessels or at processing facilities. Training material is regularly updated and created in response to changes in data needs. 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 in-season advising 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. They 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 provides observers with support during their deployment. Staff members 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 and conduct data quality control checks; verifying the accuracy of recorded data, identifying errors, and ensuring the observer makes the necessary corrections. They also conduct 1- and 2-day briefings and maintain an inventory of complete sampling gear sets for observers redeploying directly from the Anchorage office.

Kodiak Field Office provides support to observers 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 methods and data, providing in-situ problem resolution, and issuing sampling and safety gear. In addition, they receive, track, and ship biological samples that are collected by observers in support of resource management, scientific research, and observer training. They also serve as the primary FMA contact for observed vessels and processing facilities in the Gulf of Alaska.

Dutch Harbor Field Office provides support 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 their data collection methods and data, providing in-situ problem resolutions, and issuing sampling and safety gear. In addition, they conduct observer sample station and scale inspections to ensure stations meet the standards required in federal regulations. They also serve as the primary FMA contact for observed vessels and processing facilities in the Bering Sea and Aleutian Islands.

Observer Gear Inventory and Deployment ensures fishery observers have the sampling and safety equipment needed to conduct their work within any fishery operation they are assigned to observe. This requires that 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 needs and provide for losses or the exchange of observer gear during deployment. In addition, they 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 provides oversight of the fishery observer contract; serving as the primary point of contact for the contractor and FMA. They coordinate with NOAA's Acquisition and Grants Office to develop future Requests for Proposals. They 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.

Electronic Monitoring (EM) was formed as a unique activity within FMA in 2013 as we have dedicated staff time on the development and integration of electronic technologies in Alaskan fisheries. Staff have the lead role in planning and executing coordinated research activities that will advance the science of EM and increase efficiencies in interpreting resulting data.

2.3.2 Contract Costs for Partial Coverage

Funding for observer deployment in the partial coverage component of the restructured Observer Program in 2013 was provided through 2012 Federal start-up funds of $4.48 million. In 2013, NMFS managed the available observer days conservatively with coverage rates set to spend, on average, 90% of the days. This approach was necessary to ensure that NMFS did not spend beyond the budget since was no financial buffer for cost over-runs. NMFS also needed to consider that observer days would be needed at the beginning of 2014 until the fee proceeds became available. As the implementation of the observer fee was new, it was highly uncertain when the fee proceeds would be available for spending. With this uncertainty, NMFS provided 2013 federal appropriations of $2,11 million late in the fiscal year which procured 1,913 additional observer days for use into 2014. At the close of 2013, NMFS had used 3,538 observer days and carried forward 2,910 observer days already procured with federal funds. Note that some of the days carried forward were due to the conservative approach, and others were due to lower coverage rates in the vessel selection strata. Given the buffer in days carried forward, NMFS incrementally increased the 2014 coverage rate. And, given fee proceeds were lower than initial projections; NMFS is planning to supplement the 2014 fees with $550,000 in federal appropriations. The fee proceeds became to the AFSC on April 2, 2014, and staff are in the process of allocating these fees to sea days.

Table 2-4 summarizes fee and federal funding for partial coverage observers across the respective years.

Table 2-4. Summary of fees, federal funds and observer days purchased for deployment under the partial coverage observer contract in the North Pacific.

	2012		2013		2014	
	Fees	Federal	Fees	Federal	Fees	Federal
Funds at the start of the calendar year	$0		$0		$0	
Funds deposited during the calendar year	$0		$0		$4,251,452	
Funds paid out during the calendar year	$0	$4,484,962	$0	$2,115,166	$3,944,606[1]	$550,000[2]
Observer Days at the start of the calendar year	0	0	0	4,535	0	2,910
Observer Days purchased during the calendar year	0	4,535	0	1,913	4,002[3]	558[3]
Observer Days used during the calendar year	0	0	0	3,538		

[1]These funds have been received and will be paid out to the contract during summer of 2014.
[2] These funds have not been received, but are anticipated and will be paid out to the contract later this summer.
[3]The approximate number of days that will be purchased when the funds above are paid out.

Estimated cost per day for partial coverage

To date, NMFS has spent $6,600,128 to procure 6448 observer days for an average cost per observer day is $1024 per day. The cost is a combination of a daily rate which is paid for the days the observer is on a boat or at a shoreside processing plant, and reimbursable travel costs. The detailed breakdown between daily rate and travel is confidential. Costs are higher in partial coverage and there are several factors influencing the higher cost. Please note that the contractor must recoup their total costs and profit through the daily rate. This includes the costs for days the observers are not on a boat. These days include training, travel, deployed but not on a boat, and debriefing. Partial coverage is inherently inefficient compared to full coverage as days when they are not deployed are expected, but they were difficult to predict. Regarding the contract, risk and uncertainty regarding the number of unobserved days are likely influenced the contract bidding process (see section 2.5 for more information on the contract process). In addition, the federal contract requires wages and benefits consistent with Service Compensation Act determinations for the profession and area. All travel costs and expenses incurred are reimbursed in accordance with the Government's Travel Regulations which includes specified per diem rates which are paid regardless of actual expenses.

2.4 Estimated Cost Per Day for Full Coverage

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), 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 2013.

The total cost billed to 182 vessels and processing facilities for observer coverage in the full coverage category in 2013 was $13,642,543. The total number of observer days represented by these invoices was 37,137. Based on this information, ***the average cost per day of observer coverage in the full coverage category in 2013 was $367.*** This average combines invoiced amounts for the daily rate per observer day (variable cost) plus all other costs for transportation and other expenses. Following is more detail on the breakdown by cost category and vessel type.

Figure 2-1 summarizes the average costs to fishing vessels and processors in the full coverage category by sector and gear type in 2013. Figure 2-1, part (a) shows the average number of observer days for vessels in five vessel and processor categories, and the average daily rate observer providers charged for observer coverage. Days may include days by more than one observer in a year, and days for an operation may exceed 365 days in a year if multiple observers were present. The average daily rate ranges from $329/day for shoreside processors to $335/day for catcher/processors using pot and trawl gear. 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 coverage 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.

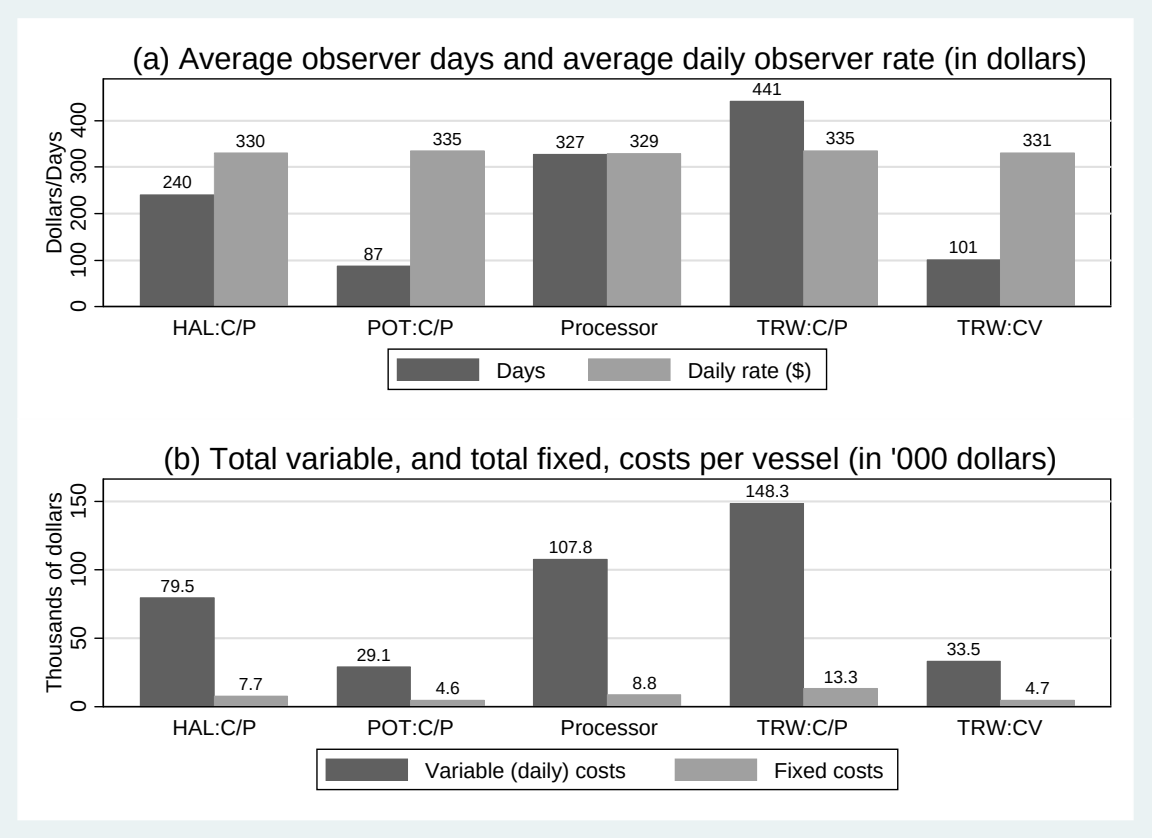


Figure 2-1. Costs to vessels and processors, by sector and gear type, for observer coverage in the full coverage category in 2013.

2.5 Contract Process

NOAA's Acquisition and Grants Office secures and administers contracts for NMFS. FMA staff participates 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, 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. for the provision of fishery observer services to the partial coverage component of the Alaskan fleet. This contract is scheduled to expire in September 2014. The current contract provides the option for NOAA to extend the current contract for up to 6 months. It is anticipated that NOAA will exercise this option and extend the current contract until March 2015. Staff from FMA and the Western Acquisition Division are currently compiling the documents required to solicit for the next contract. NMFS anticipates having a Request For Proposal out during the summer of 2014 and a new contract awarded by March 2015.

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.[8]

2.6 Cost Savings and Efficiencies

In a broad context, the FMA division of the AFSC conducts many supporting activities each of which can impact costs in both partial and full coverage. To be efficient, the same training, debriefing and data handling infrastructure in FMA provides for all Alaskan groundfish and halibut observers. There are internal actions that FMA has taken to increase efficiencies. In addition, competition for services between observer provider companies establishes the market rate for observer labor and travel in both partial and full coverage. In partial coverage, competition occurs through the federal procurement process where a contractor is selected for a period of time through an open bid. The selected contractor is then paid for services by the government using appropriations or fees. In full coverage, competition occurs through the daily rates offered to the fleet by certified companies. These fees are paid directly to the observer provider by industry and the government is not party to the transactions. Invoices from these transactions are provided to NMFS so full coverage costs can be summarized. Following are details on where NMFS has taken, or considered, actions to lower costs through efficiency and competition in partial coverage, full coverage, and FMA supporting activities.

2.6.1 Partial Coverage

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 is set out under our NOAA contract. The partial coverage contract contains inherent inefficiencies due to the randomized selection of trips and vessels. This may require the contractor to move observers to different ports to meet vessels that have been selected for training, debriefing, and any observer coverage. Because NMFS only pays for sea days, the daily rate charged must factor in an estimate for the contractors costs for

[8] Available online at: https://www.fbo.gov/index?s=opportunity&mode=form&id=dc897646db9de61f36682e5d32140c76&tab=core&_cview=1

unobserved days. Increasing the proportion of time spent at sea would increase the efficiency of the overall program. The rates that NMFS currently pays the contractor were established through a competitive bid process, which was conducted without prior experience with this deployment model in Alaska. It is likely that bidders factored uncertainty and risk into their bids.

The current contract is scheduled to be re-bid and NMFS expects the competition associated with that process will establish the market rate for the observer services needed for the partial coverage component. The new bid will be informed by experience under the restructured program. In addition, should NOAA extend the current contract, the bid process will be informed by any decisions NMFS or the Council plans to the restructured program for 2015. Clarity in the contract requirements will improve the quality of the bids NMFS receives. Predictability in the deployment rates, policies, and model (trip versus vessel selection) to be used will help provide efficiencies.

NMFS modified the observer contract in 2013 to include the provision of observers to staff NMFS survey vessels, paid through federal appropriations. While not related directly to observer services, this modification allows the contractor to provide additional work to their employees during the summer season when observer opportunities are more limited. This provides their employees continuity in employment, additional experience, and may help to reduce employee turnover, thereby increasing their overall efficiency. NMFS survey staff get trained observers with sea experience to help to conduct their fieldwork. The survey fieldwork is funded with NMFS appropriations outside the scope of the observer fee or FMA appropriations.

2.6.2 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 fees observer providers charge recoups their costs associated with recruiting, paying observers to attend training and debriefing, and deploying observers on the full coverage sector of the fleet. There are currently four active certified providers in Alaska and they compete for the business of industry. The full coverage costs are explored in Section 2.7.

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. Increasing the number of providers could potentially increase competition and possibly lead to lower costs. However, 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 last received an application from a new observer provider in 2012, and NMFS declined to consider the application due to the workload associated with implementing the restructured Observer Program. An additional concern was the potential for confusion of a new certified observer provider beginning work at the same time. NMFS does not have any applications for certification pending at this time. Note that increasing the number of certified providers would

increase the workload and reduce the efficiency of NMFS due to the time required to ensure a new observer provider was complying with applicable regulations.

Reducing regulatory requirements has often been proposed as a mechanism that could improve efficiencies and thereby reduce costs. For example, NMFS requires educational minimums for observers, physical exams, limits deployment durations, and requires minimum experience levels for more complex deployments. Each regulation governing the observer program was put in place for a specific reason, and NMFS has not identified any specific regulations that it believes are unnecessary at this time.

Several NMFS supporting activities also influence costs in the full coverage program and those issues are covered in Section 2.6.3.

2.6.3 FMA Supporting Activities

FMA provides a range of activities that directly support both the full coverage and the partial coverage components of the program. The ongoing provision of this work is essential to the overall function of the Observer Program and efficient completion of these tasks can directly impact costs. For example, if NMFS were to cut the frequency of training, observer providers would need to retain more experienced observers, which could increase their costs. If they were unable to retain experienced observers, industry would be unable to obtain required coverage and thus experience delays and disruptions in fishing operations.

The following is a short summary of steps NMFS has taken to improve efficiencies in 2013 and areas where additional capacity is needed.

Training

NMFS fully absorbed responsibility for all observer training when the Observer Training Center in Anchorage closed in 2012. All training for the Observer Program is now conducted by NMFS, aided by a half-time fisheries specialist contracted with the University of Washington. Additional classes were added to ensure the demand was met (see section 4.2), and an additional training session was created to prepare the partial coverage observers for deployment on smaller vessels. NMFS also conducted a mid-year review of the 3-week training program and implemented changes to the training curriculum to update and streamline the material while covering essential duties. The alternative to streamlining was to extend the class beyond three weeks, which would have increased costs to industry. The streamlined classes commenced late in 2013. FMA is currently seeking additional space within the AFSC to ensure the ability to conduct concurrent 3- week classes when the demand is high. The highest training demand is typically in December and January as we prepare for the coming fishing year.

Debriefing

Debriefing of observers is an area where NMFS has been challenged by an increased demand for additional data collections such as salmon counts and salmon genetics, and an overall trend of increasing observer days each year. NMFS capacity has not kept up with the demand and this has resulted in some delay in the debriefing process when the workload is highest. Typically, the first wave of deployments returns from sea in the late spring. Regulations limit full coverage deployments to a maximum of 90 days, resulting in large pulses in the debriefing workload and a

bottleneck in the process. The voluntary addition of full coverage in the Bering Sea cod trawl fishery further added to this debriefing workload.

The debriefing process was disrupted in 2013 by the government furlough. During this period, the AFSC was closed and staff were unable to conduct debriefings. This exacerbated an already challenging workload and delayed the debriefing of many observers and the completion of the 2013 data set. The normal completion date for any given calendar year is late February of the following year. Once complete, analysts can use the database knowing the data are not subject to further quality control corrections. The 2013 data were not completed until April of 2013.

Given the increased workload and continued need to ensure data quality, NMFS worked on several innovations. First, full time staff were supplemented with contractors to increase capacity. Second, the Observer Program has instituted processes to place the burden on the observers to turn in high quality and completed work. Observer Program staff spot check data and if simple errors are detected, the data are returned to the observer for further proofing. Last, Observer Program staff have experimented with advancing experienced high quality observers to the front of the debriefing queue to reward them for excellence. Note that the debriefing process is expedited when the observers produce high quality data and are experienced.

Application Development and Data Presentation

In 2013 the program implemented a web based application used by the partial coverage component of industry to log trips. The system required staff to be available to help industry learn the system, and to work through identified bugs. This application has been stable and is functioning as designed. The program provided the option for industry to manually call in and receive assistance with entering the trips in the system. The fisherman would then be informed if the trip was selected for coverage.

Overall efficiency is increased when capturing observer data electronically as early as possible. Many vessels have taken advantage of an Observer Program application (commonly known as Atlas) that allows observers to enter data and to transmit it to AFSC. However, not all vessels provide computer hardware to support this application. For example, the voluntary full coverage in the Bering Sea Pacific cod fleet has increased our data entry workload because Atlas is not available on these vessels. This workload absorbs staff time that could best be spent contributing to training or debriefing. NMFS has not yet solved this issue, but has initiated discussions with the fleet to address it in the long term.

FMA also implemented a re-designed debriefing survey in 2013 to streamline the debriefing process. Every observer completes a series of questions that help inform our understanding of his or her work. It serves as the basis for the debriefing process, and the new application is web enabled so observers can complete it prior to returning to Seattle or Anchorage for debriefing.

Electronic Monitoring (EM)

The EM work conducted in 2013 was an investment in future efficiencies. NMFS believes that imagery offers high potential as a future data source, and that innovations which enable efficient image analysis will be essential to implementation. A key milestone this year was the production of the EM strategic plan (Loefflad et al. 2014).

Our overall goal in the Observer Program is to provide quality data products to our diverse end-user community. Quality is the hallmark of observer information, and quality demands are ever increasing so maintaining the infrastructure and continuing to develop and implement efficient innovations will be important for the future success of the Observer Program in Alaska.

3 DEPLOYMENT PERFORMANCE REVIEW

3.1 Introduction

In this chapter, the Observer Science Committee (OSC) presents its review of the implementation of the restructured Observer Program deployment during 2013 relative to the intended sample design. The OSC is an interagency working group enabled by the Fisheries Monitoring and Analysis Division of the Alaska Fisheries Science Center. The purpose of the OSC is to provide scientific advice to NMFS on methods to deploy observers in the North Pacific. Group members consist of stock assessment authors, statisticians, research fishery biologists, and program analysts that have working knowledge of observer data collected in the region. This chapter 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 2015 Annual Deployment Plan (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 ecosystem modeling efforts and salmon stock-of-origin analyses (NMFS, 2013). 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. It does not evaluate the catch estimation process that is currently being assessed separately.

3.1.1 Observer Deployment Performance Metrics

Performance metrics have been developed to assess the efficiency and effectiveness of observer deployment into the partial coverage strata. These metrics reflect three mechanisms that can impact the quality of the data: sample frame discrepancies, non-response, and sample size. Sample frame metrics (under- and over-coverage of the sample frame) are used to quantify the differences between the sampled population and the population for which estimates (inferences) are made, as well as to identify possible bias arising from the deployment of observers. Similarly, non-response measures are used to assess bias that arises from differences between the selected sample (selected trips or vessels) and the observed sample (observed trips or vessels). Other measures that address potential observer deployment effects (*sensu* the "observer effects" of Benoit and Allard [2009]) are focused on the representativeness of the sample; whether observed trips have similar characteristics to unobserved trips such as areas fished, numbers of species landed, and trip duration.

Sample size is evaluated by assessing whether sample sizes were large enough to ensure data were captured for all types of fisheries. Specifically, the probability of selecting a sample and observing no trips in a specified area is used to evaluate the adequacy of the sample rates used in 2013.

It is important to recognize that the annual Observer Program review is an evaluation of whether the deployment of observers into the fisheries (randomization of the primary sample units) is representative of the fisheries themselves. The Observer Program collects data for a broad range of purposes ranging from quota management (where timely and accurate catch information is

critical), to stock assessment (where length and age distributions are critical), to monitoring of endangered species impacts due to fishing (where detection is critical). The metrics that are used to evaluate those estimates and analyses, such as catch variance, variance of catch- or length- at-age, or effective sample size are specific to the analysis. For example, because of the complex nature of the estimation routines, and the numerous points where variance is introduced into the estimates, final variance estimates are neither the only metric nor necessarily the best metric for evaluating stratification and randomization of sampling of primary sample units (trips, vessels). An analytical focus on variance does not evaluate the overall quality (representativeness, sample size adequacy) of the underlying data collection process. The performance measures listed below are meant to assess the effectiveness of randomization of observer deployments.

3.1.2 Description of Performance Metrics Used in this Evaluation:

1. Deployment rates for each stratum: This is the basic level of evaluation confirming that we achieved the target sampling rates. Implementation challenges can be identified in this step, such as: sample frame inadequacy, selection biases, and issues with sample unit definitions (e.g., tender trips).
    a. Sample rates (partial selection strata) and number of samples (vessel selection strata) relative to intended values.
    b. 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. Non-response rates. Non-response occurs when elements randomly selected (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 (representativeness) can lead to bias in estimators of parameters of interest. We expect a randomized sample design to result in an achieved rate of observed events (relative to the trip or vessel strata) that is similar across both space (NMFS reporting areas) and time (e.g., months).

    The hypergeometric distribution is used in 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 effort (cumulative) over time (x-axis) for unobserved and observed trips. 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 total effort, 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. This probability of observing as many or a more extreme number of trips for each NMFS area and deployment stratum is determined using the hypergeometric distribution.

c. Representativeness of trip characteristics

    i. Consistency of trip characteristics for observed and unobserved portions of the stratum. Attributes such as trip length, total catch, number of species caught for observed versus unobserved can be used as an indicator of representativeness of the sample relative to the population.

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) with no observer coverage as determined using the hypergeometric distribution.

3.1.3 Overview of Catch Estimation

The estimation routines used by the Catch Accounting System (CAS) rely on the expansion of available observer data and on catch reports provided by industry. These are combined to obtain estimates of retained catch, at-sea discards of groundfish species, and at-sea discards of non-target and prohibited species. A schematic of the methodology is provided in Figure 3-1and additional details are provided in Cahalan et al. (2010). An update is expected to be available in 2014 (Cahalan et al., in review (a)).

The analytic methods used to estimate catch all assume that the sample process is randomized and therefore sampling bias is minimized. If this assumption is not valid, the estimates of (by)catch and associated variance may be biased; although, since the true values are not known, it is often not possible to estimate the magnitude and the direction of this bias. Thus, this review of the 2013 sampling effort is focused on the first two steps of the CAS process (Figure 3-1, numbers 1 and 2).

A separate evaluation of the estimation process is currently underway (Cahalan et al., in review(b)). In the first phase of this evaluation, the imputation process (Figure 3-1 at number 5) was evaluated against two alternative estimators (Cahalan, et al. in review (a)). In this evaluation, the design-based and ratio (model-based) estimators exhibited better overall statistical performance than the currently used imputation estimator. In the next phase of the evaluation, variance estimates at the trip level for all fisheries will be generated and tested using simulation (Figure 3-1 numbers 3 through 5). This is an analytic process building on the imputation

simulations and incorporating the variance from at-sea sampling through to the trip-level: a three-level sampling hierarchy (samples, hauls, trips). Algorithms for estimating variance will be developed and is expected to be complete in2015.

Expansion of the trip-level data to the final fishery (quota) level will be dependent on the previous work and the definition of post-strata. The performance of design-based or ratio estimators will be compared to assess the most appropriate method for this portion of the estimation process. Based on, and incorporating, results from the previous phase, the expansion of catch from the trip to the fishery will be assessed (Figure 3-1, numbers 6, 7, and 9) and estimation algorithms for (by)catch and its associated variance will be developed. In addition, the suite of variables used to define the current post-strata will be assessed to determine whether these are the most appropriate post-strata given the underlying fisheries and sampling programs. Incorporation of these algorithms into the CAS is expected to begin in mid-2016 or early 2017.

3.2 Evaluation of 2013 Implementation of Observer Deployment

The deployment of observers into the 2013 Federal fisheries in Alaska needs to be evaluated against stated goals. NMFS has stated in the 2013 ADP that its goal for 2013 was to "*address the data quality concern expressed within the Council's 2010 problem statement, i.e., to achieve a representative sample of fishing events, and to do this without exceeding available funds*" (NMFS 2013, p. 11). Evaluations need to be conducted at the level of the deployment stratum, because each stratum is defined by a different sampling unit and sampling rate (i.e., time period).

3.2.1 Tracking Costs and Creating Temporal Strata in Trip Selection

One of the principal objectives set out in the 2013 ADP was that NMFS not exceed budgets. To do this, a sampling rate was derived using 2011 fishing effort information and anticipated budgets that would likely meet this objective. Following a Council request to NMFS that coverage rates in trip selection be higher than those in vessel selection, we performed an analysis that was adopted in the ADP whereby trip selection coverage rates would be 15% of trips and vessel selection coverage rates would be approximately 11% of vessels (NMFS 2013, Appendix 2.4). Whether these sampling rates actually result in cost overages will be a function of how much fishing effort was observed in 2013 relative to anticipated observed effort from simulated sampling of 2011 effort data.

To inform the Observer Program of costs throughout the year, three sources of information were used. The first was the range of observer days expected to be observed from the 2013 ADP simulations. The second was the number of days invoiced to NMFS from the observer provider; however, this information was delayed by up to two months. The third source of information was the amount of observer days for which the program had data for, updated daily. Because these values were expressed as an accumulated value throughout the year, they are referred to as cost-trajectories, and are presented in units of days. From simulations of 2011 fishing data, the FMA expected fishing effort to have a surge during the first 20 weeks, a slow down during the summer months, and a second surge starting around week 36 (Figure 3-2). The number of observed days in trip selection exceeded our expected values for the first 20 weeks of 2013. At this point NMFS faced a difficult decision; with the anticipated surge in effort to come after the summer, there was a risk of ending up over budget at the end of the year. The only option available to the program was to reduce the selection rate, which would slow down the cost trajectories; however

a reduction in coverage during the second surge in effort was to be avoided. The decision was made on June 22 to reduce the selection probability in the Observer Declare and Deploy System (ODDS) from 0.1478 to 0.1115. This date effectively meant that two temporal strata were created: the first period from January 1 to June 21 (where the expected coverage rate was 0.1478), and another after June 21 (where the expected coverage rate would be 0.1115). As desired, the cost trajectory during weeks 24-32 went from above the upper range of expected values to the lower bound of expected values. On August 17 the decision was made to return the selection rate of ODDS back to the original 0.1478. This then created a third temporal stratum that lasted until the end of the year. While the amount of observed days did indeed surge after this date and was close to expected values at week 36, it never again reached expected values and ended the year below the lower bound of the expected value from the 2013 ADP simulations (Figure 3-2).

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

The Observer Declare and Deploy System (ODDS) is a web application and database that enables fishermen to declare their intent to fish, capturing anticipated dates and ports of departure, dates and ports of return, and the anticipated processor for delivered catch. ODDS generates a random number and assigns each logged trip to either the "selected to be observed" (selected) or "not selected to be observed" (not selected) categories. NMFS observer provider has access to all selected trip information necessary to schedule observer logistics. If a vessel operator (ODDS user) cancels a selected trip, the user's next logged trip is automatically selected for coverage. This is termed an "inherited trip" since the trip inherits the cancelled trip's selection.

The rate of trip selection is broken down into its component rates: the rate from the random number generator, the rate from the random number generator inclusive of the inherited trips, and these two processes combined with trip cancellations (Table 3-1). Because each trip is assigned observer coverage randomly, the proportion of trips selected to be observed will not be equal to the programmed rate (the number of selected trips is a random variable that is binomially distributed with probability of selection equal to the programmed rate). Hence, it is of interest to assess whether the actual proportion of trips selected falls within what would be expected given the binomial distribution (is the outcome of the initial random assignment within expectations). The rate obtained in the initial selection process was within the 0.025 and 0.975 percentile bounds expected from a binomial distribution, and two-sided tests of proportions failed to reject the null hypothesis that the selection results were the result of a selection rate that was equal to the programmed rate (Table 3-1). As expected, the rates of selection were greater when inherited trips were included. Final selection rates were less than the rates that included inherited trip assignments (Table 3-1). These data would result if not-selected trips were disproportionately fished by vessel operators compared to selected trips. The performance of the selection process in terms of the daily expected rate is presented, with 0.025 and 0.975 percentiles, for the three trip selection periods in Figure 3-3.

There is no mechanism to link the trips logged in ODDS with the landings data stored in eLandings. This disconnect represents a potential source of error in tracking deployment performance. This problem is constrained in the case of observed trips because the observers track landing report identifiers that are stored in the observer database and can be used to link with ODDS. In addition, for trips that are not selected, there is the potential that those trips were

taken but were not "closed" by the vessel operator (user indicating that they fished this trip). To prevent 2013 ODDS trips from bleeding into 2014, trips that were not closed by the end of the year were automatically closed (cancelled) by ODDS. The number of trips that were cancelled by ODDS highlights the scale of this problem; a total of 239 trips were auto closed at the end of 2013. The percent difference between the number of trips expected based on ODDS and number of trips based on observer and landings data (enumerated in this chapter) was between 4.5 and 16.7 among time periods with a weighted difference of just over seven (Table 3-1).

There were two other events that occurred during 2013 in trip selection that are noteworthy. The first is the impact of the Federal Government Shutdown that lasted between October 1 and October 17. During this time ODDS functioned properly with no interruptions to vessel operators or the NMFS observer provider. This period coincided with a rapid increase in the number of logged trips in ODDS (Figure 3-4). The second was the discovery of an error (bug) in the trip selection system resulting from simultaneously allowing trips to be logged at two different rates (one for the end of 2013 and one for 2014). For 7 days in December, logged trips had no probability of being selected for observer coverage. Since prior to this period and after this period there were no observed trips realized during 2013 (Figure 3-4), there was no impact to realized coverage rates as a result of this programming error.

3.2.3 Evaluation of Deployment Rates

There are three deployment strata described in the 2013 ADP; trip selection, vessel selection, and dockside coverage. These are the only strata described in the ADP because these are the strata that are under NMFS deployment control and were to have observer coverage greater than zero. However, there are additional groups evaluated here: the partial coverage's no selection pool, and the full coverage category. There are two groups of full coverage vessels: those covered in Federal regulations and a group of vessels that voluntarily agreed to full coverage when fishing in the BSAI. In addition observers were deployed dockside to monitor deliveries of walleye pollock (formerly *Theragra chalcogramma* now *Gadus chalcogrammus*).

In each selection category, additional strata are defined by sample rate. Within trip selection, three time periods defined by changes in the selection rate programmed into ODDS defined three strata that set the expected level of observer coverage. Because the sample rate differs between these time periods, each defines a separate stratum. Furthermore, within each trip selection time period, vessels are divided into those that are catcher vessels (CVs), and catcher/processors (CPs) that qualified for an exemption from the full coverage requirement. Similarly, the vessel selection stratum has six selection periods to evaluate, each corresponding to a two-month period of the calendar year. All remaining coverage categories are pertinent for the entire year, and do not have temporal or vessel-type demarcations.

Evaluations for the full coverage category and the partial coverage no selection category are straightforward—either the coverage achieved was equal to 100% or 0% respectively or it was not. For each vessel-type category within each time period, the coverage rate achieved was compared against the coverage rate expected from ODDS programmed selection probabilities. Upper and lower bounds on the expected value were generated from the 0.025 and 0.975 quantiles of a binomial distribution (aka a 95% "confidence bound") for each time period for trip selection deployment. 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 process for evaluating coverage rates in the vessel selection strata is based on the number of vessels observed relative to the target number of vessels. For the 2013 ADP, simulated sampling of 2011 data at an 11% rate of selection of vessels in the vessel selection strata yielded the number of vessels to be targeted for 2013 (v_t). The expected coverage rate for 2013 is the target number of vessels, v_t , divided by the number of vessels that actually fished in 2013 (f*), as opposed to those that fished in 2011. Hence, the anticipated rate of coverage for vessel-selection is v_t / f*. The expected rate of coverage for 2013 will not equal 11% in each vessel selection time period unless effort in 2011 and 2013 is exactly equal. Coverage levels for vessel selection were considered to have met expectation goals if the actual coverage rate (number of observed vessels divided by f*) met or exceeded the expected rate.

The 2013 Observer Program had 16 different deployment strata to be evaluated (Table 3-2). The program met expected values of coverage for the full-coverage regulatory and full-coverage voluntary strata, all vessel-type and time periods within trip selection deployment, one of six time-periods within vessel selection, and the partial coverage no selection (Table 3-2).

Coverage Rates in Vessel Selection

Coverage levels did not meet expectations for the first five vessel selection time periods, potentially due to a variety of factors. Two of particular interest are (1) the lack of a complete sampling frame, and (2) policies that grant releases from observer coverage based on certain conditions. A sampling frame should include all the elements of the population of interest. Hence, a sampling frame for vessel selection would consist of a list of vessels that actually fish in each 2-month deployment period. This list is not available for the vessel selection strata. In trip selection strata, vessels that intend to fish log trips into ODDS, hence the sampling frame is equal to the target population. However in vessel selection, without a similar notification system informing NMFS of their intent to fish, the sample frame is based on past fishing behavior, specifically whether the vessel landed catch in the same 2 month period the year prior.

The lack of a complete sampling frame means that NMFS uses past fishing activities to build the sample frame (list of vessel that will fish) for the current year. As briefly described earlier, NMFS used 2011 data to plan for coverage given anticipated budgets for the 2013 ADP. However, for each selection period in 2013, the list of vessels to be in the vessel selection strata was based on 2012 landings data, noting that a list of vessels that fished two years ago may not be the same as the list of vessels that fish in the current year.

This introduces two potential sources of error. The first is the inclusion of vessels that fished prior to 2013 but did not fish during 2013. This is called “over-coverage” and results in sampling inefficiency (this term over-coverage derives from survey research methods and should not be confused with having too much observer coverage). To meet the target sample size (number of vessels), additional vessels are selected to carry observers. The amount of this “over-draw” was based on the expected proportion of vessels in the selection frame that will not fish in 2013 *plus* the proportion of vessels that are selected and will fish, but are granted a release from observer coverage. The greater this combined proportion, the greater the inefficiency of the sampling process. The relative amount of over-draw for each selection period was based on the differences in the numbers of vessels that fished in each time period of prior years, and the information from previous time periods in the current year. To allow for a 60-day advance notice of selection to

vessel operators, results were from two time periods earlier were used in the current year (e.g., the first time-period results could not inform future draws until the third time period, the fourth time period over-draw was informed by the first and second time period over-sampling results).

The second source of error introduced by an incomplete sampling frame is that a portion of the population has no chance of being selected for observer coverage (no way to select "new" vessels). A new vessel in this case is one that did *not* fish during a time period in 2012 but *will* fish in the same time period in 2013; these are not included in the selection frame. These "new" vessels then have no chance to be selected for observer coverage. This is called "under-sampling" and is of particular concern because it represents a potential bias (the term under-sampling derives from survey research methods and should not be confused with having too little observer coverage). Bias would result if these new vessels fish differently than vessels that fished in 2012 and were in the selection frame.

Vessels in vessel selection can be classified in numerous ways depending on their fishing, selection, and observation status. Table 3-3 presents these values for each time period. Among time periods, the number of vessels that fished in 2013 was equal to, or lower than, the number of vessels anticipated to fish based on 2011 and 2012 data (row 6 versus row 1 in Table 3-3). Values of the relative amount of overdraw, (expressed as the number of selected vessels divided by the target number of vessels to be observed) were 1.28, 1.71, 1.56, 2.37, 3.10, and 6.71 for the six time periods respectively. Between 4 and 27 vessels were selected and actually fished in 2013 among time periods (Table 3-3, line 10). Between 3 and 13 vessels were selected, fished, and actually observed among time periods (Table 3-3, line 15).

The number of vessels that would be expected to carry observers after considering conditional release policies is difficult to determine because a conditional release may be granted that is only for a part of the coverage period, or for only some activities. For example, if a vessel is granted a conditional release based on a life raft with insufficient capacity, then we would expect all fishing to be released from coverage. However if a release was granted for only those trips during which an IFQ holder is on board, the vessel would carry an observer when fishing without an IFQ holder, i.e., outside of IFQ fisheries. In this example the vessel has received a conditional release based on certain criteria; in some situations there is an observer on board whereas on other trips there is not. The data summaries pertaining to the expected number of observed vessels are presented in a generalized level in Table 3-3 on lines 12-19. More detail about the disposition of conditional releases is provided in section 4.3.

To measure the performance of the vessel selection process, data in Table 3-3 were expressed as relative percentages (Table 3-4). Over- and under-coverage rates in the vessel selection sampling frame are not additive, since the former is a percentage of the *sampling frame*, and the latter is a percent difference from the *true frame* (i.e. the list of vessels that actually fished). Values in these metrics ranged from 17–68% among time periods, with the highest values in the last selection period (Table 3-4, rows 1 and 2). The percentage of vessels that were in the selection frames and did not fish should be approximately equal to the percentage of vessels that were in the selection frame and were selected for coverage and did not fish. However, comparing the first and third lines of Table 3-4 shows that the percentage of selected vessels that did not to fish was consistently higher than the percentage of vessels that did not fish and were not selected.

This may be evidence of an "observer effect" where the act of observation, or in this case selection of a vessel to carry an observer, alters fishermen's behavior.

The presence of an observer effect and an over-draw may imply that the burden of observation falls disproportionately on those vessels in the sampling frame (i.e. fished in 2012) that are selected for coverage, and choose to fish. Yet the actual likelihood of these events happening after conditional releases from coverage are factored in are actually quite low- less than 23% in all but the last time period, when it suddenly jumped to 100% (Table 3-4, line 5). This is because the percentage of vessels that were selected for observer coverage and given a conditional release from coverage increased from 0 in the first time period, to 27 in the second time period, to over 55 in the remaining time periods. Over two-thirds of the vessels selected in the fourth and sixth time periods were granted releases from coverage (Table 3-4, line 7).

The probability of being selected in the last time period of vessel selection jumped to 100%, which can be explained by the difference between the target coverage rate and the achieved coverage rate for this selection type. By dividing the number of desired vessels to be observed from the 2013 ADP by the number of vessels that actually fished in 2013, the expected proportion of vessels to be observed is obtained (Table 3-4, line 8). Dividing the number of observed vessels by the number of vessels that actually fished in 2013 gives the actual proportion of vessels observed (Table 3-4, line 9). In each vessel selection period of 2013, the achieved coverage rate was less than the target rate. In the first selection period an over-draw of nearly 30% failed to yield the desired coverage rate, in the second selection period an over-draw of 71% did the same, in the third a 156% over-draw did the same, in the fourth a 237% over-draw did the same, and in the fifth, 310% over-draw failed to result in target rates of coverage. The Observer Program abandoned the random selection of vessels from the selection frame in the last selection period and every vessel in the selection frame was selected for coverage. NMFS achieved its target coverage rate when every vessel that fished during the last two months of 2012 was selected for observer coverage in 2013.

Since the manner in which selections for observer coverage were made differs between the last and the five prior selection periods, there is opportunity to compare their performance. Selection of every vessel in the sampling frame during the last time period coincided with more new vessels fishing; the percentage of new vessels that fished spiked from between 17 and 32 for the prior five periods to 68 during the last period (Table 3-4, line2). In the absence of an observer effect, caused here by the selection of every vessel, we would have expected the percentage of new vessels that fished during the last period to be between 17 and 32 (since that is what resulted from the first five periods).

Our final evaluation of the vessel selection sampling rates involves the loss of information on trips that should be observed. This type of non-response is represented by the number of vessels that were selected, fished, but were not observed divided by the number of vessels that fished. It can be caused by conditional release, loss of observer data due to poor quality or failure to follow protocols, or non-compliance. The percent non-response for "expected to be observed" vessels ranged between 13 and 71 with peak values during the third and fourth selection periods (Table 3-4, line 4).

Spatial Patterns of Non-response in Vessel Selection.
The effect of non-response (expected to be observed but were not) on the spatial distribution of observer coverage was evaluated (Table 3-5). In total, 52% of the vessels, and 50% of the trips resulting from these vessels, were in the non-response category (expected to be observed but were not). All vessels that were released from coverage used hook and line gear. The percentage of non-response vessels and resulting trips was not equally distributed among NMFS areas. Non-response percentages must be interpreted with caution when only a few vessels are present within each category (consider the extreme case where only one vessel fishes- the only possible percentages are either zero or 100%). The percentages of non-response vessels among NMFS areas are similar, with the exception of higher percentages in area 650 (Fishery Management Plan for Groundfish of the Gulf of Alaska [GOA FMP], Southeast outside State Waters [SE]). There was more variation in the resulting percentages of non-response trips in vessel selection. There were greater percentages of trip non-response in areas 541 and (Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands [BSAI FMP]) and area 650, and lower percentages of trip non-response in areas 620 and 630 (GOA FMP, Central), and areas 649 and 659 (GOA FMP, inside State Waters).

Coverage Rates in Dockside Deployments
Coverage rates in dockside observer deployments did not meet stated objectives and warrant further investigation. Observer dockside deployments were made to comply with the sampling requirements for obtaining genetics tissues from the bycatch of salmon within the pollock fishery according to Pella and Geiger (2009). Dockside, this sampling design requires a census of the primary sampling units (pollock landings) and a systematic random sample of individual salmon in the bycatch. Rates of sampling individual fish are set from anticipated bycatch amounts and desired numbers of samples from the Auke Bay Laboratory of the AFSC. In the Bering Sea, Amendment 91 to the BSAI FMP facilitates the interception of pollock deliveries at dockside processing plants by observers by requiring 100% coverage and modifications to the way fish are offloaded increase the likelihood of detection of salmon bycatch in the offload. In the Gulf of Alaska, a voluntary agreement between fishermen, processors, and NMFS was in place in 2012 that was codified into regulation as Amendment 93 of the GOA FMP. Amendment 93 does not carry full-coverage requirements for observers nor does it require modifications to the offload process to improve salmon bycatch detection. Amendment 93 in the Gulf of Alaska requires that the processing plant notify NMFS that a pollock delivery has occurred and set aside any salmon bycatch it obtains in the offload until an observer has had a chance to quantify it. This system offers multiple challenges for obtaining a census of deliveries: notifications may not be always made, observers may not always be available when and where a pollock delivery is made, and salmon held by the processing plant may not represent a census of all bycatch salmon from which the observer obtains his or her systematic sample. In addition, the definition of a pollock delivery is dependent on the captain at sea, the processor for dockside notification, and the percentage of pollock in the landed catch in the resulting data. For a combination of these reasons, the Observer Program sampled from only 91% of the pollock deliveries in this review, defined by landed data and regulations as greater than or equal to 20% pollock in the landed catch.

Spatial Patterns in Dockside Deployments.
The amount and percentage of pollock deliveries observed in various ports during 2013 are presented in Table 3-6. In full-coverage operations, which include those under Amendment 91 in

the BSAI, the Observer Program obtained near census of all pollock deliveries; only three of 1,956 pollock deliveries were not observed (0.2%). In the partial-coverage operations, the Observer Program was able to sample from 73% of operations where pollock landings occurred. Most of these 739 deliveries occurred in Kodiak, where the Observer Program was stationing observers for this purpose; 92% of pollock offloads were observed in this port. The potential errors in properly identifying a pollock offload are illustrated by the number of non-pollock offloads observed. Such errors in the sampling frame for dockside observers appear to be minor (0.3%).

3.3 Representativeness of the Sample

3.3.1 Temporal Patterns in Trip Selection

There were two types of non-response in trip selection. The first was the phone-in request by vessels in this coverage category to be released from coverage based on the conditional release policy granted to vessels. The second resulted from the observer provider being unable to get an observer to a vessel in time for its anticipated departure, which may be due to reasons such as the lack of availability of an observer, failure to secure a flight due to weather, or sickness; exploring those reasons is beyond the scope of this chapter. There were 16 trips that were granted a conditional release from coverage; 14 of these occurred during the first trip selection period. There were 28 provider-releases granted, and all of these occurred during the first trip selection period. The impact of those releases can be measured by comparing the coverage rate achieved and the coverage rate that would have been achieved without non-response. The results are presented in Table 3-7. Coverage percentages during the first and second period would have risen from 16.2 to 17.9 in the first period and from 9.2 to 10.4 in the second period. Since achieved coverage rates in the first period were already higher than our programmed rate in ODDS this loss due to non-response is less concerning than the loss due to non-response in the second period. That is, the loss of an observer trip has much greater impact when coverage rates are low than when they are high.

We evaluated the effect of these sources of non-response on the temporal coverage of fishing trips. Observed trips should occur throughout the year at the same relative pace as unobserved trips. To evaluate this, cumulative plots of the number of unobserved and observed trips were generated for the year. The expected 95% bounds of observed trips and unobserved trips was generated in three steps: by calculating the variance (s^2) for each day of the year from $Nr(1\text{-}r)$ where r is the rate programmed into ODDS and N is the total number of observed or unobserved trips; generating the expected number of unobserved and observed trips from Nr; and subtracting and adding $1.96s$ to the expected trips (i.e., by using a normal approximation to the binomial distribution). The same was done on the cumulative number of observed and unobserved trips throughout the year, and these cumulative trips were divided by their maximum to put them on the same scale (0-1).

The number of observed and unobserved trips achieved was outside of their expected values during part of the year. Focusing on the observed trips, the achieved values were below the lower range of expected during three periods: January 2–8, February 2–16, and February 21–March 6 (36 days total). We would expect that 5% of our observed values would fall outside of our upper and lower expected bounds, and the value was only slightly higher (6.8%). If the deployment of observers was occurring as anticipated, a random selection of trips to be observed in ODDS

should result in the accumulation of observed trips and unobserved trips at the same pace. Excepting the periods at the start of the year, this is what occurred (Figure 3-4, lower panel). However, it is worth noting that there were no observed trips after November 25th, whereas unobserved trips continued throughout the year.

There are multiple factors that could explain the results shown in Figure 3-4. As was demonstrated in Table 3-1, a number of releases from observer coverage were granted to the vessel and to the observer provider during 2013, and the majority of these happened in the first trip-selection period. However, the realized observed rate was 16.2%, which was above the anticipated 14.78% programmed into ODDS. A review of the expected selection probability in ODDS during the first selection period was also 16.4. The apparent paradoxical situation is due to a nuance in the trip selection system. ODDS allows users to log up to three trips prior to making a landing. At the start of the year, users were able to declare these trips as completed and "closed" in any order. If not all of those trips were selected for coverage, the user could delay fishing with an observer by fishing the unselected trips first. The same mechanism could also explain the dearth of observed trips at the end of the year.[9]

3.3.2 Spatial Representativeness

In the trip selection category, there were three selection periods with different selection rates. Each of these time periods became a separate sampling stratum. 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 the overall population. Therefore the proportion of observed trips in each area should be similar to the selection rate used to select individual trips. The proportion of trips actually observed in each NMFS reporting area varied (0% to 100%). The NMFS Reporting Areas where the proportion of trips observed was very different from the expected proportion (14.87% or 11.15%) generally occurred in areas with less fishing activity (Figure 3-5).

The same analysis was conducted for the vessel selection strata. There are six 2-month time periods during which vessels were selected for coverage, each having a different sample rate (see Table 1). The target proportion of trips observed is between 11% and 15%. The proportion of trips actually observed varied with NMFS Reporting Area (Figure 3-6).

In those areas where fewer fishing trips occurred (e.g., trip-selection category, time period 1, NMFS Area 523), there is a larger probability of observing zero trips due to the randomization process than there is in other areas where more fishing occurred. In other words, the probability of drawing a sample from ***all*** trips and having that sample include no trips from an area with little fishing is relatively high. For example, in the first time period 2,375 fishing trips occurred (Table 1), and of those only 4 occurred in Area 523, less than 0.2% of all trips in the first period. In an observed sample of 386 trips, we would expect less than 1 of the 386 selected trips to occur in Area 523; hence observing no trips in Area 523 (Figure 3-5) is not unlikely.

To properly address the confounding effect of population size on expected rates of coverage, we computed the number of trips that are expected to be observed given the stratum-specific sample

[9]Changes to the trip logging logic changed on January 15, 2014 in an attempt to limit this behavior. Trips must be closed in the order they are entered.

rate, the underlying fishing patterns, and randomization of deployment using the hypergeometric distribution. The hypergeometric distribution describes the probability of having a given number of items with a certain characteristics (e.g., 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). [10] 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. Using this method, we compared the expected number of trips with the observed number for any NMFS Reporting Area and stratum (Figure 3-7). In both selection strata, the actual number of observed trips generally followed the expected; note the difference in scale (number of trips) between the two graphs. The size of the data points represent the probability of observing that number of trips or a number of trips farther from the expected number (more extreme), also based on the hypergeometric distribution. Small data points indicate an observed number of trips that is unlikely given randomization of deployments. Note that unlikely events do occur by chance: an outcome with probability of 0.05 is expected to occur once out of 20 times, for example. This analysis of the vessel selection strata (Figure 3-7, right panel) should be viewed with caution since trips are not independent but rather clustered within a vessel. Not accounting for this clustering of trips will result in an underestimation the probability of observing that number of trips or a more extreme value; more cells will be identified as extreme outcomes than actually exist.

We also computed the number of expected trips in both NMFS Area and gear type (Figure 3-8). Each cell is defined by gear in addition to NMFS Area and the hypergeometric distribution is used as before so that the size of the data point represents the probability of observing that number of trips or a number of trips farther from the expected for that cell.

The probability of observing a number of trips as far or farther than the expected number are mapped for trip and vessel selection (Figure 3-9, and Figure 3-10, respectively). While values less than 5% are often considered to be statistically significant (evidence that the hypothesis being tested is false), in this case we are not testing a hypothesis, but rather assessing patterns of unlikely outcomes (the tails of the distribution).

In each trip selection time period stratum, there were 1 or 2 NMFS Areas where the probability of the observed number of trips or a more extreme outcome was less than 5% (Figure 3-9). These occurances do not necessarily indicate a departure from what is expected under random deployment. On three of the five NMFS Areas where the probability was less than 5%, the observed number of trips was higher than expected: 1st period Area 521 (expected 3.4, observed 11); 2nd period NMFS Area 519 (expected 0.3, observed 1); and NMFS Area 610 (expected 7.1, observed 12). On two occasions the observed number of trips was lower than expected: 1st period NMFS Area 519 (expected 20.1, observed 10); and 3rd period NMFS Area 509 (expected 4.8, observed 1).

[10] The hypergeometric distribution is similar to the binomial distribution which describes the number of successes in a sample drawn with replacement. Since fishing trips cannot be sampled with replacement, the hypergeometric distribution (sampling without replacement) is more the appropriate distribution to use in this analysis.

There were more NMFS Areas where the probability of the observed number of trips (or a number farther from expected) was less than 5% in the six vessel selection strata compared to the results of trip selection. In four of the five time periods that had fishing effort, the probabilities of observing a number of trips in NMFS Area 650 that was as far or farther from the expected number was less than 5% (Figure 3-10). However, the direction of this outcome was not always the same among time periods. The observed number of trips in this area was less than expected in the July-August period (0 observed, 3.2 expected) and the September-October period (0 observed, 3.9 expected). The observed number of trips was larger than expected on all other occasions where the probability the observed number of trips being as far or farther from expectation was less than 5%. Clustering of trips within each vessel may result in data that do not follow the hypergeometric distribution, and therefor the probability of observing a more extreme number of trips may not be correct.

Taken together, there are no apparent departures in the spatial distribution of observed trips in either strata from what would be expected under a random sample of trips and the distribution of observed trips appears to be consistent with the distribution of unobserved trips. There are a greater number of unusual results in the vessel selection strata than might be expected due to random chance. However, the clustering of trips within vessels combined with the sparseness of data in vessel selection may cause overdispersion (i.e., the variance is larger than expected under the hypergeometric distribution), resulting in the map-depicted probability values being overestimated and complicating interpretation of probability values. This issue needs further evaluation; but comparing the relative spatial patterns of extreme values is important especially in light of certain federal reporting areas consistently exhibiting extreme values.

3.3.3 Trip Metrics

The consistency of trip characteristics between the observed and unobserved trips in trip- and vessel-selection was evaluated to assess whether observed trips had characteristics that were different from the portion of the fleet that was not observed. Specifically, the distributions of trip duration, number of NMFS areas visited during a single trip, landed weight of catch, and the species diversity of catch were visually compared for each strata.

Trip Duration

In the trip selection stratum, the duration of trips varied between one and 47 days (first time period) and between one and 15 days in the third time period (Figure 3-11). The distributions of trip length were consistent between the observed and not observed categories.

In the vessel selection stratum, the distributions of trip length were consistent between the observed and not observed categories for most time periods (Figure 3-12). The distribution of trip length was less consistent between the observed and not observed trips in Period 4 (July - August) and Period 5 (September - October).

For the vessel selection strata, the distribution of trip duration was also evaluated for several subsets of trips without observers. These included: trips made by vessels that were not in the sample frame (zero chance of carrying an observer), vessels that were released from observer coverage, and trips made by vessels that were not selected to carry an observer (and are not in the other categories). Allowing for the lack of data in the observed category, the distributions of trip length are consistent between categories (Figure 3-13).

Lastly, the duration of trips for observed and unobserved trips that delivered their catches at-sea to tenders was inspected for trips in the trip selection strata (Figure 3-14). In terms of observer deployment, trips are defined as the length of time from when a vessel leaves port with an empty hold to the time they return to a port (with a shoreside processor with a valid Federal Fisheries Permit). While trips delivering to tenders had a few trips of longer duration than those that deliver catch to shoreside processors, the differences in trip length between the observed and unobserved trips was less pronounced than earlier comparisons from the first 16 weeks of 2013 (NMFS, 2013). There were insufficient trips in vessel selection for this same comparison to be made.

Taken together, there were no patterns in trip duration that provide evidence of systematic differences in trip length between trips that are observed and those that are not. However, the lack of data in the observed trip categories resulted in distributions that tended to be less dense, and hence may have been insufficient to clearly capture any discrepancies.

Number of NMFS Areas Visited per Trip

The proportion of trips that visited one, two, three, or more NMFS Areas was computed for the observed and not observed trip categories within trip and vessel selection strata (Figure 3-15 and Figure 3-16, respectively). In the absence of an observer effect, the proportion of trips that visited a one, two, or more NMFS Areas should be the same between observed and unobserved trips. While this was the case in the first time period of the trip selection strata, in the second and third time periods the proportion of observed trips visiting a single NMFS Area was higher than for the unobserved group while the opposite condition was true for trips visiting more than one NMFS area (Figure 3-15). In these same time periods there were no observed trips that visited more than two NMFS Areas.

Differences were more pronounced in the vessel selection strata. In every time period but the second, the proportion of trips visiting only one NMFS area was lower for observed trips than unobserved trips while the opposite condition was true for trips visiting more than one NMFS area (Figure 3-16).

Landed Catch Weight

Distributions of landed catch did not show any obvious differences between observed and unobserved trips in any of the deployment strata (Figure 3-17, Figure 3-18). As expected, vessels in trip selection strata tended to have larger deliveries than those in vessel selection. Landings early in the year (time periods 1 in both trip and vessel selection strata) tended to be larger than in later time periods. Of particular note are a few deliveries of over 200t in the vessel selection strata (time period 1).

Species Diversity

The number of species within the landed portion of the catch should be dependent in some degree to the size of that catch. For this reason, a suite of possible metrics have been devised in ecology to standardize comparisons. However these techniques all rely on the relationship between the number of species and the number of individuals, not weight (e.g., rarefaction). Relative species diversity curves have been shown to convey large amounts of information about the structure of the population or sample, but can be difficult to understand (Magurran 1988). For

this reason, we adopted a simplified version of the species diversity curve, and compared the percentage of the total retained catch that was accounted for by the most abundant species. This metric follows the concepts behind Hill's diversity numbers N1 and N2 that depict the number of abundant and very abundant species (Hill 1973). High percentages in our metric should indicate lower diversity catches. We did not find large differences between observed and other classes of trips in trip selection (Figure 3-19) or vessel selection (Figure 3-20). However, the relative proportion of trips that had no diversity (a value of 1 in Figure 3-19 and Figure 3-20) was higher for vessels in the frame and out of the frame than for observed trips in five of six time periods in vessel selection, and differences were more pronounced and could not be explained by releases from coverage in period 5. In vessel selection, catches are less "pure" during observed trips than during unobserved trips.

Summary

Overall, there were no consistent patterns of discrepancy between the observed trips and the unobserved trips for any metrics except possibly the number of NMFS Areas visited on a trip and the purity of the catch. Although in some comparisons the lack of data for the observed group may have masked inconsistencies, we found no evidence of systemic bias for those characteristics for which data are available for both observed and unobserved groups.

3.4 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 coming into the system to group observer data from fishing activities of similar character (gear, NMFS Area, trip targets) within weekly periods. At low sample sizes, the probability of the sample data containing no observations for 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 to have reasonable expectation of observing all types of fishing.

There are many fishing trips in each of the gear types, hence regardless of sample size, all gear types can be expected to be represented in the sample. However, over the course of an entire year, some NMFS Areas have low fishing effort and as a result relatively high probability of collecting a sample across all NMFS areas that contains no data for that area with low effort. The fishing effort data for each stratum (trip and vessel selection for each time period) and the sample size (number of observed trips) over the course of 2013 was used to evaluate the probability of drawing a sample of trips and observing no trips in a NMFS Area, based on the hypergeometric distribution (Figure 3-21). The smaller the population being evaluated, in this case defined only by NMFS Area, the larger the probability of failing to capture observer data from that cell. Including additional factors, such as week, will decrease cell size and increase the probabilities. Because trips in the vessel selection strata are not independent, but rather are grouped within vessels, these results should be interpreted with caution.

In addition to assessing the probability of the sample of trips containing no data for a NMFS Area (cell), the probability of a sample containing no trips was computed for cells defined by gear type, NMFS Area, and stratum (selection category and time period) (Figure 3-22). Similar

to the probability of not observing any trips in an area, given the same fishing trips and same sample size, we can compute the probability of drawing a sample and observing three or more trips (Figure 3-23). In this scenario, the probability of observing three or more trips increases as the number of trips that occurs in an area increases (note that the x-axis is truncated in these plots). For example, looking at trawl gear, the same areas (NMFS Areas 640 and 620) and strata combinations having few trips have a low probability of 3 or more trips (Figure 3-23) and a large probability of no observed trips.

In both Figure 3-21 and Figure 3-22, the cells are defined as all trips in each selection group, time period, NMFS Area (Figure 3-21) and gear type (Figure 3-22). If the data are divided into smaller cells, with fewer trips occurring in each cell (for example by including week), the probability of observing no data in a cell will increase. Conversely, the probability of observing no data in a cell will decrease with increasing sample rate (in addition to increasing numbers of trips in a cell). Sample size requirements to ensure data are present in all cells of interest will be evaluated during the planning process for 2015.

3.5 Recommendations to Improve Data Quality

Three sources of error were found that disrupted the integrity of the observer deployment sampling design: the lack of a proper sampling frame in vessel selection, conditional release policies, and the manipulation of trip order in trip selection.

- The sampling frame in vessel selection would be improved through a check-in system whereby vessels would notify the Observer Program of their intent to fish and would in return be notified of whether the vessel would require an observer and the duration of the observation period. This type of check-in system is identical to the procedure currently used in trip selection. Use of such a system would greatly reduce errors due to oversampling and improve the efficiency of the selection process.

- The conditional release policy imparts bias into the observer data. If such releases are continued, then they should apply to all fishing activities within the sampling unit (all trips made by a vessel during the time period, and not only during certain fishing activities).

- The selection rate in ODDS should remain constant throughout the year. Changing the selection rate creates temporal strata. Rather than reduce the selection rate in ODDS to reduce the risk of cost overages, we recommend that NMFS use budget buffers if possible to mitigate for the rare event of overage.

- Data analyses continue to be hampered by the lack of a trip identifier. We recommend that the linkage between ODDS and eLandings be strengthened.

Table 3-1. Summary of trip selection metrics (CV and CP combined) measured in the Observer Declare and Deploy System (ODDS). The Binomial test p.value refers to the value returned by a two-sided exact binomial test with a probability of success equal to the programmed rate and an actual probability of success given the random number generator. Values were not sufficient to reject the null hypothesis that the random number generator was selecting at the programmed rate. Inherited selection percentage is the percentage of logged trips selected to carry an observer given the random selection process and a 100% selection probability if the user's last cancelled trip was to be observed. These are termed "inherited trips". The expected trips is the number of logged trips expected to be realized considering random selection, inherited trip probabilities, trip releases, and cancelled trips. Expected selection percentage is the percentage of expected trips selected to be observed. Trip amounts reported here between logged and actual may not match because the logged dates will be different from the dates a trip is realized. In addition, there were 239 trips that were cancelled by the system. We would expect the totals for the year in ODDS to be similar to the totals in this analysis identified using the eLandings and Catch Accounting System databases. The mismatch in the totals column highlights some potential problems with defining trips between various databases.

Selection Period	**1**	**2**	**3**	**Totals**
Selection period duration	Jan. 1 – June 21	June 22 – Aug. 16	Aug. 17 – Dec. 31	
		Selection Percentages		
Programmed	14.8	11.2	14.8	
Random number generator	15.5	10.2	13.9	
95% interquartile range	(13.7 – 17.5)	(6.5 – 14.9)	(12.1 – 16.0)	
Binomial test p.value	0.39	0.75	0.43	
Inherited	17.9	11.1	15.6	
Expected	16.4	11.4	15.7	
Actual	16.3	9.1	13.4	
		Trips		
Logged into ODDS	2,551	225	1,257	4,033
Expected after user cancellations	2,206	201	1,043	3,450
Cancelled by ODDS (CS)	78	19	142	239
Expected after CS (Exp.)	2,284	220	1,185	3,689
From landings (Actual)	2,391	264	1,322	3,977
Percent difference (Exp. vs. Actual)	4.5	16.7	10.4	7.2

Table 3-2. Coverage in trip units for full and trip selection; vessels for vessel selection.

Stratum	Date		Trips (#)		Vessels (#)		Coverage (%)		95% percentile		Meets or exceeds expected?
	Start	End	Total	Observed	Total	Observed	Actual	Expected	Lower	Upper	
Full Coverage											
Regulatory	Jan. 1	Dec. 31	4,485	4,482	173	170	99.9	100.00			**Yes**
Voluntary			353	353	35	35	100.0				**Yes**
Total Full	Jan. 1	Dec. 31	4,840	4,835	178	175	99.9	100.00			
Partial Coverage: Trip Selection											
CV 1	Jan. 1	Jun. 21	2,375	386	267	151	16.2	14.8	13.3	16.2	**Yes**
CP 1			confidential				18.8		0.0	31.2	**Yes**
CV 2	Jun. 22	Aug. 16	250	23	69	15	9.2	11.1	7.6	15.2	**Yes**
CP 2			confidential				7.1		0.0	28.6	**Yes**
CV 3	Aug. 17	Dec. 31	1,308	177	206	96	13.5	14.8	12.9	16.7	**Yes**
CP 3			confidential				0.0		0.0	35.7	**Yes**
Total Trip	Jan. 1	Dec. 31	3,977	590	302	187	14.8	14.5[11]			
Partial Coverage: Vessel Selection											
1	Jan. 1	Feb. 28	262	16	51	3	5.9	13.7			**No**
2	Mar. 1	Apr. 30	453	45	146	13	8.9	11.6			**No**
3	May 1	Jun. 30	549	22	212	9	4.2	11.8			**No**
4	Jul. 1	Aug. 31	384	15	151	6	4.0	12.5			**No**
5	Sep. 1	Oct. 31	483	29	164	12	7.3	12.8			**No**
6	Nov. 1	Dec. 31	118	27	47	7	14.9	14.9			**Yes**
Total Vessel	Jan. 1	Dec. 31	2,249	154	388	41	10.6	11.0			
Partial Coverage: No Selection											
NMFS Do Not Deploy	Jan. 1	Dec. 31	3,040	0	610	0	0	0			**Yes**
Dockside											
Pollock	Jan. 1	Dec. 31	2,695[12]	2,972[3]			90.7	100.0			**No**

[11] Calculated from (sum(r_t*N_t))/ sum (N_t).
[12] Represents landings, not trips.

Table 3-3. The number of vessels that fall under specific criteria within the vessel selection strata.

Row	**Time strata**	**1**	**2**	**3**	**4**	**5**	**6**
	Coverage duration	**Jan.-Feb.**	**Mar.-Apr.**	**May-Jun.**	**Jul.-Aug.**	**Sep.-Oct.**	**Nov.-Dec.**
	Number of vessels in the Sampling Frame						
1	..anticipated to fish (for ADP rates; 2011 data)	65	153	231	169	194	66
2	..in selection frame (2012 data); F	74	181	234	170	203	47
3	..in frame and fished; f_Y	42	114	165	102	117	15
4	..in frame and did not fish; f_N (over-coverage= inefficiency)	32	67	69	68	86	32
5	..not in frame fished; f_0 (under-coverage=potential bias)	9	32	47	49	47	32
6	..active (fished=true frame); $f_* = f_0 + f_Y$	51	146	212	151	164	47
	Selected vessels						
7	..desired number to be observed; v_t	7	17	25	19	21	7
8	..selected for coverage; v_s	9	29	39	45	65	47
9	..selected did not fish (non-response); v_N	5	14	16	24	38	32
10	..selected and fished; v_f	4	15	23	21	27	15
	Released vessels						
11	..selected, fished, never released	4	11	10	7	11	5
12	..selected, fished, and had some release; v_R	0	4	13	14	16	10
13	..selected, fished, and released entire period	0	2	12	14	16	9
14	..selected, fished, released part of the period	0	2	1	0	0	1
	Observed vessels						
15	..selected and observed total; v	3	13	9	6	12	7
16	..selected, not released, all data present	2	10	9	6	9	5
17	..selected, not released, some data missing	1	3	0	0	0	0
18	..selected, not released, all data missing	1	0	2	1	2	1
19	..selected, released, but observer data; $v_?$	0	0	0	0	3	2

Table 3-4.Vessel-selection rates expressed as percentages (all rate formulations multiplied by 100). Abbreviations follow Table 3-3.

Row							
	Percent errors in Sampling Frame						
1	over-coverage (% of Sample Frame); f_N / F	43.2	37.0	29.4	40.0	42.3	68.1
2	under-coverage (% of true frame); f_0 / f_*	17.6	21.9	22.2	32.4	29.0	68.1
	Percent errors due to non-response						
3	Selected and did not fish; v_N / v_s	55.5	48.3	41.0	53.3	58.5	68.1
4	Selected, fished and not observed; $(v_f - v)$ / v_f	25.0	13.3	60.1	71.4	55.5	53.3
	Percent chance of selection						
5	..in frame, fished, and selected; v_f / f_Y	9.5	13.1	13.9	20.6	23.1	100.0
6	..if not in frame (rate for under-coverage boats)	0.0	0.0	0.0	0.0	0.0	0.0
	Percent Selected						
7	..fished and given some sort of release; v_R / v_f	0.0	26.7	56.5	66.7	59.2	66.7
	Percent coverage						
8	Desired coverage; v_t / f_*	13.7	11.6	11.8	12.5	12.8	14.9
9	Achieved coverage; v / f_*	5.8	8.9	4.2	4.0	7.3	14.9

Table 3-5. The total number of trips and vessels in the vessel selection strata that were either observed or conditionally released. The number of vessels and trips are not unique among individual cells of this table (trips and vessels can cross NMFS Reporting areas), so totals should be interpreted with caution.

	Trips (resulting from vessels)			**Vessels (1º sampling unit)**		
NMFS Reporting Area	Observed	Released	Non-response (%)	Observed	Released	Non-response (%)
517	0	1	100	0	1	100
518	5	1	16	3	1	25
519	4	0	0	3	0	0
541	2	10	83	1	1	50
542	1	6	86	1	1	50
610	17	21	55	4	5	56
620	14	6	30	5	4	44
630	77	61	44	21	25	54
640	3	5	63	3	4	57
649	4	3	43	3	2	40
650	19	41	68	8	15	65
659	20	10	33	11	8	42
Total	166	165	50	63	67	52

Table 3-6. Pollock and non-pollock landings by port and observed status (O=observed U=Unobserved) where observers recorded salmon information, length, or specimen information.

		Pollock Deliveries				Non- Pollock Deliveries			
Port	Landings	O	U	Total	% O	O	U	Total	% O
Full-Coverage									
Akutan	894	774	0	774	100.0	0	654	654	0
Dutch Harbor	851	784	0	784	100.0	0	120	120	0
Inshore Floating Processor	442	304	1	305	99.7	0	67	67	0
King Cove	89	84	0	84	100.0	0	137	137	0
Kodiak	189	0	2	2	0.0	0	5	5	0
Sand Point	10	10	0	10	100.0	0	138	138	0
Other	138	0	0	0	0.0	0	187	187	0
Total- Full Coverage	2,613	1,956	3	1,959	99.8	0	0	0	0
Partial-Coverage, Trip- and Vessel-Selection									
Akutan	307	5	40	45	11.1	0	262	262	0.0
Dutch Harbor	505	0	0	0	0.0	6	499	505	1.2
Inshore Floating Processor	186	7	12	19	36.8	0	167	167	0.0
King Cove	453	8	63	71	11.3	9	373	382	2.4
Kodiak	2,305	710	54	764	92.9	0	1,541	1,541	0.0
Seward	504	0	6	6	0.0	0	498	498	0.0
Sand Point	717	9	99	108	8.3	3	606	609	0.5
Other	2,074	0	0	0	0.0	0	2,074	2,074	0.0
Total- Trip and Vessel	7,051	739	274	1,013	73.0	18	6,020	6,038	0.3
Partial-Coverage, No-Selection									
Total- No Selection	3,082	0	0	0	0.0	0	3,082	3,082	0.0
Grand total	**12,746**	**2,695**	**277**	**2,972**	**90.7**	**18**	**9,756**	**9,774**	**0.2**

Table 3-7. Summary of release from observer coverage metrics for trip-selection CVs. No trip-selection releases were granted for trip-selection CPs.

Time strata	1	2	3
Coverage duration	Jan. 1- Jun 21	Jun 22 – Aug. 16	Aug. 17 – Dec. 31
Total trips; T	2,375	250	1,308
Total trips observed; t	386	23	177
Vessel released trips; t_{RV}	14	2	0
Provider released trips; t_{RP}	25	1	3
Total released trips; $t_{RV} + t_{RP} = t_R$	39	3	3
Realized coverage rate; (t / T) x 100	16.2	9.2	13.5
Unrealized potential coverage rate without releases; [($t_R + t$) / T] x 100	17.9	10.4	13.8

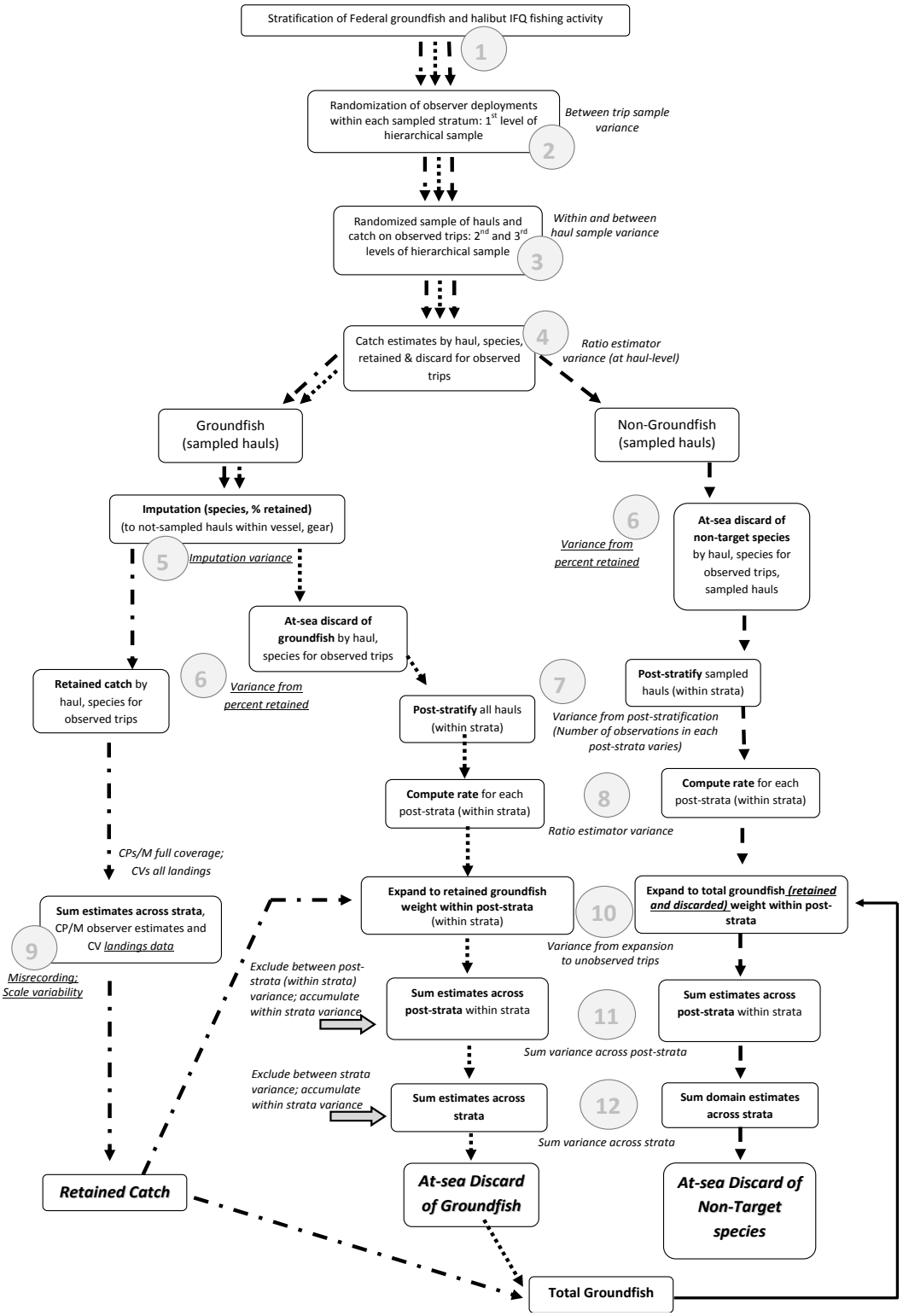


Figure 3-1: Schematic representation of the catch estimation process for retained catch, at-sea discard of groundfish species, and at-sea discard of non-target and prohibited species. Numbering indicates steps in the estimation process where uncertainty is accumulated.

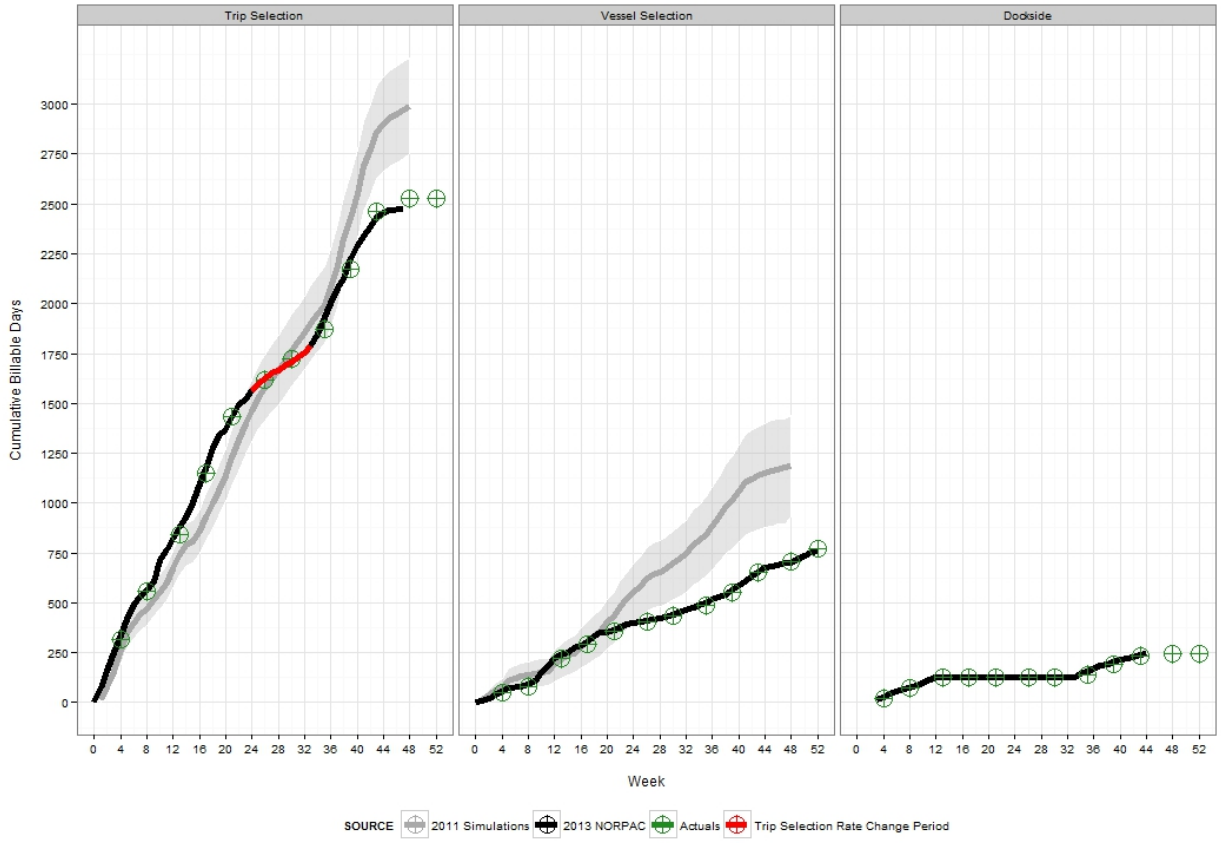


Figure 3-2. Trajectories of cumulative observer days expected from various sources within three deployment strata. Expected values from 2013 ADP simulations are depicted as gray bands, those from Observer Program databases are depicted as a black line, and those from NMFS observer provider invoices are depicted as green circles. The period denoting the change in the ODDS selection rate to and from 0.1115 is denoted in red.

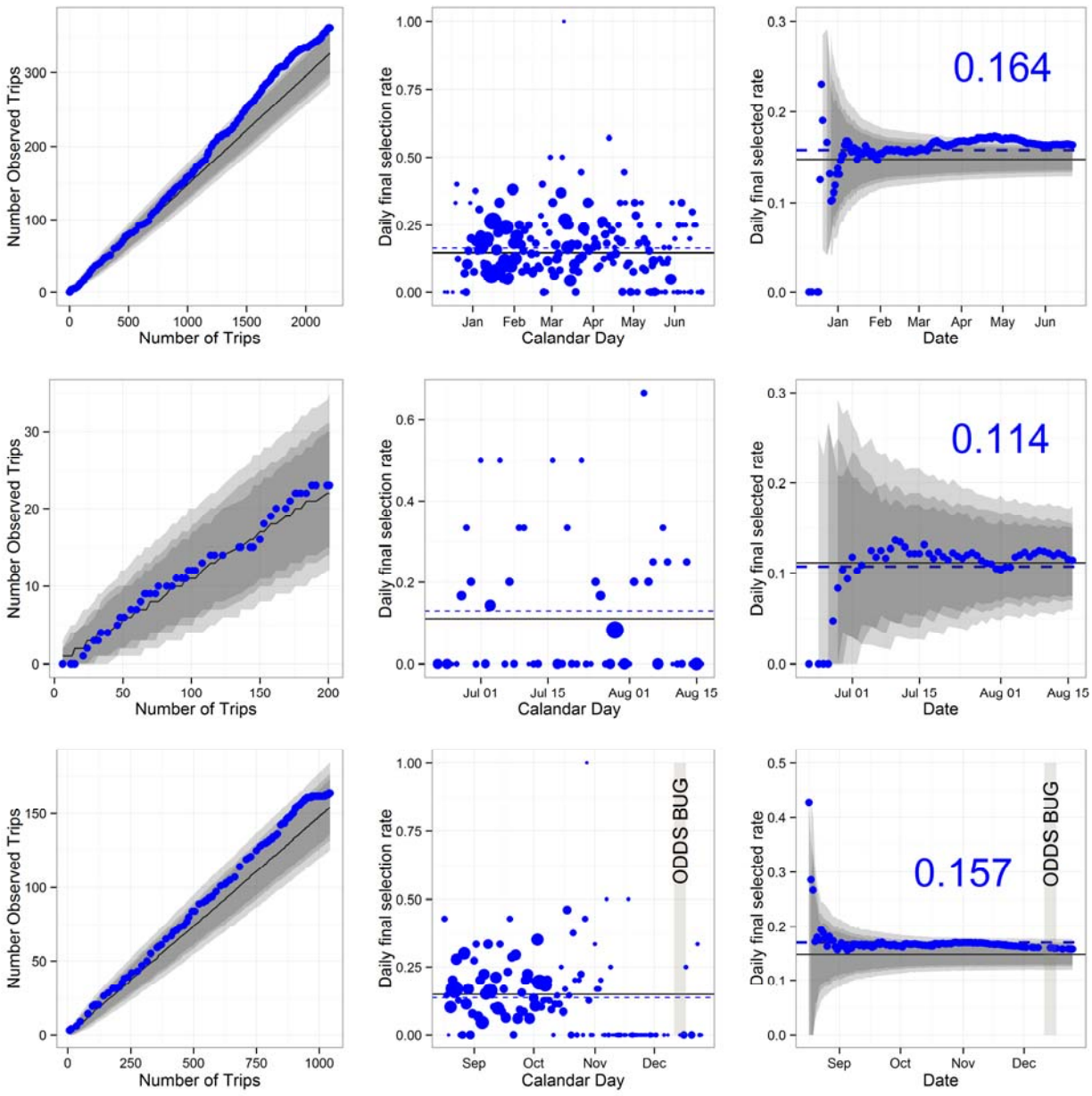


Figure 3-3. Diagnostic plots from the Observer Declare and Deploy System. All values depict values from the logged trips after considering all factors (inherited trips, cancellations, and releases). Each row corresponds to the three time periods of trip-selection from Table 1. The left column depicts the number of trips anticipated compared to that expected from a truly random selection at the programmed rate. The central column depicts the daily coverage rate with points sized to the number of trips logged in a day. Vertical dashed line is the average rate for the period compared to the programmed rate depicted as a solid line. The right column depicts the cumulative rate compared to the theoretical range of rates expected from a truly random selection at the programmed rate. The final rate is depicted as text.

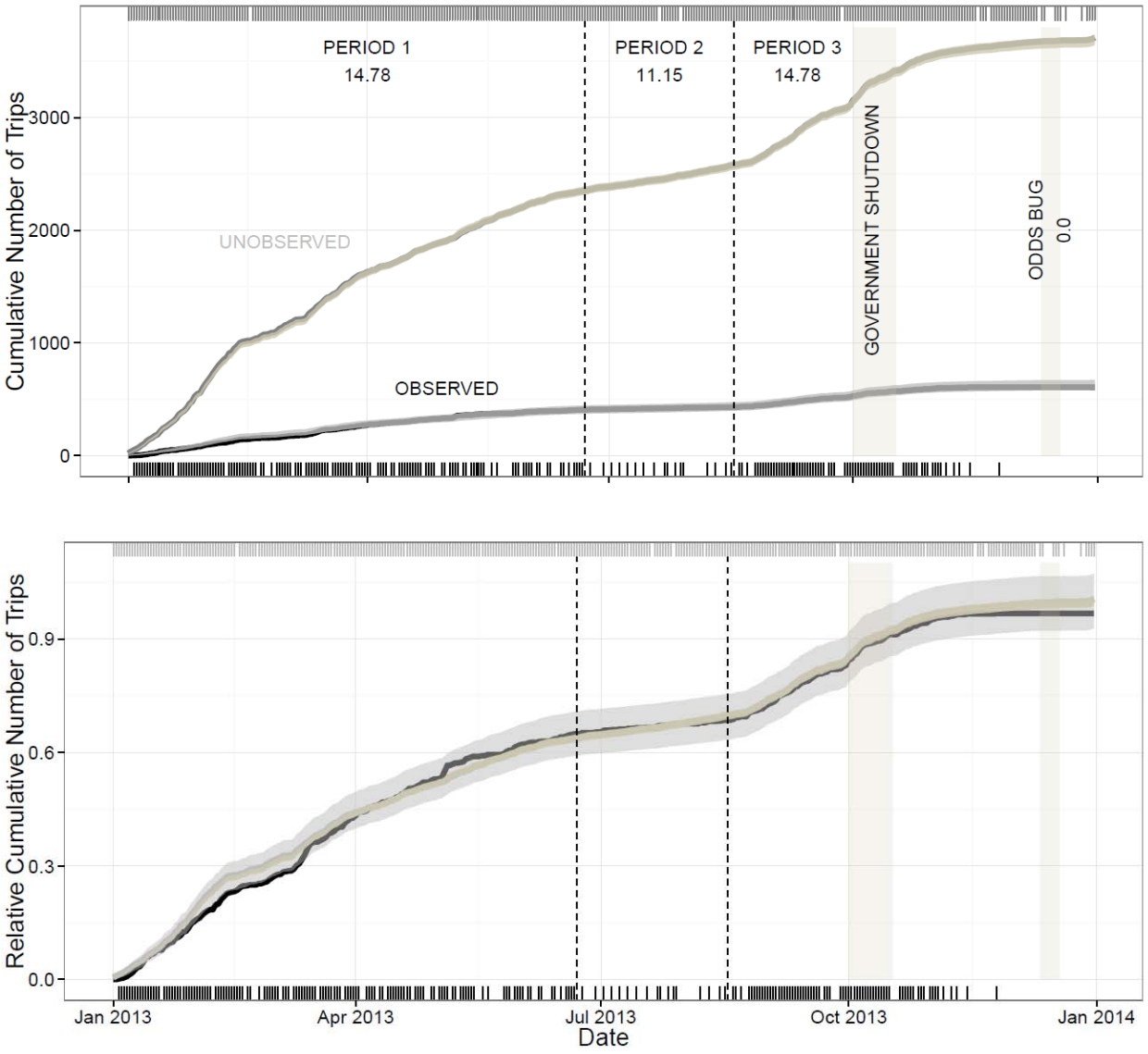


Figure 3-4: Accumulation of unobserved and observed trips within the trip selection deployment stratum during 2013. Observed trips are depicted as black lines with 0.025 and 0.975 percentiles depicted in gray. Unobserved trips are depicted as gray lines with brown percentile bounds. Days with unobserved trips are marked with ticks at the top of the upper panel, while days with observed trips are marked with ticks on the bottom of both panels. When the values in the top figure are divided by the respective total for the year, the result is the lower figure. The number of observed trips was lower than expected in the beginning of the year only, although there is a dearth of observed trips after December. The duration of the 2013 Federal Government Shutdown and a 7-day non-selection period due to a bug in ODDS are also depicted.

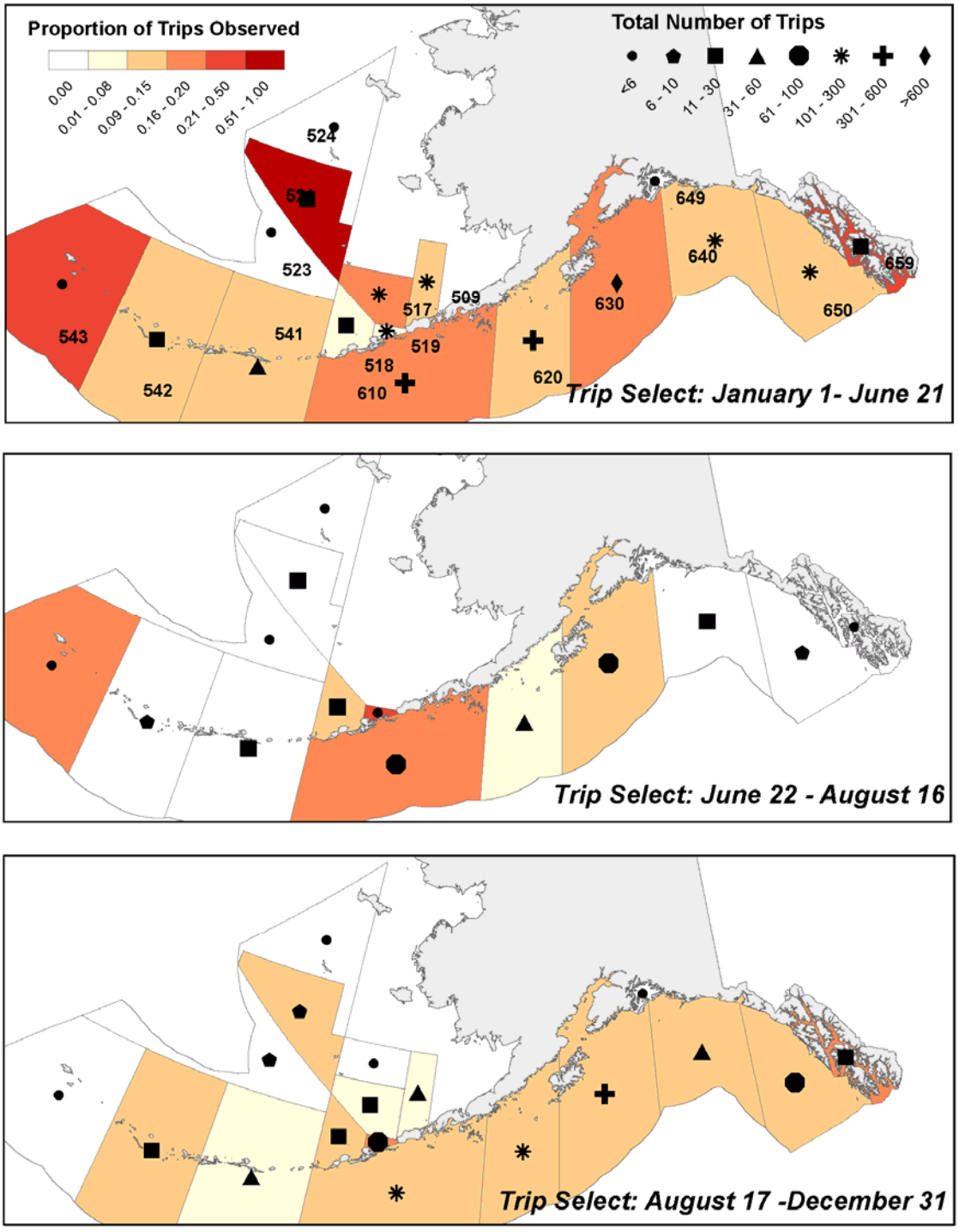


Figure 3-5: Proportion of trips observed in each NMFS reporting area in the trip selection strata. The color of the reporting area reflects the proportion of trips that were observed while the symbol indicates the total number of fishing trips that occurred in that area.

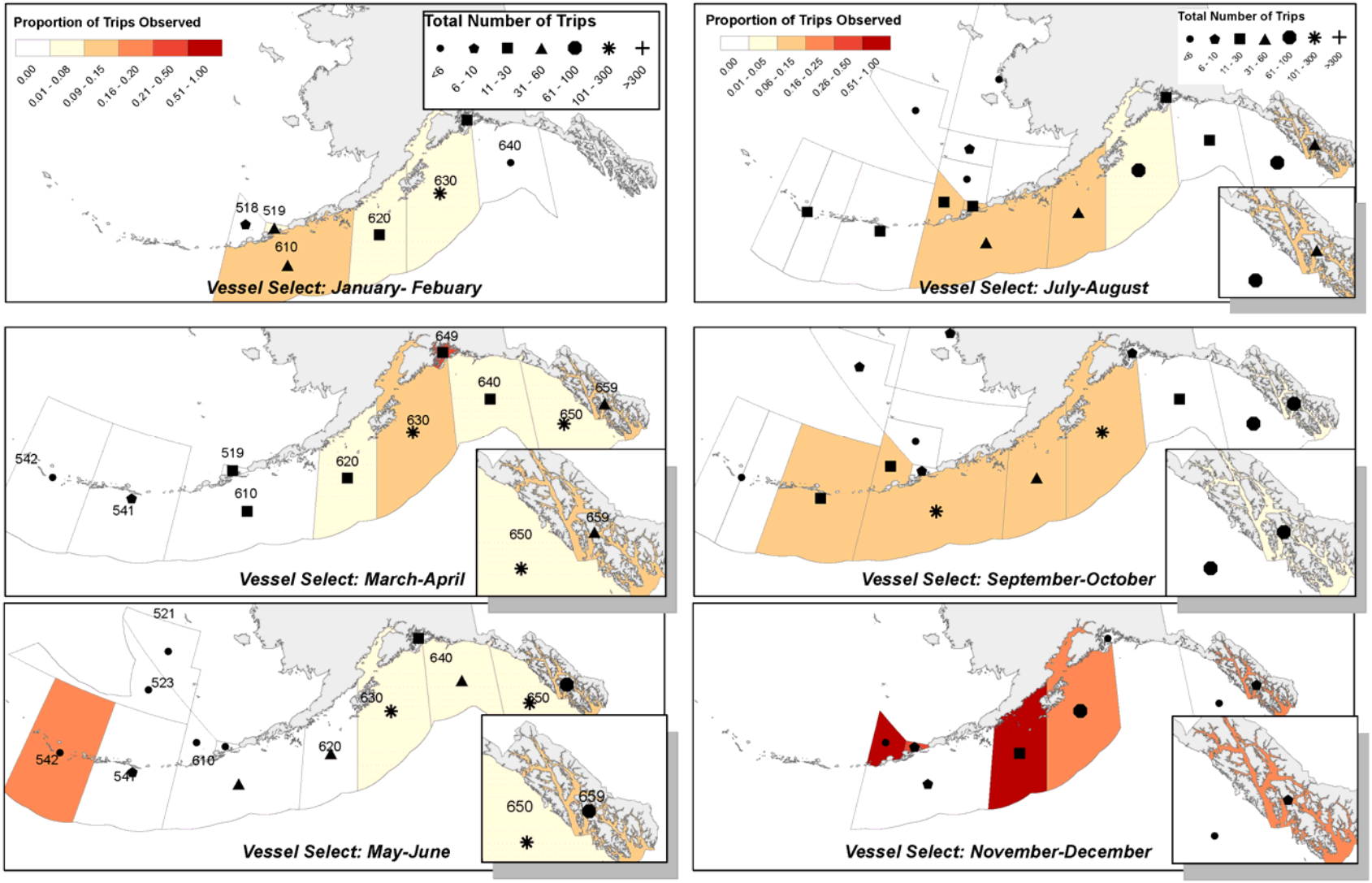


Figure 3-6: Proportion of trips observed in each vessel selection stratum.

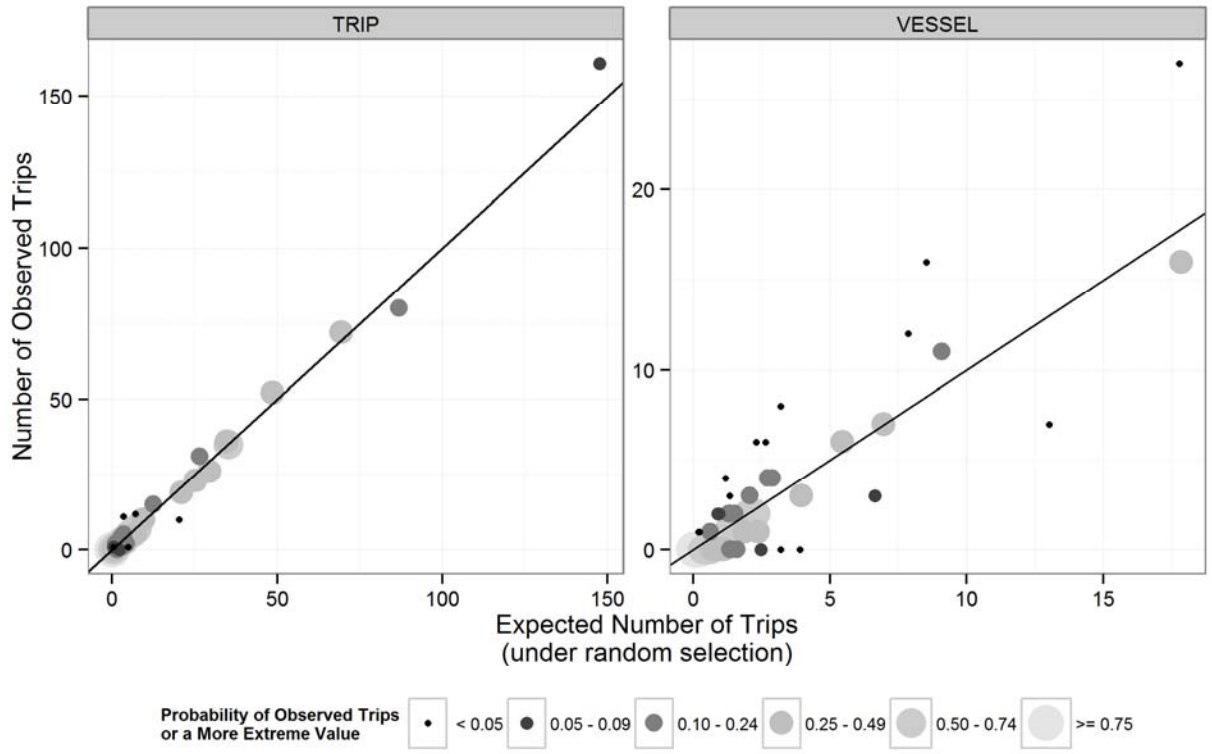


Figure 3-7: Comparison of the number of trips observed (y-axis) with the number of trips expected (x-axis) under random deployment of observers into trip (left frame) and vessel (right frame) selection strata. Each data point represents the number of trips in a NMFS Reporting Area and time period cell. Note the difference in scale between the two panels with trip selection cells having higher numbers of trips. The size of the data point corresponds to the probability of observing a number of trips as far or farther from expected than realized; the data points are plotted in layers from the largest probabilities (largest data points) at the lowest level while the smallest probabilities (smallest data points) are plotted on top of other data.

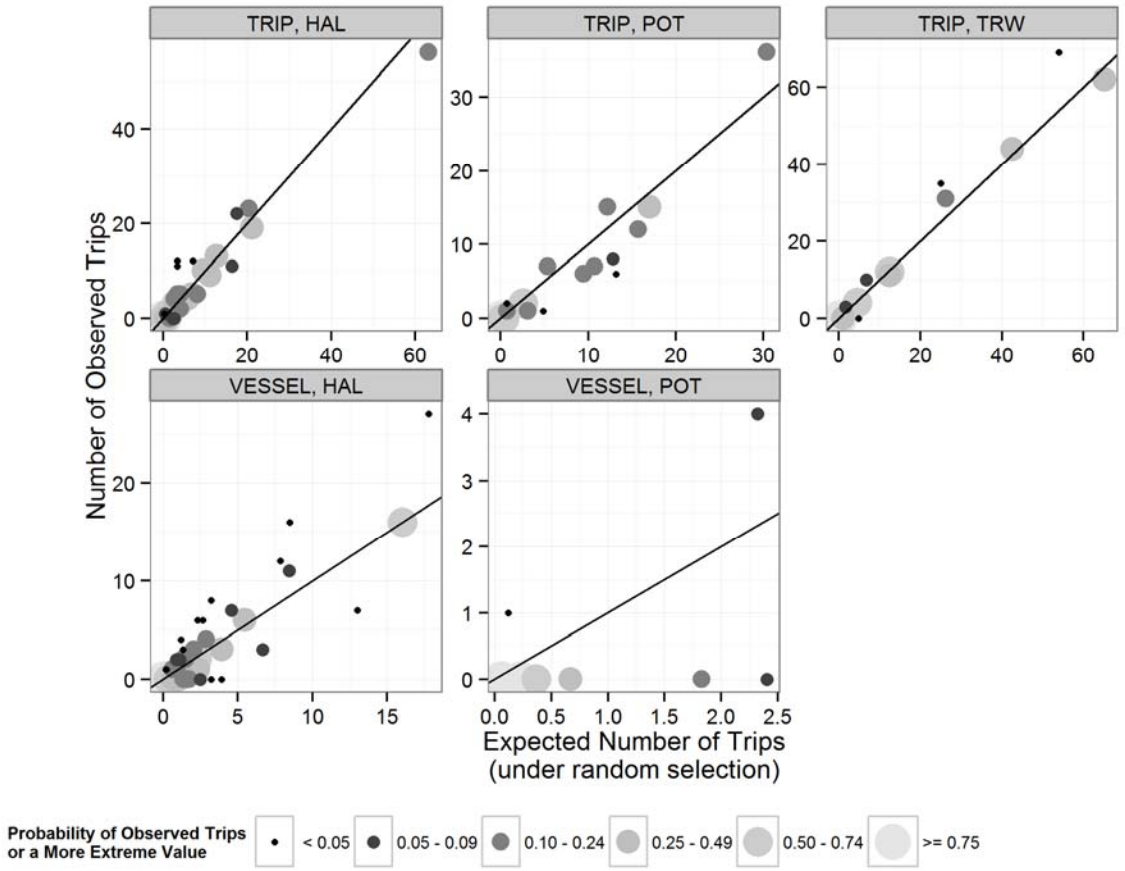


Figure 3-8: Comparison of the number of trips observed (y-axis) with the number of trips expected (x-axis) under random deployment of observers into trip (top row) and vessel (bottom row) selection strata and gear type (HAL=hook and line; POT=pot gear; TRW=trawl gear). Each data point represents the number of trips in a NMFS Reporting Area and time period cell. Note the difference in scale between the two panels with trip selection cells having higher numbers of trips. The size of the data point corresponds to the probability of observing a number of trips as far or farther from expected than realized; the data points are plotted in layers from the largest probabilities (largest data points) at the lowest level while the smallest probabilities (smallest data points) are plotted on top of other data.

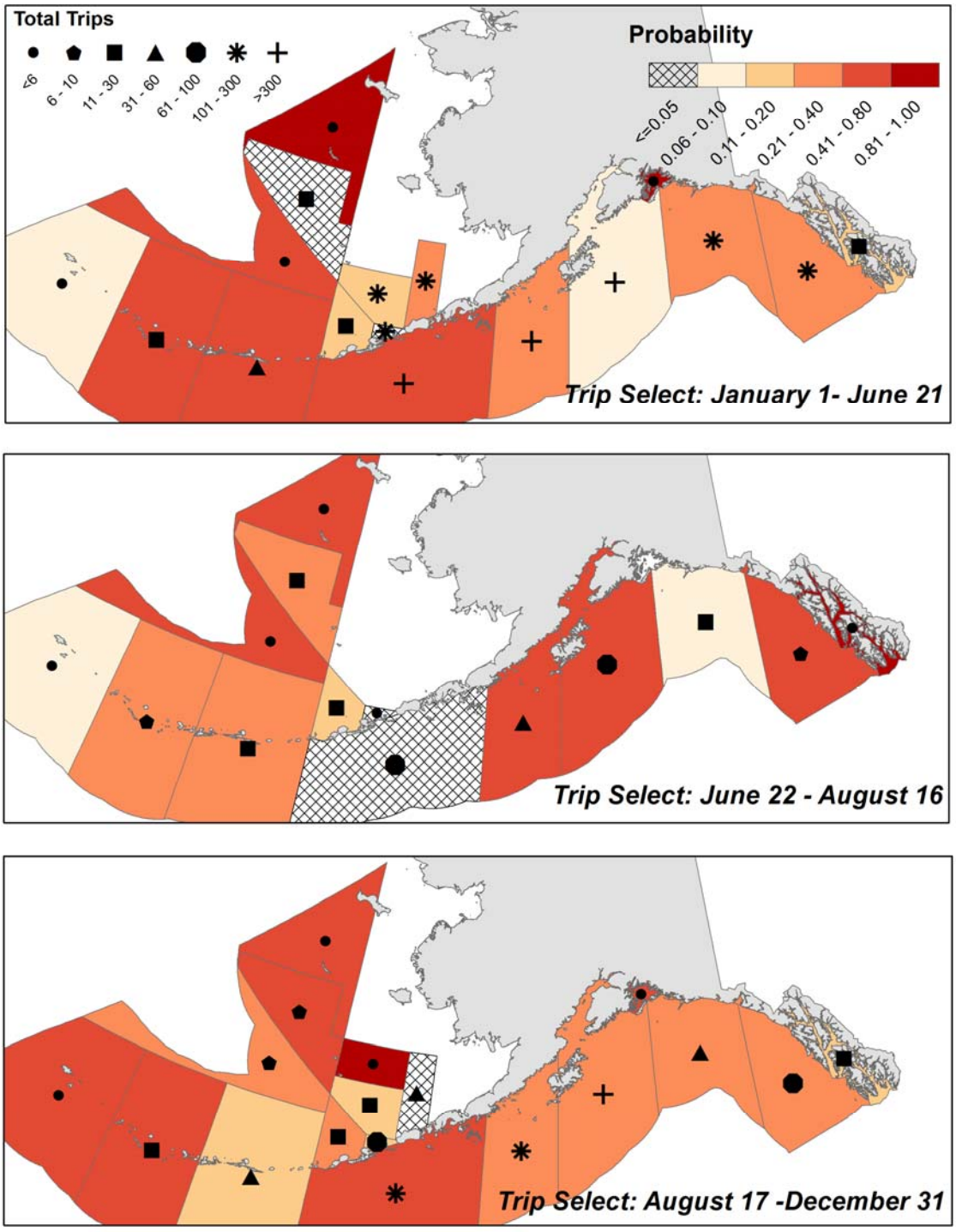


Figure 3-9: The probability of observing a number of trips as far or farther from the expected number than the sample contained (probability of observing a more extreme value).

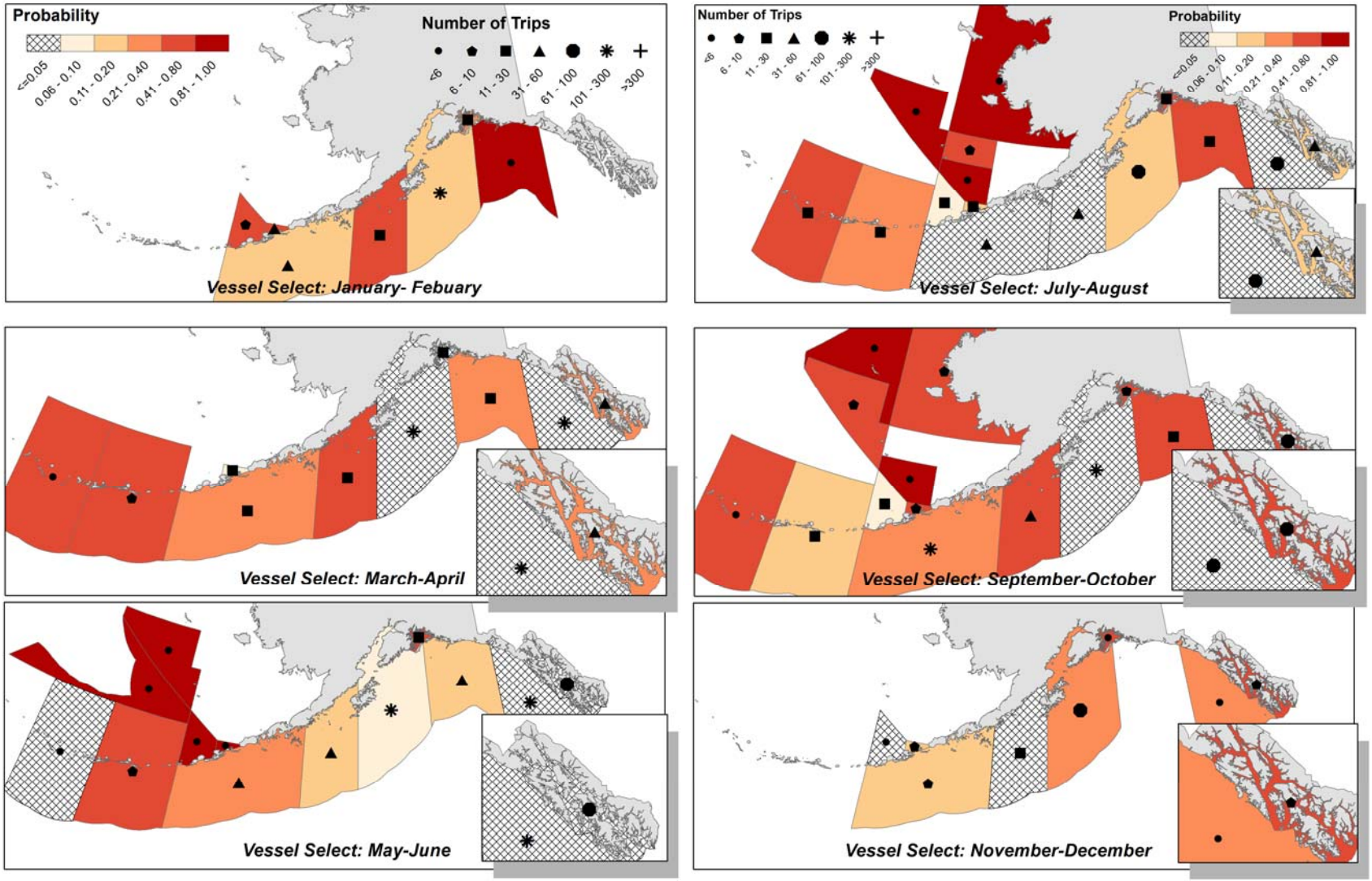


Figure 3-10: The probability of observing a number of trips as far or farther from the expected number than the sample contained (probability of observing a more extreme value).

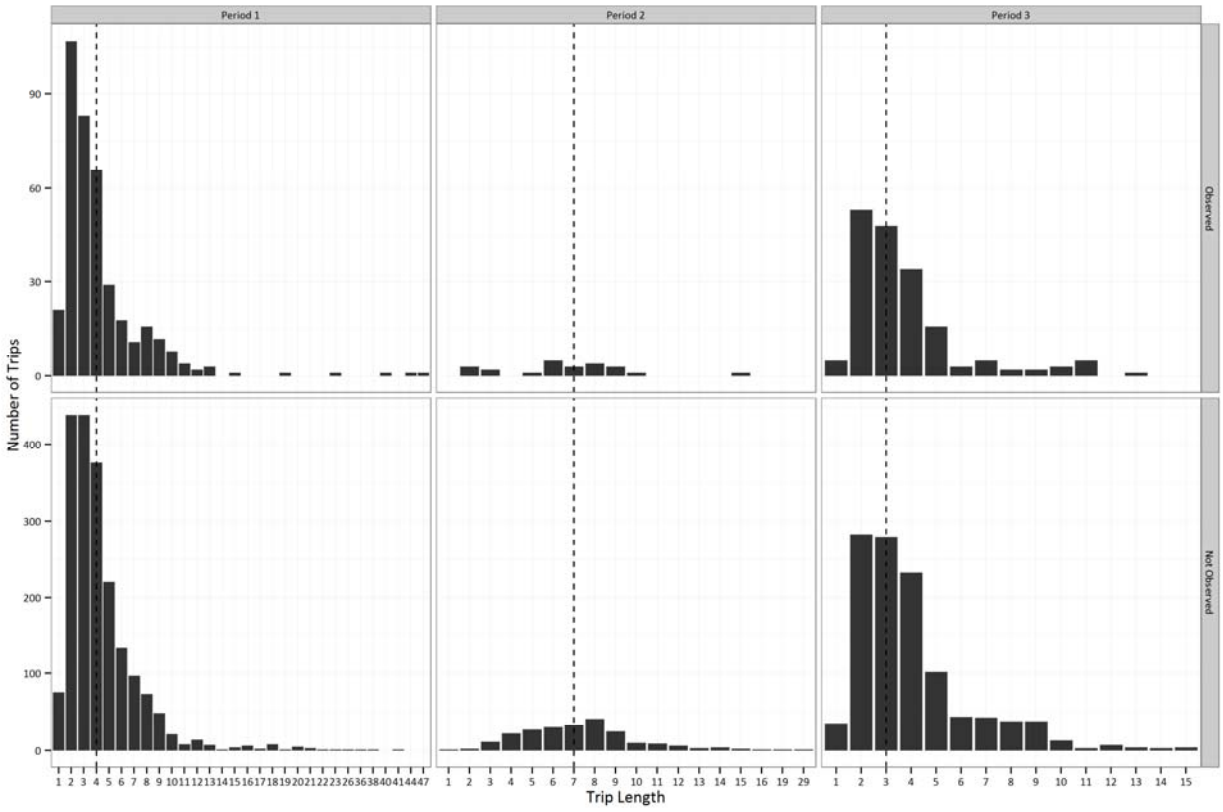


Figure 3-11: Distribution of trip length for trip selection strata, in number of days, for the observed and not observed trips. The median trip length for trips without observers is indicated in each time strata by the dashed line. Note that empty trip length intervals are not included.

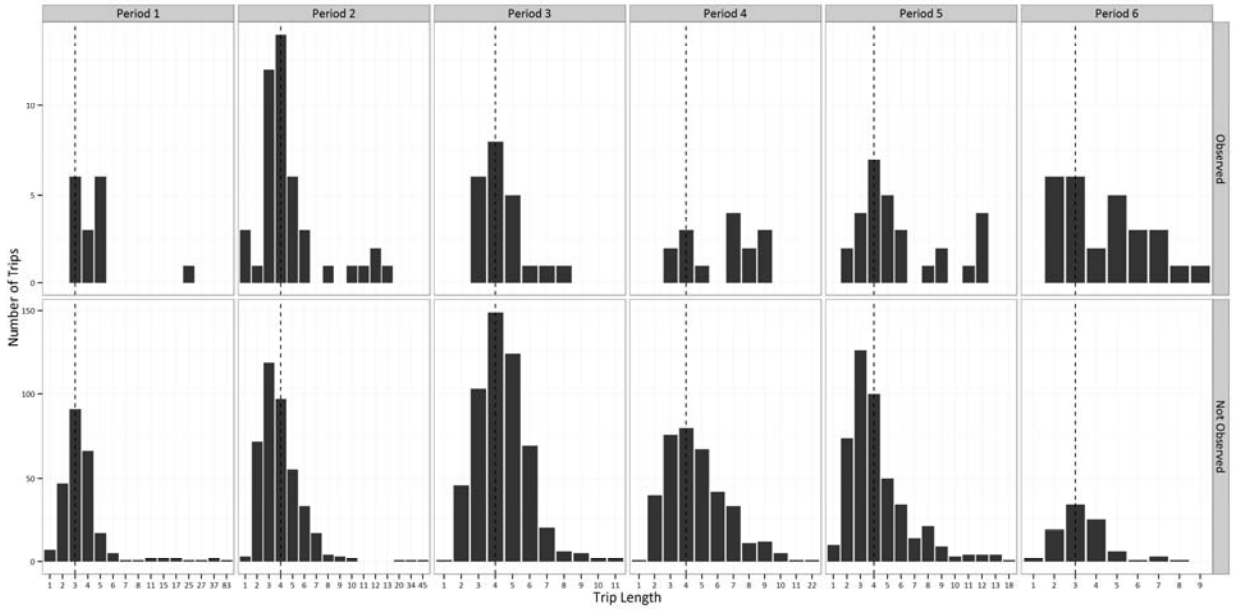


Figure 3-12: Distribution of trip length for vessel selection strata, in number of days, for the observed and not observed trips. The median trip length for trips without observers is indicated in each time strata by the dashed line. Note that empty trip length intervals are not included.

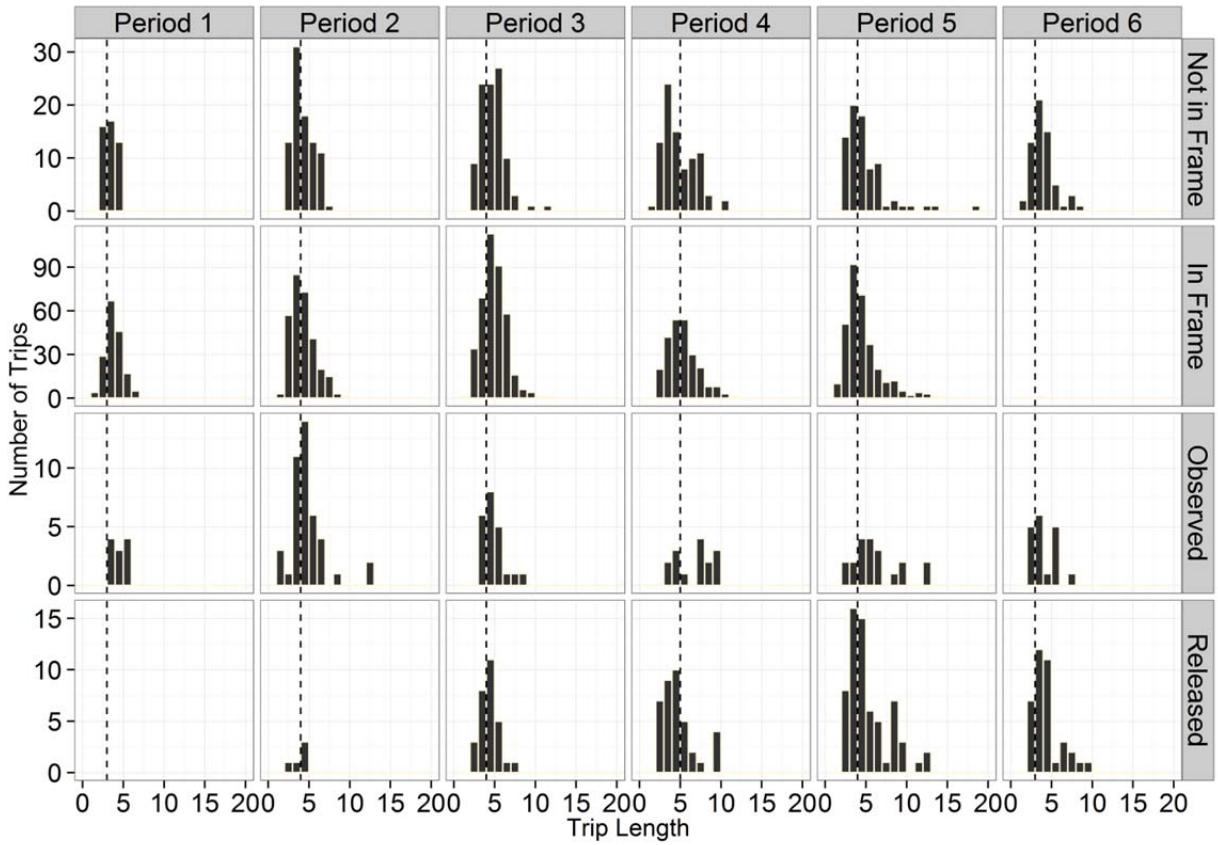


Figure 3-13: Distribution of trip length for trips in the vessel selection strata for observed trips and three groups of trips without observers: vessels not included in the sample frame, vessels released from coverage, and vessels that were not selected for coverage. The dashed line references the median trip duration for vessels in the frame that were not grated a release (In Frame group).

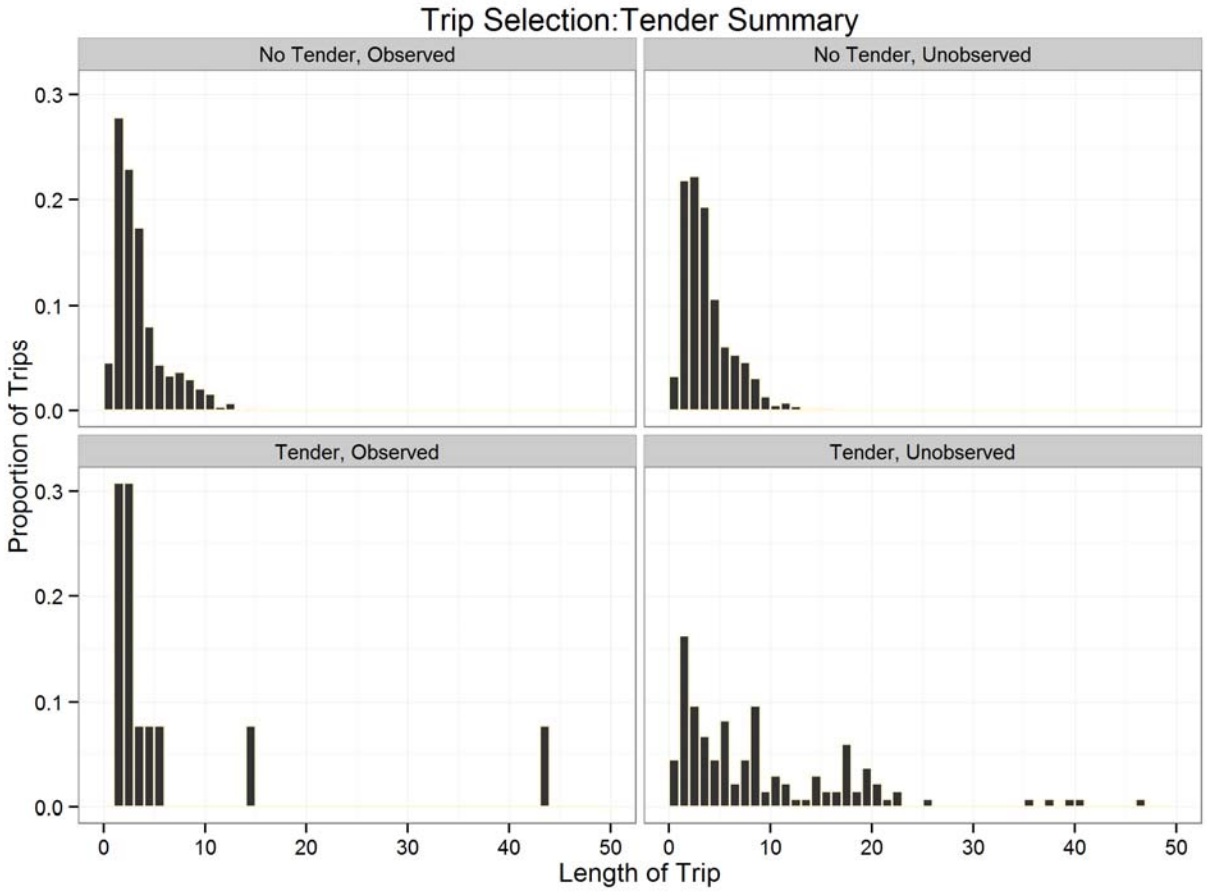


Figure 3-14: Distribution of trip length for vessels in the trip selection strata delivering their catch at-sea to tenders.

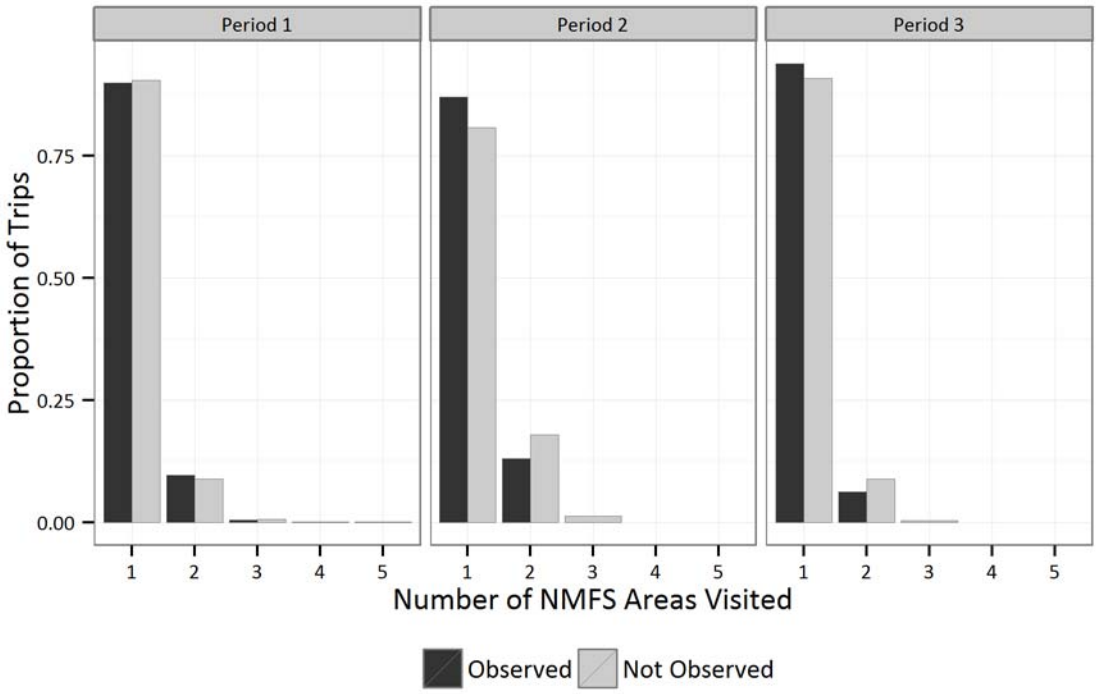


Figure 3-15: Number of NMFS Reporting Areas that are visited per trip in trip selection strata. Proportions are within the observed and unobserved categories (e.g. proportion of observed trips that visit one NMFS Area).

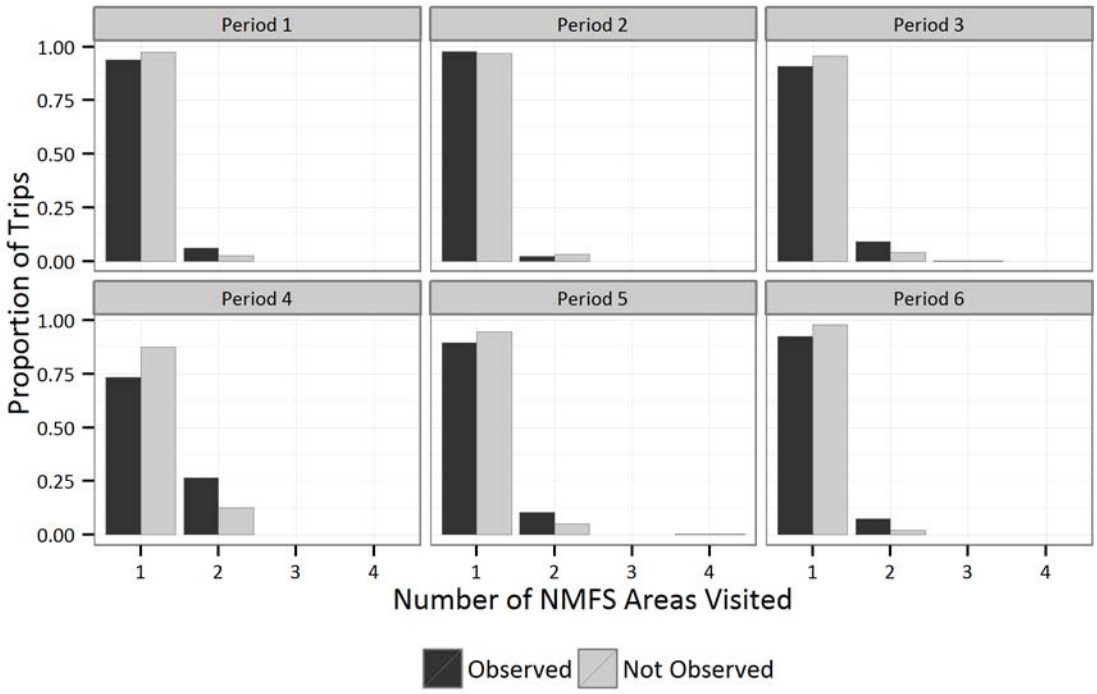


Figure 3-16: Number of NMFS Reporting Areas that are visited per trip in vessel selection strata. Proportions are within the observed and unobserved categories (e.g., proportion of observed trips that visit one NMFS Area).

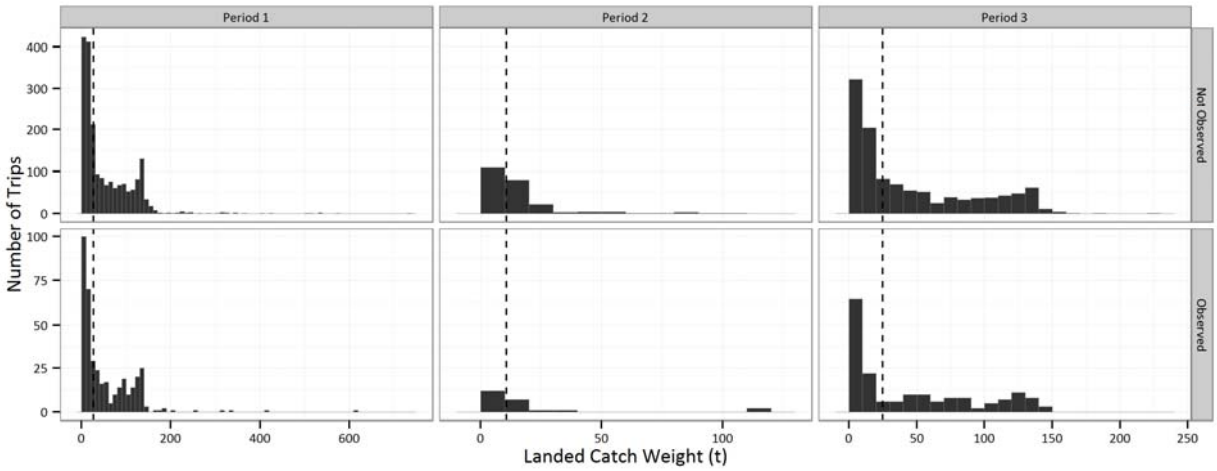


Figure 3-17: Distribution of landed catch for trips in the trip selection strata.

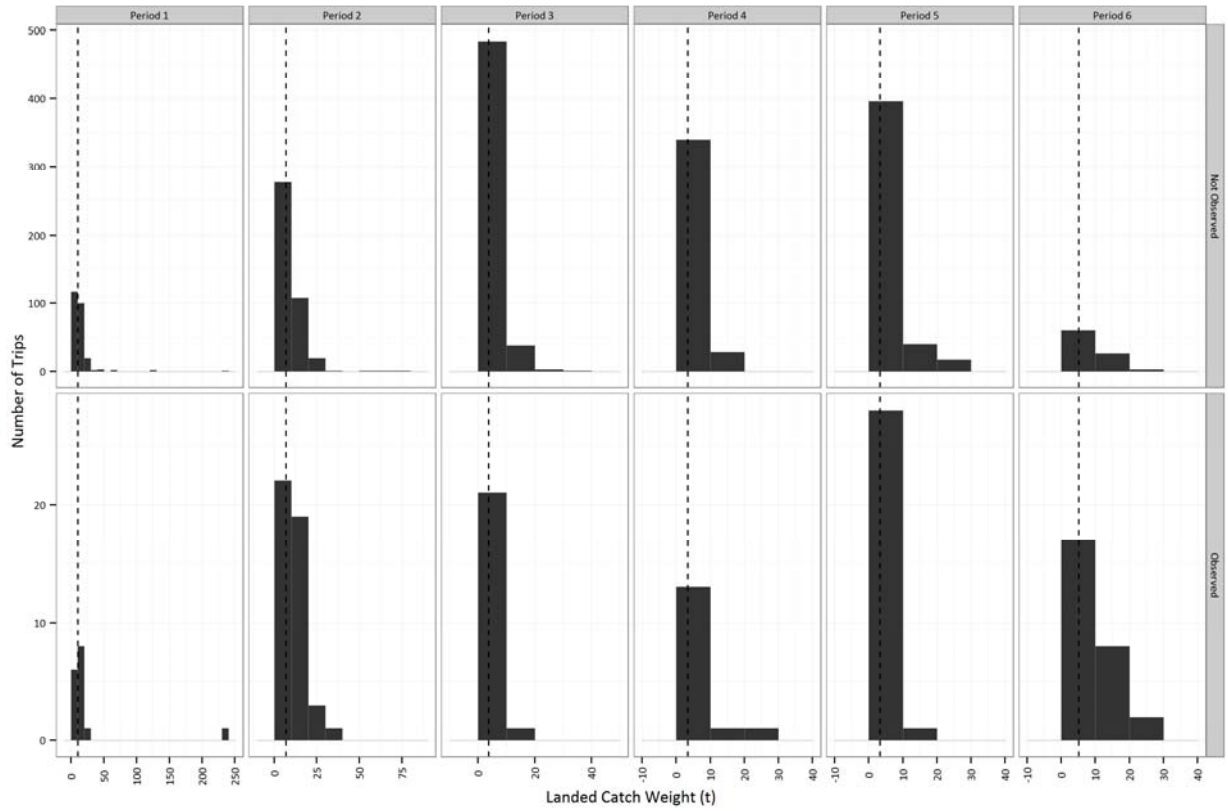


Figure 3-18: Distribution of landed catch for trips in the vessel selection strata.

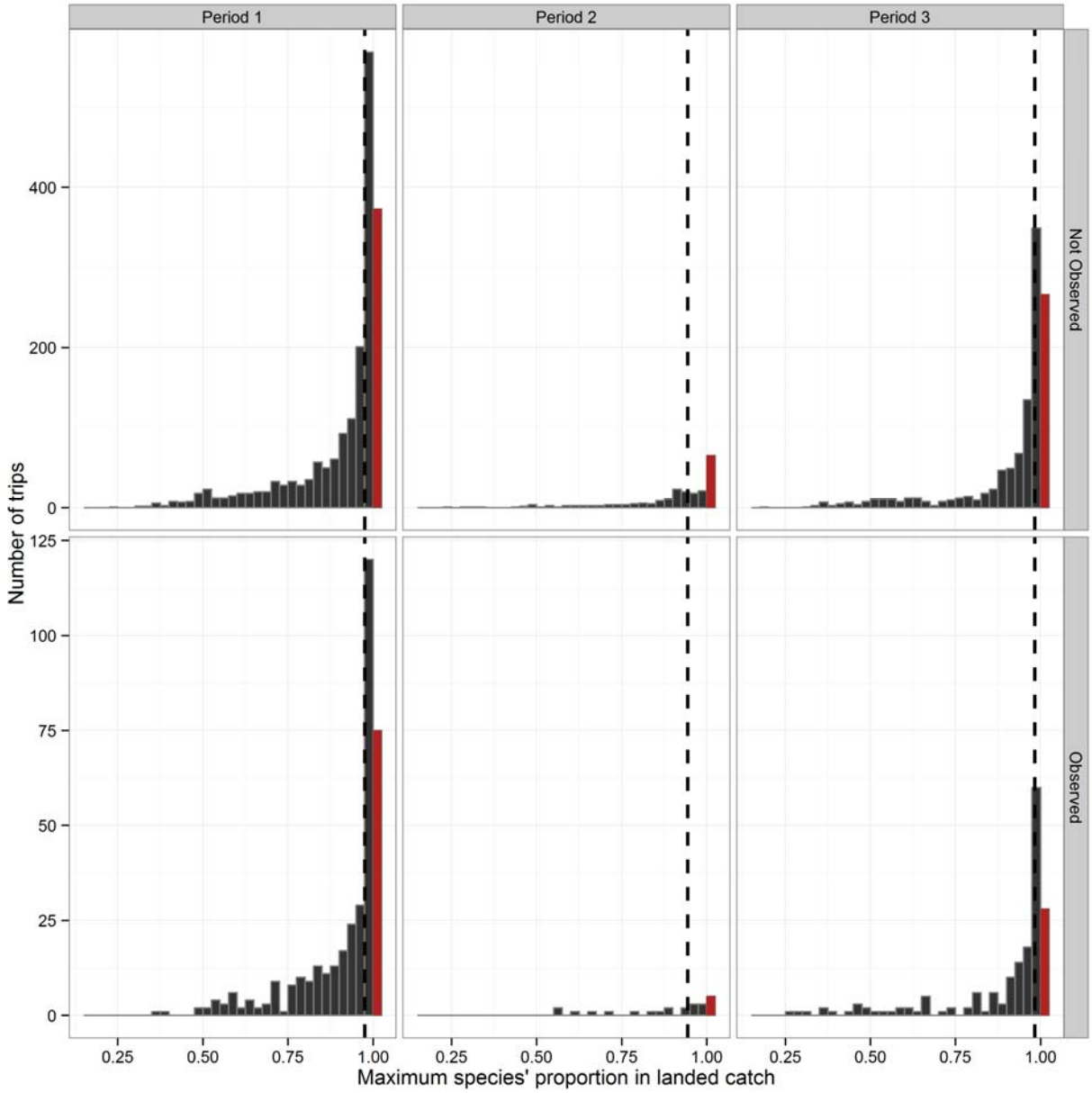


Figure 3-19: Distribution of the proportion of the total landed catch accounted for by the most abundant species landed in the trip selection strata. Vertical dotted lined depict the median value from unobserved trips.

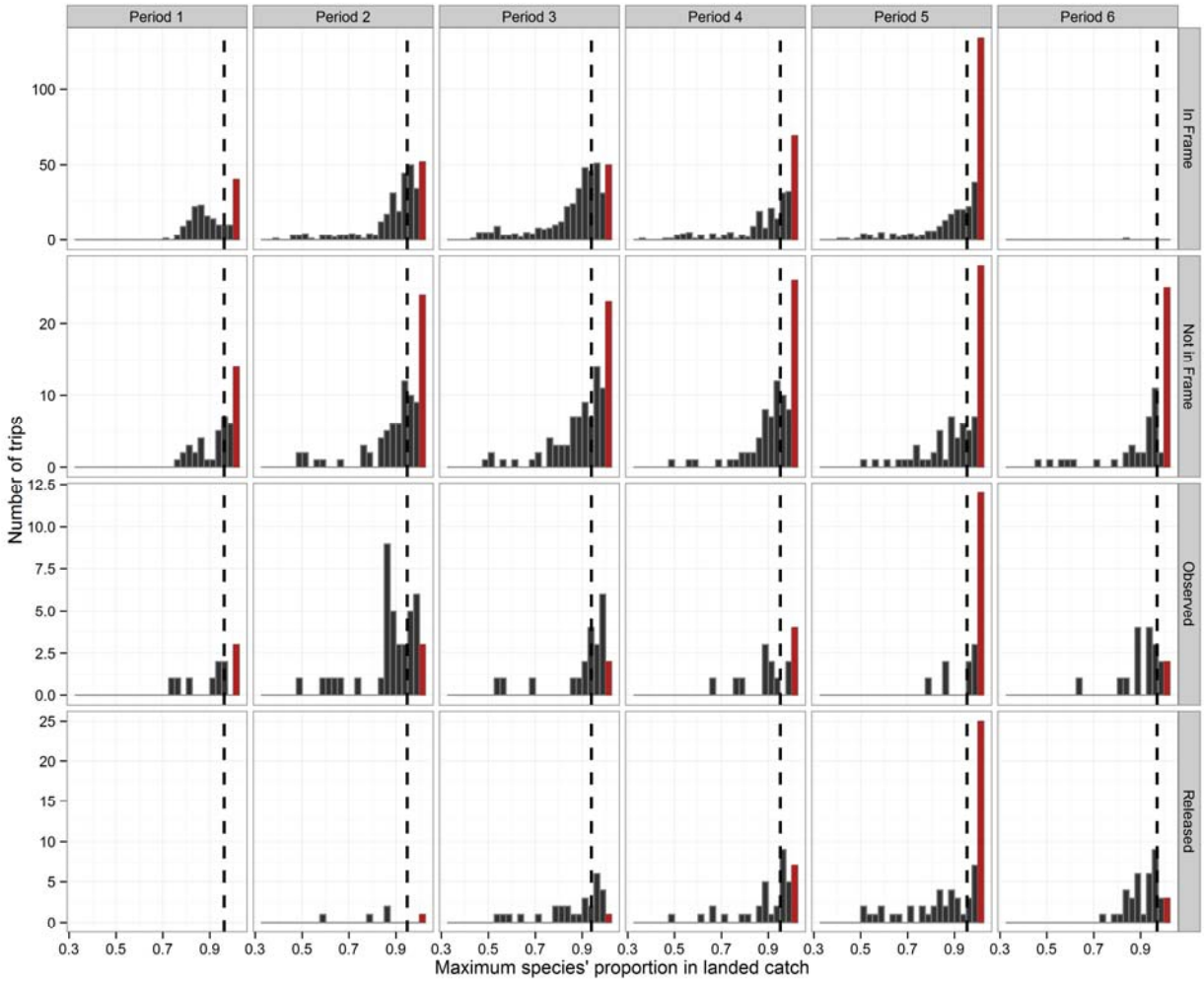


Figure 3-20: Distribution of the proportion of the total landed catch accounted for by the most abundant species landed in the vessel selection strata. Vertical dotted lined depict the median value from unobserved trips.

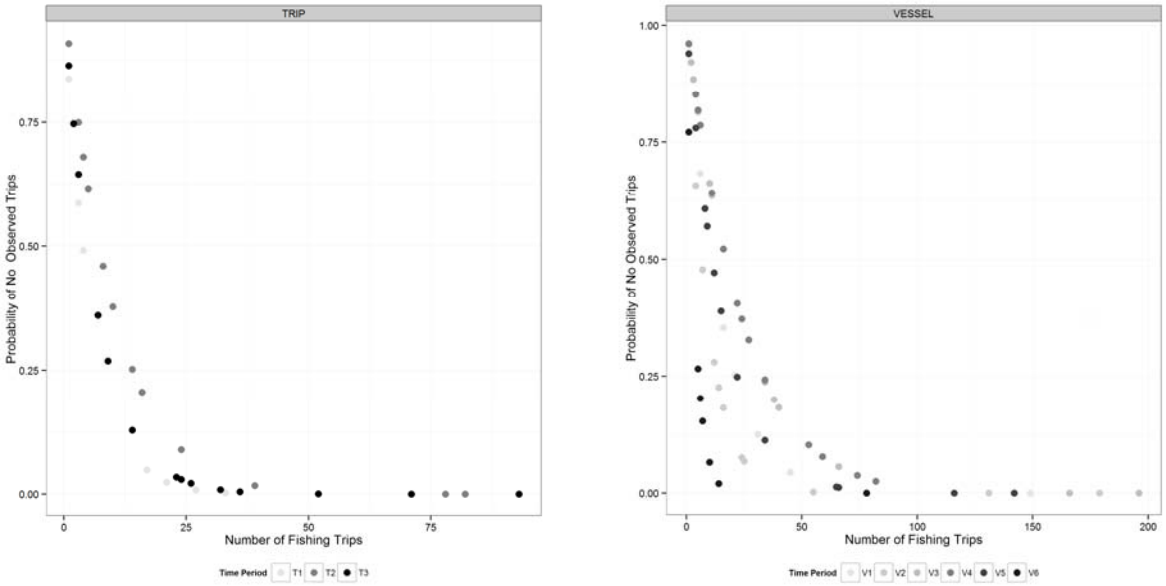
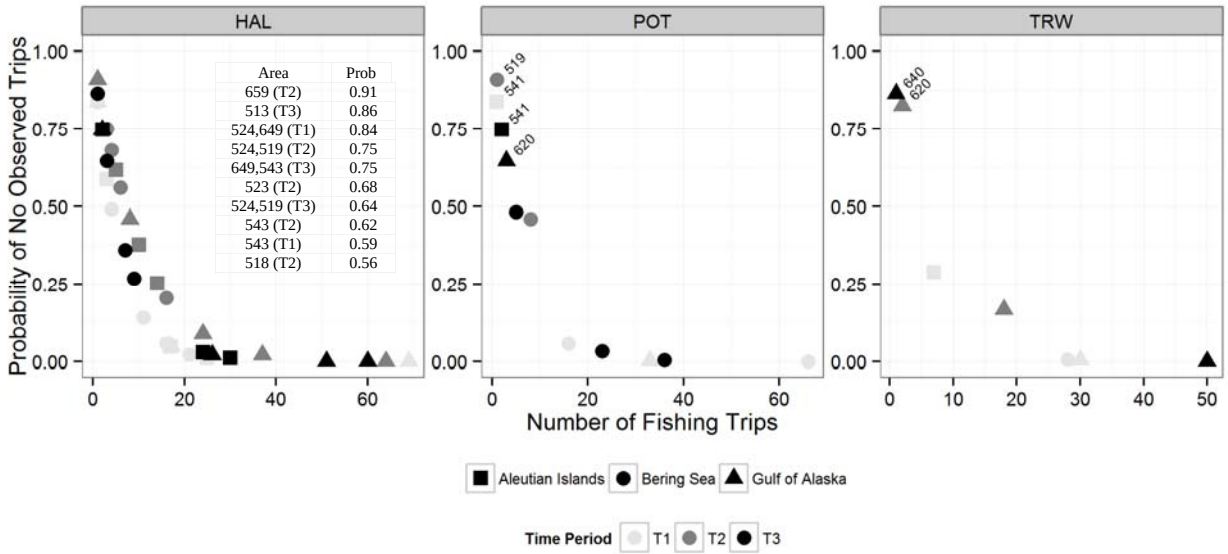


Figure 3-21: Probability of selecting a sample and observing no trips as a function of the number of trips that occurred in a NMFS Area, time period, and stratum (trip selection, left panel; vessel selection, right panel) cell. Each datum represents a NMFS Area and time period total. X-axis has been truncated to increase resolution at smaller numbers of fishing trips; none of the omitted probabilities were greater than 0 (rounded to 5 figures right of decimal).



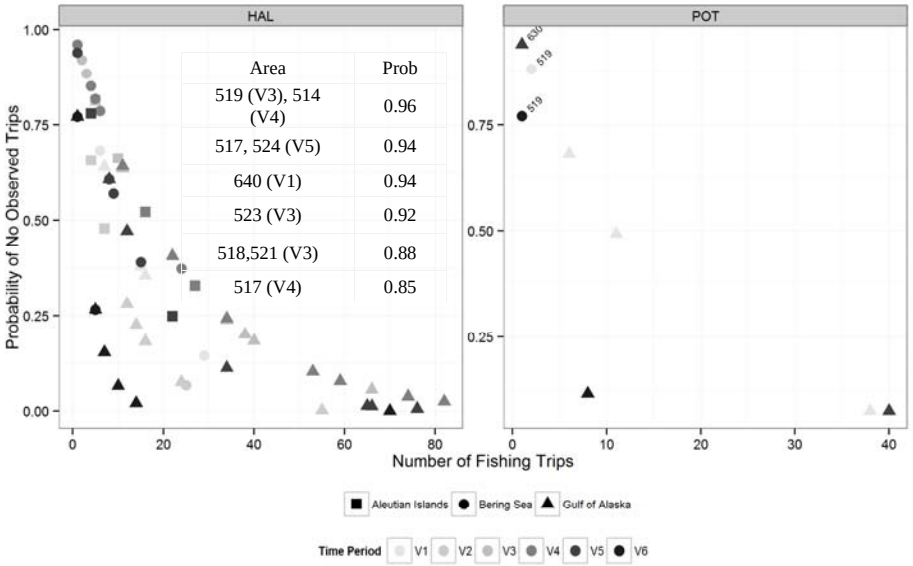


Figure 3-22: Probability of selecting a sample and observing no trips as a function of the number of trips that occurred in a NMFS Area, gear type, time period, and stratum (trip selection, top panels; vessel selection, lower panels) cell. Each datum represents a NMFS Area and time period total for each gear type. X-axis has been truncated to increase resolution at smaller numbers of fishing trips; none of the omitted probabilities were greater than 0 (rounded to 5 figures right of decimal). Numbers indicate NMFS Reporting Area for selected observations; summarized table for hook and line gear.

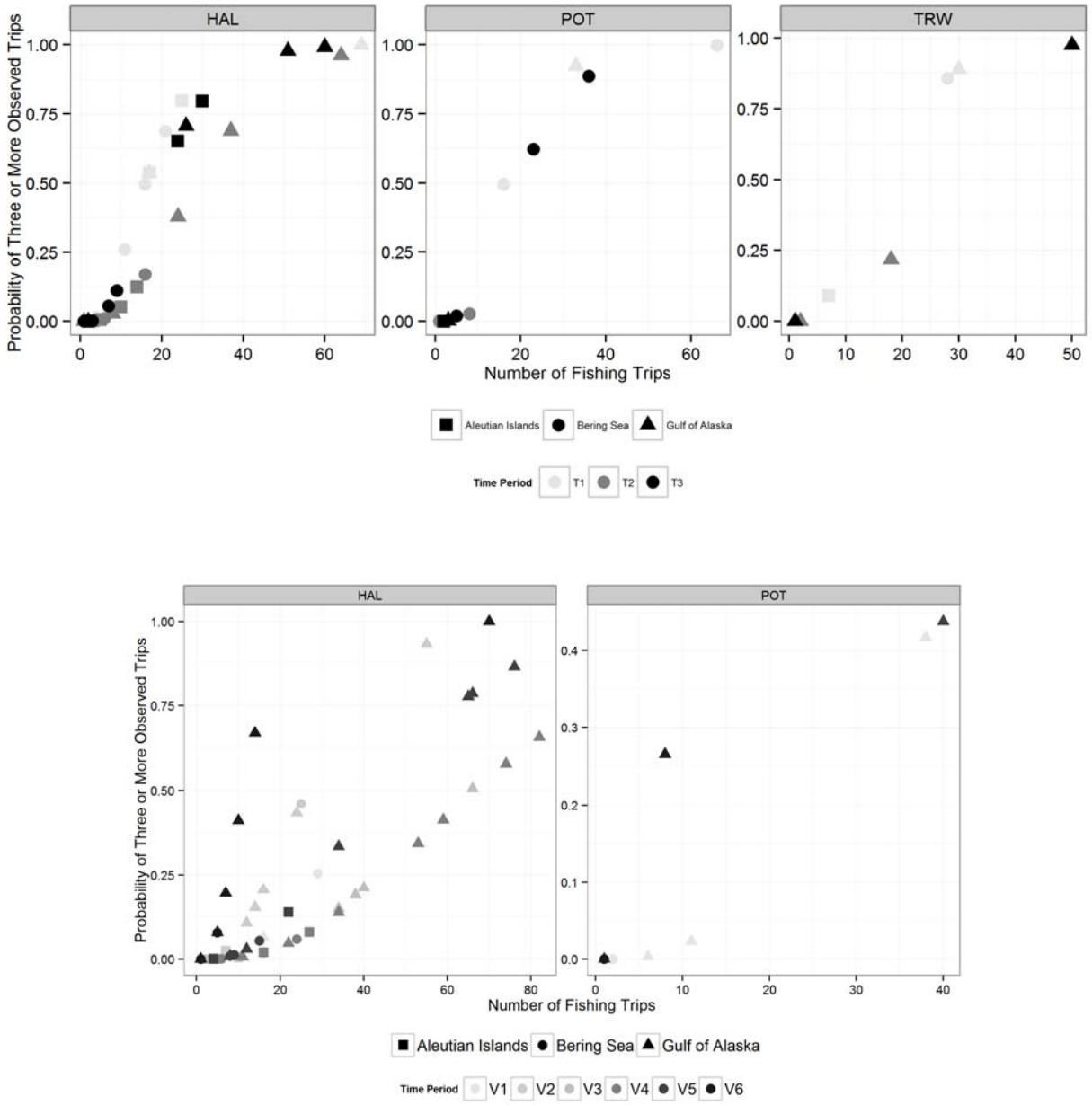


Figure 3-23. Probability of selecting a sample and observing 3 or more trips as a function of the number of trips that occurred in a NMFS Area, gear type, time period, and stratum (trip selection, top panels; vessel selection, lower panels) cell. Each datum represents a NMFS Area and time period total for each gear type. X-axis has been truncated to increase resolution at smaller numbers of fishing trips). Numbers indicate NMFS Reporting Area for selected observations; summarized table for hook and line gear.

4 DESCRIPTIVE INFORMATION

This chapter describes information that has been requested on to the restructured Observer Program that is not specifically related to the annual performance review of the sampling design for observer deployment.

4.1 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 2013 and 2012 (Table 4-1 through Table 4-10) 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.

Harvest information, or retained catch, was collected from eLandings landing reports (fish tickets) and production reports. Discard information was estimated using bycatch rates derived from haul-specific at-sea observer information. The rates were then applied to landings on a landings specific basis. Catch estimation methods are described in detail in Cahalan et al. 2010. The table rows titled "Observed" indicates catch that occurred on trips[13] 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,[14] is presented in round weight metric tons. If species were landed in a condition other than round weight then standard product recovery rates (PRRs[15]) 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 information in the Gulf of Alaska (GOA) presented in Table 4-3 was derived from Table 4-1 in that the same information is broken by species. Species groupings can be found in Appendix A. The same is true for tables Table 4-4 and Table 4-5 in that they provide more detail of the Bering Sea/Aleutian Islands (BSAI) information that is summarized in Table 4-2. This same pattern of summary tables for the GOA and BSAI (Table 4-6 and Table 4-7) and details by species (Table 4-8, Table 4-9, and Table 4-10) is repeated for 2012. 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 species across all fisheries using a particular gear type.

[13] Trips for catcher processors are defined as a week (Sunday-Saturday). Trips for catcher vessels are defined as the time period between when a vessel started fishing and all fish were offloaded (including split deliveries).
[14] 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.
[15] Standard PRRs are published in Federal regulations and available at http://alaskafisheries.noaa.gov/rr/tables/tabl3.pdf

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 morality 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 2014a). 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 2014b) and in its assessment and management of the halibut stock, IPHC uses a DMR of 0.16 for halibut fishery discards.

Currently, NMFS uses the average weights of both retained and discarded fish to estimate discard of halibut in the halibut IFQ fishery. Since there is a minimum size limit of 32 inches (approximately 15 lb) the average weight derived from both retained and discarded fish is likely higher on average than what would be calculated for just discarded fish. NMFS is evaluating the methodology for estimating halibut discards in the halibut fishery and will provide more in-depth review in the 2014 Annual Report.

Table 4-1. Total catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *Gulf of Alaska in 2013*. 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**
	Observed	3,770	939			24,976	8,534				
Catcher/Processor	Total	3,916	953			24,976	8,534				
	Observed	2,966	1,417			5,807	666	335	11	12,996	76
Catcher Vessel	Total	30,129	21,267	522		43,968	6,168	16,968	460	83,226	505
Catcher Vessel:	Observed					8,129	612			2,044	19
Rockfish Program	Total					8,423	650			2,044	19

Table 4-2. Total Catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *Bering Sea / Aleutian Islands (BSAI) in 2013*.

	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	131,540	27,588			374,988	33,719	6,793	381	579,526	3,518
	Total	133,671	27,971			375,027	33,722	6,793	381	579,633	3,518
Mothership	Observed					23,599	1,867			111,181	654
	Total					23,599	1,867			111,230	654
Catcher Vessel	Observed	290	204			29,285	2,032	764	15	543,883	394
	Total	3,904	1,443	40		38,016	2,704	23,848	515	553,028	399

Table 4-3. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in the *Gulf of Alaska in 2013*. See Appendix A for species grouping definitions.

			Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
Sector	**Species Caught**	**Trip Disposition**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**	**Retained**	**Discard**
Catcher/ Processor	Deepwater Flatfish	Observed	16	47			8,837	3,400				
		Total	17	49			8,837	3,400				
	Halibut	Observed		308				547				
		Total		309				547				
	Other groundfish	Observed	38	337			1,031	889				
		Total	39	345			1,031	889				
	Pacific cod	Observed	3,110	98			1,068	760				
		Total	3,128	99			1,068	760				
	Pollock	Observed	4	6			1,156	1,335				
		Total	4	6			1,156	1,335				
	Rockfish	Observed	65	129			11,271	1,522				
		Total	79	129			11,271	1,522				
	Sablefish	Observed	536	11			393	47				
		Total	649	11			393	47				
	Shallow-water flats	Observed		4			1,219	34				
		Total		4			1,219	34				
Catcher Vessel	Deepwater Flatfish	Observed	<1	31			2,698	429		<1	75	1
		Total	1	417			12,946	1,972	<1	1	546	29
	Halibut	Observed	677	746				186		1		19
		Total	10,947	11,613	1			1,262		89		30
	Other groundfish	Observed	50	370			259	210	5	8	34	6
		Total	550	5,825	<1		1,528	1,071	207	244	309	36
	Pacific cod	Observed	960	118			1,992	159	329	1	113	<1
		Total	7,712	1,899	476		17,576	1,524	16,749	109	740	3
	Pollock	Observed	15	3			1,137	164	<1	<1	12,906	60
		Total	90	34	17		8,556	602	12	8	81,471	359
	Rockfish	Observed	78	90			6,898	115		<1	1,913	10
		Total	957	898	27		7,394	209	<1	8	2,129	64
	Sablefish	Observed	1,187	56			344	<1		<1	<1	<1
		Total	9,871	566			404	<1		<1	1	<1
	Shallow-water flats	Observed	<1	2			609	16		<1	<1	<1
		Total	<1	16	<1		3,987	179	<1	2	73	2

Table 4-4. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught by *catcher/processors in the BSAI in 2013.* See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher/ Processor	Atka Mackerel	Observed	2	23			20,750	658	<1	<1	1	<1
		Total	2	23			20,750	658	<1	<1	1	<1
	Flatfish	Observed	4	1,818			224,539	14,507	<1	295	6,351	2,281
		Total	4	1,854			224,562	14,508	<1	295	6,351	2,281
	Halibut	Observed	36	5,617				3,036		10		217
		Total	36	5,704				3,036		10		217
	Other groundfish	Observed	6	1,149			60	3,894	3	46	89	78
		Total	6	1,159			60	3,895	3	46	89	78
	Pacific cod	Observed	120,207	3,068			38,587	1,216	6,789	26	4,971	4
		Total	122,032	3,090			38,592	1,216	6,789	26	4,972	4
	Pollock	Observed	4,446	608			34,623	3,375	1	4	566,988	36
		Total	4,500	612			34,623	3,375	1	4	567,093	36
	Rockfish	Observed	104	172			31,066	722	<1	<1	265	60
		Total	129	175			31,066	722	<1	<1	265	60
	Sablefish	Observed	318	15			187	2			<1	
		Total	481	15			187	2			<1	
	Turbot	Observed	728	636			24,010	3,379	<1	1	270	121
		Total	751	652			24,010	3,379	<1	1	270	121
	Skates	Observed	5,687	14,441			1,176	2,925			592	705
		Total	5,730	14,645			1,176	2,927			592	705
	Sharks	Observed	<1	41			<1	5			1	15
		Total	<1	41			<1	5			1	15

Table 4-5. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught by *catcher vessels in the BSAI in 2013*. See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher Vessel	Atka Mackerel	Observed		0			<1	1		<1	60	9
		Total		0			<1	2	<1	3	60	9
	Flatfish	Observed		1			8	262	<1	<1	1,067	8
		Total		15			10	382	<1	6	1,101	8
	Halibut	Observed	233	78				318		1		26
		Total	2,256	513	25			416		17		27
	Other groundfish	Observed		3			2	158	0	10	111	1
		Total	<1	49			2	217	40	376	113	1
	Pacific cod	Observed	13	26			27,953	173	760	4	2,354	1
		Total	1,039	361	15		36,423	240	23,369	73	2,392	1
	Pollock	Observed		0			1,320	805		<1	539,680	221
		Total	<1	0			1,578	1,033	1	1	548,741	224
	Rockfish	Observed	3	15			<1	10		<1	224	48
		Total	38	78			<1	15	<1	6	225	48
	Sablefish	Observed	42	2				0	4	<1	<1	
		Total	569	14				0	438	1	<1	
	Turbot	Observed		20			2	159		<1	206	<1
		Total	<1	96			2	209	<1	31	211	<1
	Skates	Observed		58			1	145			179	61
		Total	1	297			1	189			185	62
	Sharks	Observed		1			<1	<1			1	19
		Total		19			<1	<1		<1	1	19

Table 4-6. Total Catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *Gulf of Alaska in 2012*.

Sector	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
		Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher/Processor	Observed	4,240	578			23,664	4,475			1,450	9
	Total	5,551	913	37	<1	25,481	5,812	24	<1	1,450	9
Catcher Vessel	Observed	1,356	150			9,180	1,071	577	16	25,729	201
	Total	21,634	3,302	712	<1	34,331	7,170	21,467	626	96,560	670
Catcher Vessel: Rockfish Program	Observed					8,941	460			2,703	11
	Total					9,241	463			2,740	11

Table 4-7. Total Catch of groundfish and halibut (in metric tons) caught in the groundfish and halibut fisheries in the *BSAI in 2012*.

Sector	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
		Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher/Processor	Observed	117,150	23,818			369,132	26,141	3,688	37	555,360	5,931
	Total	141,983	26,143	26	1	370,098	26,190	5,373	55	555,360	5,931
Mothership	Observed					21,648	2,031			106,193	1,122
	Total					21,648	2,031			106,193	1,122
Catcher Vessel	Observed	34	9			22,699	2,092	656	13	522,573	718
	Total	1,386	129	60		36,750	3,728	23,844	308	533,810	727

Table 4-8. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in the *Gulf of Alaska in 2012*.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher Processor	Deepwater Flatfish	Observed	27	15			8,206	1,519				
		Total	27	18		<1	9,268	2,565				
	Halibut	Observed	NA[16]	249				504				
		Total	NA	444				565		<1		
	Other groundfish	Observed	104	195			895	754				2
		Total	119	332		<1	1,034	796				2
	Pacific cod	Observed	3,413	25			1,040	103				
		Total	4,557	25	36		1,216	133	24			
	Pollock	Observed	31	6			891	357			54	<1
		Total	31	6	1		1,063	514			54	<1
	Rockfish	Observed	95	78			12,108	1,168			1,395	7
		Total	117	78			12,132	1,169			1,395	7
	Sablefish	Observed	570	9			378	52				
		Total	700	9			383	52				
	Shallow-water flats	Observed		2			147	18				
		Total		2			384	18				
Catcher Vessel	Deepwater Flatfish	Observed		14			2,659	536		<1	196	8
		Total	1	198	<1		9,444	2,863	<1	3	1,036	17
	Halibut	Observed		18				457		9		11
		Total		1,272				1,978		248		14
	Other groundfish	Observed	14	55			455	213	10	5	7	20
		Total	833	1,090	<1		1,464	795	275	299	36	55
	Pacific cod	Observed	150	5			3,916	61	567	1	124	1
		Total	9,711	182	687		17,298	553	21,184	54	981	2
	Pollock	Observed	7	1			1,982	112	<1	<1	25,407	137
		Total	105	21	9		3,903	1,019	8	10	94,218	393
	Rockfish	Observed	54	25			7,266	98		<1	2,686	35
		Total	878	296	16	<1	7,707	206	<1	11	2,964	200
	Sablefish	Observed	1,131	33			369	6		<1	11	
		Total	10,107	238			401	12		<1	13	<1
	Shallow-water flats	Observed		0			1,473	48		<1	2	
		Total	<1	5	<1		3,356	207	<1	1	51	

[16] Retained catch of halibut was not available in the NMFS catch accounting system prior to 2013.

Table 4-9. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught by *catcher/processors in the BSAI in 2012*.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher Processor	Atka Mackerel	Observed	12	10			42,127	1,063			1	<1
		Total	12	11			42,127	1,063		<1	1	<1
	Flatfish	Observed	8	1,362			219,944	10,774		9	5,295	3,638
		Total	10	1,407			220,061	10,783		14	5,295	3,638
	Halibut	Observed	NA	5,183				2,821		5		226
		Total	NA	6,128				2,848		11		226
	Other groundfish	Observed	<1	1,473			99	3,509	2	19	130	88
		Total	<1	1,511	<1	1	99	3,514	2	27	130	88
	Pacific cod	Observed	106,461	1,721			31,775	665	3,686	3	4,926	15
		Total	129,256	1,792	25		32,548	665	5,370	3	4,926	15
	Pollock	Observed	3,739	427			20,190	1,565	<1	<1	544,108	907
		Total	4,336	503	<1	<1	20,266	1,565	1	<1	544,108	907
	Rockfish	Observed	124	59			24,109	958		<1	242	189
		Total	175	73	<1	<1	24,109	959		<1	242	189
	Sablefish	Observed	214	7			237	2				
		Total	471	7			237	2				
	Turbot	Observed	2,372	970			29,799	2,007		<1	130	109
		Total	2,644	1,102	<1		29,800	2,010		<1	130	109
	Skates	Observed	4,220	12,584			851	2,767			527	736
		Total	5,078	13,579			851	2,771		<1	527	736
	Sharks	Observed	<1	22				10			1	23
		Total	<1	30				10			1	23

Table 4-10. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught by *catcher vessels in the BSAI in 2012*.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher Vessel	Atka Mackerel	Observed					5	11		<1	224	39
		Total					5	28	2	6	225	39
	Flatfish	Observed		1			13	573	<1	1	2,447	1
		Total		6			35	1,003	1	18	2,506	1
	Halibut	Observed	NA					270		2		171
		Total	NA	12				498		45		177
	Other groundfish	Observed					2	160	1	5	440	18
		Total	1				5	301	22	165	490	18
	Pacific cod	Observed					21,888	70	606	<1	4,431	9
		Total	615	3	60		35,275	95	23,316	37	4,538	9
	Pollock	Observed					790	818	<1	<1	513,999	210
		Total					1,425	1,455	1	2	524,973	211
	Rockfish	Observed	6	1			<1	12		<1	309	88
		Total	55	5	<1		<1	21	<1	2	314	88
	Sablefish	Observed	28	1					49	1	<1	
		Total	713	6					500	9	<1	
	Turbot	Observed		4			1	93	0	4	379	<1
		Total	<1	47			3	184	1	23	405	<1
	Skates	Observed		2			1	83			342	159
		Total	1	51			2	144		<1	355	159
	Sharks	Observed								<1	2	23
		Total								<1	2	24

4.2 Observer Availability

For the 2013 fishing year, 467 observers were trained, briefed, and equipped for deployment to vessels and processing facilities operating in the Bering Sea and Gulf of Alaska groundfish fisheries. These observers collected data on board 367 fixed gear and trawl vessels and at 14 processing facilities.

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 171 new observers to deploy in 2013 (Table 1).

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. Prior to subsequent deployments, all observers must attend a 1-day, 2-day, or 4-day briefing; the length of the briefing each observer attends is dependent on that individual's needs.

After each deployment, observers meet with an FMA staff member for debriefing where their sampling and data recording methods are reviewed and the data is finalized. There were 97 debriefings in Anchorage completed by 3 FMA staff and 572 debriefings in Seattle completed by 15 FMA staff. Many observers deploy multiple times throughout the year and debrief after each contract, followed by a briefing for redeployment. Since observers are required to attend more than one briefing annually, the total number of trainings/briefings exceeds the total number of observers. Thus, the total number of briefings and debriefings for 2013 do not represent a count of individual observers.

With some exceptions, observers for the partial coverage category were available to deploy on vessels in the trip and vessel selection pools. In the trip selection pool, 29 trips out of the 586 trips that were observed were released from coverage because an observer was not available (Table 3-7). These trips were properly logged in ODDS by the vessel; however the observer provider was unable to deploy an observer and therefore coordinated with NMFS to release the trip from observer coverage. The majority of these released trips occurred right at the start of 2013. For the remainder of the year the observer provider was able to successfully deploy observers on selected trips, often in remote port locations.

Table 4-11. Number of observer training classes and number of observers trained/briefed from November 27, 2012 through November 21, 2013[17].

Training Classes	Number of Classes	Number of Observers Trained/Briefed
3 week training	8	171
4-day briefing	19	261
4-day partial coverage briefing	7	50
2-day briefing	14	15
1-day briefing	56	323
TOTAL		**820**

4.2.1 Lead Level 2 Observers

At the February 2014 Council meeting in Seattle, several observer provider companies sent a letter to the Council raising concerns about the availability of lead level 2 observers for the freezer longline fleet. This issue is relevant to the 2013 report because many freezer longline vessels moved into 100 percent coverage, concurrent with another rulemaking which outlined their catch monitoring options. Currently, longline catcher/processors that engage in directed fisheries for Pacific cod in the BSAI are required to choose between two monitoring measures: a flow scale and one observer or two observers. If the vessel owner selects the flow scale option, 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. A lead level 2 observer on a vessel using non-trawl gear must have completed two observer cruises (contracts) of at least 10 days each and sampled at least 30 sets on a vessel using non-trawl gear. There are currently 28 longline catcher/processors with flow scales that require a lead level 2 observer.

The lead level two requirements were met in 2013, though the certified observer provider companies advise that observer availability will be an issue in the future. To inform this issue, NMFS queried the observer database to assess how many observers in the trained workforce had the requisite experience to serve as a lead level 2 observer on longline catcher/processors. We looked at the number of observers who have debriefed within the last 18 months as that indicates they have been recently active in the workforce. The results are summarized in Table 4-12. Please note that NMFS has no information on the availability of these observers to return to work in the North Pacific.

Table 4-12. Number of lead level 2 observers available as of January 2014.

Lead Level 2 observers in Full Coverage	210
Lead Level 2 observers in Partial Coverage	13
OVERALL Number of Lead Level 2 observers:	213

[17] The dates were selected based on observers being trained in November and 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 2013 fishing year.

4.3 Conditional Release Disposition

Chapter 3 evaluates the conditional release policy and the impact on the sampling plan. The analysis, however, did not include details about why conditional releases were granted since removing a vessel from the sampling frame occurs regardless of the reason. This section provides more information on the disposition of conditional releases that were granted in 2013.

In its October, 2012, motion the Council expressed its intention that crew members should not be displaced by the requirement to have an observer on board. In the halibut and sablefish IFQ fishery, vessels sometimes have the opportunity to take additional IFQ permit holders (sometimes called "IFQ clients") on board who are above and beyond the number of crew normally associated with the vessel. The Council's intention was that IFQ clients would also be considered crew. In accordance with this policy, NMFS granted releases for situations when all bunk space on the vessel was filled with crew or IFQ permit holders. NMFS also granted releases from observer coverage to vessels that had sufficient bunk space, but did not have enough life raft capacity to accommodate the observer and all other persons on the boat. For example, a boat might have had 6 bunks and 4 crew members, but had only a 4-person life raft; therefore, although there was bunk space for the observer, the life raft capacity was insufficient.

Table 4-13 shows the types of conditional releases that were granted for each 2-month period in 2013 and Figure 4-1 shows the conditional release by vessel size. Note that these totals are higher than the totals reported in Chapter 3 and is likely due to a few conditional releases that were granted but the vessel decided not to fish, whereas the totals in chapter 3 reflects realized fishing.

As described in chapter 3, the combined impact of the conditional releases and poorly defined list of vessels resulted in NMFS having to select a greater number of vessels in each selection to reach anticipated selection goals in the 2013 ADP. The probability that a vessel that fished and was selected for coverage is shown in Table 3-4 line 5 and it increased throughout the year. Of the 105 vessels that were selected and fished (Table 3-3, line 10), there were 8 observed vessels that got selected for multiple periods; 7 were observed for 2 periods and one was observed for 3 periods. Of those 8 vessels, however, 2 of these vessels had some of their trips conditionally released and some trips were observed.

Table 4-13. The number and type of conditional releases by time period in 2013.

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Total
Lack of bunk space - crew	0	2	10	8	11	8	39
Lack of bunk space - IFQ client	0	1	1	3	4	2	11
Lack of life raft space	0	0	2	4	6	1	13

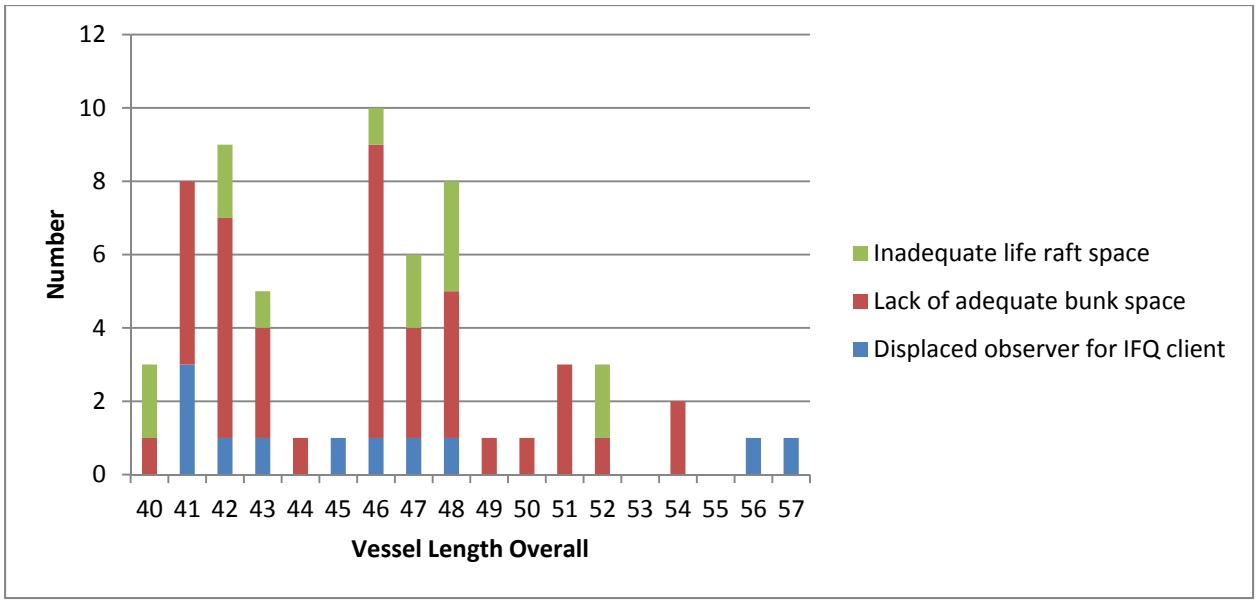


Figure 4-1. Number and type of conditional releases by size (length overall) of the vessel.

5 COMPLIANCE AND ENFORCEMENT

5.1 Observer Program and Enforcement

The Alaska Division (AKD) of the NOAA Office of Law Enforcement (OLE) maintains a close partnership with the North Pacific Groundfish and Halibut Observer Program (Observer Program). The AKD's highest priority is to support resource management by enforcing the laws and regulations that protect observers and their ability to perform assigned duties. Reports of tampering, sample bias, assault, interference, harassment, or coercion are among the highest investigative priorities for OLE.

During 2013, AKD agents and officers engaged with industry and the Observer Program in 731 hours of observer related outreach, education, and compliance assistance. Agents and officers in all AKD field offices responded to industry questions and potential observer related violations and participated in industry outreach and Agency meetings. Outreach and a collaborative agency response resulted in good industry awareness of the restructured Observer Program and an overall high level of compliance.

OLE dedicates a full time contractor to liaison with the Observer Program in Seattle. Duties of the liaison contractor include: receive, organize, and distribute observer compliance statements; provide resources and support to observer victims of crime; develop and edit manuals, reports, and compliance training materials; provide training and liaison with Observer Program staff and observers; and distribute AKD outreach materials to selected vessels in the vessel selection pool. The liaison also provides observer related administrative and investigative support to OLE agents and officers.

OLE also assigns a full-time liaison Special Agent. Duties include, conduct and assist complex observer related investigations, liaison with observer program staff, provide agency analysis on observer related topics, provide OLE portions of observer training, provide program staff updates, attend meetings and outreach to industry, and provide compliance assistance to industry. Observer surveys completed during 2014 briefings indicated a high level of confidence in OLE support.

During 2013, observers were deployed for the first time on vessels 40 to 60 ft in length. These deployments presented a number of logistical and safety challenges as industry and observers adjusted. Common violations reported by observers in this fleet included: failure to carefully release undersized halibut, failure to deploy seabird avoidance gear, failure to maintain safe conditions for the protection of the observer, failure to provide required accommodations, failure to provide reasonable assistance, failure to carry an observer when required, and failure to retain/discard bycatch species as required.

5.2 Compliance Reporting and Enforcement Actions

The Observer Program reports potential regulatory violations detected by program staff members and by observers. During debriefing, Observer Program staff assist observers to identify and report potential violation(s) they witnessed during deployment. Observers report violations in

written statements that are forwarded to the OLE and/or the U.S. Coast Guard (USCG). Each potential violation is categorized by OLE as a potential resource violation or victim crime. Statements alleging potential observer victimization or serious safety violations are reported to OLE immediately. The Observer Program forwards MARPOL and vessel safety statements directly to the USCG (Table 5-1).

Each statement received by the OLE is evaluated to identify all violations. Statements that require no outreach or investigation or those recording no violation are retained as 'information only.' Statements requiring investigation or enforcement response are forwarded to OLE agents and officers. The assigned agent or officer investigates the report and creates a case or closes the incident without action. Table 5-2 records incidents reported and cases created in 2013. Incidents with no associated case indicate no enforcement action. Multiple statements are often combined into a single incident resulting in significantly fewer incidents than number of observer statements forwarded.

OLE responds to many minor violations with outreach to the industry and no is case initiated. Most cases within OLE are handled as civil violations, but some rise to the level of criminal activity. Table 5-3 summarizes the status of criminal investigations initiated from observer reports. In 2013, some significant violation types included: harassment or hostile work environment, failure to maintain safe conditions for observers, failure to provide observer reasonable assistance, failure to notify observer of operations, failure to provide observer access to reports and records, failure to carry an observer when required, failure to accurately weigh catch, interfere with an observer, or bias an observers samples, see also 50CFR§679.7(g).

Table 5-1. Number of reported observer statements and forwarding location in 2013[18].

Forwarding Location	Number
OLE	953
USCG	430
Total	**1383**

[18] All tables reflect numbers of statements received between January 1, 2013 and December 31, 2013.

Table 5-2.[19] Summary of all incident disposition and case prosecution status of observer reported violations in 2013.

Incident Disposition	Prosecution Status	Number
Case Initiated	Dismissed by OLE	2
	Sent to General Counsel	1
	Summary Settlement	12
	Verbal Warning	36
	Written Warning	19
	Transferred to another Region or agency	1
Case Initiated Total		71
Closed - Outreach		44
Closed - Info Only		148
Closed - Lack of Evidence		11
Closed - Lack of Resources		8
Closed - Unfounded		17
Transferred to Another Agency		1
Open - Investigation ongoing		111
Grand Total		411

Table 5-3. 2013 Criminal investigations initiated and prosecution status.

Incident Disposition	Prosecution Status	Number
Criminal Case Initiated	Closed - No Action	1
	Transferred to another Region or agency	1
	Verbal Warning	2
	Written Warning	1
	Open – Investigation ongoing	6
Criminal Cases Initiated Total		11

5.2.1 Observer Coverage Violations

Full Coverage

OLE documented very high compliance with observer coverage requirements in the full coverage category. In addition to required full coverage, most AFA catcher vessels participating in the Bering Sea Pacific Cod trawl fishery elected to carry observers for all fishing trips in the Bering Sea and Aleutian Islands.

[19] Table 5-2 includes all incidents listed in Tables 5-3 through 5-10.

Partial Coverage
To monitor for compliance in the trip selection pool, the Observer Program reviewed ODDS entries, compared logged trips to landing reports, and identified potential failure to log trip violations. The Observer Program reported 82 potential violations for failure to log trip. This resulted in considerable outreach efforts and 8 OLE cases. See Table 5-4 for resulting incidents and enforcement actions. Tender activity, data entry errors, and confusion over the requirement to log trips contributed to the majority of confirmed violations.

OLE also received reports from the Observer Program vessel selection pool vessels fishing without required observer coverage. See Table 5-5 for incidents and enforcement actions issued.

Table 5-4. 2013 Case prosecution status – Failure to log fishing trips in ODDS.

Incident Disposition	Prosecution Status	Total
Case Initiated	Summary Settlement	3
	Verbal Warning	3
	Written Warning	1
Case Initiated Total		7
Closed - Outreach		1
Grand Total		8

Table 5-5. 2013 Case prosecution status – Fish or process fish without carrying an observer as required.

Incident Disposition	Prosecution Status	Total
Case Initiated	Dismissed by OLE	1
	Summary Settlement	6
Case Initiated Total		7
Closed - Unfounded		1
Open - Investigation ongoing		1
Grand Total		9

5.2.2 Observer Reported Resource Violations

Full Coverage
OLE relies on observer data and information to monitor and enforce limited access program catch and bycatch limits - AFA, CDQ, Amendment 80, Rockfish Program, and Bering Sea catcher/processor longline cooperative for Pacific Cod. Regulations for each of these programs contain requirements to weigh catch, provide approved observer sample stations, track and monitor bycatch, and meet electronic monitoring and reporting requirements.

Partial Coverage
Reports of violations from vessels in partial coverage commonly included: observer notification, reasonable assistance, recordkeeping and reporting, prohibited species handling, seabird avoidance, IFQ species retention, and bycatch retention/discard violations.

5.2.3 Observer Safety

Complaints of failure to maintain a vessel lookout (wheel watch) peaked during the first 6 months of 2013. The trend was addressed quickly by collaborative outreach and enforcement efforts by OLE, the Observer Program, and the USCG. The number of reported violations dropped sharply to 2 isolated incidents during the second half of the year. The majority of violations were reported by observers in the partial coverage sector. Other safety concerns frequently involved loose equipment or gear near observer work areas, see Table 5-6.

5.2.4 Observer Victim Crimes

Protecting observers from workplace harassment or assault is the OLE highest priority. OLE agents and officers responded to the following types of observer victim violations:

- Assault or Sexually harass an observer;
- Harass, intimidate or create a hostile work environment for an observer;
- Interfere with or bias observer sampling, prohibit or bar by command, refuse to provide reasonable assistance, or harass with the intent to interfere;
- Tamper with, destroy or discard observer gear, samples, or personal effects; and
- Pressure or coerce observer to perform crew duties.

See Table 5-7 through Table 5-10 for the number of reported incidents and cases created for the above listed violations.

OLE initiated five criminal cases involving assault and sexual harassment in 2013 (included in Table 5-3). One case was transferred to another agency for prosecution and four investigations are ongoing. Two criminal investigations involved an observer subject. OLE training materials include information about workplace harassment and support resources.

Table 5-6. 2013 Case prosecution status – Fail to maintain safe conditions for observer.

Incident Disposition	Prosecution Status	Total
Case Initiated	Summary Settlement	1
	Verbal Warning	11
	Written Warning	3
Case Initiated Total		15
Closed - Outreach		5
Closed - Info Only		6
Closed - Lack of Evidence		1
Closed - Unfounded		3
Transferred to Another Agency		1
Open- Investigation ongoing		6
Grand Total		37

Table 5-7. 2013 case prosecution status – Civil harass, intimidate or create a hostile work environment for an observer.

Incident Disposition	Prosecution Status	Total
Case Initiated	Summary Settlement	1
	Verbal Warning	2
	Written Warning	3
Case Initiated Total		6
Closed - Outreach		3
Closed - Info Only		8
Closed - Lack of Resources		1
Closed - Unfounded		1
Open - Investigation ongoing		10
Grand Total		29

Table 5-8. 2013 Case prosecution status – Interfere with or bias observer sampling, reasonable assistance, interfere with performance of observer duties.

Incident Disposition	Prosecution Status	Total
Case Initiated	Dismissed by OLE	1
	Verbal Warning	3
	Written Warning	2
	Summary Settlement	2
Case Initiated Total		8
Closed - Outreach		5
Closed - Info Only		7
Closed - Lack of Evidence		4
Closed - Unfounded		4
Open - Investigation ongoing		14
Grand Total		42

Table 5-9. 2013 Case prosecution status – Pressure or coerce observer to perform crew duties.

Incident Disposition	Prosecution Status	Total
Case Initiated	Verbal Warning	1
Closed - Info Only		2
Open - Investigation ongoing		3
Grand Total		6

Table 5-10. 2013 Case prosecution status – tamper with, destroy or discard observer gear, samples, records, personal effects.

Incident Disposition	Prosecution Status	Total
Case Initiated	Written Warning	2
	Verbal Warning	1
Case Initiated Total		3
Closed - Outreach		1
Closed - Info Only		3
Closed - Lack of Evidence		1
Open - Investigation ongoing		3
Grand Total		11

5.3 Enforcement Challenges

Changes to the Observer Program impacted every sector of the fishing industry during 2013. Good cooperation between observers and industry helped minimize the impact on fishing operations and ensure quality observer data collection. Areas of overall ongoing challenge include observer notification of vessel operations; observer access to areas, records, and navigational equipment; observer assistance where reasonable for work related requests; and observer harassment and assault. Each of these violation types with intent may carry criminal penalties under the Magnuson Stevens Act. It is a goal of OLE to reduce criminal violations involving observer to zero.

5.3.1 Full Coverage

In the full coverage sector, observers may remain on one vessel for a long time. Failed communication can impact observer duties or contribute to a hostile work environment. Lengthy deployments, in particular, require ongoing observer/crew rapport and communication.

5.3.2 Partial Coverage

Trip Selection

In the trip selection pool, OLE anticipates ongoing challenges including: avoidance of observer coverage and behavior that biases data or coverage rates. The Observer Program will continue to monitor and compare logged trips in ODDS to landing reports and report any potential compliance concerns.

OLE has noted situations where fishing behavior may circumnavigate the intent of the Observer Program. While intentional behavior changes may not violate regulations, OLE monitors these activities for potential violation. Suspicious behaviors noted by OLE include: extended trips involving multiple deliveries to a tender, altered fishing behavior or crew behavior while the observer is present (deployment or sample bias), reordering trips in ODDS, and altering safety equipment or crew size to qualify for a coverage release.

Offload notification violations remain a concern for observers in the Gulf of Alaska pollock fishery. In this fishery, observers have duties to collect prohibited species information during the entire offload. To perform this duty, the operator must accurately notify the observer in advance of the offload in order for the observer to be present at the entire offload.

Vessel Selection

OLE continues to monitor selected vessels subject to coverage or conditional release, including verifying total crew on board and vessel safety equipment on board the vessel. Though incidents of failure to maintain safe vessel conditions (as required by USCG rules) have dropped, this violation type continues to be a priority for the OLE.

All vessels in the vessel selection pool had no prior experience carrying observers. NMFS education and outreach efforts will continue to play a role to help inform and increase compliance rates within this sector.

6 OUTREACH

Outreach activities on the restructured Observer Program began in 2012 with three public hearings during the comment period of the proposed rule, followed by several public outreach meetings prior to and during implementation, with follow-up outreach later in 2013 to obtain feedback on the first years operations. This report focuses specifically on the outreach which was conducted during the 2013 calendar year. The outreach meetings were held in various locations in Washington and Alaska, and via telephone (Table 6-1).

Many agency staff contributed to outreach efforts including: NMFS (Observer Program and Sustainable Fisheries), Office of Law Enforcement, United States Coast Guard, Alaska Department of Fish and Game, International Pacific Halibut Commission, 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 early 2013 outreach efforts continued a series of meetings in late 2012 which were focussed on distributing factual information about the new observer program, answering industry questions, and identifying issues that needed further resolutions. A key product of these interactions with industry was the compilation of a list of frequently asked questions that NMFS has maintained on its website. Table 6-2 provides a list of links with outreach information on the observer program.

During the fall outreach meetings, NMFS staff provided an overview of the first year of the restructured Observer Program, highlighting the successes and challenges identified throughout the year; observer fee calculation and invoicing process; and a discussion of the proposed regulatory changes identified in the Council process. A portion of each meeting was dedicated to responding to questions from participants.

Some successes that were highlighted included: successful deployment of observers on board vessels using a random selection model including some previously unobserved fisheries and areas; implementation of the online user interface, Observer Declare and Deploy System (ODDS); and implementation a the fee collection system to fund the partial coverage observer provider services.

Challenges included start-up logistical issues with obtaining and transporting observers to and from remote ports early in the year; accommodation and space requirements on board small vessels; and potential differences between observed and unobserved trips associated with tender vessel activity in some areas of the Gulf of Alaska. Minor technical issues with ODDS were addressed throughout the year and technical bugs were corrected.

Meeting participants included many representatives from vessels in the vessel selection pool where observer coverage is completely new, as well as representatives from vessels in the trip selection pool, shoreside processors, and vessels in the full coverage sector. Questions answered dealt with a variety of topics including quality of data collected; purpose of the observer data; observer coverage rates; random selection process; halibut careful release regulations; electronic

monitoring; the observer fee and standard price calculation; Observer Program budget, funding, and cost efficiencies; and various topics related to the logistics of having an observer on board, such as how to deal with a seasick observer, space considerations, and how to resolve conflict with an onboard observer. Some people were interested to understand the uses of the information collected by observers and its role in fisheries management. Particular comments were specific to the impacts of observers on small vessels required to carry an observer for the first time. Some concerns were expressed about perceived inequalities in how vessels are selected for coverage in the vessel selection pool.

NMFS plans to continue outreach meetings in a broad range of communities while recognizing that the times and locations need to be spread throughout the year, and logistics may require that some meetings will be conducted via telephone, or other technologies as is appropriate. Due to the logistics of travel, competing meetings and the locations of communities, we envision that outreach meetings will be conducted earlier in the year in the future.

While NMFS conducts formal outreach sessions, it is important to note that the observer providers and the individual observers have the most direct daily contact with the fishing industry. Those day to day interactions are very important to the overall success of the program and it is important to acknowledge their important contribution to the overall effort of providing factual information on the restructured observer program to the industry.

Table 6-1. Outreach activities on the Observer Program in 2013 dates.

Date	Location	Description
Jan 2, 2013	Phone	Aleutians East Borough meeting
Jan 14, 2013	Ketchikan, AK	public outreach meeting
Jan 15, 2013	Sitka, AK	public outreach meeting
Jan 16, 2013	Juneau, AK	public outreach meeting
Jan 16, 2013	Phone & web ex	Demo of ODDS for Kodiak trawl fleet
Jan 23, 2013	Phone & web ex	demo for processors on observer fee payment
May 14, 2013	Seattle, WA	Freezer Longline Association meeting
Nov 20-22, 2013	Seattle, WA	Pacific Marine Expo
Dec 3, 2013	Petersburg, AK	public outreach meeting
Dec 5, 2013	Homer, AK	public outreach meeting
Dec 11, 2013	NPFMC Anchorage, AK	public outreach meeting
Dec 19, 2013	Phone	Aleutians East Borough meeting

Table 6-2. Summary of the outreach information distributed on the Observer Program in 2013.

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%204-27-11.pdf
North Pacific Groundfish Observer Program	handout at meetings; available online	http://www.afsc.noaa.gov/FMA/PDF_DOCS/NPG%20observer%20program%20brochure%20small%204-27-11.pdf
Summary of the restructured North Pacific Groundfish and Halibut Observer Program	handout at meetings; available online	http://www.alaskafisheries.noaa.gov/sustainablefisheries/observers/overview.pdf
Observer Program Frequently Asked Questions	handout at meetings; available online	http://www.alaskafisheries.noaa.gov/sustainablefisheries/observers/faq.htm
Partial coverage contacts	laminated card handed out at meetings	
Observer harassment warning poster	mailed to vessel permit holders; available online	http://www.alaskafisheries.noaa.gov/sustainablefisheries/observers/harassment_warning.pdf
Vessel responsibilities regulation excerpt	mailed to vessel permit holders	
Halibut careful release poster	handout at meetings	
USCG MARPOL sticker	distributed by USCG Dockside Safety Examiners	http://www.uscg.mil/TVNCOE/Documents/policyletters/CVCPolicyLtr2013.pdf

7 NMFS RECOMMENDATIONS

Vessel Selection:

- **NMFS recommends that participants in the vessel selection category be placed in the trip selection category in 2015.** The trip selection process is working well whereas the vessel selection process has several problems that impact data quality. To expand the trip selection category successfully, the current policy of not considering conditional releases for vessels in trip selection might have to be evaluated to account for life raft capacity on some smaller vessels.

  Implementing the recommendation to move vessel selection participants into trip selection would improve several problem areas. First, it would correct the sample frame problem because all vessels making fishing trips would log them in advance, and NMFS can monitor landings to ensure these trips are being logged. Thus, all fishing effort would be included in the sampling frame. Second, the impact on any given operator would be reduced because only single trips would be selected. NMFS has heard testimony at the Council and in public outreach meetings that the 2 month selection period creates a substantial burden on vessel operators, whereas a single trip is considered less of a burden. Third, operators could not avoid coverage by delaying fishing within the year because the coverage requirement for any selected trip is carried over to the next trip if the selected trip is cancelled by the operator. NMFS believes the trip selection approach will be more workable for the fleet, will reduce NMFS workload to manage, and will improve the data quality for NMFS and the Council. NMFS is interested in Council input on this issue. This action would address several key recommendations from the Observer Science Committee (OSC) noted in chapter 3.

- The conditional release policy was applied to vessels that met the criteria of maximum crew or IFQ permit holder on board. This may have resulted in some vessels being subject to observer coverage under certain conditions but not others. If the vessel selection pool continues in 2015 and the releases are continued in the vessel selection pool, then they should apply to all fishing activities during a release period.

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 in 2015. 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.

Selection Rate:

- NMFS does not anticipate recommending coverage rate changes at this time, except that NMFS will scale coverage rates up if there is sufficient funding to do so. Trip selection rates should remain constant throughout the entire year and NMFS should use buffers in the budget to mitigate the risk of the rare event of a cost-overage.

Tenders:

- Analysis of trip length for vessels in the trip selection pool delivering to tenders did not show a systematic difference in trip length between observed and unobserved vessels (see Chapter 3 and Figure 3-14: Distribution of trip length for vessels in the trip selection strata delivering their catch at-sea to tenders.). The distribution of trip length was similar for both observed and unobserved trips, with a few longer trips occurring in both categories. The differences in trip length for the full year of 2013 were less pronounced than the differences noted in the June 2013 preliminary report for the first 16 weeks of 2013. However, the small number of observed trips in 2013 for vessels delivering to tenders may be insufficient to clearly capture any differences in trip length. In addition, NMFS continues to receive anecdotal information that vessel operators are taking longer trips when delivering to tenders to avoid ending a fishing trip, thereby delaying becoming subject to selection for observer coverage. Therefore, NMFS recommends that continued development of alternatives to deploy observers from or on tenders be considered in the context of other actions and priorities for Council and NMFS analysis.

Performance Metrics:

- NMFS envisions that future reporting will expand key performance metrics to improve our understanding of the observer program performance. NMFS has already noted progress on incorporating variances associated with catch estimates, and will continue to report as work progresses.

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.

8 LITERATURE CITED

AFSC (Alaska Fisheries Science Center). 2014 Observer Sampling Manual. Fisheries Monitoring and Analysis Division, North Pacific Groundfish Observer Program. AFSC, 7600 Sand Point Way N.E., Seattle, Washington, 98115.

Benoit, H. P., and J. Allard. 2009. Can the data from at-sea observer surveys be used to make general inferences about catch composition and discards? Canadian Journal of Fisheries and Aquatic Sciences, 66: 2025-2039.

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

Cahalan, J. A., J. Gasper, and J. Mondragon. In review(a). Catch estimation in the Federal trawl fisheries off Alaska: A simulation approach to compare the statistical properties of the simple mean estimator, a deterministic imputation method, and the ratio estimator. Canadian Journal of Fisheries and Aquatic Sciences.

Cahalan, J., Mondragon, J., and J. Gasper. In review(b). Catch Sampling and Estimation in the Federal Groundfish Fisheries off Alaska: 2014 Edition. NOAA Tech. Memorandum.

Cahalan, J., J. Mondragon, and J. Gasper. 2010. Catch sampling and estimation in the Federal groundfish fisheries off Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-205, 42 p. Available at: http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-205.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 .

Magurran, A.E. 1988. Ecological Diversity and Its Measurement. Princeton University Press.

NMFS (National Marine Fisheries Service). 2013 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. 39 pp plus appendices. Available online at http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_Final_2013.pdf.

NPFMC (North Pacific Fishery Management Council) and NOAA. 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, Secretarial Review Draft. March 2011.

Pella, J. J., and H. J. Geiger. 2009. Sampling considerations for estimating geographic origins of Chinook salmon bycatch in the Bering Sea Pollock fishery. Alaska Department of Fish and Game, Special Publication No 09-08, Anchorage.

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

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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 4-5 and Table 4-8.

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

Table A-2. Description of the individual species that were combined into species groups in the Bering Sea/Aleutian Island for Table 4-4, Table 4-5, Table 4-9, and Table 4-10.

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