

**C-1 Council motion on Observer Program
4/4/13**

The Council requests the agency to complete the Electronic Monitoring Strategic Plan for review and adoption at the June 2013 Council meeting with the following revisions.

The Council requests the matrix (p. 4-7) in the Electronic Monitoring (EM) strategic plan be revised to include a broad list of tools and a relative ranking of the ability of those tools to meet the monitoring objectives, similar to those identified in the "Fisheries Monitoring Roadmap" document.

The Council requests the implementation section (p. 13) include the following:

1. Funding options, including whether fees collected under the Observer Program are applicable to EM development and implementation, or whether outside funds are going to be necessary.
2. Timelines and implementation schedules to meet the Council's objective to implement EM in the 40' – 57.5' fixed gear IFQ and Pacific cod fisheries.
3. Specific to the actions identified under Goal IV, a description of how the agency will coordinate and collaborate with an EM Working Group (described below) to inform a) the design and execution of pilot projects (including 2014) and b) the evaluation of alternative EM approaches, with OAC review,.
4. Include a description of the EFP process and what steps stakeholders would have to follow to propose the use of an EFP to achieve particular goals or strategies in the strategic plan.

The Council also approves formation of an EM Working Group to evaluate alternative EM approaches, with a consideration for tradeoffs between achieving monitoring objectives, timelines, and other factors (e.g., costs, disruption to fishing practices). The EM Working Group will be guided by the Electronic Monitoring Strategic Plan that the Council is scheduled to adopt at the June 2013 Council meeting.

Synthesis of Council requests/expectations for June 2013 report on the restructured observer program

Note, this lists the requests that were made at each meeting, and does not account for duplication.

<p>Council's original request for an annual report on program <i>(from Oct 2010 motion, and restructured observer program analysis)</i></p>	<p>Annual report on the observer program to include:</p> <ul style="list-style-type: none"> • Detailed financial spreadsheet, by budget category, on the financial aspects of the program <ul style="list-style-type: none"> • program revenues and costs • information on the fees collected, NMFS' financial contribution, dollars spent • intent: transparency on financial aspects of the program • How industry participants have adapted to and been able to accommodate the new program • Observer coverage levels • Fishery management objectives
<p>NMFS' plan for the annual report <i>(from Final 2013 ADP, Jan 2013)</i></p>	<p>NMFS proposes breaking out the annual report on the observer program (to be presented in June) from the annual deployment plan (to be prepared by Sep 1). The report will include:</p> <ul style="list-style-type: none"> • Comprehensive evaluation of observer activities, costs, sampling levels, issues and potential changes in the coming year • Evaluate data collected in prior years to identify areas where improvements are needed to (1) collect the data necessary to manage the groundfish and halibut fisheries; (2) maintain the scientific goals of unbiased data collection; and (2) accomplish the most effective and efficient use of the funds collected through the observer fee • It is intended that this review will inform the Council and the public of how well various aspects of the program are working, and consequently lead to recommendations for improvement • In June 2013, as the review will not include an entire year of data collection, the report will focus on implementation of the program to date
<p>Council additional requests for June 2013 <i>(from Oct 2012 motion)</i></p>	<p>Requests to be specifically looked at in the 1st year (June 2013) review:</p> <ul style="list-style-type: none"> • Consider that vessels in the vessel selection pool should either have the option to go into the trip selection pool OR all vessels should be in the trip selection pool • Evaluate the difference between coverage in the vessel and trip selection pools • Provide information on catch vessels that operate as catcher processors for a portion of the year • Insert cost effectiveness measures into the deployment plan, to prevent expensive deployments to remote areas for insignificant amounts of catch • Report on whether there are issues related to observer availability as a result of this program • Report on other EM options that may be appropriate to replace or supplement human observers • Identify detailed programmatic costs and possible cost reductions as they relate to programmatic and deployment options <p>Council also asked NMFS for strategic planning document on EM, for June 2013, that identifies:</p> <ul style="list-style-type: none"> • the Council's EM priority of collecting at-sea discard estimates from the 40' to 57.5' IFQ fleet • the timeline and vision for how the EM pilot project in 2013 and future years' projects will serve to meet this objective, including funding.

<p>Council asked that an outline of requested evaluations be presented in April 2013 <i>(from Dec 2012 motion)</i></p>	<p>To include:</p> <ul style="list-style-type: none">• Review of the trip selected and vessel selected pools, in consideration of whether vessels should have an option to choose either one, or whether the deployment plan should place every vessel in the partial coverage category in the trip selection pool• Review of the sampling method resulting in a difference between observer coverage in the vessel and trip selection pools• Evaluation of how to insert cost effective measures into the deployment plan• Evaluation of detailed programmatic costs• Identification of alternative approaches to achieving Council's stated EM objectives
<p>Council additional request for April outline and June report, if appropriate <i>(from Feb 2013 motion)</i></p>	<ul style="list-style-type: none">• Asked NMFS to assess a proposal submitted in public testimony (by FVOA) to implement deployment based on vessels that account for the greatest percent of harvest for any sector; include if it meets the Council's objectives for data collection and increasing cost effectiveness

Strategic Plan for EM/ER in the North Pacific

Integrating Monitoring
Technology into the
North Pacific Fisheries
Dependent Data
Collection Program

Prepared by:
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1. INTRODUCTION

1.1 Background

We live in a world of great technological advances many of which are applicable to fisheries monitoring issues, and some that are already in use to support fisheries management in the North Pacific. National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (Council) have been on a path of integrating technology into our fisheries monitoring program for many years: we have advanced Electronic Reporting (ER) systems in place; we have implemented a variety of monitoring tools like motion-compensated flow scales and Vessel Monitoring Systems (VMS); we have conducted and continue to conduct experimental projects with Electronic Monitoring (EM); and have integrated video monitoring into several fisheries in a compliance capacity. Further, application development, database and web technologies are continuing to revolutionize how we manage and report information to both internal and external constituents.

Developing and implementing technology requires careful thought given that technologies and automated image processing techniques are rapidly evolving. Technological investments made today may not best fit the needs of future processing and data delivery capabilities in the near future. Consideration of cost must extend beyond the acquisition of the technology and provide for infrastructure necessary to support the technology into the future, and to adapt and evolve as technology advances. Decisions about where and what to invest in represent strategic choices; wrong choices can be costly.

Throughout the process of integrating electronic technologies into data collection and monitoring NMFS and the Council have continued to consider the tradeoffs between technologies and their ability to meet specific objectives. At the June 2006 Council meeting, NMFS presented a discussion paper about the issues associated with the implementation of EM (Kinsolving 2006). This paper highlighted several issues that needed to be resolved prior to implementation of a large scale EM program. Since 2006, EM technologies have continued to evolve and the use of video, in particular, has seen considerable interest and has been the subject of many studies. In January 2011, NMFS presented a discussion paper to the Council that summarized the work that has been done evaluating the potential use of EM in commercial fisheries off Alaska and described the EM programs that had been implemented at that time (NMFS 2011).

In October of 2012, the Council initiated an electronic monitoring strategic planning process by requesting that NMFS:

“provide a strategic planning document for electronic monitoring (EM) that identifies the Council’s EM management objective of collecting at-sea discard estimates from the 40’ – 57.5’ IFQ fleet, and the timeline and vision for how the EM pilot project in 2013 and future years’ projects will serve to meet this objective, including funding.”

And that NMFS:

“...report to the Council on other EM options that may be appropriate to replace or supplement human observers.”

This strategic plan is intended to explain the goals and objectives of NMFS and the specific actions that it will take to accomplish these goals and objectives in the North Pacific fisheries dependent data collection program. Goals are broad aims. Objectives are specific, measurable targets. A strategic plan provides an assessment of (1) where an organization is now, (2) where it wants to be in the future, and (3) how it will get there. The purpose of this Electronic Monitoring Strategic Plan is to clarify the purpose, guide integration of monitoring technologies and provide benchmarks necessary to evaluate attainment of goals.

“Simply put, strategic planning is clarifying the overall purpose and desired results of an organization, and how those results will be achieved.”

- Carter McNamara,
September 30th 2010

The strategic planning process requires collaboration and support by all parties affected by the plan and those who must contribute to make the plan a success. The first step in the strategic planning process was presentation of an outline of the strategic planning document to the Council in April, 2013. Strategic planning also requires clear identification of goals and objectives before specific action items are identified open discussion and exchange of information, and thorough and accurate information about resource requirements and constraints. This document is the next step in the strategic planning process.

Implementation of a strategic plan requires sufficient staff and budget resources to undertake the actions in the strategic plan, a willingness to set priorities, continuous reporting and evaluation to monitor if actions are being undertaken and milestones met, and periodic adjustments to the plan, as necessary. As such, the plan is intended to be a living document that will evolve to keep in step with new technologies and software advances as they come available.

Concurrent with the development of this North Pacific EM/ER strategic plan, NMFS headquarters (HQ) staff developed several white papers on the use and development of electronic technologies. Drafts of five of these white papers were presented to the Council Coordination Committee (CCC) in February of 2013. These papers provide helpful information that may be useful to NMFS and the Council in future EM/ER developments. The white papers are available on the CCC web site at:
http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2013/Agenda.htm

1.2 Definitions

Electronic monitoring (EM) – The use of technologies – such as vessel monitoring systems or video cameras – to passively monitor fishing operations through video surveillance, tracking and sensors. Video monitoring is often referred to as EM in the literature.

Electronic reporting (ER) – The use of technologies - such as phones or computers - to record, transmit, receive, and store fishery data.

Goals – Our goals describe how the future world will be different. They do not describe what we will do. Goals address: “How will the world be different” and should not change over time.

Objectives – Measureable, attainable milestones that we want to achieve on the way to meeting the goals.

Strategies – How we organize our resources and actions to maximize our effectiveness and efficiency to meet the Objective (examples will be provided to illustrate).

Actions – Concrete and sometimes completed steps implementing the strategies.

1.3 Primary Authorities

NMFS ability to collect information is authorized under several primary authorizes:

1. Magnuson-Stevens Fishery Conservation and Management Act (MSA), which was amended by the 2006 Magnuson-Stevens Reauthorization Act: The MSA is the primary domestic legislation governing management of the nation’s marine fisheries. NOAA manages fisheries in federal waters through fishery management plans (FMPs) developed in conjunction with the Councils.
2. Marine Mammal Protection Act (MMPA): The MMPA provides for, in part:
 - A program to authorize and control the taking of marine mammals incidental to commercial fishing operations;
 - Preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction;
3. Endangered Species Act (ESA): NOAA's National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibility for implementing the Endangered Species Act (ESA).

There are approximately 2,050 species listed under the ESA. Of these species, approximately 1,430 are found in part or entirely in the U.S. and its waters; the remainder are foreign species. Generally, USFWS manages land and freshwater species, while NMFS manages marine and "anadromous" species. NMFS has jurisdiction over 94 listed species. The ESA requires NMFS to designate critical habitat and to develop and implement recovery plans for threatened and endangered species.

1.4 Electronic Monitoring/Reporting Approaches

EM/ER technologies provide a variety tools and potential configuration of tools that may be used to help accomplish specific objectives. Clarity in the desired objectives is essential and will help determine the appropriate methods. Decisions related to costs, feasibility, and effectiveness will help to determine the right combination of tools needed to achieve objectives. Where possible, NMFS will seek to implement EM/ER programs that can meet a variety of functions across a broad spectrum of vessels. Here we describe two broad EM/ER approaches that are available to meet specific monitoring objectives and provide examples of where these approaches have been investigated and/or implemented in Alaska and other fisheries. A summary of the EM/ER tools currently being used in Alaska fisheries is provided in Appendix A.

1.4.1 Compliance Monitoring:

A compliance monitoring approach uses EM/ER tools to enable and/or improve regulatory compliance monitoring and provide independent information to inform agencies if industry is complying with specific regulations. The EM data obtained under the compliance monitoring approach do not feed into catch accounting or stock assessments. Instead EM used in this approach is often used to support data collection through other methods (e.g. observers, or industry self-reported data).

Depending on the monitoring objectives, there are different approaches to implementing a compliance-monitoring program with EM/ER tools.

1.4.1.1 Compliance monitoring for a specific requirement

The Alaska region has had success with the use of EM for compliance monitoring and has implemented this methodology in the AFA pollock fishery, Rockfish and Amendment 80 Programs, and the Pacific cod freezer longline fishery in the Bering Sea. In all of these cases, EM is being used to verify compliance with regulations for catch sorting and weighing. For example, EM is being used on catcher/processors in the BS pollock fishery to verify that salmon have been sorted and stored properly to enable observer sampling.

Another example of a compliance monitoring approach was a pilot project that was conducted in the West Coast trawl catcher vessel hake fishery (<http://www.pcouncil.org/groundfish/trawl-catch-share-program-em/>). The purpose of video monitoring was to verify compliance with a no discard requirement for hake. In this pilot project, the video appears to be able to detect discard events, although some events occurred outside of the camera view and a well-publicized discard event occurred when the camera was unplugged. There are also "operational" discards where the catch is not brought onboard and no solution for estimating these discard events currently exist. The compliance monitoring design, however, is simple.

In monitoring approaches to verify compliance with specific regulations, EM data can be reviewed when other sources of information suggest the need for review, through random audit checks, or anytime to verify that the EM system is functioning as required. The review can consist of only portions of the information that is recorded or it could be a review of all the information that is recorded. The intensity of the review depends on the need and available resources.

The advantages of EM as a compliance monitoring tool include: relatively low cost to both industry and the agency (especially after the initial years of implementation); depending on the compliance monitoring objective, the data storage and review requirements can be relatively low; and the tool can serve as an enhancement to enforcement that may not be able to do frequent patrols or at-sea boarding of vessels. The disadvantages include: the fact that these types of EM programs are not able to accomplish other tasks such as catch estimation; the compliance approach usually requires some other method such as observers, flow scale or e-logbook to gain the necessary fishery specific information; and special chain of custody requirements may make data storage and handling procedures more complicated since the data may be used for enforcement.

More details about how EM is being used in Alaska to monitor compliance for particular requirements are provided in Appendix B as well as other potential ways that compliance monitoring could be developed for other specific requirements, for example to verify compliance with a gear handling requirement or a no-discard regulation.

1.4.1.2 Compliance Monitoring (Audit) of Self-Reported Data

A different compliance monitoring approach is to require industry self-reported data and to use the EM to audit, or verify, compliance with the record keeping and reporting requirement. The EM program in the Canadian hook and line groundfish is the most well known example of this approach. In their program, the goal of requiring self-reported data in the logbook is to document species-specific catch of quota species in an Individual Transferable Quota (ITQ) program. To accomplish this goal, they required detailed logbook reporting by species and by set. All vessels have camera systems and a subset of footage is reviewed after landing by industry contractors to validate the logbook reports. A critical component of this program is that there are immediate financial penalties to individual fishermen for poor reporting in the logbook. If the audit of the self-reported data is not within a specified tolerance, then the entire video may require review and the individual fishermen bears this cost. Another important aspect of the program is a comprehensive dockside-monitoring component where species identifications are verified during offload.

This compliance monitoring approach has been shown to perform well for the species that are included in the audit review; and an advantage of the program is that it provides the public with assurance that self-reported data is being monitored for accuracy.

More information about how a compliance-monitoring program of self-reported logbook data might be implemented in Alaska, as well as a comparison of this approach to extraction of the video data, is provided in Appendix C.

1.4.2 Data Collection for Management and Science

The second broad approach is to use EM/ER tools to collect data that are used to manage fisheries and conduct scientific stock assessments. A primary management objective is to track catch and bycatch of fisheries (i.e. total catch accounting). Often there is a management demand for the catch accounting to occur very quickly, especially in catch share management programs that may necessitate near real time quota accounting. In other fisheries that are being managed in season by NMFS, catch accounting may occur within a week or two. In addition to total catch, managers also need spatial information about fishing locations, as well as data about fishing gear. Scientists also rely on fishery catch and bycatch data to estimate mortality, which is a critical component of stock assessments. Other important science data needs are dates, times, location, depth, and gear information that are used to estimate fishing effort; and biological data such as otoliths, scales, lengths, and weights that are used in stock assessments. The timelessness of data collected for science is generally less critical since most stock assessments are conducted on annual cycles.

Here we outline two scenarios where EM/ER could be used to collect data for management and science: near-real time data collection, and less time critical approaches.

1.4.2.1 Management data under a catch share program (near-real time)

Catch share programs usually require: near-real time access to data by agency and fishery participants; data that are not subject to wide variability on a day to day basis; and information that is frequently vessel specific that can be legally defensible when holding a quota holder accountable for staying within their quota allocations. A combination of observer data and a suite of EM/ER tools have been used to accomplish these goals in multiple Alaska catch share programs. Information needs under catch share management programs, for both the industry and agencies, have also raised the bar for the level of timeliness and quality of the data collected by EM/ER and these technologies have advanced. Other projects have also sought ways to reduce observer coverage by using information collected from EM.

Suite of EM/ER tools in combination with observers:

The Alaska Region has implemented several catch share management programs that include large EM/ER monitoring components (Appendix A). The suite of EM/ER tools that have been implemented include: Observer reporting (ATLAS) software for timely reporting of observer generated data; e-logbook for timely reporting of catch and area information; e-landings for timely reporting of landings data; flow scales to obtain the total weight of species caught; and, as described in the previous section, EM as a compliance tool to enhance observer data collection. These tools, in combination with observer data collection, provide a single authoritative record of the amount of quota harvested and have greatly enhanced the ability for NMFS and cooperative managers to monitor and manage catch and bycatch. These tools are costly to NMFS (e.g. IFQ crab reporting through e-Landings requires significant agency support staff and infrastructure for development and maintenance) and to industry (e.g the cost of flow scales installation and maintenance) and do require additional attention and time by industry (e.g data entry for electronic reporting, flow scale maintenance and testing). However, these costs can be offset by the benefits of a catch share management program and without these EM/ER tools implementation of some catch share programs would not be possible.

EM/ER to reduce reliance on at-sea observers:

To date, NMFS has not implemented any operational systems where video imagery is collected and information is extracted for fisheries management; although projects have tested the idea of using data from video for management of a catch share fishery. A series of pilot projects in the GOA rockfish fishery evaluated the use of video to quantify the amount (in weight) of halibut discard from trawl catcher vessels (McElderry 2005; Bonney and McGauley 2008; Bonney et al 2009). The Rockfish Program requires 100% observer coverage on catcher vessels in order to get vessel-specific estimates of halibut bycatch, which is a species that must be discarded in the trawl fisheries. The cost of the observer coverage is borne by industry. The EM pilot projects in the rockfish fishery sought to reduce the amount of at-sea observer days that were necessary while still accomplishing the vessel-specific accounting of halibut bycatch; although it was recognized that even with a fully implemented EM program, there was likely going to be some level of at-sea observer coverage needed in the rockfish program to collect biological samples.

The pilot projects were able to demonstrate that EM can be used reliably in Alaska on a variety of vessels and that it was possible to quantify the discard of halibut from a single discard location on particular trawl vessels. However, the EM technology at the time the Rockfish Program pilot projects were conducted was not able to meet the stringent demands for data in a catch share fisheries management program, namely high quality data delivered quickly and cost effectively. As an example, the costs for EM in the rockfish program was higher than observer coverage and the time lag to extract the halibut discard data from the video was unacceptable for NMFS and industry quota managers. Both the costs and the time lag were related to human review needed to obtain full census and length estimate of halibut bycatch. If automation of the video review was feasible then using EM under the catch share management approach might be more cost effective and timely. To address this topic, NMFS conducted a video automation project that showed potential to lower analysis costs by reducing the review time necessary to obtain a census. However, the project identified issues related to crew sorting and video technology that led to some limitations in the automation results (Mamigo, 2010).

In addition to timeliness, issues related to species identification and obtaining accurate weights and counts need to be addressed before EM can be implemented in a catch share management fishery. In the case of the Rockfish fishery, only a single species, halibut, was being discarded and quantified by the video. However, depending on the information needs in other fisheries management programs, data may be needed for a variety of different species. For EM to be a valid approach in other catch share fisheries, it must be possible to quickly identify all species to the level they are managed. Many quota species, such as flatfish and rockfish, are very difficult to identify to species using EM. Also, many fisheries are managed by weight and not number of animals. Currently, a system for accurately obtaining weight of total catch in near real time has not been successfully established using EM.

Another example of EM being investigated for use in a catch share management program is the east coast multi-species sector fishery. The Northeast Fisheries Science Center (NEFSC) began a multi-year pilot program in 2010 to test EM technology to collect catch and fishing effort data aboard commercial vessels. The goal of the study was to evaluate the potential of EM to monitor retained and discarded catch on a real-time basis in the Northeast groundfish sector fleet (NOAA, 2011). This study identified a number of deficiencies that would first need to be addressed before EM technology could be considered in lieu of at-sea observers in the Northeast multispecies fishery. Recommendations to improve data quality included the development of a more reliable EM system and modifications to how discarded catch was handled by the crew. The NEFSC stated that further research would also required to improve the accuracy and reliability of species identification and to reliably monitor weights of discard by species, and identified the need to analyze multiple data sources to improve their ability to validate and identify discrepancies between observer and EM collected data. Given the issues identified under the first year of this pilot project, EM was not incorporated as a monitoring tool in the 2012 fishing year by the NEFSC.

1.4.2.2 *Less-time sensitive approach*

The other scenario where data could be extracted from video to be used for science and management would be in less time sensitive fisheries. Like catch share programs, NMFS has not implemented any

operational systems where video imagery is collected and information is extracted for fisheries management in non-catch share fisheries. However, there have been several projects that have evaluated the potential to obtain data from video to be used to estimate catch in fisheries where there was not an immediate (i.e. near real time) demand for the data: in Denmark work has been done to quantify discard (Dalskov, 2010); in Alaska a series of projects has been done to evaluate the potential of EM as an alternative tool to monitor bycatch on Pacific halibut longline vessels (Ames 2005; Ames et al, 2005; Ames et al. 2007; Cahalan et.al 2010 and a study in Canada to investigate independent sampling based estimates of yelloweye rockfish catch in Canada (Stanley et.al. 2011). Many of these projects cite common limitations of using video data that continue to constrain the usefulness of EM; 1) the inability to collect weight of discarded catch, 2) inability to collect biological specimens 3) the inability to determine precise species identification between common species similar in appearance. An assessment of the observer program monitoring activities for hook and line vessels in Alaska and the ability of current EM/ER technology to collect those data elements is provided in Appendix D.

The EM project underway in the North Pacific in 2013 builds on lessons learned from previous projects and is intended to address and/or evaluate these limitations in the context of fisheries operating in the North Pacific. Results will be used to inform the Council to determine the priority monitoring objectives, the potential capability of using EM or a combination of tools to meet specific objectives, and the level of EM that may be necessary to meet the monitoring objectives that cannot be obtained through observers or to supplement observer coverage where an observer deployment may not be feasible

One way to increase efficiency and cost effectiveness would be to sample video data and estimate catch instead of census of all fishing events. To sample, video would be randomly selected to sample and those samples would be extrapolated to the entire haul or trip. In some fisheries sampling the video to extrapolate to total catch may not be a viable option, because EM is unable to determine total catch size or consistently estimate sample size. Sampling does hold potential for vessels whose units for gear can be readily determined from video, such as longline and pot or trap.

In summary, we have distilled two basic approaches that can be taken with EM/ER technologies along with a reference to example projects into the following outline format:

1. Compliance monitoring
 - a. Complying with specific regulation
 - i. Existing EM Programs in Alaska on the Amendment 80, Amendment 91, and freezer longline fleet.
 - ii. West Coast video on trawl C/V's pilot (did they discard hake or not)
 - iii. VMS
 - b. Auditing Self-Reported Data
 - i. Logbook reports (the Canadian EM system): The Canadian hook and line monitoring system to verify self-reported logbook data using using on-board camera systems.

2. Data Collection for Management and Science

- A. Systems that enable near real-time data for management (necessary for catch share programs)**
 - a. EM/ER in combination with observer data**
 - i. E-logs and e-landings**
 - ii. NMFS at-sea data entry application (Atlas) allows timely reporting by observers**
 - iii. Flow scales**
 - b. EM/ER to reduce reliance on at-sea observers**
 - i. Rockfish program projects estimating halibut discard.**
 - ii. NE groundfish sector pilot program to estimate retained and discarded catch**
- B. Video data extracted for management/science in less time sensitive scenarios**
 - a. Denmark work quantifying discard (what species and quantities did they discard).**
 - b. Independent sampling based estimates of yelloweye rockfish catch in Canada (Stanley et.al. 2011)**
 - c. Alaska longline project (Cahalan et.al. 2010)**
 - d. Current EM pilot work being conducted in Alaska**

1.5 Strengths, Weaknesses, Opportunities, and Threats (SWOT) of Current State

The State University of New York's Center for Technology in Government provides a short brief on SWOT analysis:

"SWOT analysis is a simple framework to help answer the question, "What are the prospects for success?" The approach recognizes that any project should be examined for both positive and negative influences from internal and external perspectives. A SWOT framework prompts you to look in detail at both sides of the coin. That is, the strengths and weaknesses of your project are only meaningful in terms of the opportunities and threats in its environment."

NMFS conducted a SWOT analysis to assess the current operational environment in which this EM strategic plan is being developed and implemented. In assessing our internal strengths and weaknesses, we considered "internal" to include NMFS and the North Pacific Fisheries Management Council working together on EM/ER issues.

Strengths (Internal)

- Leadership focus on EM advancement
- Dedicated and capable staff
- Success implementing performance based approaches in regulation
- A committed Council
- AK experience with EM/ER in a range of applications
- AK experience advancing EM technology in survey applications
- AK reputation for doing things right
- NMFS investment in IT infrastructure
- Large scale implementation of ER across Alaska
- Inter-agency collaboration on ER

Weaknesses (Internal)

- Lack of agreement on monitoring objectives, data needs and priorities
- Demands that do not take into account time for regulatory processes and scientific study to make informed decisions
- Variable, and sometimes unrealistic, expectations of what EM can do
- Funding shortfalls, staff resources and competing demands on staff time

Opportunities (external)

- EM work emerging in other regions
- Collaborative fishing industry members who are eager to advance EM
- Many advanced technologies that are mature and tested
- Emerging technologies with high potential
- Many potential partnerships to advance EM work
- Various funding sources may be available

Threats (external)

- Information demands can exceed the capacity of people or EM (census everything!)
- An unpredictable federal budget environment
- Data quality challenges (prove it!)
- Maintaining chain of custody and data integrity
- Confidentiality restrictions and protections
- Competition for money and time
- Industry and agency/Council objectives for EM may conflict

2. STRATEGIC PLAN FOR EM/ER IN ALASKA

2.1 Vision

A future where electronic monitoring and reporting technologies are integrated into NMFS North Pacific fisheries dependent data collection program where applicable to ensure that scientists, managers, policy makers, and industry are informed with fishery dependent information that is relevant to policy priorities, of high quality, available when needed, and obtained in a cost effective manner.

2.2 Goals and Objectives

NMFS has identified the following goals, objectives, strategies and actions to implement electronic monitoring tools into the North Pacific fisheries dependent data collection program. Goals address “How will the world be different” and this vision should not change greatly over time. In aggregate, the strategies and actions are designed to meet a specific objective and the cumulative achievement of objectives is intended to meet an overall goal.

Goal I: NMFS has the infrastructure and regulatory requirements to support EM/ER operations.

Objective 1: Communicate through planning documents and processes.

Strategy A: Develop an EM/ER strategic planning document in collaboration with the Council to guide actions.

Action: Present EM/ER strategic plan to the Council for feedback.

Action: Periodically update the Council and public on the progress relative to the EM/ER strategic plan.

Objective 2: Dedicate resources to support EM/ER data acquisition, post processing, and integration.

Strategy A: Provide IT infrastructure that supports catch estimation and/or compliance monitoring.

Action: Develop accurate and timely EM data stream to support management.

Action: Maintain accurate and timely ER data stream to support management.

Action: Identify data storage and data processing methods.

Action: AFSC and AKR maintain database and information support staff as part of agency infrastructure.

Strategy B: Assign EM development work to scientific staff for a comprehensive assessment, evaluation, and advancement of technologies.

Strategy C: Include EM and IT support staff in planning and budget requests for offices with data stewardship responsibilities.

Action: Request distinct EM staffing and budget for FY14.

Objective 3: Continue to develop the regulatory framework to implement EM/ER requirements.

Strategy A: Develop requirements to use EM for catch estimation.

Action: Identify agency/industry responsibilities.

Action: Identify performance-based standards for regulations.

Action: Assign and prioritize staff work on regulation development.

Action: Develop vessel monitoring plans, maintenance protocols and operator responsibilities.

Strategy B: Adapt and improve existing EM/ER regulations to ensure compatibility with emerging technology and changing fisheries management

Action: Evaluate at-sea flow scale regulations and approval requirements.

Action: Evaluate regulations for EM/ER on freezer longline vessels (flow scales, video, and e-logbook).

Action: Review and improve existing regulations where EM is required in Alaska (Amendment 91, bin-monitoring).

Action: Evaluate VMS type approval process.

Objective 4: Secure funding to advance EM/ER technologies and use.

Strategy A: Monitor and initiate action on opportunities within NMFS for internal funding.

Action: Develop RFP system within NMFS for National Observer Program money dedicated to EM efforts.

Action: Apply for internal cooperative research and other funding sources to supplement 2013 EM work.

Action: Secure AKR and AFSC funding to conduct 2013 EM pilot work.

Action: Apply for Fishery Information System project funding (e.g., integrate flow-scales with other technologies, other EM/ER work).

Strategy B: Apply for external grant funding through appropriate sources

Action: Submit NPRB proposals in response to RFPs.

Action: Look for other grant funding opportunities.

Strategy C: Use observer fees to fund research and development.

Goal II: NMFS is advancing cost effective EM/ER capabilities through science-based studies and technological developments.

Objective 1: Conduct scientific research to advance the science of monitoring and data integration.

Strategy A: Improve catch estimation methods by incorporating data gathered through electronic monitoring.

Action: Evaluate broad e-logbook coverage and technology that independently records specific catch location and total effort for improved specification on post strata assumptions and catch rates to support stock assessments.

Action: Develop potential algorithms to estimate or inform discard in the Catch Accounting System.

Action: Evaluate catch estimation assumptions and post stratification processes.

Strategy B: Develop methods that can improve EM data to fill existing gaps such as length compositions, species identifications, and fish weights.

Action: Develop performance standards for species identification.

Action: Build a stereo camera system (PSMFC funding support) to provide a prototype for testing automated review and collection of length compositions.

Action: Develop vessel monitoring plans to improve ability to identify and quantify discard through discard control points.

Action: Develop procedures where crew could potentially collect random samples.

Strategy C: Evaluate EM technologies in the 2013-14 EM project on volunteer vessels in the <57.5 ft longline and pot vessels.

Action: Evaluate species identification issues.

Action: Identify data gaps and potential solutions for species weight estimates, biological samples and rare species interactions.

Action: Assess the efficacy of using technology for capturing information that would quantify discard and provide spatial and temporal distribution of effort.

Strategy D: Provide support to partners in cooperative research, and industry volunteers.

Action: Assist in providing technical support and guidance to fishing industry and other constituent research initiatives (e.g., two 2012 NFWF grants, EFPs).

Objective 2: Reduce costs by gaining efficiencies in data processing and/or improving data quality.

Strategy A: Develop automated review and data extraction technologies to reduce costs, improve timeliness, and improve data quality.

Action: Collaborate with other AFSC staff to develop image processing applications (automated species ID and length estimation).

Action: Identify potential efficiencies in data processing and improving data quality such as automated review and data extraction technologies.

Action: Build a stereo camera system (PSMFC funding support) to provide a prototype for testing automated review and collection of length compositions.

Action: Identify minimum image quality standards necessary for data extraction.

Strategy B: Identify fish handling practices and integration methods that will facilitate automation and improve data quality.

Action: Collaborate with industry to develop Vessel Monitoring Plans.

Objective 3: Understand all aspects of costs associated with EM technology integration, implementation, and processing.

Strategy A: Track all associated costs of the 2013-14 pilot study.

Action: Track project expenditures to inform potential logbook audit approach or sample based approach to inform discard.

Action: Determine cost to support EM such as port sampling and programming personnel, data storage, post processing, hardware, maintenance and installation.

Action: Determine cost benefit ratios for various fleets or fleet sectors where EM could provide improvements or cost savings compared to observer coverage.

Strategy B: Evaluate costs of existing EM programs in the North Pacific.

Action: Track NMFS costs.

Action: Identify fishery participants' costs.

Strategy C: Evaluate trade-offs of using observer fees to fund EM systems versus human observers.

Action: Evaluate impacts on observer deployment and coverage rates of using observer fees for EM.

Goal III: NMFS has a cost effective, adaptable and sustainable fishery data collection program that takes advantage of the full range of current and emerging technologies.

Objective 1: Implement EM/ER technology where appropriate and cost effective to improve catch estimation and better inform stock assessments.

Strategy A: Implement EM as appropriate based on scientific research from goal II.

Action: Select EM approach.

Action: Analyze EM approach, impacts, cost, and benefits.

Action: Write implementing regulations.

Action: Implementation, roll out, outreach.

Strategy B: Expand use of e-logbooks to increase the timeliness and fill data gaps.

Action: Implement e-logbooks in the freezer longline fleet.

Action: Develop a catcher vessel e-logbook.

Strategy C: Expand observer data entry application (ATLAS) requirements to improve the quality and timeliness of observer data.

Action: Analyze adding an ATLAS requirement for AFA catcher vessels.

Strategy D: Continue ongoing development and support of e-Landings system.

Objective 2: Implement EM/ER technology where appropriate and cost effective to enhance compliance monitoring.

Strategy A: Monitor, evaluate and improve existing ER compliance monitoring programs.

Action: Perform periodic audits to ensure and improve system performance for freezer longline fleet, Amendment 80, Amendment 91, and Rockfish Program.

Strategy B: Expand use of EM in compliance applications

Action: Evaluate EM for compliance monitoring in shoreside pollock fisheries (see Appendix B).

Objective 4: Improve procedures, methods or technology to enhance quality of EM data.

Strategy A: Evaluate and develop solutions to incrementally improve EM and data quality.

Strategy B: Address challenges to managing a fishery using an integrated system approach that incorporates data collected through a variety of sources that includes electronic reporting (e-ticket, e-logbook, and sensors), video systems, scales, and observers.

Action: Work with EM subcommittee to evaluate data needs and data collection approaches.

Goal IV: The Council and NMFS leverage global EM/ER developments while sharing AK perspectives with others.

Objective 1: Learn from the experience of others.

Strategy A: Organize and participate in local, national, and international forums on EM/ER and fishery dependent systems.

Action: EM panel participation at IFOC and other international forums.

Action: Participate in regional, National, and international workshops and committees.

Action: Develop EM subcommittee of NOPAT to inventory and track National EM efforts.

Strategy B: Collaborate with partner organizations.

Action: Meet periodically with Pacific States Marine Fisheries Commission, ADF+G, other NOAA entities.

Objective 2: Influence and inform monitoring policies.

Strategy A: Assist in national EM policy and procedures.

Action: Work on the NMFS draft policy and procedural directives.

Strategy B: Engage in Council processes which inform monitoring policy.

Action: Work with the OAC and OAC sub-committee on issues of onboard catch handling procedures and technology integration or any other tasks assigned by the Council.

Action: Ensure staff members are engaged in standing Council or Agency advisory committees that involve monitoring.

Action: Develop thorough Monitoring and Enforcement sections of analytical documents.

3. IMPLEMENTING THE STRATEGIC PLAN

Our vision of the future may include numerous EM/ER tools that are incorporated into the North Pacific data collection program to support stock assessments and management of fisheries operating in the North Pacific. This strategic plan outlines the goals and objectives and the specific actions that it will take to accomplish these goals and objectives to achieve our vision.

The strategic plan enables individual projects, or action items/steps, to be mapped back to the strategies, objectives, and goals. The nested hierarchal design (Figure 1) provides for flexibility where specific strategies or actions can be periodically added or removed to account for changes in technology and application and/or as priorities change.

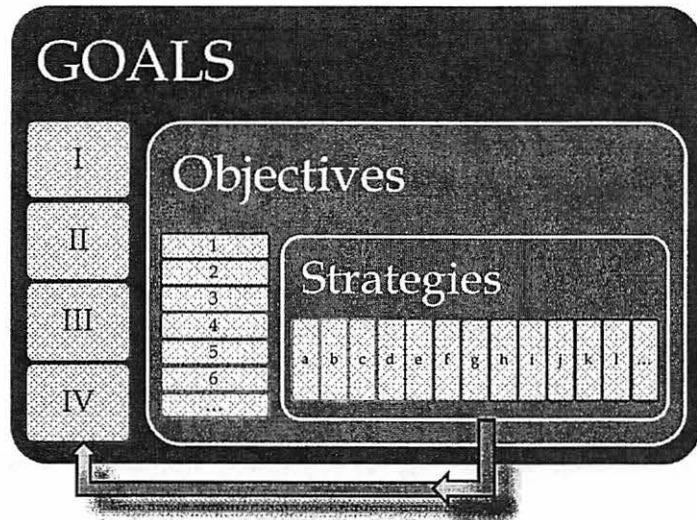


Figure 1. Hierarchical nesting scheme of the Strategic Plan goals, objectives and strategies.

2013-2014 EM PROJECTS

The first step in developing an EM/ER program is to fully understand current EM/ER capabilities and advance these technologies through science-based studies and technological developments.

In 2012, NMFS designed a video based electronic monitoring project to achieve Council’s objective of “collecting at-sea discard estimates from the 40’ – 57.5’ IFQ fleet” and “explore other EM options that may be appropriate to replace or supplement human observers”.

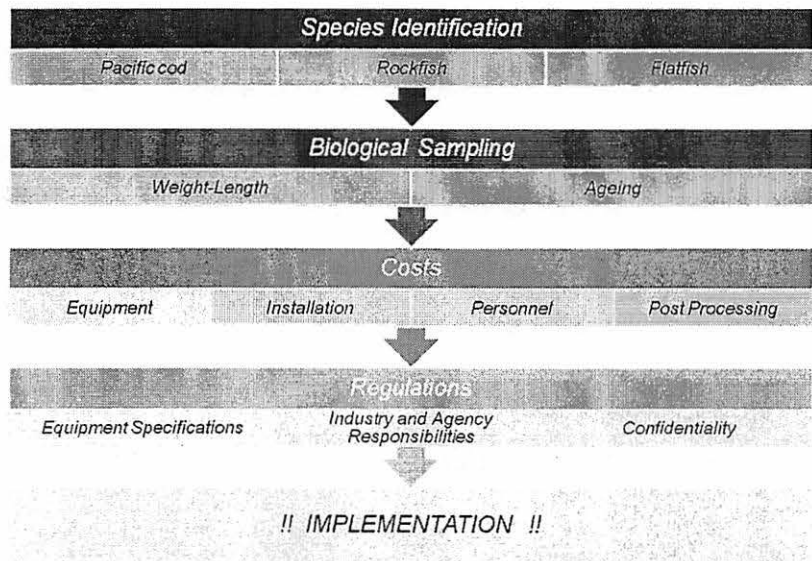


Figure 2. Project benchmarks for the 2013-14 less than 57.5’ IFQ fleet.

This project began deployment of video based EM systems April 1st, 2013 and will continue through 2014. It is designed to inform the logistical integration of camera based systems into the fishery, establish data storage requirements and data processing procedures for implementing a video based EM program. Most importantly, it is designed to evaluate and address universal challenges in using video data to establish or estimate discard. Major challenges include: 1) inability to accurately identify species; 2) inability to obtain weights of discarded fish; 3) time required to obtain and review video and extract all requisite information; and 4) inability to collect biological samples from discarded catch. Without first addressing these issues it is not possible to fully develop potential strategies to utilize data for either establishing discard through a compliance program (Canada's logbook audit program) or through video estimation procedures. This information will be required prior to developing methods that could potentially incorporate these data into the catch accounting system.

Another important focus for the 2013-14 EM project is to evaluate cost information. Project costs will be used to inform cost benefit ratios in order to evaluate the relative scale and potential target fishery of the program prior to implementation. We will also be developing performance standards (video, species ID, responsibilities, etc.) and required EM/ER integration procedures/protocols for specific vessel layout and design. Only after this step is taken can we then establish performance standards for which to base regulatory requirements on that will be required to support an electronic monitoring data collection program to inform discard, stock assessments or management.

Appendix E illustrates the relationship between specific action items being addressed through the 2013-2014 project studies and the associated implementation strategies that are designed to meet a specific objective, which collectively are intended to accomplish a specified goal.

INNOVATIONS (R&D)

NMFS is also evaluating a number of innovations in both image analyses and hardware that could dramatically improve collection of video data and post processing of those data. We are currently assessing the potential to automate capture of single catch events and provide length composition through image processing techniques of both stereo and non-stereo images. We believe image processing in real time has great promise to greatly reduce processing time, storage requirements and enable collection of length composition that could be used to infer weight of discarded species. We will also be investigating software applications that use wireless technologies to automate data acquisition through download from vessels landing catch in ports where wireless services exist. The combination of technology advances, continued price reductions in hardware and development of image analysis applications have great prospect to drastically change the cost benefit ratio of collecting and processing video images to inform discard or provide near-real time catch information on temporal and spatial distribution of fishing effort. These efforts are supported through funding from the NMFS and the Pacific States Marine Fisheries Commission (PSMFC).

DISSEMINATION OF PROJECT RESULTS

The diagram to the right (Figure 3) provides a conceptual flow of how study results will be disseminated through the Council. We expect that project results from the previous years' studies, advances in research and development will be presented to the OAC and the Council each April. These results will provide critical information for making informed decisions on the future of EM/ER in the fishery.

TIMELINE

The timeline for implementation of any EM/ER is highly dependent upon results from current studies including; advances in research and development, complexity of the program and funding. The timeline presented below (Figure 4) should be used as general guideline for a fairly complex program. The timeline is intended to map general scientific and management objectives that will be addressed through study and public process.

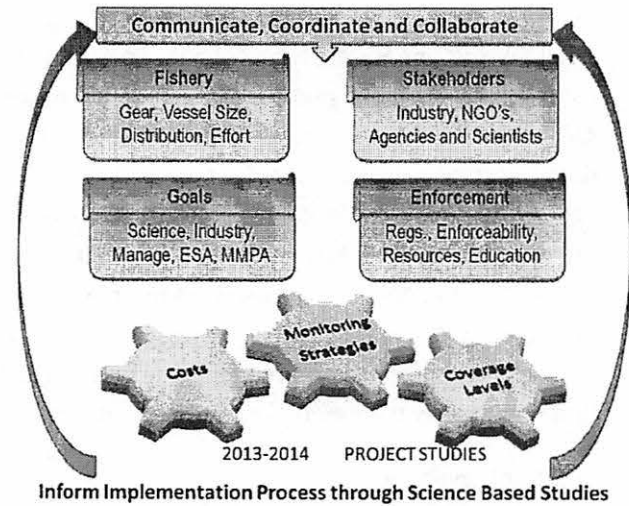


Figure 3. Conceptual flow of how study results will inform the public process and decision making.

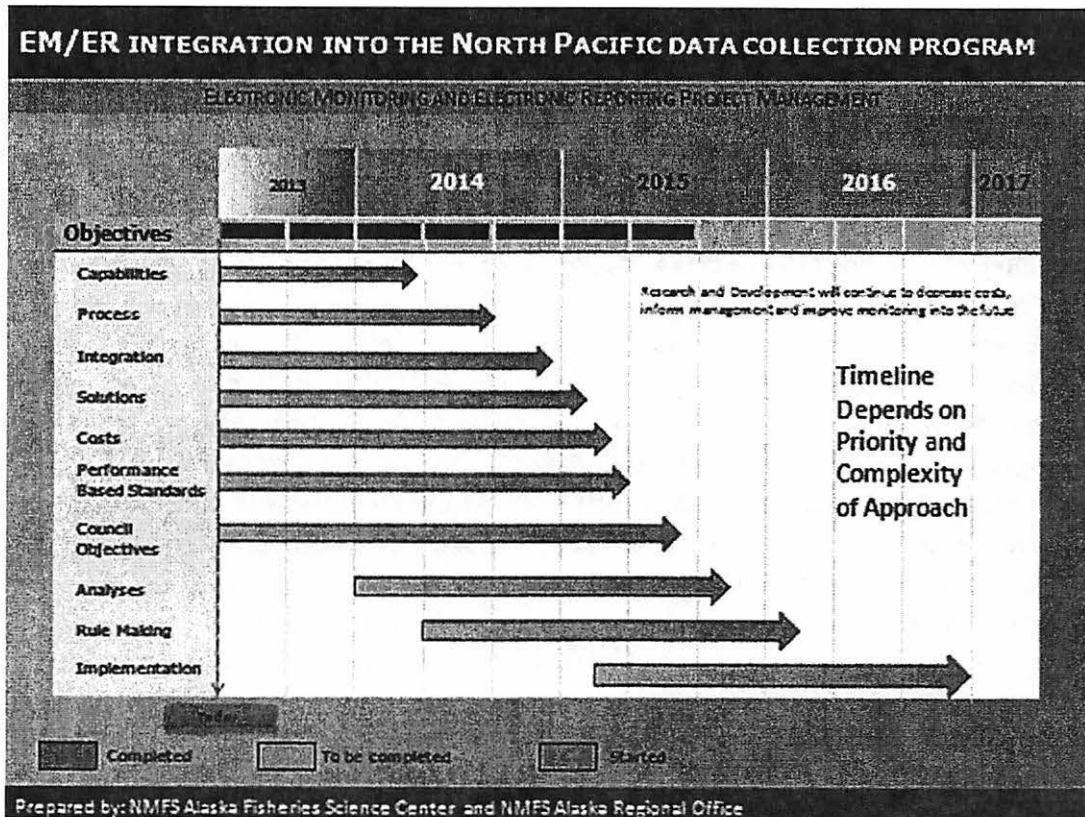


Figure 4. EM development timeline in the North Pacific

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Appendix A: Existing monitoring tools in the North Pacific fisheries

The following table summarizes the existing monitoring tools currently implemented in the North Pacific fisheries. Please note that the catch share programs require a more intensive suite of tools for management.

There are many improvements and cost efficiencies that could be realized through automation and electronic transfer of both e-logbook and ATLAS information where it is currently not required. Expanded implementation of these tools could add real value to our scientific data collection program improving stock assessments and improve management of North Pacific fisheries.

Program	Fishery	Monitoring Tools							
		Paper logbook ¹	E-logbook	Flow Scale	VMS	Video	100% observer coverage	2nd observer	ATLAS
Catch Share	AFA CPs/motherships	N	Y	Y	Y	Y	Y	Y	Y
	BSAI Trawl CPs in H&G	Y	Y - voluntary	Y	Y	Y	Y	Y	Y
	CGOA Rockfish CP	N	Y	Y	Y	Y	Y	Y	Y
	BSAI P.cod Freezer Longliner	N	Y	Y	Y	Y	Y	Y	Y
	CR Crab CP	Y	N	Y	Y	N	Y- not NMFS	N	N
	AFA CVs	Y	few- voluntary	NA	Y	N	Y	N	Y ³
	CGOA Rockfish CV	Y	N	NA	Y	N	Y	N	Y
	IFQ CP Sablefish	Y	N	N	Y-AI only	N	Y	N	N
	IFQ CP Halibut	Y	N	N	Y-AI only	N	Y	N	N
	IFQ CV Sablefish	Y	N	NA	Y-AI only	N	N	N	N
	IFQ CV Halibut ²	Y ²	N	NA	Y-AI only	N	N	N	N
Non-Catch Share	BSAI CP Longline Turbot	Y	N	N	Y	N	Y	N	Y
	GOA CP Trawl	Y	Y- voluntary	N	Y	N	Y	N	Y
	GOA CP Longline	Y	Y voluntary	N	Y	N	Y	N	Y
	BSAI CV Trawl P.cod	Y	N	NA	Y	N	Y-voluntary	N	N
	GOA CV Trawl	Y	N	NA	Y	N	N	N	N
	GOA CV Longline	Y	N	NA	Y	N	N	N	N
	CP Pot	Y	N	N	Y	N	Y	N	Y
	CV Pot	Y	N	NA	Y	N	N	N	N
Jig	Y	N	NA	Y-AI only	N	N	N	N	

1-Paper logbooks are required by NMFS for vessels >60ft

2-Paper logbooks are required by IPHC for vessels >26ft fishing for halibut; vessels >60ft are also required to submit paper logbooks by NMFS and there is a shared IPHC-NMFS paper logbook.

3-Atlas is required for vessels over 125 LOV, but many vessels voluntarily use ATLAS

Appendix B: Compliance monitoring and electronic reporting options to inform management and/or supplement observer data collection

EM is currently being used in three different compliance monitoring applications in Alaska and in all of these cases EM is being used in conjunction with other monitoring tools (e.g. e-logbooks, flow scales) and full observer coverage. The combination of these data collection and verification methods enables catch accounting at vessel specific levels in near-real time. Here we describe some additional compliance monitoring objectives where EM could be used to replace or supplement observers. There are likely many other examples of regulations that have potential application for EM, and the Council may wish to ask enforcement personnel, or the enforcement committee, to discuss this concept and identify regulations that are high priority where EM could assist. In short, any required behavior that can be monitored by sight, has potential to also be monitored using camera technology. The compliance monitoring programs currently in place and some potential additional options are summarized in Table B-1.

Catch Sorting:

Three programs have been implemented in Alaska where EM is being used to monitoring compliance with catch sorting requirements. In the Rockfish and Amendment 80 programs, EM is used on trawl catcher/processors to verify that no pre-sorting of fish in bins has occurred before the observer has had the opportunity to sample the catch. Under Amendment 91 in the Bering Sea, EM was implemented as a tool on AFA catcher/processors to verify compliance with sorting and storage of salmon bycatch. The storage requirements enable observers to identify species, obtain a census count and collect biological samples from salmon.

EM is also being used on longline catcher/processors which catch and process Pacific cod in the BSAI. If vessels are using motion-compensated scales to weigh Pacific cod, then they are required to maintain a video system to monitor sorting and flow of fish over the flow scale. NMFS is also considering using EM to verify proper flow scale use and maintenance for all vessels that use a motion-compensated flow scale.

Full Retention:

The OAC has previously identified the GOA shoreside pollock fishery as a good candidate for monitoring as it most closely resembles a "full retention" fishery. Pollock discards are very limited, salmon bycatch are now required to be landed, and the fish are primarily handled in specific deck areas which could be viewed by cameras. If discard is negligible and cameras are proven to be able to fully monitor all deck handling areas on deck, observers may not be needed on the vessels. This approach has been extensively tested on the West Coast in the Pacific whiting fishery and has very similar characteristics to the shoreside pollock fishery.

Note that a lesson learned from the Pacific whiting fishery is that the camera systems could be disabled. In one publicized event, a high bycatch event occurred, the camera was disabled, and the bycatch was subsequently discarded. The event was detected when the bycatch washed up on the beach. Subsequent investigation revealed the facts. Regulations would need to be developed to control this potential behavior. If it is found that there are "operational" discards in the shoreside pollock fleet a solution would have to be evaluated and developed to estimate this type of discard event.

This approach could also be considered in the Bering Sea shoreside pollock fishery. However, complexity increases with increasing ship size. For example, larger vessels may have more elaborate sorting processes which occur before fish are placed in refrigerated seawater tanks. For example, some have sorting belts which run from the deck into internal sorting areas prior to the fish going into storage tanks. These more complex operations would increase the complexity and costs associated with monitoring using cameras, and may not prove to be cost effective.

This no-discard monitoring approach could be considered in the currently un-observed catcher vessels delivering to motherships. These catcher vessels have historically been exempt from observer coverage in Alaska as they deliver unsorted cod-ends to motherships. In contrast, the Northwest Region required observers on these same vessels when fishing in NW waters and they are exploring the use of cameras instead. They report that limited discard does occur on catcher-vessels in the whiting fishery with 90.5MT's in 2012 and 175.2MT's in 2011. Please note that when discard does occur, the camera systems would have limited capacity to quantify that discard, or to identify what species were present in the discard.

Gear Handling:

There are several regulations that exist in Alaska where EM could be used to monitor for compliance with gear handling requirements. For example, regulations that require fisherman to deploy streamer lines for seabird avoidance, to carefully release halibut bycatch, and to not use de-hooking devices are all behaviors which could be monitored with technology.

Current camera systems allow for high resolution, wide angle 360 degree capture of images. One, and possibly two cameras installed above the deck of an open decked catcher vessel can view both the setting and retrieving of longline gear. Potentially, compliance with careful release regulations, streamer deployment requirements could be accomplished via cameras. An appropriate video review program would need to be established to ensure effective detection and follow up action to have a deterrent effect.

Area Closures:

EM in the form of VMS has been used for many years as a tool for monitoring time and area closures. A current Council white paper summarizes the current status and additional capacities of VMS. However, one important point is that the internal infrastructure to support VMS is in place and functioning. Internal infrastructure costs are an important consideration in the development of any new systems. This tool could be implemented at any time.

Alternatively, integration of EM with GPS systems, or GPS data-loggers alone, may provide after-the-fact, but near real-time, position information comparable to VMS.

Table B-1. Compliance monitoring objectives that are currently being achieved using EM and potential objectives and fisheries where EM could be used to supplement or replace observers in the future.

Data Need	Compliance Monitoring Objective	Fisheries where implemented	Supplement/Replace Observers?
Verify proper catch sorting & weighing procedures	Video monitoring to verify that crew is not sorting catch inside the live tanks. Sorting is prohibited so that observers can obtain an unbiased sampled.	Catcher/processors (CPs) in Rockfish and Amendment 80 Programs	Enable observer data collection
	Video monitoring to verify that all salmon are sorted and retained to enable census and genetic sampling by an observer.	AFA CPs fishing for BS pollock	Enable observer data collection
	Video monitoring to ensure all Pacific cod are weighed on the motion compensated flow scale.	Longline CPs fishing for Pacific cod in BS	Supplement observer data collection
	Video Monitoring to ensure proper flow scale testing and use.	Being considered in revision to flow scale regulations	Supplement observer data collection
Verify Compliance with Full Retention Regulations	Video monitoring to verify that no fish were discarded	Not currently implemented in Alaska. Pollock catcher vessels in the GOA and BS are potential fisheries where this approach might be applied.	Replace vessel observers. Instead, observer sampling could occur in shoreside processing plants
Verify Gear Handling Requirements	Verify compliance with regulations to deploy streamer lines, carefully release of halibut, and to not use de-hooking devices	Not currently implemented in Alaska.	Supplement observers
Area Closures	VMS provides a specific tool that provides tamper evident reporting of vessel positions in real time, on a defined and automated reporting schedule. The information is captured in and OLE data system and used to support	There are many examples in AK where VMS is required in order to monitor the location of vessels in relation to area restrictions.	Supplement observers

	enforcement of time/area closures. System requirements are well known and defined elsewhere. There are secondary uses for science and management.		
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Appendix C: E-logbook audit compared to catch estimation approach using EM.

This Appendix is intended to provide information to support an informed discussion of the relative merits for choosing a monitoring approach best suited for fisheries in the North Pacific. There are significant tradeoffs that will need to be considered and the Councils' choice will largely control how NMFS directs future resources and rule making to support development of the desired approach.

As was described in the section on EM approaches, there are potentially two distinct approaches where discard is either based on self reported data (Audit) or where discard is estimated using data extracted from video (Estimation). The Audit based approach utilizes logbook data for catch accounting and the Estimation approach uses data extracted from the video recordings to estimate discard. In both cases, a combination of EM/ER would be required on the vessel. However the amount of observer coverage and where the observers sample (at-sea or in port) could vary greatly and would largely depend on funding and cost controls. Either approach could possibly be applied to the Council's EM management objective of collecting at-sea discard estimates from the 40' – 57.5' IFQ fleet, but could potentially be applied broadly to any fishery where catch is serially caught and discarded. Vessels operating outside the pool of vessels targeted for these approaches would still be required to carry an observer to ensure collection of a suite of information that an observer collects that video data cannot (Appendix D).

Potential model for e-logbook audit with EM/ER (compliance monitoring): A subset of vessels would be required to carry a suite of EM/ER tools for an entire year and deliver to a subset of ports in Alaska to control costs and make the program efficient and affordable. The suite of EM/ER tools would include video, sensors, and an e-logbook. In order for the program to be implemented quickly, NMFS would require a full retention requirement (except for PSC). The captain or other authorized crew member would be required to ID everything caught and discarded on the line to the same level an observer would be required to without having the fish in hand and record these species in an e-logbook that would be submitted at the end of every trip. The Captain or assigned crew would also be required to record disposition. Port samplers would be required at each of the designated ports to verify that the retained species are recorded correctly both in number and in species. EM would be used to audit a set portion of the self-reported logbook data to verify species specific logbook enumeration of retained and discarded fish. Questions related to species ID would still need to be answered to ensure the quality of the logbook audit.

Since there would likely be substantial penalties in the logbook-audit model associated with incorrectly identifying and enumerating discard in the logbook there would also need to be a period of time of approximately 2 years for training crew and vessel operators. This will be required to help ensure positive identification and enumeration of catch to a specific species with a high degree of accuracy while not putting substantial penalty on the Industry during startup. This approach has been shown to be a precise method for enumerating discard for a defined list of target species and is used in Canada to monitor precise vessel quota's in-season (Stanley, 2011)

Estimation-based monitoring approach using video to estimate discard rates in a fishery: This approach has not been used for any fishery under NMFS jurisdiction and methods are currently being developed using information collected in NMFS 2013-14 EM/ER projects in the North Pacific. Data collected from these studies are required to define capabilities and methodology of applying this approach to a fishery. It remains unclear whether this approach can be applied to any fishery at this time, but potential cost savings relative to an Audit based approach could be very large. Methods would likely be based on similar observer data collection procedures for estimating discarded catch using video data instead of an observer. High image quality will be required to ensure precise and consistent identification of both retained and discarded catch. High image quality also minimizes the cost of post-processing and data storage and supports development of an image processing application that automatically identifies species or species group in the future.

Given limitations of collecting high quality video necessary for species identification under difficult and often changing environmental conditions, this approach will require all hooked fish to be brought onboard. Retained and discarded catch would be required to be separated onboard and then flow past either a video camera designed to record discard or one designed to record retained catch under a controlled environment and lighting conditions. Cameras would be mounted above simple chutes or complex belt driven operations and therefore adaptable to most fishing operations. Vessel operators would be required to record species and weight/length of any drop-offs in the e-logbook. A compliance camera would be used to ensure handling procedures are followed. As with the Audit based system, an e-logbook would have to be maintained and hydraulic sensors installed to ensure accurate accounting of catch location and effort. Dockside monitoring would not be required in the estimation approach.

Automation of video processing: The current approach to processing video requires video data to be sent to NMFS for post-processing where a video reviewer streams video data on a monitor to find catch events which are then identified to species. This information is then entered into a database along with the location, date and vessel specifics that is used to enumerate species and produce catch statistics. Image processing applications for extracting catch events have been developed that we are hopeful can be applied to fisheries that will allow for onboard processing of video data that extract individual catch events and store only those images. This will greatly improve our ability to devise a cost effective and sustainable approach for video monitoring of fisheries in several ways including; 1) reduce post processing costs 2) reduce data storage costs 3) reduce data storage requirements onboard and therefore enable data collection for very long periods of time and 4) automate length measurements to estimate average weight. However, there remain a number of challenges that first have to be addressed before discard data collected from video will be sufficient to support estimation procedures. Finding solutions to these challenges and developing performance standards to support rule making are the focus of our study efforts in 2013 and 2014.

Comparison of 2 approaches:

There are substantial, differences, and tradeoffs between these two approaches (Table C-1, C-2, C-3).

Based on our understanding of current technology and requirements for a logbook-audit system this approach could be accomplished with existing camera and sensor technologies. However, both approaches would require a substantial amount of time to vet through the public process and write the regulations (1 year minimum). A key question that would need to be answered if logbook-audit approach was going to be implemented in Alaska is how to pay for the cost of the logbook auditing, and how, or if, the same financial incentives that exists in the Canadian program could be implemented in Alaskan fisheries. In the Canadian program, there is extra cost to individual fishermen if the audit reveals a large difference between the self-reported logbook data and the EM data. In these cases, the entire video from the trip may be reviewed and the fisherman pays for this extra review. This system provides a financial incentive to the fishermen to report as accurately as possible in their logbook and has shown to increase the quality of the self-reported data. The regulatory framework for implementing this type of an approach in Alaska has not been vetted and would likely need input from NOAA General Counsel.

Table C-1. Comparison of the requirements for a logbook audit approach to establish total discarded weight by species versus a estimation-based monitoring approach using video to estimate discard rates in a fishery.

Required Elements	Logbook audit based ¹	Video Estimation based
Logbook	Y	Y
EM sensors	Y	Y
Video imagery	Y	Y
Species weight	Y	Y
Hails	Y	N
Dockside monitoring	Y	N
Port Sampling	Y	N
Complex Scoring/Audit	Y	N
Catch based on self reported data	Y	N

Source: ¹Stanley et.al. 2011

Table C-2. Comparison of general considerations between the logbook audit approach estimation-based monitoring approach using video to estimate discard rates in a fishery.

General Considerations	Logbook audit based	Video Estimation based
Scalability is a function of	Ports/Fisheries/Season	Rate/Fishery/Season
Coverage flexibility	Difficult	Easy
Dependence on compliance	High	Low
Species ID limits	Species on audit	Any identifiable

	scoring list	species
Industry support and training	3 years	1 year
Potential cost controls	Audit rate/Scoring list	Sampling rate
Precision	Unknown-Self Reported	Depends on Sample intensity and rarity
CAS integration difficulty	High	Low
Discard spp. weight required	Yes	Yes
Limited Port of landing	Yes	No
Start up costs	High	Low
Monitoring costs	3.33% ¹	1.25% ²
Total	998	908

Source: ¹Stanley 2010 personal communication with NEFSC; and ² current Observer Program's cost recovery rate

Table C-3. Comparison of regulatory considerations between the logbook audit approach estimation-based monitoring approach using video to estimate discard rates in a fishery.

Regulatory Considerations	Logbook audit based ¹	Video Estimation based
Retention Requirements	Y	N
Data confidentiality and control	Y	Y
Industry responsibilities	High	Low
Enforcement action and penalties	High	Low
Port hail requirements	Y	N
Dockside monitoring requirements	Y	N
System component requirements	Same	Same
Maintain logbook	Y	Y
Logbook Audit requirements	Y	N
Species ID requirements	Scoring list	Maybe some

Source: ¹Stanley et.al. Personal communication

Appendix D: Assessing Current Observer Program Monitoring Activities for Hook-and-Line Vessels in Alaska

Each of the listed activities is a current 2013 data collection requirement for observers deployed on hook-and-line vessels in Alaska. These tasks were excerpted from the observer training manual available on line at: <http://www.afsc.noaa.gov/FMA/document.htm>. This table compares the current observer activities with the potential for other currently available approaches to collect the same data. The table illustrates what is possible right now with current technology and is not an assessment of what might be possible after further research has been completed. Appendix E has information about the potential for various tools to accomplish different objectives in the future.

Current Monitoring Activities of Observers on Hook-and-Line Vessels	Observer	EM (video)	Industry Reporting (landing reports, e-logbooks, etc)	Notes	Purpose
Birds					
Monitor and report take of short-tailed albatrosses	Yes	No	No		ESA Biop
Document all observations of short-tailed albatrosses	Yes	No	No		ESA Biop
Identify and count all other seabirds within samples	Yes	No	No		ESA Biop
Dead short-tailed albatrosses must be frozen and surrendered to the NMFS or the USFWS.	Yes	No	Potential	Physical specimens	ESA Biop
Mammals					
Record marine mammal sightings	Yes	Potential	Potential		MMPA
Record marine mammal interactions including deterrence, entanglements, lethal removals, ship strikes, and predation on fishing gear by sea lions, sperm whales and killer whales.	Yes	Potential	No		MMPA
Collect marine mammal parts (snouts, etc)	Yes	No	No	Physical specimens	MMPA
Fish					
Catch composition by species in number and weight to incorporate into the CAS for total catch accounting.	Yes, with some species limitations.	No	Yes (for landed catch)		MSA – catch accounting and ACLs

Catch composition by PSC species in number and weight to incorporate into the CAS for total catch accounting.	Yes	No	No		
Disposition of the catch (retained or discarded) by weight.	Yes	No	Potential		MSA
Viability of halibut released	Yes	No	No		IPHC and MSA
Sexed length frequency data for target and bycatch species	Yes	No	No		Stock Assessment and Council analyses
Sexed length and weight for salmon and crab	Yes	No	No		Stock Assessment and Council analyses
Misc biological collections (maturity, genetics, scales)	Yes	No	No	Physical specimens	Stock assessment , genetic, and ecosystem studies
Miscellaneous/Invertebrates					
Numbers, weights and identifications of corals and misc invertebrates (degree of ID varies)	potential	No	No		Habitat, potential for ESA issues, ecosystem research.
All Species					
Tag recoveries	Yes	No	potential	Physical specimens	Stock assessment
Collection of voucher specimens	Yes	No	potential	Physical specimens	Training and verification
Fishing, gear characteristics, and management program identifications					
Set/ retrieval dates, times, and locations.	Yes	Yes	Yes		Stock Assessment , Council analyses, Catch Accounting and

					Management
Location of non-fishing days.	Yes	Yes	Yes		Council analyses
Quantity of gear deployed in each set.	Yes	Yes	Yes		Effort
Quantity of gear retrieved.	Yes	Yes	Yes		Stock Assessment, Council analyses, Catch Accounting and Management
Hook Counts and spacing measurements of specific set segments (sablefish only).	Yes	No	No	Hook and line-sablefish only	Stock Assessment Catch Accounting
Gear performance, including instances of predation.	Yes	No	potential		Catch Accounting and MMPA interactions
Beginning and end Depth	Yes	potential, with sensor integration.	Yes		Stock Assessment and Council Analyses
IFQ- Yes or no	No	No	Yes		Catch Accounting Management
CDQ group number if applicable	No	No	Yes		Catch Accounting Management
Regulatory Compliance					
Compliance with careful release regulations.	Yes	Yes		Hook and line only	Regulatory Compliance
Ensure rehabilitation of injured short-tailed albatross	Yes	No		Physical handling required	Regulatory Compliance
Compliance with seabird avoidance measures	Yes	No			Regulatory Compliance
Compliance with time area closures	Yes	Yes, with GPS			Regulatory Compliance

		integration			
Real time position monitoring	Yes	Yes, with GPS integration			Regulatory Compliance
Witness flow scale testing and record test weights and results	Yes	potential		Flow scale vessels only	Regulatory Compliance

Appendix E: A summary of current EM research and development work (actions) identifying where they map into the goals, objectives and strategies of the EM strategic plan.

The following table shows the 2013-2014 Pilot project actions and the corresponding strategies, goals and objectives from the EM Strategic Plan. The actions will help us achieve strategies that are designed to meet specific objectives which collectively are intended to meet a specified goal.

	OBJECTIVES	STRATEGIES	Actions in 2013-14 EM Pilot Project
GOAL I	Objective 4: Secure funding to advance EM/ER technologies and use.	Strategy B: Apply for external grant funding through appropriate sources	Action: Two EM proposals (EM light and Stereo Cameras) were submitted to NPRB in 2012 and if funded will begin October, 2013
	Objective 3: Continue to develop the regulatory framework to implement EM/ER requirements.	Strategy A: Develop requirements to use EM for catch estimation.	Action: Identify agency/industry responsibilities. Action: Identify performance-based standards for regulations. Action: Assign and prioritize staff work on regulation development. Action: Develop vessel monitoring plans, maintenance protocols and operator responsibilities.

GOAL II

	OBJECTIVES	STRATEGIES	Actions in 2013-14 EM Pilot Project
	Objective 1: Conduct scientific research to advance the science of monitoring and data integration.	<p>Strategy A: Improve catch estimation methods by incorporating data gathered through electronic monitoring.</p>	<p>Action: Evaluate broad e-logbook coverage and technology that independently records specific catch location and total effort for improved specification on post strata assumptions and catch rates to support stock assessments.</p> <p>Action: Develop potential algorithms to estimate or inform discard in the Catch Accounting System.</p> <p>Action: Evaluate catch estimation assumptions and post stratification processes.</p>
		<p>Strategy B: Develop methods that can improve EM data to fill existing gaps such as length compositions, species identifications, and fish weights.</p>	<p>Action: Develop performance standards for species identification.</p> <p>Action: Build a stereo camera system (PSMFC funding support) to provide a prototype for testing automated review and collection of length compositions.</p> <p>Action: Develop vessel monitoring plans to improve ability to identify and quantify discard through discard control points.</p> <p>Action: Develop procedures where crew could potentially collect random samples.</p>

	OBJECTIVES	STRATEGIES	Actions in 2013-14 EM Pilot Project
GOAL II	Objective 1: Conduct scientific research to advance the science of monitoring and data integration.	Strategy C: Evaluate EM technologies in the 2013-14 EM project on volunteer vessels in the <57.5 ft longline and pot vessels.	<p>Action: Evaluate species identification issues.</p> <p>Action: Identify data gaps and potential solutions for species weight estimates, biological samples and rare species interactions.</p> <p>Action: Assess the efficacy of using technology for capturing information that would quantify discard and provide spatial and temporal distribution of effort.</p>
		Strategy D: Provide support to partners in cooperative research, and industry volunteers.	Action: Assist in providing technical support and guidance to fishing industry and other constituent research initiatives (e.g., two 2012 NFWF grants, EFPs).

	OBJECTIVES	STRATEGIES	Actions in 2013-14 EM Pilot Project
GOAL II	Objective 2: Reduce costs by gaining efficiencies in data processing and/or improving data quality.	Strategy A: Develop automated review and data extraction technologies to reduce costs, improve timeliness, and improve data quality.	<p>Action: Collaborate with AFSC Develop image analyses procedures in collaboration with AFSC staff.</p> <p>Action: Identify potential efficiencies in data processing and improving data quality such as automated review and data extraction technologies.</p> <p>Action: Build a stereo camera system (PSMFC funding support) to provide a prototype for testing automated review and collection of length compositions</p> <p>Action: Identify minimum image quality standards necessary for data extraction.</p>
		Strategy B: Identify fish handling practices and integration methods that will facilitate automation and improve data quality.	Action: Collaborate with Industry to develop Vessel Monitoring Plans.

	OBJECTIVES	STRATEGIES	Actions in 2013-14 EM Pilot Project
GOAL III	Objective 3: Understand all aspects of costs associated with EM technology integration, implementation, and processing.	Strategy A: Track all associated costs of the 2013-14 pilot study.	<p>Action: Track project expenditures to inform potential logbook audit approach or sample based approach to inform discard.</p> <p>Action: Determine cost to support EM such as port sampling and programming personnel, data storage, post processing, hardware, maintenance and installation.</p> <p>Action: Determine cost benefit ratios for various fleets or fleet sectors where EM could provide improvements or cost savings compared to observer coverage.</p>

Appendix F: Assessing the Range of Monitoring tools and their applicability to Fisheries Data needs.

At the Council's request, we adopted the table approach used in the Draft "Fisheries Roadmap" document which was distributed at a recent Council Coordination Committee meeting. We used the suggested table approach, and added to it by identifying specific fishery data needs and fishery characteristics relative to the North Pacific, adding additional tools, and providing our own interpretation of the potential utility of those tools in Alaska. We colored coded each cell to reflect the potential ability of a monitoring tool to meet a given data need. The color ratings are scaled as white (highly applicable) as light grey (potential), to dark grey (limited ability to meet data needs) and where tools are not appropriate for meeting specific data needs are colored black. We dropped interpretive text within the table and instead we have identified those areas where we are conducting research to improve the utility of the respective tools.

Ability to Meet Data Need	
Applicable	
Potential	
Limited	
Not Applicable	

Data Needs	Fishery or Data Characteristics		Independent Monitoring					Industry Reporting		
			VMS	Camera Systems	At-Sea Observers	Dock-side Observers	Other technology	Logbooks	Hailing or notifications	Fish tickets
Confirm that no catch was discarded	Full Retention- see appendix B also.			Current research						
Discards: species and amount (identification, count, length and/or weight)	Serial or low volume catch handling			Current research						
	High volume bulk catch handling	Single target		Current research (Coral ID)						
		Multi species								
	Species which are difficult to differentiate									
Discards: length and condition at release	Halibut discard in Alaska									
Retained Catch: species and amount	Serial or low volume catch handling			Current research						
	High	Single								

(identification, count, length, and/or weight)	volume bulk catch handling	target							
		Multi species							
	Species which are difficult to differentiate								
Spatial information for trip	Single management area								
Spatial information for fishing event	Multiple management areas								
Protected species interactions	Species caught		Current research						
	Species sighted								
	Condition at release		Current research						
	Behavior in relation to, or interactions with, vessel		Current research						
Operational	gear used								

Characteristics	quantity deployed								
	gear lost								
	hook spacing								
	Bait type and quantity								
	Economic data								
	Pre-trip logging, and prior notice of landing								
Biological data from catch	Physical specimens (tags, genetic samples, otoliths, stomachs, maturity, voucher specimens)								
	Length frequency								
	Sex								
Data to assess compliance with specific regulations – crew behavior	Specific targeted regulations would need to be identified – see appendix B.								
Time sensitivity	In-season accounting or		Current						

for end users	tracking		research						
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Appendix G: A description of how NMFS will coordinate with the EM working group.

NMFS staff members have worked on a number of Council advisory groups and the EM working group would be no exception. However, there is a distinction between staffing a working group and being on a working group. As monitoring is an area where NMFS has an interest and legal responsibility, we suggest that agency staff be named as working group members. Agency staff will be able to inform the data needs. We suggest that agency staff from NMFS AKR, NMFS PR, NMFS OLE, NMFS Observer Program, NMFS AFSC stock assessments, ADF+G, and IPHC be considered as working group members. This is because each of these agency groups are dependent on data collected from the commercial fisheries. Industry input on how data can best be obtained would be helpful, recognizing that agency staff input and expertise should drive the data requirements.

A major focus of this sub-committee could be solving operational problems we expect when integrating new technologies into the commercial fisheries and gaining support from fishery participants for testing and experimentation. An important aspect of having successful EM will be gaining fleet cooperation and partnership in moving forward. This sub-committee could be well placed to promote the communication and cooperation necessary for a successful program.

We suggest the sub-committee be initially tasked with reviewing the suite of tools which have been implemented in Alaskan fisheries and identify the existing monitoring gaps within the halibut and small boat fleets where EM may be applicable. In turn, agency staff can assist by identifying the data needs from these fisheries. Combined, the committee should be able to produce a recommended suite of e-monitoring tools which the Council should consider implementing to inform the Alaskan management effort.

We suggest the sub-committee could also consider the compliance information needed to support existing regulations in more cost effective manner. Consideration should be given to the creation of an equal playing field within industry for compliance information such that regulations can be consistently enforced.

As NMFS is facing reduced budgets and staff, it will be important to be efficient with the sub-committees work and minimize NMFS travel to the extent possible. It is also important to recognize that current litigation is NMFS first priority so scheduling will need to consider that priority.

Appendix H: Process for Obtaining an Exempted Fishing Permit in the Alaska Region of NMFS.

Purpose of an EFP

Exempted Fishing Permits (EFP) provides entities not affiliated with a government agency, university, or scientific institution the opportunity to conduct scientific investigations that would otherwise be prohibited by regulations governing the groundfish fisheries off Alaska. The research conducted under an EFP must have testable objectives described in a study design. Entities wanting to conduct exempted fishing must submit an application to NMFS Alaska Region for approval.

Most EFP activities in Alaska Region have focused on bycatch reduction; however, EFPs have also been issued to test fishing gear, provide information for stock assessment, and study electronic monitoring systems. The scope of permissible exempted fishing activity is limited by regulation: exempted fishing activity must meet the objectives of the Fishery Management Plan; exempted fishing activity shall not create substantial enforcement problems nor have a significant detrimental affect on living marine resources (e.g., cause overfishing); and the proposed research shall not have economic allocation as its sole objective. Unlike some other regions, the Alaska Region has a specific regulatory process to review EFPs. This process was established in consultation with the Council.

Agency Review Process

Permitting for most EFP takes a minimum of 6 months, but more complicated and controversial may take longer. The time period provides for review and completion of analysis. The review process, outlined in Federal Regulations at 50 CFR 679.6, requires: NMFS and the applicant to consult with the North Pacific Fishery Management Council; and Alaska Fishery Science Center approval the EFP study plan and experimental design. In addition, the EFP must be legally sound and all exemptions must be feasible. This requires review of the proposed EFP by NMFS Sustainable Fisheries Division (SF), NOAA Office of Law Enforcement (OLE), and NOAA General Council (GC). The type and extent of environmental analysis required depends on the scope of the project and potential environmental impacts.

Application Process

Frontloading the EFP process is critical to timely permit issuance once the permit is submitted to NMFS and creating a scientifically rigorous study plan:

1. Applicants should review EFP application requirements on the Alaska Region website (<http://alaskafisheries.noaa.gov/ram/efp.htm>), including EFP regulations at 50 CFR 679.6. This page also provides examples of past EFPs.
2. Contact staff at the Alaska Fishery Science Center (Jennifer Ferdinand) to provide advice on experimental study design and observer requirements (Martin Loefflad).

3. Contact Jeff Hartman with NMFS SF to assess possible impacts on in-season management, catch accounting, NEPA compliance, and other regulatory issues. This type of information is critical to developing a study plan.

Once an application is formally submitted to NMFS, the following is a summary overview of the approval procedure (see 679.6 for a detailed description):

- The AFSC is formally requested to review and approve the experimental design associated with the EFP application.
- Review of the application is scheduled with the Council.
- The appropriate NEPA document is identified and the analysis conducted. Depending on the type of NEPA analysis required, this may require the applicant to provide analysis to NMFS SF. NMFS SF will also work with NMFS Protected Resources to identify any potential Endangered Species Act issues.
- The US Coast Guard and Alaska Department of Fish and Game are provided the EFP application and associated analysis for review.
- A Federal Register Notice of Receipt for an Application of an EFP is published prior to Council review of the EFP. The public comment period is between 15 and 45 days for and EFP, with the comment period generally ending after the last day of the Council meeting.
- After the comment period is closed, all NEPA documentation, application material, and other supporting documentation are internally reviewed (i.e., NOAA OLE, NOAA GC, AFSC) and hopefully approved for final signoff by the Regional Administrator.
- Permit is issued to applicant. The permit describes terms and conditions consistent with the purpose of the experiment and legal requirements associated with exempted fishing activities. The applicant must agree to the terms and conditions prior to issuance of the permit.
- Upon completion of the exempted fishing, the applicant is generally required to provide a report to NMFS describing the study results. In some situations, the Council may also wish to receive a presentation about the findings.

Council Consultation

EFP applicants generally present information to the Council in support of their applicants. Generally someone from NMFS SF or the AFSC are present to present results from the NEPA analysis (if required). The Council will recommend whether to support the EFP.

Department of Commerce * National Oceanic & Atmospheric Administration * National Marine Fisheries Service

<i>NATIONAL MARINE FISHERIES SERVICE POLICY DIRECTIVE 30-133 EFFECTIVE DATE</i>	
<i>Administration and Operations</i>	
<i>POLICY ON ELECTRONIC TECHNOLOGIES AND FISHERY-DEPENDENT DATA COLLECTION</i>	
NOTICE: This publication is available at: http://www.nmfs.noaa.gov/directives/ .	
OPR: F/OP Type of Issuance: Initial	Certified by: F/OP (M. Holliday)
<i>SUMMARY OF REVISIONS:</i>	

Introduction.

This policy provides guidance on the adoption of electronic technology solutions in fishery-dependent data collection programs. Electronic technologies include the use of vessel monitoring systems (VMS), electronic logbooks, video cameras for electronic monitoring (EM), and other technologies that provide EM and electronic reporting (ER). The policy also includes guidance on the funding for electronic technology use in fishery-dependent data collection programs.

Constraining budgets and increasing demands for data are driving the need to evaluate and improve existing fishery-dependent data collection programs, in particular with respect to cost-effectiveness, economies of scale and sharing of electronic technology solutions across regions. The demands for more precise, timelier, and more comprehensive fishery-dependent data continue to rise every year.

The implementation of fisheries management regulations that require near real-time monitoring of catch by species at the vessel level have challenged the methodological and budgetary limits of data collection methods such as self-reporting, on-board observers, and dockside monitoring. A policy and process to consider the adoption of electronic technology options can help ensure the agency's fishery-dependent data collection programs are cost-effective and sustainable.

Objective.

It is the policy of the National Oceanic & Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NOAA Fisheries) to encourage the consideration of electronic technologies to complement and/or improve existing fishery-dependent data collection programs to achieve the most cost-effective and sustainable approach that ensures alignment of management goals, data needs, funding sources and regulations.

To achieve this:

1. NOAA Fisheries encourages the consideration of all electronic technology options to meet science, management, and compliance data needs.
2. Fishery-dependent data collection programs will be designed and periodically reviewed by NOAA Fisheries regions to ensure effective, efficient monitoring programs that meet industry and government needs, increase coordination between regions, and promote sharing of research, development and operational outcomes.
3. Fishery-dependent data collection programs may be comprised of a combination of methods and techniques including self-reporting, on-board observers, and dockside monitoring, as well as the use of electronic technologies including electronic reporting and video monitoring.
4. Where full retention regulations and associated dockside catch accounting measures are in place, NOAA Fisheries supports and encourages the evaluation/adoption of video cameras to meet monitoring and compliance needs in federally managed fisheries.
5. NOAA Fisheries encourages the use of electronic technologies that utilize open source code or standards that facilitate data integration and offer long-term cost savings rather than becoming dependent on proprietary software.
6. NOAA Fisheries, in consultation with the Councils and subject matter experts, will assemble guidance and best practices for use by Regional Offices, Councils and stakeholders when they consider electronic technology options. Implementation of electronic technologies in a fishery-dependent data collection program is subject to the Magnuson-Stevens Act and Council regulatory process, other relevant state and federal regulations, and the availability of funds.
7. No electronic technology-based fishery-dependent data collection program will be approved by NOAA if its provisions create an unfunded or unsustainable cost of implementation or operation contrary to applicable law or regulation. Funding of fishery-dependent data collection programs is expected to consider the entire range of funding authorities available under federal law, including those that allow collection of funds from industry.
8. Where cost-sharing of monitoring costs between the agency and industry is deemed appropriate and approved under applicable law and regulation, NOAA Fisheries will work with Councils and stakeholders to develop transition plans from present to future funding arrangements.

Authorities and Responsibilities.

This policy directive establishes the following authorities and responsibilities:

- (1) The NOAA Fisheries Science Board and Regulatory Board are the Executive-level sponsors of the execution of this policy, including oversight of the development of guidance and best practices. Staff support to the Boards will be provided by the Offices of Policy,

Sustainable Fisheries, and Science and Technology. Technical assistance will be provided by *ad hoc* working groups, NOAA Fisheries Headquarters (HQ), Region and Science Center subject matter experts, and other agency or contract resources as requested by the Science or Regulatory Board, subject to the availability of funds. Approval of guidance and best practices is subject to Leadership Council concurrence and Assistant Administrator approval.

(2) Regional Administrators and the Office of Sustainable Fisheries - Implementation of this policy will rely on Regional Offices (and the Office of Sustainable Fisheries with respect to Atlantic Highly Migratory Species) initiating consultations in FY 2013 with their respective Science Centers, Councils, States, Commissions, industry, and other stakeholders on the consideration and design, as appropriate, of fishery-dependent data collection programs that utilize electronic technologies for each Federal fishery.

Measuring Effectiveness.

(1) The consultations by the Regional Administrators and the Office of Sustainable Fisheries will be initiated in FY2013 with the goal of completing by the end of calendar year 2014 a schedule of where and how to adopt appropriate electronic technologies, if any, for all fishery management plans (FMPs).

The following metrics will be used to evaluate progress towards the implementation of this policy:

- The number of FMPs with defined fishery-dependent data collection monitoring goals.
- The number of FMPs reviewed to identify fisheries where the adoption of additional electronic technologies would be appropriate for achieving data needs.
- For fisheries where additional electronic technologies are identified as appropriate, the number of FMPs with electronic technologies incorporated into fishery-dependent data collection programs.

Status reviews of the metrics will take place twice a year by the Regulatory and Science Boards.

References.

Procedural directives will be issued to implement this policy as needed. This policy directive is supported by the glossary of terms listed in Attachment I.

Signature and Date Line.

 5/3/13
Sam D. Rauch III Date
Acting Assistant Administrator
National Marine Fisheries Service

Attachment 1 GLOSSARY

Terms

Electronic Technology(ies) – Any electronic tool used to support catch monitoring efforts both on shore and at sea, including electronic reporting (e.g., e-logbooks, tablets, and other input devices) and electronic monitoring (Vessel Monitoring Systems, electronic cameras; and sensors on-board fishing vessels).

Electronic Monitoring (EM) – The use of technologies – such as vessel monitoring systems or video cameras – to passively monitor fishing operations through observing or tracking. Video monitoring is often referred to as EM.

Electronic Reporting (ER) – The use of technologies – such as smart phones, computers and tablets – to record, transmit, receive, and store fishery data.

Fishery-dependent Data Collection Program - Data collected in association with commercial, recreational or subsistence/customary fish harvesting or subsequent processing activities or operations, as opposed to data collected via means independent of fishing operations, such as from research vessel survey cruises or remote sensing devices.

Full Retention – A type of fishery where total catch is retained and brought to shore, without discards. This is a generic definition, used in the Policy Directive for illustrative purposes only. There are multiple stages in the fishing process where intentional and unintentional discards can occur. Such variations (e.g., maximum retention, operational discards, prohibited species catch, etc.) require specific definition in each fishery for regulatory compliance and/or enforcement purposes.

DRAFT AGENDA

OBSERVER ADVISORY COMMITTEE (OAC)

June 3-4, 2013, Juneau, Alaska

NMFS Regional Administrator's Conference Room

4th Floor, Federal Building on Willoughby Avenue

Call-in Line 907-586-7060

(NOTE – times listed below are estimates!)

Monday, June 3

8:00 – 8:15 am – Introductions and review of agenda

8:15 – 9:30 am – Review of NMFS Strategic Plan for Electronic Monitoring (EM)

9:30 – 10:00 am – Public comment on EM Strategic Plan

10:00 – 10:15 am – BREAK

10:15 – noon – Develop Committee recommendations on EM Strategic Plan

Noon – 1:30 pm – LUNCH

1:30 pm – 2:30 pm – Review NMFS report on first year implementation

2:30 – 3:00 pm – Public comment on first year implementation issues

3:00 – 3:15 pm - BREAK

3:15 – 5:00 pm – Committee discussion and recommendations on first year implementation issues

Tuesday, June 4

8:00 – 8:30 am – Staff report on potential regulatory amendments

8:30 – 9:00 am – public comment on potential regulatory amendments

9:00 – 10:30 am – Committee discussion and development of recommended criteria/priorities for regulatory amendment package

10:30 – 10:45 am – BREAK

10:45 am – 11:00 am – Staff report on potential 3rd party joint partnership agreement (JPA) structure

11:00 am – 11:30 – Committee discussion/direction on potential 3rd party JPA

11:30 am – 1:00 pm – Continue as necessary

ADJOURN by 1:00 pm

Annual Performance Review

North Pacific Groundfish and Halibut Observer Program

First and Preliminary 2013 Version

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Disclaimer: This document is intended to provide scientific data and where appropriate, advice in the areas of regulatory management, natural science, mathematics, and statistics as they relate to observer deployment and sampling in the groundfish and halibut fisheries of the North Pacific. Any opinions expressed in this document are those of the authors and do not necessarily represent the position of their representative organizations.

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INTRODUCTION

In partnership with the North Pacific Fishery Management Council (Council), the National Marine Fisheries Service (NMFS) restructured the North Pacific Groundfish Observer Program (Observer Program). The new North Pacific Groundfish and Halibut Observer Program went into effect on January 1, 2013. The restructured program enables ongoing analysis and evaluation of the deployment of observers and the data collected in the program through an Annual Deployment Plan (ADP) and associated review process. The ADP process was developed to provide enough flexibility so that new scientific information could be incorporated, on annual basis, to adjust observer coverage to improve estimation, and maintain transparent public review of deployment.

As outlined in the 2013 ADP (NMFS, 2013). NMFS will present an annual report to the Council during its June meeting that provides an evaluation of observer activities, costs, sampling levels, issues, and proposed changes to the deployment plan for the following year. The annual report will inform NMFS, the Council, and the public about how well various aspects of the program are working, and consequently lead to recommendations through the ADP. This report is the first of the annual reviews and contains a scientific evaluation of the restructured program in early 2013. The report for 2013 is limited in the types of comparisons and inferences that can be made because only the first 16 weeks of data that had been collected under the restructured program is considered at the time of this writing to be quality controlled for this purpose. Thus, as stated in the 2013 ADP, this report is a progress report on implementation during the first 16 weeks of 2013. The first full annual review of the 2013 Observer Program will occur in June 2014.

As a first step towards developing a draft ADP for 2014, NMFS is providing recommendations and analysis from the Observer Science Committee (OSC) for Council comment. The final ADP will contain the NMFS analysis and recommendation on deployment using a synthesis of Council input and OSC recommendations on deployment methods. The OSC is an interagency working group enabled by the Observer Program that provides scientific advice to NMFS on deployment methods. Group members author this report.

Council recommendations will be considered by NMFS for incorporation into the draft ADP. The draft ADP will be available for review by the Council, the Scientific and Statistical Committee (SSC), the Plan Teams, and other Council advisory groups by September 1, 2013. NMFS will consider recommendations made by the Council during its October 2013 meeting to modify the draft ADP, recognizing limitations on the types of analysis that can be completed prior to finalizing the ADP in early December 2013.

This OSC report is broken into two sections: the Assessment of the Sampling Frame and the Proposed Deployment Plan. The assessment of the sampling frame provides an evaluation of observer activities, costs, sampling levels, and issues. As noted above, 2013 is the first year of the restructured program, so the assessment is a status report of implementation to-date in 2013. The Proposed Deployment Plan describes the proposed sampling design for 2014. In the future, the Proposed Deployment Plan will use information from the prior year's deployment to identify areas where improvements are needed 1) to collect the data necessary to manage the fisheries; 2) maintain the scientific goals of unbiased data collection; and 3) accomplish the most effective and efficient use of the funds collected through the observer fee. Since a full year of data has not yet been collected under the restructured program, the Proposed Deployment Plan for 2014 relies heavily on analysis conducted in the 2013 ADP.

ASSESSMENT OF THE SAMPLING FRAMES

The number of vessels, trips, observer coverage rates, and compliance with ADP assumptions were evaluated for each stratum. Here a stratum is defined as fishing operations subject to different observer coverage rules. Only those operations under the authority of NMFS to deploy observers under the 2013 ADP were considered in these evaluations.

These evaluations depend on identifying individual fishing trips. This can be accomplished for the partial coverage trip-selection stratum by combining information stored in the Alaska Fisheries Science Center's Fisheries Monitoring and Analysis Division observer databases (NORPAC and ODDS) and the Alaska interagency reporting system (eLandings). Since some observer deployment and at-sea data may not be immediately available to the Observer Program, only the first sixteen weeks of 2013 were included in analyses.

DOCKSIDE DEPLOYMENTS

Dockside observer duties vary between those observers that are deployed to monitor deliveries that occur in full-coverage operations and those that are deployed outside of full coverage operations. Full-coverage dockside operations include only those processors that take deliveries from American Fisheries Act vessels delivering pollock in the Bering Sea and Aleutian Islands. These processors are required by federal regulation to have observers available to sample shoreside deliveries while they are processing (accepting) deliveries of BSAI AFA pollock. In these full-coverage operations, an observer records delivery information, salmon bycatch information (e.g. total number of fish), collects specimens for genetic analysis from salmon, and collects otoliths and lengths from groundfish (to support stock assessments). Observers collect salmon genetic tissues according to the protocols of Pella and Geiger (2009), which requires a systematic sample of every n^{th} salmon to ensure a uniform random sample of the bycatch is obtained.

Observers in plants not receiving AFA pollock deliveries are in the partial coverage category. The 2013 ADP established the collection of tissue samples from Chinook salmon in the Gulf of Alaska pollock fishery as sampling priority for shoreside observers. Observers in this situation are supposed to be notified by industry of a pollock delivery- if this condition is not met the delivery will not be monitored. Once in the plant, the partial-coverage observer records delivery information, salmon bycatch information (e.g. total number of fish) and collect specimens for genetic analysis from salmon according to the protocols of Pella and Geiger (2009). Shoreside counts of salmon are used to estimate salmon bycatch in the Catch Accounting System (CAS) only when the trip is observed whereas genetic samples are collected from both observed and unobserved trips.

Since catch delivered by a tender is sorted at sea and may include the harvests of several vessels, the observer does not sample from or monitor these offloads. They record only the basic information on the tender vessel from information on the landing report: date, gear, area fished, delivered weight and program management code.

In the first sixteen weeks of 2013, a total of 748 deliveries of AFA pollock were made. True to expectations of the 2013 ADP, all of these deliveries were observed dockside and none of the observers were restructured observers (that is, employed by the observer provider company under contract by

NMFS to provide coverage for the partial coverage strata). During the same time period, 439 non-AFA pollock deliveries were made and eighty-eight percent of these were observed and sampled for salmon genetics (Table 1). In 2013, Kodiak was the principal port of deployment for partial coverage dockside observers since this port received the most Gulf of Alaska pollock deliveries and the port is relatively easy to reach. Kodiak had all but one delivery observed .

Table 1. Number of non-AFA pollock deliveries observed and unobserved.

Port	Unobserved	Observed	Total	Percent observed
Akutan	31	6	37	16.2
Inshore Floating- Dutch	2	6	8	75.0
King Cove	9	0	9	0.0
Kodiak	1	368	369	99.7
Seward	6	0	6	0.0
Sand Point	2	8	10	80.0
Total	51	388	439	88.4

BSAI COD VOLUNTARY 100% FLEET

Forty trawl vessels signed a compliance agreement with NMFS to carry full observer coverage when fishing Pacific cod in the BSAI. Of these vessels, 35 vessels ranging in size from 85 to 149 feet length-over-all (LOA) conducted 353 trips during the first sixteen weeks of 2013. The remaining 5 vessels that signed agreements did not land fish predominantly comprised of Pacific cod in the BSAI. NORPAC data confirms that all BSAI 100% Cod trips were observed. No restructured observers were used for voluntary deployments, in accordance with agreements specified in the 2013 ADP and letters of agreement sent to NMFS by participating parties.

FULL COVERAGE FLEET

The catcher processor vessels Kruzof, Judi B, and Amber Nicole requested and were removed from the full coverage stratum using exemptions at 50 CFR 679.51(a)(2)(v). A total of 2,647 trips were made by 151 vessels ranging from 51 to 376 feet LOA in the full coverage stratum during the first sixteen weeks of 2013. NORPAC data used to identify which trips are observed show that 99.7% of these trips were observed. However other data sources in NORPAC (e.g. haul information) indicate that the three trips with missing records were in fact observed. No restructured observers were used in accordance with the 2013 ADP.

PARTIAL COVERAGE FLEET

The Partial Coverage category includes vessels whose fishing operations are not required by federal regulation to always carry an observer. This category is divided into two sampling strata depending on the method used to deploy observers: trip-selection and vessel-selection.

- Trip selection vessels are those that are required to log trips into the Observer Declare and Deploy System (ODDS) using a NMFS supplied username and password. Each logged trip is assigned a

random number that determines whether a trip is to be observed. The sampling frame for trip-selection is generated one trip at a time.

- Vessel-selection vessels are those that are selected to have every trip observed for a two-month period of the year. From the pool of vessels that fished in the same two-month period in 2012, a number of vessels are randomly chosen for observer coverage. Only those vessels selected for coverage are provided access to the Vessels Assessment Logging System (VALS) in which they may petition NMFS for a conditional release of observer coverage. A conditional release is a case where the NMFS has decided under certain conditions to release the vessel from the observer coverage requirement for a period of time. If a vessel requests a conditional release from coverage through the VALS, NMFS follows up by contacting the vessel, conducting a visit and inspection of the vessel, and recording the results of the vessel assessment to be used in future vessel selections.

Trip Selection

A total of 1,300 trips were made by 206 vessels ranging from 58 to 176 feet in length in this stratum during the first sixteen weeks of 2013. Observer (NORPAC) data indicates that 17.7% of these trips were observed.

ODDS Performance

Non-randomness in the random selection of trips for observer coverage can lead to bias in deployments of observers that could be reflected in the final catch estimates. When a trip is logged into the ODDS, it is assigned a random number. If the random number generated for that trip is below a pre-programmed critical value, the trip is selected for observer coverage. After the launch of the 2013 Observer Program, a feature was added to ODDS to permanently store the random number assigned to a trip to allow tracking and evaluation of the generation and assignment of random numbers. Between February 14th and May 22nd, 1,272 trips were logged into the ODDS. From these records, there appears to be no pattern in the random number over time (Figure 1). Selection of trips for observer coverage based solely on the assigned random number is at 15.8 %, which is very similar to the anticipated rate of 14-15% in the 2013 ADP.

The rate of selected trips from the ODDS random number is not the same as the rate of observed trips. The differences are due to the fact that not all trips that are entered into ODDS are actually realized by the vessel. There is an opportunity for an ODDS user to cancel every trip that has been selected for coverage. However, ODDS automatically selects the operators next trip to be observed if the vessel operator had cancelled a “to-be observed” trip.

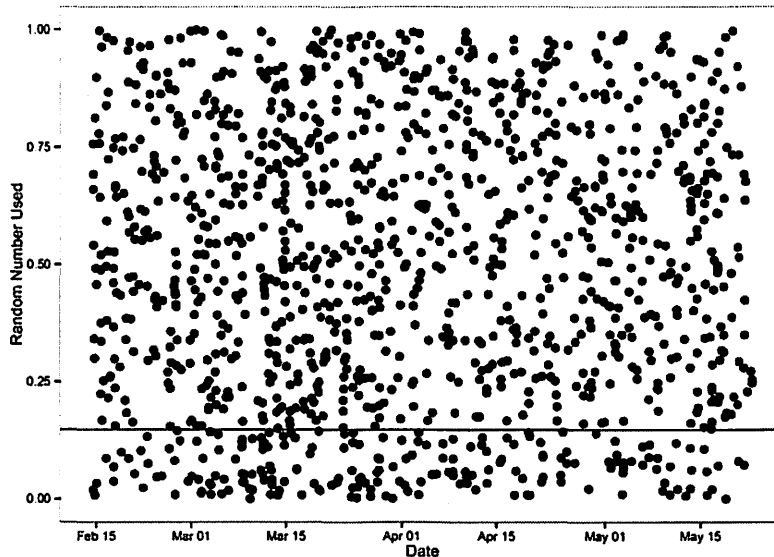


Figure 1. Random number used in ODDS organized by logged trip date. Each number is tied to a logged trip. Trips below the red line were selected for observer coverage based on the random number.

Vessel Selection

A total of 141 vessels ranging from 40 to 57 feet LOA in length made 507 deliveries in this stratum during the first sixteen weeks of 2013. Over both two-month sample periods, 11.8% of trips in this stratum were observed.

Two vessel-selections were conducted during the first 16 weeks of 2013. The NMFS targeted a fixed sample size based on the 2013 ADP. The targeted number of observed vessels for each two-month period (sample size) was equivalent to 11% of the number of vessels that fished in each selection period during 2011.

In each selection, a list of vessels identified as likely vessels to fish in the desired time period based on past activity were generated. Each vessel was assigned a random number. Vessels were then put into ascending order according to their random number, and the first n vessels were selected for observer coverage where n is the number of vessels to be selected.

The Agency over-sampled (that is, selected more vessels to carry observers than was necessary) in each selection to allow for changes in the vessels anticipated to fish in the upcoming two month-period. To evaluate how much over-sampling was necessary, the similarity between the list of vessels in this stratum that fished between 2009 & 2010, 2010 & 2011, and 2011 & 2012 were evaluated prior to the selection.

The weighted average across the three years indicated that the NMFS should expect that 77% of the vessels that fished in the first two months of 2012 would also fish in the first two months of 2013. For this first selection period, 74 vessels were identified as potential candidates for selection and assigned random numbers (fished in the same two months in 2012). The NMFS targeted sample size was seven vessels to carry observers during January and February of 2013. Therefore the NMFS selected nine vessels to carry observers during the first two months of 2013 (Table 2). Three of these selected vessels did not have valid Federal Fisheries Permits, reducing the number of valid selected vessels to six. Of the

74 vessels that were identified as potential candidates from 2012, only 28 actually fished in the first period of 2013 (a smaller set of vessels fished in both years than expected) and six new vessels fished as well. Only two of 34 vessels that fished in the first two months of 2013 were observed in this stratum. This equates to a coverage rate of 5.8% of the vessels that fished in the January – February period (Table 2).

In the second two-month period (March-April), 181 vessels were identified as potential candidates to carry observers and assigned random numbers. Making the same comparisons as for the Jan-Feb period, the NMFS expected that only 73% of the vessels identified from 2012 activity would fish in 2013. Based on the Jan-Feb randomization process, the NMFS anticipated that 14% of selected vessels would surrender their FFPs and 28% would be granted conditional releases. Hence, although the NMFS targeted 17 vessels to carry observers during March and April of 2013, twenty-nine were selected for coverage (Table 2). One hundred and nine (61%) of the 181 potential candidate vessels from 2012 actually fished in the third and fourth months of 2013. A total of 135 vessels fished during March and April of 2013, and of these 13 carried observers. Based on vessels, this equates to a coverage rate of 9.6% (Table 2).

Table 2. Vessel-selection metrics from the first and second selection draws of 2013. The first vessel-selection draw was for January-February and the second was for March-April.

	First Draw	Second Draw
Targeted Sample Size (# of vessels to carry observers in 2013)*	7	17
Vessels selected to carry observers	9	29
Vessels from 2012 anticipated to fish in 2013 (Sampling Frame)	74	181
Vessels that fished in 2013	34	135
Vessels that fished in 2013 but did not do so in 2012 (new vessels**)	6	26
Vessels in 2013 actually observed	2	13
Vessels coverage rate in 2013	5.8%	9.6%
Draw efficiency (vessels selected that actually carried observers)	22%	44%

*equivalent to 11% of the number of vessels that fished in 2011. ** these vessels had no chance of being selected for coverage.

SPECIAL CONDITIONS

CONDITIONAL RELEASES

Requested by the Vessel Operators

Trips were conditionally released when vessels provided a robust argument that either crew or an IFQ holder would be displaced by an observer. Of the 32 conditional release requests by vessel operators, 21 were granted (66%). Most release requests (28 requests) originated from vessels in the vessel selection stratum. Of the granted releases, 14 were crew releases (67%), 6 were IFQ holder releases (29%), and one was due to a life raft having inadequate capacity to accommodate an observer (5%). The duration of released periods (during which an observer is not required) ranged from a minimum of 4 days to several months (max 109 days), with the median duration being 38 days. The size of vessels requesting releases ranged from 41 feet to 58 feet LOA.

To evaluate the distribution of trip outcomes, all trips occurring within a calendar week that were observed, not-observed, and those that were released from coverage were summarized across both vessel and trip selection strata (Table 3).

Table 3. The total number of trips taken in the first sixteen weeks of 2013 by vessels in the partial coverage category. Trip totals will not sum to totals in other tables because some trips contain deliveries that span multiple weeks and are “double-counted” in this table.

Week	Total # Trips: Trip Selection	Total # Trips: Vessel Selection
1	54	2
2	86	4
3	97	6
4	146	28
5	164	18
6	133	21
7	92	5
8	60	19
9	71	27
10	58	23
11	147	51
12	104	62
13	63	54
14	79	57
15	60	43
16	104	93

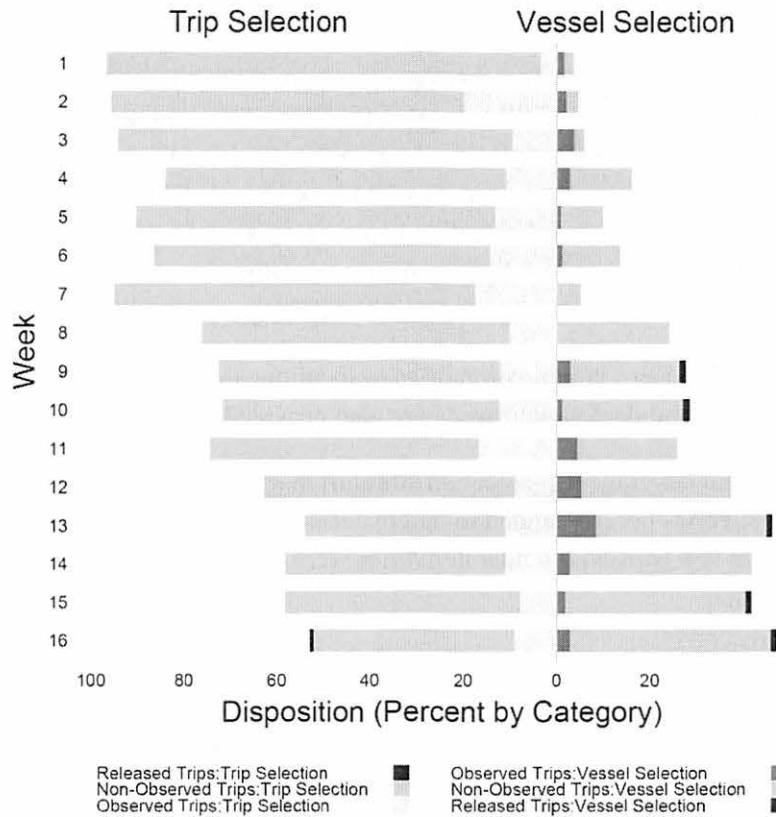


Figure 2. The relative percentages of trip dispositions for trip and vessel selection strata as a function of calendar week. Trip totals for each week are provided in Table 2.

Requested by Observer Provider

A total of 20 trips were not observed that should have been due to the failure of an observer to appear at the scheduled time of departure. These NMFS-issued releases were almost all during the first month of the program when a larger than expected number of "selected to be observed" trips resulted in a shortage of trained observers to deploy (Table 4).

Table 4. NMFS issued trip releases due to a lack of an observer.

Port	Jan	Feb	Mar	Apr	May	Totals
Adak	0	0	1	0	0	1
Akutan	3	0	0	0	0	3
Dutch Harbor	7	0	0	0	0	7
Kodiak	5	0	0	0	0	5
Sand Point	3	0	0	0	1	4
Totals	18	0	1	0	1	20

DELIVERIES TO A TENDER VESSEL

New definitions of a trip for the purposes of observer coverage requirements differ depending on the type of activity a vessel is engaged in. For a catcher vessel delivering to a shoreside processor or stationary floating processor, a trip is defined as the period of time that begins when a catcher vessel departs a port to harvest fish until the offload or transfer of all fish from that vessel. In contrast, for a catcher vessel delivering to a tender vessel, a trip is defined as the period of time that begins when a catcher vessel departs from port to harvest fish until the vessel returns to a port in which a shoreside processor or stationary floating processor with a valid FPP is located (§679.2). The definition of a tender trip allows a vessel to stay at-sea fishing and make multiple deliveries without ending the trip. There may be incentive to preferentially fish and made deliveries to a tender when unobserved. This situation should only occur in the trip-selection stratum; since in vessel-selection boats are observed for all activities during a two-month period. For comparison, trips were tallied by observed status, tender delivery status, and deployment stratum (Table 5). Methods used to identify tender trips are described in the next section.

Trips tallied by fishery, defined as a combination of gear, location, and predominant species (target), observer status, tender status and deployment strata are also provided (Table 6).

For those trips (in the partial coverage trip-selection stratum) that included at least one delivery to a tender, the number of deliveries per trip tended to be greater in unobserved trips compared to observed trips (Figure 3). Note that few trips with tender deliveries were observed and only a few observations are available for comparisons.

Similarly, distributions of trip duration (number of days per trip) showed evidence that observed trips were typically shorter than unobserved trips (Figure 4) in the trip-selection stratum. This trend was less evident in the vessel selection stratum. Again, note that there are limited data presented here from which inferences can be drawn.

Table 5. Number of deliveries made in each stratum, by observation status, whether a delivery was made to a tender vessel (offload type) and the sampling unit used (Rate Type). *: Observer data confirms that all trips were observed. This number is less than 100% because a field in NORPAC had not yet been updated in observer debriefing at the time of this writing.

Sampling Frame	Observed	Count	Observed	Offload Type	Rate Type
Vessel-Selection	43	440	9.8%	NonTender	Trip
Trip-Selection	220	1196	18.4%	NonTender	Trip
Full-Coverage	2,627	2,635	99.7%*	NonTender	Trip
No-Coverage	0	236	0.0%	NonTender	Trip
Vessel-Selection	17	67	25.4%	Tender	Trip
Trip-Selection	16	134	11.9%	Tender	Trip
Full-Coverage	12	12	100.0%	Tender	Trip
No-Coverage	0	39	0.0%	Tender	Trip
Vessel-Selection	60	507	11.8%	All	Trip
Trip-Selection	236	1330	17.7%	All	Trip
Full-Coverage	2,639	2,647	99.7%*	All	Trip
No-Coverage	0	275	0.0%	All	Trip
Vessel-Selection	15	172	8.7%	All Non Tender	Vessel
Vessel-Selection	5	27	18.5%	At Least One Tender	Vessel
Vessel-Selection	15	149	10.1%	All	Vessel

Table 6. Number of deliveries to a tender vessel organized by gear, NMFS area Target species, observation status and partial coverage selection pool. Gear codes: HAL=Hook and Line, POT=Pot, TRW=Trawl. Target codes: COD=Pacific cod, POL=walleye pollock. Since all deliveries are labeled as belonging to a tender trip if one delivery in that trip were made to a tender, some gear, areas, and target species combinations in this table do not represent activities typically associated with tender deliveries.

Gear Area Target	Total Deliveries	Deliveries Observed	Selection Pool
HAL_620_COD	1	0	Vessel
HAL_630_COD	48	7	Vessel
POT_610_COD	9	8	Vessel
POT_620_COD	1	0	Vessel
POT_630_COD	6	0	Vessel
POT_BS_COD	2	2	Vessel
HAL_620_COD	7	1	Trip
HAL_620_HBT	1	0	Trip
HAL_620_POL	1	0	Trip
HAL_630_COD	5	0	Trip
POT_610_COD	15	1	Trip
POT_620_COD	4	0	Trip
POT_630_COD	13	1	Trip
POT_BS_COD	13	0	Trip
TRW_610_COD	31	1	Trip
TRW_610_POL	8	1	Trip
TRW_620_COD	34	7	Trip
TRW_620_POL	20	4	Trip
TRW_630_ATH	2	0	Trip
TRW_630_COD	2	0	Trip

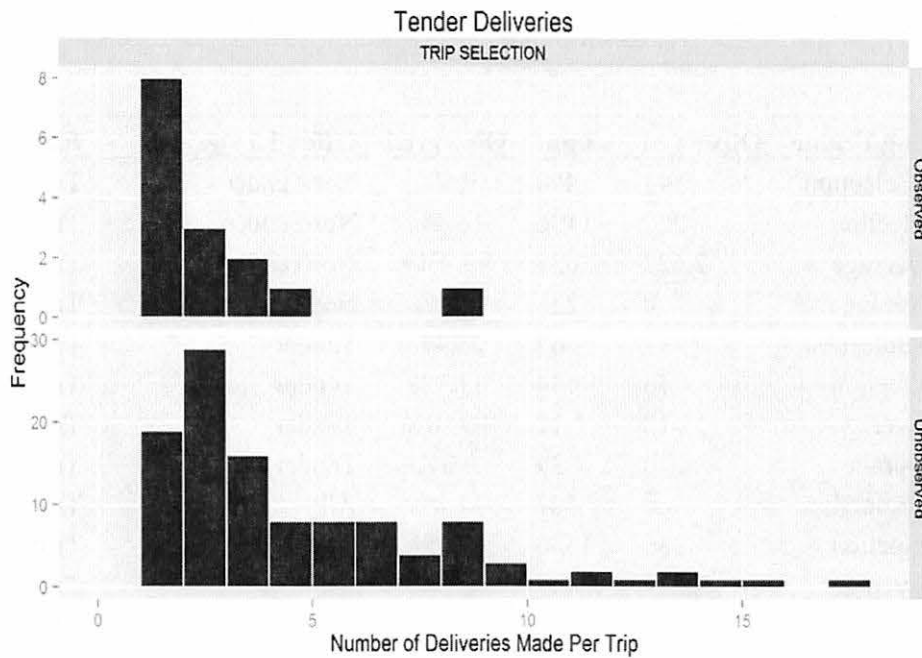


Figure 3. Distribution of the number of deliveries made in a trip in which at least one delivery was made to a tender vessel presented by observation status. Distinguishing individual trips (groups of tender deliveries) for vessel-selection operations is not possible with available data.

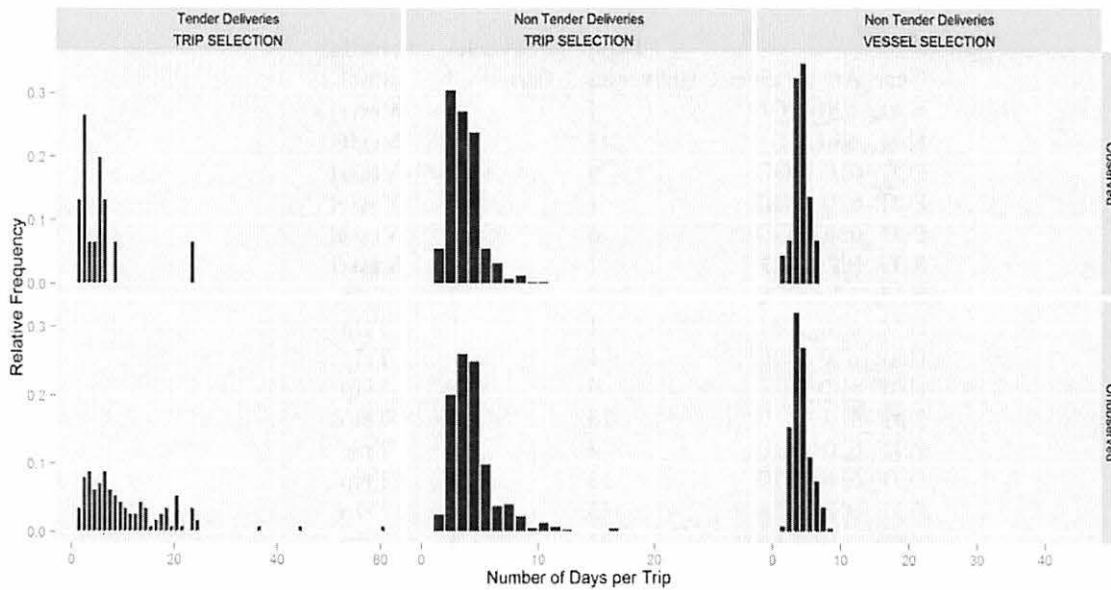


Figure 4. Distribution of the number of days fished in a trip by vessels in the partial coverage pool organized by observation status and whether or not the delivery was made to a tender. Separating deliveries from trips for vessel-selection operations is not possible with available data. The relative frequencies (vertical axis) in each plot sum to one.

BETWEEN YEAR AND STRATA COMPARISONS

IDENTIFICATION OF INDIVIDUAL FISHING TRIPS IN LANDINGS DATA

This section includes data collected from January 1, 2012 to May 23, 2013. To accurately assess deployment patterns and observer coverage rates under the restructured observer program, it was necessary to identify individual fishing trips, both observed and unobserved in the landings data. In the partial trip-selection stratum, individual fishing trips are the sampling unit and form the basis for observer coverage selection. Currently, landings data do not identify fishing trips, but instead individual deliveries are recorded based on management program (IFQ, CDQ, etc.), NMFS reporting areas, and other variables. When deliveries are made to two different processing plants or to tenders, determining which landings correspond to individual fishing trips can be difficult. For the partial coverage trip-selection stratum however, the ODDS data can be used to group most landings to the appropriate trip, although currently there is no explicit linkage between the two data sources. Therefore the following routine was used in an attempt to match trips logged into ODDS and the associated landings data.

The landings data (from eLandings database) had 35,091 landings records. These represent one record for each delivery, NMFS reporting area, and management program with trip targets, gear types, and dates also identified. Based on this information, the landings that occurred under the partial coverage stratum of the restructured (2013) observer program were identified.

Data from the ODDS trip log system contained records for 2,122 logged trips in 2013. Trips were required to be logged if the vessel was in the partial-coverage-trips stratum or part of the BSAI voluntary Pacific cod cooperative. Cancelled trips and BSAI cod trips were removed from the data. All remaining trips were ordered within each vessel and the date range between when a trip's logged start date (planned trip start) and the next trip's logged start date was identified. This date range was used to identify landings records (based on landing date) that were probably made on that logged trip; all landings that fell within this date range were attributed to that logged trip. For each logged trip, there may be several landings since deliveries may be split, be associated with multiple management programs, or from several NMFS reporting areas. In addition, multiple deliveries to tenders are grouped to a single fishing (logged) trip. There were 23 landings where the appropriate logged ODDS trips could not be identified. This may be because the trip started in December 2012, the logged fishing dates were inaccurate (changed before the trip began and the new dates not updated in ODDS), or the trip was not logged. Where possible, we attempted to identify and appropriately process these cases, however, this was not always possible given time and information constraints.

For landings made outside of the partial coverage trip-selection stratum, the landing report number was assigned as their trip identifier (this assumes one report ID for each trip). In contrast, trip identifiers were assigned to landings in the trip-selection coverage stratum to include all landings associated with that fishing trip based on ODDS records.

ACHIEVED COVERAGE RATES IN EARLY 2013

To assess the distribution of observer coverage in the various fisheries, graphs depicting the intensity of coverage by week of the year and gear-area-target species combination were constructed (Figure 5). Only the first 16 weeks of data were included from each year. Each cell in the plot depicts a specific type of fishing (vertical axis) for a given week (horizontal axis); e.g. Bering Sea yellowfin sole trawl fishing in week 3 of 2012. Note that in the Gulf and Aleutian Islands, area is defined as the NMFS reporting area while all the reporting areas in the Bering Sea are pooled.

Each cell is labeled with the number of trips (as defined above) that fall within the cell while the color of the cell label indicates the number of trips that were in the zero-coverage stratum, noting that there is a difference between a cell with no observed trips when none were required and having no coverage where all trips were subject to at least some observer coverage requirement. A cell where none of the trips required any coverage (zero coverage stratum, e.g. 2012 halibut target in any area) has a white label. A cell where some of the trips did not have observer requirements has a brown label (mix of zero coverage trips and partial or full coverage trips occurred), and cells where all trips would have been subject to coverage requirements have a black label (all trips were in either partial or full coverage strata). In addition, the cell (background) color indicates the proportion of trips in a cell that were observed; if none of the trips in a cell are observed the label is bold and italicized hence differentiating two close shades of grey (little coverage and no coverage; Figure 5).

Some trips can occur in multiple cells, for example if fishing occurred in two different NMFS areas or the trip spanned multiple weeks. Hence the total number of 'trips' in these cells is greater than the actual number of fishing trips (leave port, go fishing, return to port) that occurred. In addition, the number of trips in each cell includes trips that fall into different sampling strata (e.g. full and partial coverage).

Using the same type of graph in Figure 5 but focusing only on the 2013 observer deployments, trips were separated into the same cells (weeks and gear-area-target species) according to the sampling strata (Figure 6). Cells in which no trips were observed have white labels (number of trips), while cells with some trips observed have black labels. As expected, no fishing was observed in the zero-observer coverage required stratum, and there are only two cells in the full observer coverage stratum that did not have all trips observed (Figure 6). These full coverage trips were probably observed; however, all the data from these trips are not yet available.

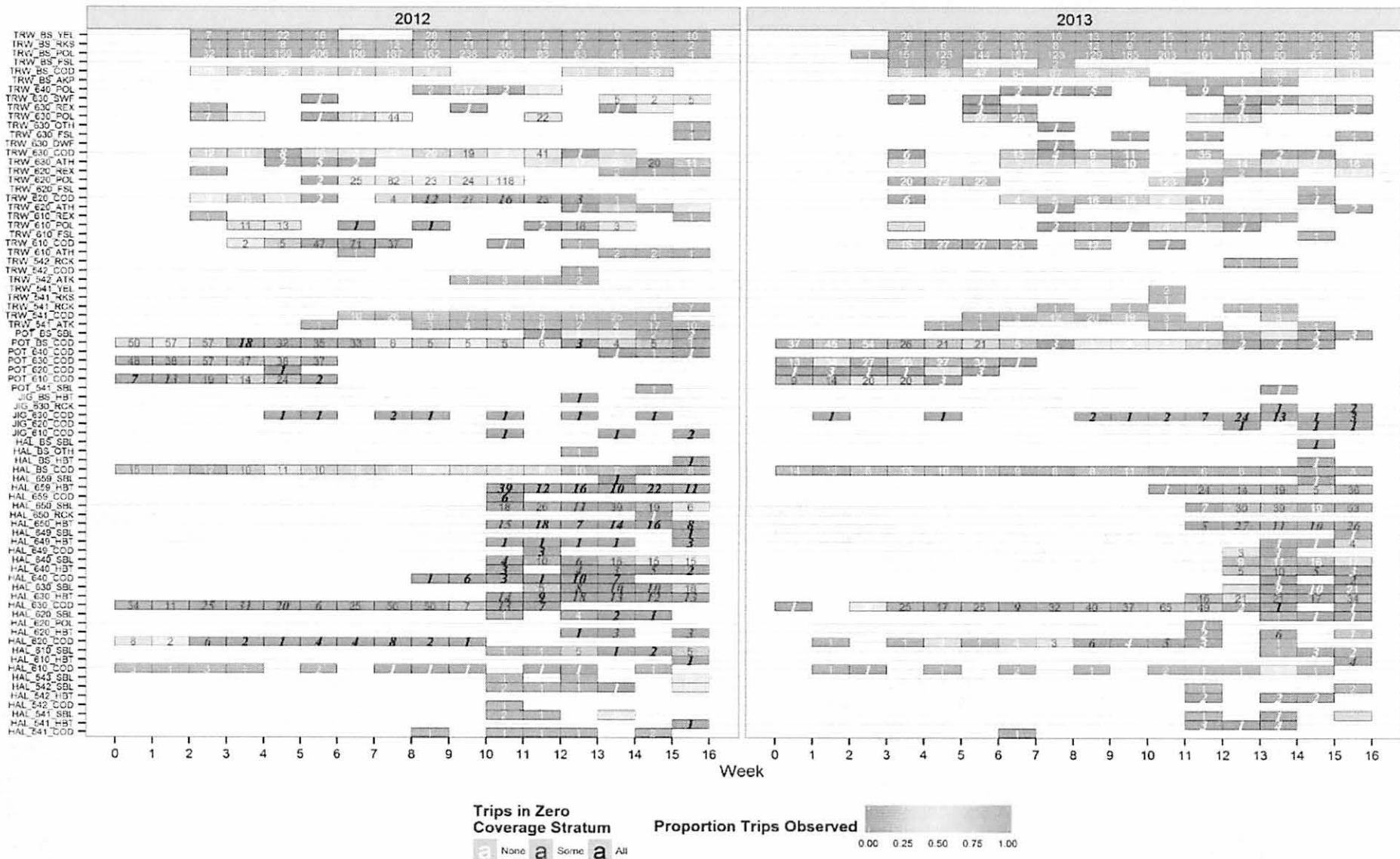


Figure 5 Distribution of fishing trips by gear-area-target species (vertical axis) for each week (horizontal axis). The cell label (text in the cell) indicates the number of fishing trips that occurred. The color of the text indicates which sample strata are represented in the cell, e.g. if all trips that occurred in the cell were in the zero-coverage stratum (e.g. <40ft) the label is white. Cell color indicates the proportion of trips that were observed. Cells with no observed trips have a bold, italicized label. Gear codes: HAL=Hook and Line, POT=Pot, TRW=Trawl. NMFS Areas were aggregated and coded as BS for those that occur in the Bering Sea, but not for those in the Aleutian Islands or Gulf of Alaska. Trip Target Codes follow those in Appendix 1.

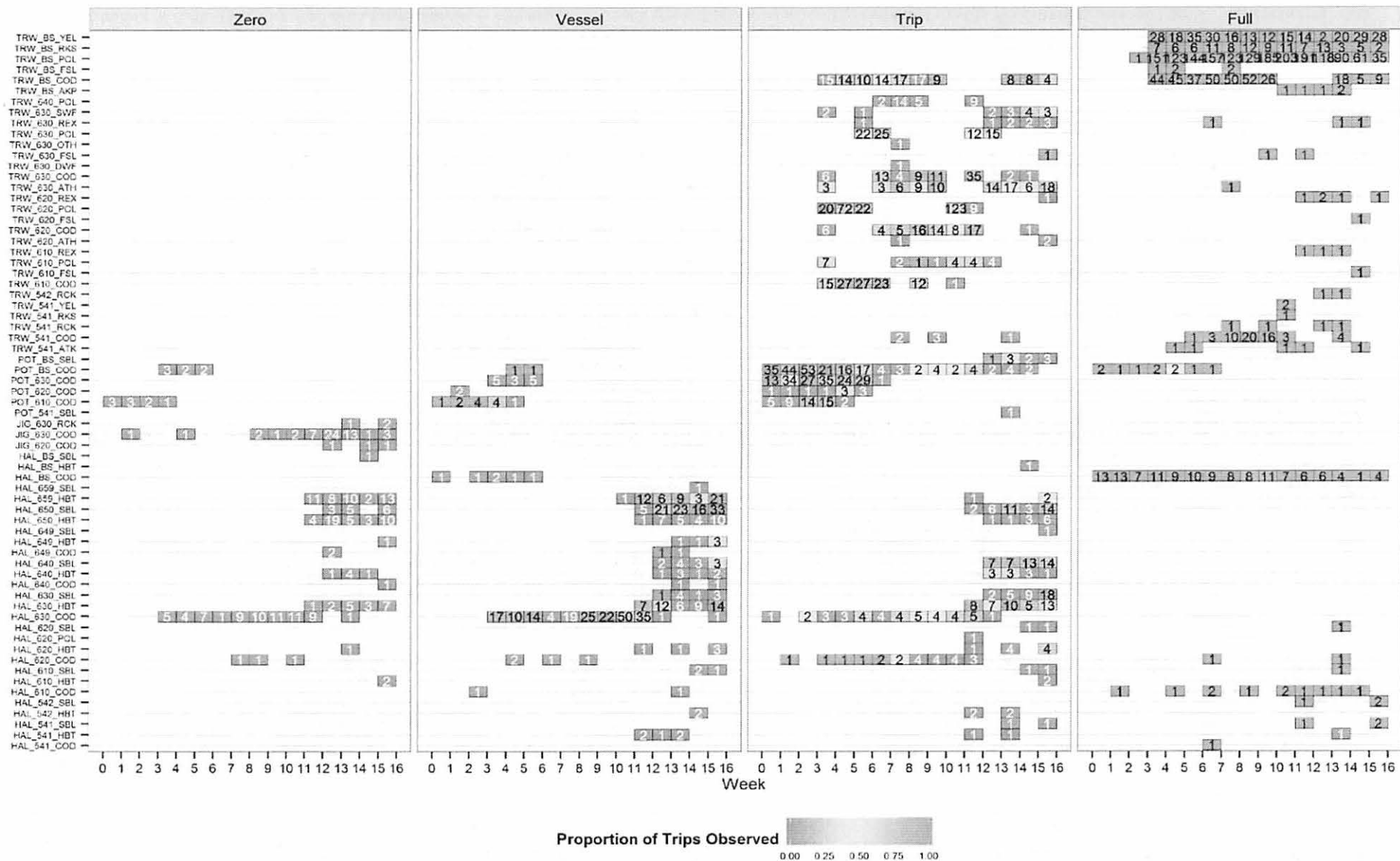


Figure 6. Distribution of fishing trips within each sampling stratum by gear-area-target species (vertical axis) for each week (horizontal axis). The cell label indicates the number of fishing trips that occurred. The color of the cell indicates the proportion of trips that were observed; cells with no observed trips have a white cell label (number of trips).

BILLABLE DAYS

It is important to realize that while most discussion about observer deployment in this preliminary review has been focused on coverage *rates* planned vs. those achieved; NMFS budgets determine coverage *amounts* (sample size). The amount of observer days billable under contract divided by the number of fishing days is the rate of observer deployment in days. The days billable represents a finite budget while the amount of fishing effort is variable. Consequently, the observer deployment rates are variable, and these rates may need to change during the year. The planned coverage rate used in the 2013 ADP was calculated from budget, cost per unit (days), and fishing effort data from two years prior. As already stated, realized coverage rates are based on the intersection between current budget, fishing effort and projected (deployment) rates of coverage.

The amount of billable days was aggregated by week and compared to the projections used in the 2013 ADP. While these values are continuously compared and updated by the Observer Program, here we limit data to the first 16 weeks of 2013 (Figure 7). The actual billable days has continually exceeded projections in the Trip Selection stratum.

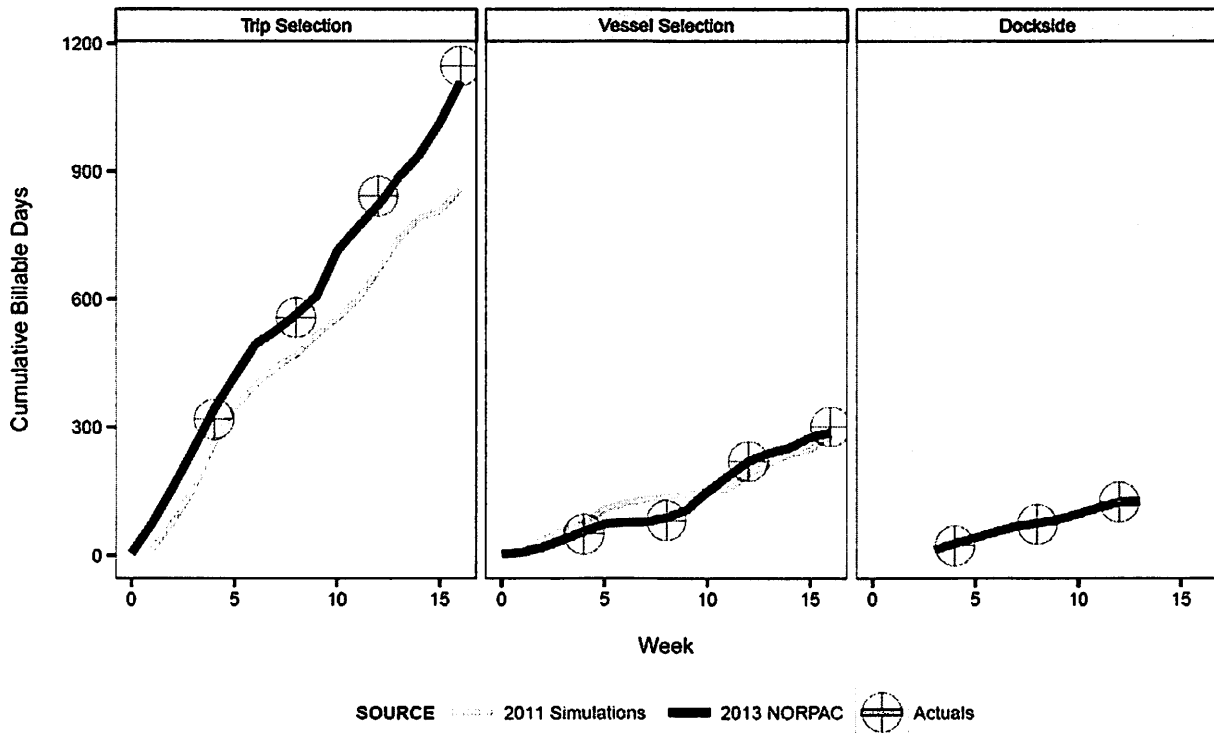


Figure 7. Trajectories of the cumulative number of billable days projected from simulations (2013 ADP) and 2013 actual monthly costs.

DEPARTURES FROM INTENDED SAMPLING DESIGN

These are preliminary results and only represent the first few months of 2013; hence caution should be used when trying to interpret the importance of these findings.

- Contrary to the belief that all Pollock offloads were monitored dockside, only 88% of Pollock deliveries outside of the AFA actually were observed.
- Conditional releases issued by NMFS have the potential to cause biased estimates of catch and discard if these vessels behave in a different manner (locations, catch, discard rates and species) than those vessels that are not released.
- The lack of a definitive list of vessels from which to make selections for observer coverage in the vessel-selection portion of the partial coverage stratum also makes for inefficient selection draws. Reasons for this include:
 - Many vessels that were identified as potential vessels for observer coverage from 2012 data did not fish in the following year.
 - Vessels that did not fish in the previous year are not included in the selection process (new vessels are not subject to being observed).
 - Since each vessel-selection draw is conducted 60 days in advance of the first day of the scheduled period to carry an observer, those draws are not as efficient as possible since they cannot be informed from the results of the draw immediately prior.
- There are data issues that make analyses of observer deployment difficult. For example:
 - For trip-selection, while the ODDS data can be used to group most landings to the appropriate trip, currently there is no explicit linkage between the two data sources.
 - Identifying trips in vessel-selection and no-selection pools is difficult to accomplish if there are multiple landing reports submitted for a trip.
- There are many factors that impact the ability of NMFS to accurately predict what budgets and selection rates are appropriate. These include:
 - Trip length may be different when observed compared to when unobserved,
 - Fleet size and fishing effort may be different from past years,
 - The realized selection rate may not equal the programmed selection rate.

PROPOSED DEPLOYMENT PLAN FOR 2014

Given the preliminary nature of the available data, our group does not recommend major changes to the 2013 ADP at this time. However, we see that the definition of a trip currently allows for differences in vessel behavior when delivering to a tender. For example, in the limited data collected so far in 2013, trips in trip-selection made to a tender have more deliveries when unobserved and also tend to be longer in duration.

REFERENCES

- NMFS (National Marine Fisheries Service). 2013. 2013 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. 39 pages plus appendices. Accessed on May 27th, 2013 at http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_Final_2013.pdf.
- 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.

APPENDIX

Table of abbreviations used for Target in Figures.

Abbreviation	Species (common name) or complex
POL	Walleye pollock
COD	Pacific cod
DWF	Deep water flatfish
SWF	Shallow water flatfish
HBT	Pacific halibut
RCK	Rockfish
FSL	Flathead sole
SBL	Sablefish
ATH	Arrowtooth flounder
REX	Rex sole
ATK	Atka mackerel
RKS	Rock sole
GRT	Greenland turbot
AKP	Alaska plaice
KAM	Kamchatka flounder
YEL	Yellowfin sole
OTH	Other