DRAFT
Alaska Region
Electronic Technologies
Implementation Plan

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1 Introduction

The National Marine Fisheries Service (NMFS) is committed to the use of electronic technologies in fishery dependent data collection to collect timely, cost-efficient data needed to manage US federal waters fisheries. In Alaska, NMFS and the North Pacific Fishery Management Council (Council) have been on a path of integrating electronic technology into fisheries monitoring programs for many years: we have advanced Electronic Reporting (ER) systems in place for landing reports (aka "fish tickets"), logbook and observer information; we have implemented a variety of monitoring tools like motion-compensated flow scales and Vessel Monitoring Systems (VMS); and have integrated video monitoring into several fisheries in a compliance capacity. We have conducted and continue to conduct experimental projects with Electronic Monitoring (EM) to configure and advance the technology appropriate for fisheries in the North Pacific. Further, application development, database and web technologies are continuing to revolutionize how we manage and report information to both internal and external constituents and improve cost efficiencies.

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."

In June, 2013, NMFS presented an EM/ER strategic plan (Loefflad et al., 2014, Appendix A) to

the Council. The document provided a vision for integrating electronic technologies into the North Pacific fisheries-dependent data collection program:

> 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.

The plan then outlined goals and objectives and the specific actions that it will take to achieve the vision.

The Council adopted the strategic plan as a guidance document for incorporating EM into the Observer Program. In addition, the Council recognized the halibut and sablefish fisheries as the highest priority for integration of EM and they recommended use of a catch estimation approach to develop EM for these fisheries. Finally, the Council created an EM Workgroup and tasked it to: identify EM performance standards, operational procedures, and sampling and deployment plans appropriate for IFQ vessels and also look at implementation vehicles and potential phase-in approaches. The Council recommended that the EM Workgroup use the following sections of the strategic plan to focus its efforts to develop a catch estimation based program for the IFQ fisheries: Goal II, Objective 1, Strategy C and Goal III, Objective 1, Strategy A (Loefflad, 2014).

Concurrent with the development of this North Pacific EM/ER strategic plan, NMFS was also looking at electronic technologies at the national level. In May 2013, NMFS issued Policy Directive 30-133, *Policy on Electronic Technologies and Fishery-Dependent Data Collection*[1], which called for the development of Regional Electronic Technology Implementation Plans to address regionally specific fishery dependent data collection issues and electronic technologies to address these issues. Importantly, the Policy Directive did not state that electronic technologies were appropriate for all of a region's fisheries or fishery management plans. Rather, it called for the identification of fisheries or fishery management plans for which electronic technologies are appropriate. For appropriate fisheries, the list has been identified as necessary components for Regional Electronic Technology Implementation Plans, noting that other issues can be added to meet regional fishery planning goals.

This document provides the Electronic Technology Implementation Plan for the Alaska region to meet the milestone outlined in the Policy Directive. This document does not replace the EM/ER strategic plan for the North Pacific nor does it supplant the implementation work that the Council's EM Workgroup is undertaking to integrate EM into the halibut and sablefish fishery. Instead, this document provides information about the specific EM/ER initiatives that are currently being undertaken to work toward implementing our vision where electronic monitoring and reporting technologies are integrated into NMFS North Pacific fisheries-dependent data collection program where applicable. NMFS and Council have been implementing electronic technology into fisheries monitoring program for many years. Here we provide a progress report on that implementation and information on the EM/ER initiatives that are underway. The document borrows heavily from the products generated from the EM Workgroup and

[1] Available at: http://www.nmfs.noaa.gov/op/pds/documents/30/30-133.pdf

information in the EM/ER Strategic Plan and, where appropriate, we have provided cross-references to the strategic Goals and Objectives.

2 Electronic Monitoring/Reporting Approaches

EM/ER technologies provide a variety of 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 monitoring approach. Decisions related to costs, feasibility, and effectiveness help to determine the right combination of tools needed to achieve objectives. 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.

2.1 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.

2.1.1 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 (Table 1~~Table 1~~). In all of these cases, video is being used to verify compliance with regulations for catch sorting and weighing. For example, video is being used on catcher/processors in the AFA fishery to verify that salmon have been sorted and stored properly to enable observer sampling.

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 elogbook 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.

2.1.2 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 industry contractors review a subset of footage after landing 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 are 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 is provides the public with assurance that self-reported data are being monitored for accuracy.

2.2 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 additional 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 timeliness 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.

2.2.1 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 (Table 1). 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
NMFS and the Council have implemented several catch share management programs in Alaska that include large EM/ER monitoring components (Table 1~~Table 1~~). The suite of EM/ER tools that have been implemented include: Observer electronic reporting software (Atlas) for timely reporting of observer generated data; elogbook for timely reporting of catch and area information; elandings for timely electronic reporting of landings and production 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 elandings 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). 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. However, on series of pilot projects in the GOA rockfish fishery evaluated the use of video in management of a catch share fishery to quantify the amount (in weight) of halibut discard from trawl catcher vessels (McElderry 2005; Bonney and McGauley 2008; Bonney et al 2009). Section 1.4.2.1 in the EM/ER Strategic Plan provides a summary of the results from this work (Loefflad et al., 2014).

2.2.2 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. (e.g. ALFA 2013, Ames 2005, Ames et al. 2005, Ames et al. 2007, Cahalan et al. 2010). The work being undertaken by the EM Workgroup builds on lessons learned from previous projects and is specifically working to find solutions to implement EM as an alternative tool to estimate discards on vessels where taking an observer is problematic (e.g. small vessels with limited bunk space).

3 List of Alaska fisheries suitable for implementation of EM and ER

A summary of the existing monitoring tools that are currently implemented in Alaskan fisheries is shown in Table 1. As described in the previous section, catch share programs require a more intensive suite of monitoring tools for management and these fisheries are therefore listed separately from the non-catch share programs. The table provides a summary of fisheries where additional ER and EM could potentially be suitable and yellow cells indicate those fisheries that

have been identified as the highest priority for implementation. The work being conducted in the high priority fisheries are described in more detail in Section 5 on EM/ER Initiatives.

Table 1. Summary of the existing monitoring tools currently implemented in the North Pacific. Catch share programs require a more intensive suite of monitoring t management and are therefore listed separately from the non-catch share programs. Green cells indicate fisheries where electronic technologies have already been i and regulated programs are in place. Fisheries where additional Electronic Reporting (ER) and Electronic Monitoring (EM) could potentially be suitable are noted; indicate fisheries that have been identified as high priority for implementation and have initiatives underway.

Program	Fishery	Current Requirements[2]									Additional ER I Suitabl
		ER for Landings &/or Production	Paper logbook[3]	ER for logbook (elogbook)	ER for Observer data (Atlas)	Flow Scale	VMS	Video	Observer Coverage	2nd Observer	
Catch Share	BSAI pollock Trawl CP & mothership (AFA)	Y	N	Y	Y	Y	Y	Y	100%	Y	
	BSAI non-pollock Trawl CP (A80)	Y	N	Y	Y	Y	Y	Y	100%	Y	
	CGOA Rockfish Trawl CP	Y	N	Y	Y	Y	Y	Y	100%	Y	
	BSAI Pcod Longline CP	Y	N	Y	Y	Y	Y	Y	100%	Y	
	CR Crab CP	Y	Y	Few- voluntary	N	Y	Y	N	100% - not NMFS	N	Y- elogbook
	BSAI pollock Trawl CV (AFA)	Y	Y	Few- voluntary	Y/N[4]	n/a	Y	N	100%	N	Y- elogbook; Atl
	CGOA Rockfish Trawl CV	Y	Y	N	Y	n/a	Y	N	100%	N	Y- elogbook
	IFQ Sablefish CP	Y	Y	Few- voluntary	N	N	Y- AI only	N	100%	N	Y- elogbook
	IFQ Halibut CP	Y	Y	Few- voluntary	N	N	Y- AI only	N	100%	N	Y- elogbook
	IFQ Sablefish CV	Y	Y	N	N	n/a	Y- AI only	N	Partial	N	Y- elogbook
	IFQ Halibut CV	Y	Y[5]	N	N	n/a	Y- AI only	N	Partial	N	Y- elogbook
	IFQ Halibut & Sablefish <40' LOA[6] CV	Y	Y[2]	N	N	n/a	Y- AI only	N	None	N	
Non-Catch Share	BSAI Turbot longline CP	Y	Y	N	N	N	Y	N	100%	N	Y- elogbook
	GOA Trawl CP	Y	Y	N	N	N	Y	N	100%	N	Y- elogbook
	GOA Longline CP	Y	Y	N	N	N	Y	N	100%	N	Y- elogbook
	BSAI Pcod Trawl CV	Y	Y	N	N	n/a	Y	N	Partial; some vessels 100% voluntarily	N	Y- elogbook
	GOA pollock Trawl CV	Y	Y	N	N	n/a	Y	N	Partial	N	Y- elogbook; tLa tenders; Atlas
	GOA non-pollock Trawl CV	Y	Y	N	N	n/a	Y	N	Partial	N	Y- elogbook; tLa tenders; Atlas
	Pot CP	Y	Y	N	N	N	Y	N	100%	N	Y- elogbook
	Longline & Pot >=40'LOA CV	Y	Y	N	N	n/a	Y	N	Partial	N	Y- elogbook; tLa tenders
	Longline & Pot <40'LOA CV	Y	N	N	N	n/a	Y- AI only	N	None	N	
	Jig	Y	Y	N	N	n/a	Y- AI only	N	None	N	

[2] Includes regulations that have been proposed for 2015 (http://alaskafisheries.noaa.gov/prules/79fr44372.pdf)
[3] Paper logbooks are required by NMFS for vessels >60ft
[4] Atlas is currently required for vessels >125' but some vessels <125' voluntarily use Atlas
[5] Paper logbooks are required by IPHC for vessels >26 ft fishing for halibut; vessels >60ft are also required to submit paper logbooks by NMFS and there is a shared IPHC-NMFS paper logbook.
[6] Length overall (LOA) of vessel

4 Regulations implementing EM/ER tools in Alaska

There are three regulatory approaches that have been used to implement EM/ER monitoring programs in Alaska: 1) prescriptive requirements; 2) type approval requirements; and 3) performance standards. In some cases, for example where EM is used for compliance monitoring, a combination of these regulatory approaches has been implemented to support the program.

Prescriptive regulations specifically define what activities must to be undertaken, how to conduct those activities, and who is required to comply. In general, the recordkeeping and reporting regulations for electronic reporting in Alaska (§679.5(e)[7]) follow a prescriptive regulatory approach. Implementation of additional ER programs in Alaska would require modification to regulations at §679.5(e).

Type-approval regulations lay out a process to grant approval to a product that meets a minimum set of regulatory, technical and/or safety requirements. The regulations governing the use of flow scales on catcher/processor and motherships are an example of type-approval regulations (§679.28[8]). Any flow scale that is to be used to weigh catch at sea must be on a list of approved scales. Scales are included on the approved list when they pass type-evaluation and testing (laid out in an appendix to the regulations[9]). This regulatory approach works for equipment, such as scales, that are part of a well-established technology with larger international trade organizations determining what types of scales to approve for use in trade.

Performance-based regulations put more emphasis on specifying a performance standard for the desired outcome and do not deliberately constrain how compliance is to be achieved. In Alaska, regulations governing catch monitoring and control plans requirements (§679.28(g)(7)[10]) are an example of performance-based regulations. The regulations describe how a shoreside processor will meet a set of specific standards to ensure that proper accounting for catch will occur and the shoreside processor submits a plan to NMFS for approval that describes how they will meet those standards. One aspect of implementing performance-based regulations is that they take cooperation between NMFS and the regulated entity, especially in the first years of a program. Alaska has had success with these programs, but this regulatory approach does take staff time for both the agency and the regulated entities.

The regulations that are currently in place governing the use of video for compliance monitoring have been implemented using a combination of prescriptive requirements along with performance standards (§679.28(h), §679.28(j) and §679.28(k)). Prescriptive requirements are used for specific types of equipment (for example, "16- bit or better color monitor") where a performance standard would be overly complicated. But if there may be multiple ways to achieve the same goal, the regulations describe a performance standard that gives a vessel the flexibility to have the necessary system configurations to meet that goal. New regulations for EM in Alaska would likely implement this combined approach, with performance-based

[7] http://www.alaskafisheries.noaa.gov/regs/679a5.pdf
[8] http://alaskafisheries.noaa.gov/regs/679b28.pdf
[9] http://alaskafisheries.noaa.gov/regs/679app.pdf
[10] http://alaskafisheries.noaa.gov/regs/679b28.pdf

regulations for many of the requirements and either type approval or prescriptive approach where performance-based standards would be cumbersome.

5 EM/ER Initiatives

Table 1 summarizes fisheries where electronic technologies have been implemented in Alaska and identifies potential fisheries where EM and ER could be expanded. This section describes five EM and ER initiatives that are currently being undertaken in Alaska. These initiatives maintain ongoing support to implemented EM/ER programs (green cells in Table 1) and support new EM/ER implementation for the highest priority fisheries (yellow cells in Table 1).

5.1 Electronic Monitoring using Video

5.1.1 EM for catch estimation in fixed gear small-boat fishery

Goal

The goal of this initiative is to assess the efficacy of EM for catch accounting of retained and discarded catch, and to identify key decision points related to operationalizing and integrating EM systems into the Observer Program for fixed gear vessels.

Project Description

The project is being conducted through a cooperative research program and a North Pacific Fishery Management Council (Council) committee, the fixed gear EM Workgroup (EMWG). The EMWG provides a forum for all stakeholders including the commercial fishing industry, agencies, and EM services providers to cooperatively and collaboratively design, test, and develop EM systems that are consistent with Council goals to integrate EM into the Observer Program.

The project goals will be achieved through: 1) field trials testing methods to provide quantifiable imaged-based data from fisheries, which can be used to support discard estimation in Alaska's fixed gear fleet; and 2) analysis ("desktop studies") of information from the field trials and past pilot work in related EM program where appropriate. This cooperative research will inform evaluation of multiple EM program design options and consider various EM integration approaches to achieve management needs. The research will: assess the functionality of EM for catch accounting, evaluate the operational costs for implementation of EM technology, identify implementation needs (e.g. people, training, infrastructure), and identify what self-reported data is needed from vessel operators for use with EM.

Data and analysis produced on costs, data quality, risks, operational procedures, and vessel compatibility will inform decisions on implementation phases, future investments in technology, and identify the combination of tools that will best meet NMFS, Council, and stakeholder management objectives. These decision points will be analyzed in a regulatory amendment, and the Council's recommendation, and subsequent NMFS rulemaking that will result in integration of EM options into the Observer Program.

Appendix B provides more details on the EMWG cooperative research being conducted to implement this initiative.

Linkage to the EM/ER strategic plan
This project addressed the following components of the Strategic Plan for EM/ER in the North Pacific (Appendix A):

- Goal II, Objective 1: Conduct scientific research to advance the science of monitoring and data integration.
    - Strategy C: Evaluate EM technologies in the 2013-2014 EM project on volunteer vessels in the <57.5 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.

Analysis of the results from the cooperative research will be used to develop a suite of alternatives for the Council to choose from to address, Council action, and development of regulations that will address:

- Goal III, Objective 1: Implement EM/ER technologies 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 approaches, impacts, costs, and benefits.
- Goal I, 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 for regulation development.
        - Action: Develop vessel monitoring plans, maintenance protocols and operator responsibilities.

Preliminary Timeline
The EMWG has developed a preliminary timeline, although it subject to change and refinement of the timeline is expected to be an ongoing process with a sustained commitment to building EM capacity. The Council may recommend implementation EM integration in phases as results from the cooperative research warrant, with ongoing refinement of EM technology, field services, and data review elements, as circumstances warrant. Currently, this is envisioned to occur with the cooperative research leading to "pre-implementation" phase of EM as the Council analysis and regulations are being completed.

Summary of preliminary timeline and major milestones, which are subject to change as the project progresses:

Council adopts EM/ER Strategic Plan and establishes initial priority of at-sea discard estimation for small vessel fixed gear fleet	June 2013

Commen
discusses

Standard/Stereo configuration research	March 2014-October 2015
Chute camera research	October 2013-October 2015
Operational testing	October 2013-October 2015
Council amendment process	2015- 2016
Pre-implementation	2016- 2017
Council final action	
NMFS regulatory process	
Implementation of regulatory program	

5.1.2 Compliance Monitoring

Goal

The goal of this initiative is to implement EM/ER technology where appropriate and cost effective to enhance compliance monitoring on catcher/processors and motherships.

Description

Starting in 2007, NMFS and the NPFMC have been implementing EM as a monitoring tool on catcher/processor vessels in four fisheries (Table 1). In all of these cases, video is required in combination with observers and the video is used to verify compliance with regulations governing catch sorting and weighing that are specific to each fishery:

- Longline catcher/processors that fish for Pacific cod in the Bering Sea that have chosen to have a flow scale aboard in lieu of an additional observer are required to have video monitoring of all areas where catch is sorted and weighed. The video monitors compliance with regulations regarding sorting and flow of fish over the scale.
- Trawl catcher/processors that fish for Pollock in the Bering Sea in the AFA program are required to have video monitoring showing all areas where salmon are sorted from catch as well as the location where salmon are stored until sampling by an observer.
- Trawl catcher/processors participating in Amendment 80 and the CGOA Rockfish program fisheries may choose video monitoring of the inside of fish bins as one method of ensuring that catch is not selectively sorted inside the bins before the observer has an opportunity to sample the catch.

In 2014 NMFS proposed to expand requirements for compliance monitoring with video to all catcher/processor vessels and motherships that are required to weigh catch at sea. These new regulations will go into effect in 2015 and all vessels that weigh catch at sea using a flow scale will be required to provide video monitoring of fish entering, moving across, and leaving the weighing platform of the flow scale. The regulations will also require video monitoring of all access panels allowing adjustments to the scale, and of crew activities in these areas. The scale display head and the light showing when the scale is in fault mode would need to be within the camera view.

Linkage to the EM/ER strategic plan

This project addressed the following components of the Strategic Plan for EM/ER in the North Pacific (Appendix A):

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

Timeline

- Work to audit the video to ensure compliance with regulations and improve system performance is ongoing.
- Regulations to expand the use of video for compliance monitoring on all catcher/processors and motherships that use flow scales will go into place in 2015.

5.1.3 Deck sorting of halibut Prohibited Species Catch (PSC)

Goal

Evaluate and test protocols and technology to enable monitoring and PSC estimation of deck sorted halibut on trawl catcher/processors in the Amendment 80 sector in the BSAI in order to reduce halibut mortality.

Description

Monitoring sorting and estimating the weight of discards of halibut that are sorted on-deck of the catcher/processor will require new protocols and electronic technologies including flow scales and/or video. Testing is necessary before this program can be effectively considered, analyzed, and implemented through rule making. Over the summer of 2014, industry tested a chute camera system and a flow scale as a "proof of concept." The initial trials showed promise, but additional testing is required that could be conducted under an Experimental Fisheries Permit (EFP).

Linkage to the EM/ER strategic plan

This project addresses the following component of the Strategic Plan for EM/ER in the North Pacific (Appendix A):

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

Timeline

The project is still under development so the exact timeline is not known and is subject to change as the project develops and there are results from the research. A very preliminary idea of timing and major milestones could be:

- Development of Exempted Fisheries Permit (EFP): Jan-June, 2015
- Presentation of EFP application to NPFMC: June, 2015
- Research preparation (installation of equipment, etc): Fall, 2015
- Research under EFP: Jan, 2015 – 2016
- Council analysis: 2017
- Development of regulations: 2018

5.2 Electronic Reporting

5.2.1 Interagency Electronic Reporting System

Goal

Provide and maintain a high quality, real-time fishery reporting system that supports sustainable fisheries while fostering positive relationships among partner agencies and with industry.

Description

The Interagency Electronic Reporting System (IERS) is an interagency project involving the three agencies that manage commercial fisheries in Alaska: NMFS, the Alaska Department of Fish and Game, and the International Pacific Halibut Commission. Commercial seafood processors are required to report data on seafood harvest to these three agencies. Traditionally reporting has involved a combination of paper forms, such as fish tickets and weekly production reports, and IFQ web-based reporting of halibut and sablefish. The IERS provides the Alaska fishing industry with a consolidated, electronic means of reporting landings and production of commercial fish and shellfish to multiple management agencies. The management agencies work together to implement the IERS to eliminate redundant fishery reporting to management agencies.

The IERS includes a suite of 5 reporting applications:

- eLandings - web-based access for seafood processors;
- Agency Interface - locally installed access for fishery management agency personnel;
- seaLandings - locally installed program which provides email-based access for catcher/processor and motherships that report at sea. SeaLandings also includes an elogbook for catcher/processors and motherships;
- eLogbook for catcher vessels - locally installed program with an elogbook for catcher vessels;
- tLandings - locally installed program for salmon, shellfish and groundfish tenders with no web access.

The long-term goal of IERS is to provide a single reporting system for commercial harvest, production, and logbook information for groundfish, halibut, salmon, and shellfish fisheries in Alaska. The eLandings reporting system was first released for the BSAI Crab Rationalization Program in August 15, 2005. eLandings reporting of groundfish and halibut IFQ landings started in January 2006 on a voluntary basis. The system became mandatory for groundfish in 2009. eLandings and tLandings for salmon was introduced in 2013 and is currently being incrementally implemented throughout the state salmon fisheries.

Requirements for elogbooks are currently in place for catcher/processors participating in the AFA and CGOA Rockfish program, as well as longline catcher/processors that fish for Pacific cod in the Bering Sea and use flow scales to weigh catch.

Linkage to the EM/ER strategic plan

This project addresses the following component of the Strategic Plan for EM/ER in the North Pacific (Appendix A):

- Goal III, Objective 1: Implement EM/ER where appropriate and cost effective to improve catch estimation and better inform stock assessment.

Timeline

- Work to support the existing IERS implementation is ongoing.
- Expansion of elogbook on catcher/processors:
    - NMFS has new regulations that will go into place in 2015 and expand requirements for elogbooks to all catcher/processors and motherships that use flow scales.

    - There are currently no plans to require the use of elogbooks by catcher/processors that do not use flow scales. However, these vessels already use seaLandings to submit production and landings data so it is possible for them to start using the elogbook without additional equipment or software and several longline and pot catcher/processors started submitting elogbooks in 2014.
- elogbook on catcher vessels: there are currently no regulations being considered to require elogbooks from catcher vessels although the elogbook is being used voluntarily by several trawl catcher vessels. NMFS is also working with ADFG to test the use of elogbooks on pot vessels fishing for crab in 2015.

5.2.2 Atlas

Goal

Provide and maintain a high quality, near real time reporting system for observer data that supports sustainable fisheries and provides support and guidance to observers deployed in the field.

Description

The Atlas software program allows groundfish observers to enter and send data directly from a vessel or plant to NMFS. The Atlas software application contains business rules that perform many quality control and data validation checks automatically, which dramatically increase the quality of the preliminary data. Data that are transmitted electronically arrive in a timely manner to managers. Without the Atlas program, data are faxed and then keypunched into a database by observer program staff in Seattle; this process increases the time for the data to be available to managers by a week or more. Additionally, observers onboard vessels with the Atlas software and transmission capabilities have the ability to communicate directly with Observer Program staff in near real time to address questions regarding sampling as well as notify staff of potential compliance concerns. Currently, all catcher vessels (CVs) greater than 125 feet length overall (LOA), catcher processors, and all shoreside and stationary floating processors that are required to have an observer present are required to have the Atlas software and transmission capabilities.

Linkage to the EM/ER strategic plan

This project addresses the following component of the Strategic Plan for EM/ER in the North Pacific (Appendix A):

- Goal III, Objective 1: Implement EM/ER where appropriate and cost effective to improve catch estimation and better inform stock assessment.

Timeline

- Work to support Atlas for the existing regulated fisheries is ongoing.
- Additional requirements for Atlas software, likely without transmission capabilities, are being considered for trawl catcher vessels under the GOA trawl bycatch management program and for AFA trawl catcher vessels <125ft LOA.

6 EM/ER Costs & Funding Needs to support Implementation

6.1 EM/ER Cost categories

There are a variety of issues to consider when it comes to EM/ER costs and funding. The obvious costs to consider are hardware and software, but many other factors and costs contribute to the successful implementation of an EM/ER program. These include infrastructure needs such as databases, hard drives, and data storage, data review and processing, staff support, training, and many others. Given the wide range and rapidly changing choices of technology and equipment in today's market, the following section describes the general categories of costs that should be considered during the development of an EM/ER program rather than specific types and costs of equipment. The type and cost of equipment and other infrastructure needed to support EM/ER tend to be highly variable and will depend on the scope and purpose of the EM/ER program. Thus, clearly defining the goals and objectives of the program will be important in determining the overall cost. The following cost categories have been identified as the primary drivers of costs and funding needed to support implementation of EM/ER projects.

6.1.1 Electronic Reporting

Hardware & software

Hardware and software are key components needed to facilitate electronic reporting. They are necessary components for the input, storage, and transmission of electronic data. Hardware and software are required at both the point of data collection (i.e. at sea or shoreside processor) as well as on the receiving end of the data stream (i.e. agency servers or computers). For ER occurring at sea, hardware may include a laptop or other appropriate equipment such as a tablet or handheld device capable of storing and possibly transmitting data. Shoreside processors will have similar requirements. On the receiving end of the data stream the agency will need to have the necessary databases, hard drives, data storage and processing hardware and software.

Field services

Field services, training, and user support are key ingredients in implementing ER. Costs may include direct staff salaries, training, and travel needed for support, outreach and education of industry partners.

Data Analysis Services

Trained staff are needed to process, review, and analyze electronic data and incorporate data for management purposes. Data analysis services are required to make meaningful use of any ER data. Costs may include direct staff salaries and training.

6.1.2 Video Compliance monitoring approach

Hardware

Hardware is one of the major cost drivers for video monitoring for compliance purposes. In Alaska, regulations require industry to pay the cost of equipment needed for video compliance monitoring programs (A91, A80, and freezer longline catcher processors). These costs have been analyzed in the EA/RIR for each of the Amendments[11]. Costs for hardware include video

[11] Amendment 80: see Section 1.10.6 "Effects on Management, Monitoring, and Enforcement" (starting on page 114, specific video monitoring equipment and storage costs are on page 129. Total installed system cost ranges from $4,050-$24,500/vessel. http://www.alaskafisheries.noaa.gov/sustainablefisheries/amds/80/earirfrfa0907.pdf

cameras, cables, and hard drives, and may include installation, maintenance, and repair costs, as well as costs to reconfigure spaces in the factory or on deck to accommodate cameras or other equipment.

Field services
Agency staff are needed to visit vessels, verify proper installation and operation, retrieve hard drives, and perform other functions. Costs may include direct staff salaries, contract costs for trained field personnel, travel, and training.

Data Analysis Services
Trained staff are needed to process, review, and analyze electronic data and provide feedback to NMFS OLE regarding potential violations. Data analysis services are required to make meaningful use of any EM data. Costs may include direct staff salaries and training.

6.1.3 Video for catch estimation

Hardware
Hardware is one of the major cost drivers for video monitoring for catch estimation purposes. Costs may include cameras, cables, hard drives, sensors, and other equipment needed for a fully functioning video monitoring system on board the vessel. Additional software costs may include development of software for automating image review and analysis for species identification and enumeration.

Field services
Agency staff are needed to visit vessels, install necessary software, verify proper installation and operation, retrieve hard drives, and perform other functions. Costs may include direct staff salaries, contract costs for trained field personnel, travel, and training.

Data Analysis Services
Trained staff are needed to process, review, and analyze video monitoring data and incorporate data for management purposes. Data analysis services are required to make meaningful use of any EM data. Costs may include direct staff salaries for video review, analysis, and training. Some of these costs may be reduced through development of software applications that automate the review process as described under hardware and software.

6.2 Infrastructure and Agency Funding Needs to Support EM/ER Implementation

6.2.1 Alaska Regional Office (AKR)

The AKR collects and manages catch data from North Pacific groundfish fisheries, develops and maintains information systems for integrating catch and observer data for estimating species-specific total catch, and uses that data to manage fisheries while maintaining harvest amounts

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Amendment 91: see section 6.3 "Management & Enforcement Costs" (starting on page 190)
http://www.alaskafisheries.noaa.gov/sustainablefisheries/bycatch/salmon/chinook/rir/rir1209.pdf
Freezer Longliner in the Bering Sea: see section 1.3.1 "Alternative 2: Scales alternative" (starting on page 34)
http://www.alaskafisheries.noaa.gov/analyses/groundfish/rirea_fllme0512.pdf

within specified, total-allowable catch, and prohibited-species catch limits. SFD staff develops, maintains, and installs electronic shore-side logbooks and software supporting the new interagency electronic reporting program, approves catch monitoring plans, certifies at-sea processor scales, and provides current and historic fishery statistics to other government agencies and the public, while maintaining the confidentiality of protected statistics.

To the extent that EM/ER is used to support many of the functions described above, funding would be needed for costs associated with EM/ER infrastructure, equipment, and hardware necessary for implementation.

6.2.2 Alaska Fisheries Science Center (AFSC)

The primary responsibility of the AFSC is to provide scientific data and analysis and technical advice to the AKR, the Council, the State of Alaska, as well as the fishing industry and the general public. The Fisheries Monitoring and Analysis (FMA) Division plays an integral role in fulfilling this responsibility, overseeing the North Pacific Groundfish and Halibut Observer Program (Observer Program) which monitors groundfish fishing activities in the U.S. EEZ off Alaska.

The FMA Division is in the process of building an EM program with a focus on cooperative research, and the research and development work needed to advance EM as a tool to supplement fishery dependent data collections. The FMA Division is leveraging the work conducted over several years by the Marine Assessment and Conservation Engineering (MACE) group in AFSC. The FMA Division is hoping to apply much of the work done with underwater cameras used in surveys to deckside applications on commercial vessels, and to continue its advancement in monitoring.

6.3 Cost Estimates

To support implementation of an EM program for catch estimation, AFSC and AKR would require funding to support the following activities:

STAFFING		
Position	**Cost/Position**	**Total**
1 FTE position for regulation development	$106,201*	$106,201
2 contract or FTE positions for application development	2 @ $106,201	$212,402
2 contract or FTE positions to support R&D and field work	2 @ $106,201	$212,402
2 contract or FTE positions for video review	2 @ $78,072**	$156,144
1 contract or FTE position for	$106,201	$106,201

database administrator		
INFRASTRUCTURE		
Data storage, hard drives, servers, computers	$500,000	$500,000
VIDEO EQUIPMENT		
Total installed system price for video monitoring system	100@ $14,275/vessel***	$1,427,500
Maintenance	100@2,390/vessel****	$239,000
TOTAL		**$2,959,850**

* based on the mid-range salary of a FTE ZP3 Step 2 + benefits. Contractor costs would be higher.
** based on the mid-range salary of a FTE ZP2 Step 2 + benefits. Contractor costs would be higher.
*** based on the estimated median cost of $14,275/vessel from A80 EA/RIR documents. The total number of vessels is an estimate and could increase or decrease depending on the regulatory package approved by the Council.
**** based on the estimated median cost of $2,390/vessel/year from A80 EA/RIR documents

6.4 Funding sources for EM/ER implementation

6.4.1 Federal Funding Sources

- NMFS FY15 Electronic Monitoring/Electronic Reporting budget line
- NMFS National Observer Program funds
- NMFS Fisheries Information System funds
- NMFS Reducing Bycatch funds
- NMFS Catch Share funds

6.4.2 Industry Cost Share Funding Sources

In January 2013 the North Pacific Groundfish and Halibut Observer Program (Observer Program) began to assess a broad-based fee to more equitably distribute the costs of observer coverage. This program is authorized under section 313(a) of the MSA. The Observer Program includes a full coverage, pay-as-you-go category, and a partial coverage category that is funded through a landings fee. Landings from all vessels in the partial coverage category are assessed a 1.25% fee on standard ex-vessel prices of the landed catch weight of groundfish and halibut. The fee percentage is set in regulation and is reviewed periodically by the Council and NMFS. The Council could recommend an increase in the future up to the MSA statutory limit of 2.0 %.

At this time observer fees may be used only for the deployment of human observers through a contract with an observer provider following an annual observer deployment plan that is developed by NMFS and reviewed by the Council. The final rule implementing the fee (77 FR 70080) explains that the Council explicitly chose to not include electronic monitoring in the alternatives considered under Amendments 86/76. Any use of observer fees for purposes other than deployment of observers under Amendments 86/76, including for electronic monitoring, would require the Council to change its fisheries research plan by submitting a fishery management plan (FMP) amendment to NMFS. If approved, NMFS would implement revisions

to the Council's fisheries research plan through federal regulations in accordance with section 313(c) of the MSA.

In summary, although observer fees cannot presently be used to fund EM, NMFS, the Council, and industry are in the process of developing an analysis that will form the basis of an FMP amendment to implement EM. Following implementation of an EM FMP amendment, observer fees could be used to fund EM. Other options that could be exercised include direct industry funding for video monitoring equipment as is currently the case for compliance monitoring video applications in Alaska.

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Appendix A. EM/ER Strategic Plan for the North Pacific

Need to paste an excerpt from EM/ER Strategic Plan -- include section 2 with the vision, goal & objectives.

Appendix B. NPFMC EM Workgoup

Need to incorporate this appendix after the EMWG meets in Nov. Items for the appendix: EMWG purpose, cooperative research plan, timeline, outcomes from Sept & Nov meeting, etc