

Electronic Monitoring Workgroup - Minutes

May 15-16, 2014

Heritage Room, Clarion Suites Hotel, Anchorage, AK

Workgroup: Dan Hull (chair)

Appointed: Bernie Burkholder (F/V Northern Endurance), Morgan Dyas (Saltwater, Inc.), Dan Falvey (ALFA), Stacy Buckelew (Saltwater, Inc. - alternate), Brian Lynch (PVOA), Howard McElderry (Archipelago Marine Research), Don Lane (NPFA - alternate), David Polushkin (KBFA), Jeff Stephan (UFMA)

Agency: Dave Colpo (PSMFC), Diana Evans (NPFMC), Heather Gilroy (IPHC), Nathan Lagerwey (NOAA OLE), Martin Loefflad (NMFS FMA), Tom Meyer (NOAA GC), Jennifer Mondragon (NMFS AKR), Megan Peterson (ADFG), Brent Pristas (NOAA OLE), Farron Wallace (NMFS FMA)

Others attending included: Sam Cotten, Jason Dean, Elizabeth Figus, Paul Grundholdt, Kathy Hansen, Bill Tweit

The Chair opened the meeting with introductions and a recapitulation of the workgroup's formation and purpose.

2014-2015 Cooperative Research Plan: Overview and Study Designs

Martin Loefflad presented an overview of the cooperative research plan, including draft tables synthesizing each of the four cooperative research tracks, from earlier ad hoc meetings. He and Farron Wallace explained the study design for Tracks 2 and 3, Howard McElderry presented the study design for Track 1, and Jennifer Mondragon led the discussion for Track 4. Through the course of the two-day meeting, **the Workgroup revised and agreed upon the overview of overall goals and objectives for the Cooperative Research Program, and the delineation of the four research tracks and how they will fit together.** The Cooperative Research Plan overview is included as **Attachment 1**. Once they are revised, the study designs will be appended to the overview to complete the research plan. Based on the feedback at this meeting, the lead authors will meet with their responsible partners to revise the study designs in June.

The Workgroup discussed at length the best way to estimate weights in the research tracks that are restricted to counting fish (i.e., Tracks 1 and 2, which do not also measure the length of the fish). Track 1 will include a conceptual evaluation of the different methods available to estimate weight from piece counts, and the group discussed whether additional data should be collected to validate any of these methods. For example, the group discussed adding a component to measure lengths (using a stereo camera or lengthboard) in Track 2. In order to ensure that the operational comparison between Tracks 1 and 2 remains consistent, however, the group suggested that it would be better to add an element to Track 3 to estimate weight using the counts as well as the length of fish, even though this would not provide data on making that estimation with the standard EM camera, and it may be difficult to accommodate halibut boats in Track 3. While the estimation of weight is a very important issue, the first priority is to get accurate counts and species identification, and improving the method for estimating weight may be an iterative process.

Some of the specific feedback for the various tracks is captured briefly below:

Track 1:

- develop track 1 so that outcomes can apply to any type of EM technology (standard or stereo cameras) – operational costs, operational support needs, categorizing groundfish and bycatch species in terms of identifiability, evaluating how to assess discard condition of halibut with EM, mechanisms for estimating weight indirectly from fish counts

- consider how to assess the changing ability of cameras to identify species when environmental conditions change (e.g., lens is wet, sun is setting, etc.)
- Fieldwork has already started. NMFS has recently sent out a letter offering release from observer coverage for volunteer vessels, while they are participating in the study.

Tracks 2 and 3:

- need to specify onboard handling, particularly with respect to deck sorting or large incidental catch species, in order to be able to compare tracks to each other
- Chute technology under Track 3 will need additional testing on trips without a technician onboard, to test how operable the equipment is on a variety of vessels and operational conditions
- assess the compatibility and utility of the chute camera in track 3 on smaller vessels, especially in the halibut fishery
- estimate weights using both lengths and counts in Track 3, using methods conceptually developed under Track 1
- to inform data review costs, suggest using two reviewers to look at the EM data, to assess both fish by fish and hook by hook, as hook by hook EM review is not likely to be the methodology used in an operational program
- including AFSC memo on catch reporting standards for GOA hook and line fisheries among appendices, and clarify that the appendices do not presuppose any particular research outcome
- Fieldwork will be supported by vessels that are compensated. The RFP(s) for Tracks 2 and 3 will be out in June, with a 30-day response period. May be two separate RFPs, as the bid price for each track will likely be different. Looking for some fixed gear vessels that can fish with EM in the fall of 2014, with most of work likely to occur in Spring 2015.

Track 4:

- for EM, need to collect effort and set location data, can be an open question whether works best through paper or electronic logbook
- one component is to collect data through an elogbook to validate the sensor information, to see whether it is possible to accurately model when a vessel is or is not fishing based on reading the sensors
- a key issue for a successful logbook program is training people; study design should address
- it was noted that logbooks in Track 4 (as an integrated tool with EM cameras designed for catch estimation) are not the same as “EM Lite”, a standalone monitoring system that has been talked about previously as a way to better expand observer (or EM) data to unobserved vessels.

There was a discussion about the available funding for the Cooperative Research Plan. Some money has already been allocated; there are also two other national NOAA funding pools that may provide money to contribute towards these projects (2014 VMS money that has been reallocated to EM, and potentially dedicated EM funding in the 2015 budget). To access a share of these funding pools, Alaska will be competing with other regions. One advantage of adopting a comprehensive, defensible EM Research Plan that integrates research and provides a clear path to implementation, is to strengthen Alaska’s application for EM funding. **The Workgroup recommends that the Council request to see budgets for the four research tracks**, however, so that if complete funding for the research plan does not come through, there will be a basis for prioritizing among the different elements of the research tracks.

Preliminary timeline and discussion of decision points

The Workgroup reviewed a preliminary draft Gantt chart prepared by Martin Loefflad, listing milestones associated with each of the research tracks, and with the Council amendment and regulatory process (Attachment 2). The timeline is designed around a cooperative research program that lasts from now through June 2015, intersecting with the analytical and rulemaking process that, under a best case scenario, would

have EM implementation occurring at the beginning of 2017. The Workgroup identified that based on the experience of other EM programs elsewhere, implementation will likely require a phased-in approach, as it depends equally on the availability of field support services and training, as it does on good technology and data processing. As a result, **the Workgroup recommends that the Council support continued fieldwork on deploying EM after June 2015, while the analytical and regulatory process is underway, to sustain capacity and continue to resolve implementation issues.** In order to better reflect this longer-term perspective, the Workgroup suggests renaming the program as the Cooperative Research and Implementation Program. Fieldwork after June 2015 might focus on gathering representative data across fisheries and under various operational conditions, noting that the program is currently reliant on voluntary vessels that may or may not be providing representative data, as well as testing costs or other assumptions resulting from the first year's research.

During the course of the two-day meeting, several key EM decision points were discussed, which the Council will need to consider in the amendment process for selecting an EM option for implementation. These include, but are not limited to:

- operational costs to industry,
- post-processing costs to the agency,
- timeliness of data,
- applicability of the technology to different vessel sizes,
- degree to which the technology requires an alteration in fishing operations,
- best method for weight estimation.

At a future meeting, the Workgroup will try to lay out all the key decision points and how they might be packaged into analytical alternatives.

The Workgroup noted several additional items that could be included on the timeline, relative to workproducts from the research tracks. These include a target date for output from some of the desktop modeling components of Track 1 with respect to species identification, and methods for estimating weight from fish counts, as well as a timeline for discussing options for subsampling. More detail also needs to be added with respect to developing implementation aspects. The Workgroup offered to work on refining the timeline at a future meeting.

Consistent data and review protocols for research projects

The Workgroup discussed draft protocols that have been identified at earlier ad hoc meetings, and began to add more detail. The group agreed that it is important to ensure that data collected among all the research projects is consistent, so that each of the tracks can contribute the necessary information to evaluate how EM should be implemented moving forward. **Attachment 3 provides the current draft of the data protocols document, with the Workgroup's input.** Research partners will meet in June to continue work on research plans and data protocols as necessary.

The group also identified that consistent data review protocols need to be considered and specified for the research projects. Dave Colpo will coordinate work on these issues prior to the next meeting, with the agency staff and other interested workgroup members, to define what PSMFC should be counting, and what else they should be looking for. A subset of these protocols relate specifically to the particular issues relating to halibut, on which he will seek the advice of the IPHC. Dave Colpo noted initially that for the first review, PSMFC would be evaluating 100% of all hauls, as a baseline to better discuss subsampling. It was suggested, however, that if the trip had known problems, then it might not be worth spending the time to analyze that data, although the trip would still be part of the study report. It will be beneficial to set a threshold of conditions that need to be met in order for the data to be analyzed.

With respect to subsampling, the group identified this as an issue for further discussion. Subsampling could occur by overall percent of fishing time, by percent of fishing effort (e.g. skates), or by fishing events (hauls). It was noted that it will be important to compare those types of subsampling methods, because they are likely to affect cost estimates of the EM program.

Independently funded EM projects

The Workgroup is interested in helping other EM projects in Alaska which are not within the umbrella of the Cooperative Research Plan to come up with data that will lead towards EM implementation. The group discussed how they might help with identifying a framework that other projects might find useful to do their work more effectively. **The Workgroup is interested in helping other projects to be as effective as possible, and had the following suggestions:**

- In developing the data protocols document, the Workgroup could consider how these protocols would apply to pot gear, including the necessary logbook fields.
- The Workgroup recommends that the Council identify the key management objective(s) for the pot and trawl fisheries, as has been done for the small boat hook and line fishery. For example, is the Council primarily interested in at-sea discard estimates, and if so, for all, or for key species?
- The Workgroup also recommends that the Council ask the AFSC to draft catch reporting standards for the pot and trawl fisheries, similar to the standards described for the GOA hook-and-line fishery in the AFSC's February 13, 2014 memorandum.

The Workgroup also encourages all vessels that are currently participating in pilot programs, or considering participation, to volunteer officially with the agency by May 30th, 2014. It is not clear, however, whether vessels that participate in the independently funded programs will qualify for the temporary release from observer coverage if they are not operating directly in projects that are under the cooperative research plan, and providing data or results that meet specific cooperative research needs. Some Workgroup members suggested that the Council and NMFS could develop an oversight or screening process as a way to integrate the independent projects and allow releases from observer coverage.

Scheduling

The Workgroup discussed meeting by teleconference over the summer, to review data protocols and revisions to the study designs that will be refined by Track leads and agency staff. Depending on the Council's decisions on tasking and scheduling, the Workgroup might plan its next in-person meeting to begin to articulate key decision points for an amendment analysis.

National Marine Fisheries Service Electronic Monitoring Cooperative Research and Implementation Program

Introduction

This cooperative research program has been developed to be responsive both to the implementation of the North Pacific Fishery Management Council (Council) EM Strategic Plan, and to Senate language included in the 2014 NMFS appropriations bill, which directed NMFS to work with the small boat fixed gear fleet to implement a program designed to test the functionality of available electronic monitoring systems. Multiple research tracks are being undertaken, in order to collect information that will help inform future Council alternatives for EM to enable catch estimation.

The research tracks that are included in the program, and which are described in more detail in the tables that follow, are:

- Track 1 Operationalizing Deployment of EM Systems
- Track 2 Comparison of Standard EM with Observers
- Track 3 Comparison of Stereo EM and Discard Chutes with Observers
- Track 4 Evaluation of Logbooks and eLogbooks (*to be integrated with Tracks 1, 2 and 3*)

These research tracks were developed and refined through a series of ad-hoc industry/stakeholder meetings, public workshops, and follow-up conference calls during the fall of 2013 and spring of 2014. In April 2014, the Council established a Fixed Gear EM Workgroup as a Council committee, to allow industry, agency, and EM service providers a forum to cooperatively and collaboratively design, test, and develop EM systems that are consistent with Council goals and objectives to integrate EM into the Observer Program.

Project Goal

The overall goal of this cooperative research project is to assess the efficacy of EM (in combination with other methods) 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 in a strategic manner.

Conceptual Approach, and Integration of Research Tracks

This goal will be achieved through a) field trials testing methods to provide quantifiable image-based data from fisheries, which can be used to support discard estimation in Alaska's fixed gear fleet, and b) desktop studies and information from past pilot work in related EM programs where appropriate. This cooperative research will inform the evaluation of multiple EM program design options and consider various EM integration approaches to achieve management needs.

EM data from Tracks 1, 2, and 3 will be collected consistently, and used to assess the functionality of EM systems for catch accounting. Track 1 provides the data to assess operational costs for the implementation of any EM technology, and identifies implementation needs (e.g., people, training, infrastructure). Tracks 2 and 3 compare the effectiveness of different EM camera technologies with observer data (two kinds of standard EM cameras, and two stereoscopic cameras, one mounted on the rail, and one in a chute), and compare post-processing of the data and operational tradeoffs between the two types of technology. Track 4, which will be integrated with the other tracks, evaluates what self-reported data is needed from vessel operators for use with EM, and the benefits and tradeoffs involved in requiring an eLogbook.

Attachment 1 – EMWG minutes, May 15-16, 2014

Data and analysis produced on costs, data quality, risk, operational procedures, and vessel compatibility will inform decisions on implementation phases, future investments in technology, and identify the combination of tools which 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 will result in the integration of EM options into the Observer Program.

Linkage to Council's EM Strategic Plan

The cooperative study addresses the following components of the Council's EM Strategic Plan:

- 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.
 - 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.

Analyses of the results from the cooperative study will be used to develop a suite of alternatives for the Council to choose from, to address:

- Goal III, 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. Following Council action, the next step will be to initiate Strategic Plan
 - Action: Write implementing regulations,
 - Action: Implementation, roll out, outreach.

Preliminary Timeline (*subject to change*)

The focus of this cooperative research effort is to identify and resolve implementation issues associated with integrating EM into the NPGOP. It is expected to be an ongoing process with a sustained commitment to building EM capacity. EM integration may be implemented in phases upon recommendation by the Council as results warrant, with ongoing refinement of EM technology, field services, and data review elements, as circumstances warrant.

Council adopts EM Strategic Plan and establishes initial objective of at-sea discard estimation for small vessel fixed gear fleet	June 2013
Track 1 research (<i>integrates Track 4</i>)	March 2014 – October 2015
Track 2 research (<i>integrates Track 4</i>)	October 2013 – October 2015
Track 3 research (<i>integrates Track 4</i>)	October 2013 – October 2015
Council amendment process	October 2014 – October 2015
NMFS regulatory process	October 2015 – November 2016
Implementation	January 2017

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Overview of research tracks

The following tables provide an overview of each of the research tracks. Sampling plan details and methods for each track are described in more detail in appendices for that track, at the end of this document:

Appendix 1:	Study design for Track 1: Operational Deployment of EM
Appendix 2:	Study design for Tracks 2 and 3: Comparison of EM systems with observers
Appendix 3:	Study design for Track 4: Evaluate logbooks, including elogbooks

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Track 1 – Standard EM

Goal - To gather information to help inform decision points related to how EM can be strategically deployed, in combination with other data sources to meet management objectives associated with estimating catch composition and weight in fixed gear fisheries		
Track 1. Standard EM only	Catch Accounting	Operational Program Specifications
Research problem(s) to be solved?	Evaluate the use of standard EM to identify species, quantity (pieces or weight), and utilization	Examine different monitoring approaches using EM and other information and develop potential operational program designs
Field work to be completed	Deploy EM systems to volunteer vessels out of Homer and Sitka, and other ports including Petersburg, Seward, and Kodiak	Establish port-based infrastructure to support deployed EM systems
Time frame - start and stop	March, and continue as necessary	March, and continue as necessary
Responsible partner	AMR/Saltwater	AMR/Saltwater
Data sets to be constructed	1. Catch/effort data by species and disposition from Standard EM data. 2. Meta data on EM system performance. 3. Species/weights from selected landings.	Operational program data including metadata on EM system performance, effort requirements by program task, program cost framework.
Source data	EM raw data, length-weight data, reference data on fishery species composition, halibut release mortality information.	Catch accounting results, skipper feedback, other fishery data
Responsible partner	AMR/Saltwater/PSMFC	AMR/Saltwater/PSMFC
Analysis	1. Evaluation of species identification ability and risk assessment for species that cannot be identified. 2. Compare different methods to derive weight from piece or length data. 3. Construct methodology for discard accounting (including halibut).	1. Consider a range of possible EM-based approaches, assessing their efficacy and operational impacts. 2. Develop an EM program design to specify requirements (onboard, field support, analysis, etc.) and data standards. 3. Develop a cost framework which can be used to evaluate different monitoring approaches.
Analytical limitations	Evaluation limited to volunteer vessels in two ports. Weight estimators would come from external data sources. Deployments on vessels do not carry observers.	<60' monitoring program is new and needs may not be fully defined; cost data may not be representative.
Responsible partner for analysis	EMWG	EMWG

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Track 2 – Standard EM with Observers

<p>Goal - to assess the feasibility of using electronic monitoring to sample and estimate catch by piece count in the fixed gear AK groundfish and halibut fisheries.</p>	
<p>Track 2. Standard EM with observers</p>	
Research problem to be solved?	The main goal of this research is to provide field-tested methods to provide quantifiable image-based data from fisheries that can be used to support discard estimation in the fixed gear fleet operating in the North Pacific.
Field work to be completed	Deploy camera systems to vessels to collect hook specific catch of fish species using EM and at-sea samplers.
Time frame - start and stop	June 2014 through June 2015
Responsible partner	NMFS and PSMFC
Data sets to be constructed	Hook-specific catch of fish species on the fishing gear from 1: EM imagery and 2: at-sea samplers. Trip effort data.
Source data	1. At-sea observer, 2. EM Video data, 3. e-log, 4. Gear sensors and GPS
Responsible partner	NMFS and PSMFC
Analysis	<ol style="list-style-type: none"> 1. Compare species identification between Observer and camera-based monitoring. 2. Compare discards and discard rates between Observer and camera-based monitoring 3. Collect data to help inform relative efficiency, cost and potential bias of the two discard estimation methods 4. Evaluate reliability and the timeliness for data to be available for management of the two discard estimation methods.
Analytical limitations	The sample size of up to 4 vessels may not be adequate to ensure a representative sample across the fleet. Experimental costs may not reflect actual operations.
Responsible partner for analysis	NMFS and PSMFC

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Track 3 – Stereo EM with Observers

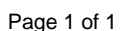
<p>Goal - to assess the feasibility of using electronic monitoring to sample and estimate catch by weight in the fixed gear AK groundfish and halibut fisheries.</p>	
<p>Track 3. Stereo camera EM with observers</p>	
<p>Research problem to be solved?</p>	<p>The main goal of this research is to provide field-tested methods to provide quantifiable image-based data from fisheries that can be used to support discard estimation in the fixed gear fleet operating in the North Pacific.</p>
<p>Field work to be completed</p>	<p>Deploy camera systems to vessels to collect hook specific catch of fish species using EM and at-sea samplers.</p>
<p>Time frame - start and stop</p>	<p>June 2014 through June 2015</p>
<p>Responsible partner</p>	<p>NMFS and PSMFC</p>
<p>Data sets to be constructed</p>	<p>Collect hook-specific catch of fish species on the fishing gear using EM and at-sea samplers.</p>
<p>Source data</p>	<p>1. At-sea observer, 2. EM Video data, 3. e-log, 4. Gear sensors and GPS</p>
<p>Responsible partner</p>	<p>NMFS and PSMFC</p>
<p>Analysis</p>	<ol style="list-style-type: none"> 1. Compare species identification between Observer and camera-based monitoring. 2. Compare discards and discard rates between Observer and camera-based monitoring. 3. Compare precision of estimates between Observer and camera-based monitoring. 4. Collect data to help inform the relative efficiency, cost and potential bias of the two discard estimation methods. 5. Evaluate reliability and the timeliness for data to be available for management of the two discard estimation methods.
<p>Analytical limitations</p>	<p>The sample size of 5-10 vessels may not be adequate to ensure a representative sample across the fleet Experimental costs may not reflect actual operations. Reliability and system performance may not be representative of actual operations.</p>
<p>Responsible partner for analysis</p>	<p>NMFS and PSMFC</p>

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Track 4 – E-Logbooks (to be integrated with Tracks 1, 2 and 3)





<p>Goal - to determine the self-reported data needed to estimate catch in the fixed gear AK groundfish and halibut fisheries</p> <p>Track 4. Logbook, including elogbooks</p>	
Research problem to be solved?	<p>Determine what self-reported (fishery dependent) information is needed and the timelines and accuracy of these data. Objectives:</p> <ol style="list-style-type: none"> 1. Identify minimum fields that are needed from logbooks to complement EM catch estimation and serve agency needs. 2. Evaluate the efficiency gains of elogs versus paper logbooks. 3. Identify QC procedures and automation methods for improving data accuracy. 4. Determine fishermen friendly attributes that could be incorporated into logbooks.
Field work to be completed	Incorporate logbook components into tracks 1-3
Time frame - start and stop	May 2014 - June 2015
Responsible partner	NMFS
Data sets to be constructed	Location and effort data, by set and by vessel. Sensor data.
Source data	<ol style="list-style-type: none"> 1. paper logbooks, with data entry by technicians post-fieldwork; 2. elog; 3. Gear sensors and GPS
Responsible partner	NMFS, IPHC, PSMFC
Analysis	<ol style="list-style-type: none"> 1. Self-reported logbooks data (paper and elog) and sensor data will be analyzed to evaluate efficacy in determining set and haul positions 2. Evaluate if sensor data can be used to automate entry of set and haul positions in elogbook, and efficiency gains.
Analytical limitations	TBD
Responsible partner for analysis	NMFS, IPHC, PSMFC

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	Task Name	Duration	Start Date	End Date	Assigned To
1	<input type="checkbox"/> Cooperative Research	654	10/01/13	04/01/16	
2	Workshop in Juneau	2	02/17/14	02/18/14	All
3	Industry meeting follow-up	1	03/05/14	03/05/14	All
4	Technical workgroup project planning	1	03/20/14	03/20/14	All
5	Industry meeting follow-up	1	03/26/14	03/26/14	All
6	Council brief at "B " reports	0	04/09/14	04/09/14	NMFS
7	<input type="checkbox"/> Establish process for release from coverage	59	03/12/14	06/02/14	
8	Coordinate approach internally and Draft letter to go to all in industry	0	03/17/14	03/17/14	NMFS
9	Shop letter by AKR, Workgroup and Council.	33	03/12/14	04/25/14	NMFS
10	Send letter to industry members	0	05/08/14	05/08/14	NMFS
11	Agree criteria for selection	2	05/15/14	05/16/14	All
12	Select participants and issue coverage release.	2	05/30/14	06/02/14	NMFS
13	<input type="checkbox"/> Track 1	409	03/10/14	10/01/15	
14	Solicit volunteers for AMR and SWI camera placement	15	03/10/14	03/28/14	Industry
15	Deploy AMR and SWI cameras on participating volunteer vessels	294	03/17/14	04/30/15	Pac States
16	Complete study design	1	03/19/14	03/19/14	AMR
17	Extract information and compile data sets	1	03/19/14	03/19/14	Pac States
18	Review resulting data and write report	390	04/04/14	10/01/15	?
19	Track 1B- assign samplers to obtain dockside composition	52	03/19/14	05/29/14	Industry
20	Track 1B - Extract data and compile analytical data sets	21	06/27/14	07/25/14	Pac States
21	Track 1B - Conduct analyses and write report	26	07/25/14	08/29/14	?
22	<input type="checkbox"/> Track 2	654	10/01/13	04/01/16	
23	Establish contract vehicle to install standard SWI and AMR camera systems	130	10/01/13	03/31/14	Pac States
24	Issue RFP and select participating vessels	29	03/21/14	04/30/14	Pac States
25	Identify and select field samplers	29	03/21/14	04/30/14	NMF
26	Deploy EM units and observer on Vessels	239	05/05/14	04/02/15	Pac States
27	Extract information and compile analytical data sets	234	06/09/14	04/30/15	Pac States
28	Conduct analyses and write report	119	11/17/14	04/30/15	Pac States and NMFS
29	Finalize reports	43	07/01/15	08/28/15	Pac States and NMFS
30	Present results to Council	0	10/05/15	10/05/15	NMFS
31	Draft for publication	40	10/05/15	11/27/15	NMFS
32	Submitted to journal	1	12/15/15	12/15/15	NMFS
33	Published	0	04/01/16	04/01/16	NMFS
34	<input type="checkbox"/> Track 3	654	10/01/13	04/01/16	
35	Purchase, build and test camera systems	195	10/01/13	06/30/14	NMFS
36	Develop code to capture catch events	108	12/02/13	04/30/14	UofW
37	Evaluate event detection reliability	345	02/03/14	05/29/15	NMFS
38	Hold demonstration at Council	0	02/05/14	02/05/14	NMFS
39	Agree project plan with partners	0	03/20/14	03/20/14	All
40	Deploy EM units data dockside	44	04/30/14	06/30/14	NMFS
41	Issue RFP and select participating vessels	29	03/21/14	04/30/14	Pac States
42	Advertise and select project assistant via Pac. States	30	04/14/14	05/23/14	Pac States and NMFS
43	Identify and select field samplers via AIS	29	03/21/14	04/30/14	NMFS
44	Identify camera installation contractor	36	03/12/14	04/30/14	NMFS
45	Deploy EM units and observer on Vessels	239	05/05/14	04/02/15	Pac States
46	Extract information and compile analytical data sets	234	06/09/14	04/30/15	Pac States
47	Conduct analyses and write report	119	11/17/14	04/30/15	Pac States and NMFS

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	Task Name	Duration	Start Date	End Date	Assigned To
48	Finalize reports	43	07/01/15	08/28/15	Pac States and NMFS
49	Present results to Council	0	10/05/15	10/05/15	NMFS
50	Draft for publication	40	10/05/15	11/27/15	NMFS
51	Submitted to journal	1	12/15/15	12/15/15	NMFS
52	Published	0	04/01/16	04/01/16	NMFS
53	Track 4	1	03/19/14	03/19/14	NMFS
54	 A80	63	03/05/14	05/30/14	
59	 Council Processes	337	06/05/13	09/18/14	
60	Council adopts Strategic Plan for EM	0	06/05/13	06/05/13	Council
61	Strategic plan published	0	05/05/14	05/05/14	NMFS
62	Initiate formation of EM workgroup	0	02/11/14	02/11/14	Council
63	Identify membership and initial charge	0	02/12/14	02/12/14	Council
64	Initial meeting with EM workgroup	2	02/13/14	02/14/14	All
65	Further EM workgroup meetings	1	09/18/14	09/18/14	All
66	 Council Amendment Analysis	390	05/19/14	11/13/15	
67	Develop and approve problem statement	100	05/19/14	10/03/14	Council
68	Develop and approve alternatives to integrate EM into the observer program	152	05/19/14	12/16/14	Council/NMFS
69	Prepare analysis	161	12/17/14	07/29/15	Council/NMFS
70	Initial Review	1	07/30/15	07/30/15	Council
71	Complete requested revisions	73	07/31/15	11/10/15	Council/NMFS
72	Final Action	3	11/11/15	11/13/15	Council
73	 Regulation Development	320	10/12/15	12/30/16	
74	Develop Proposed Rule	189	10/12/15	06/30/16	NMFS
75	Publish proposed rule	0	07/01/16	07/01/16	NMFS
76	comments due	21	07/04/16	08/01/16	NMFS
77	Respond to comments and develop final	66	08/02/16	11/01/16	NMFS
78	Publish final rule	0	11/02/16	11/02/16	NMFS
79	Cooling off period	44	11/01/16	12/30/16	All
80	Implementation under reg authority - TBD	0	11/03/16	11/03/16	All

EM Cooperative Research Data Protocols

DRAFT - Refinement of data protocols as of EMWG meeting, May 15-16 2014.

The following data protocols will be followed by all research tracks where EM is fully reviewed for composition:

- 1 Disposition codes will be standardized
 - 2 Species and species group codes will be standardized to codes used in the observer program
 - 3 Halibut release methods will be assessed in all EM review
 - 4 Halibut injury will be assessed in all EM review
 - 5 Skates of gear, or number of pots, will be recorded for each set in all EM review
 - 6 Exit interviews for all trips
 - 7 Effort information will be collected for all trips
 - 8 Retrieval level assessment of data quality (incl video quality, environmental conditions)
 - 9 Trip level assessment for all trips (data loss and sensor performance)
 - 10 Vessel monitoring plan for all EM deployments
-

1 Disposition codes

- Drop off below the water
- Drop off above water
- Intentional discard
- Retained with discard later

2 Species and species group codes

Appendix A and B in 2014 NMFS Observer manual, pages A1 to A16:

http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2014_2.pdf

3 Halibut release methods

4 Halibut injury

Minor, Moderate, Severe, Dead criteria – from Appendix V, Halibut Injury Criteria for Longline Bycatch, in 2014 NMFS Observer manual, pages A47 to 48:

http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2014_2.pdf

5 Record skates of gear or number of pots

Logbook – record skate length, number of hooks per skate, and then number of skates per set.

EM review - see whether can identify the skates using knots to identify a skate of gear. Other suggestions to test if identification is difficult – spray paint the knot orange, hang a weight on each knot.

Note, in the cod fishery, won't be able to distinguish skates, so effectively all gear will be a single skate.

6 Exit interviews

Need to develop a standardized form, using Morgan Dyas' example (attachment 1) as a starting point. Exit interview should also document how well the skipper adhered to the vessel monitoring plan.

7 Effort information

Use paper form that is currently being used in Track 1 fieldwork as a starting point (attachment 2). Skipper responsible for following fields:

- Trip number
- Set number
- hook size
- hook spacing
- skate length
- number of hooks per skate
- number of skates per set

8 Retrieval level assessment

Trying to assess data quality, or confidence in the data. For example, is the image of good quality, but someone is standing in the way, or environmental conditions (night lighting, glare, etc.) are interfering? Is the video quality snowy?

As starting point, here is a list used by AMR to categorize video data quality. The EM reviewer provides an assessment of the imagery quality, and this can be done at the trip level, or for individual hauls, depending on the program. Viewers can also provide a reason for medium or lower video quality (e.g., camera malfunction, glare, cameras dirty, out of focus, night lighting, water on dome, condensation, catch handled out of view).

- **High** - imagery was very clear and the reviewer had a good view of fishing activities. The focus was good, light levels were high, and all activity was easily seen.
- **Medium** - view was acceptable but there may have been some difficulty assessing discards. Slight blurring or slightly darker conditions hampered, but did not prevent, analysis.
- **Low** - imagery was difficult to assess. Some camera views may not have been available. Imagery was somewhat blurred or lighting was largely diminished. Some factors such as gear going out of camera view or crew standing between the catch and the camera for extended periods may have occurred.
- **Unusable** - imagery was poorly resolved or obstructed such that fishing activity could not be reliably discerned. Image quality prevented analysis.

Note, there needs to be a rapid feedback loop to the boat based on the data quality assessment, so the vessel operator can make improvements.

9 Trip level assessment

Was data lost?

If so how much?

Did the sensors perform correctly?

10 Vessel monitoring plan

This should address specific installation requirements for the vessel.

Use Saltwater (attachment 3) and AMR examples as starting point for a standardized plan.

Attachment 1 – Example of exit interview (Saltwater)

EM Trip Debrief Form

Vessel Name: _____

Date: _____

Please tell us about your experience with the performance of the following system attributes:

	Strongly Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Strongly Dissatisfied
Camera trigger sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What improvements are needed to the above?					
GPS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What improvements are needed to the above?					
Camera view angles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What improvements are needed to the above?					
Monitor placement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What improvements are needed to the above?					
Monitor view	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What improvements are needed to the above?					
Reliability & consistency of system function	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Were there any issues with this system during this trip? (i.e. intermittent power, unexpected recording times, dead batteries, etc.)?

Were there any safety hazards associated with the system? (i.e. placement of wiring, interference with any vessel systems, placement of deck equipment, etc.)?

Please tell us about your experience with the responsibilities of a vessel operator carrying an EM system:

Did you alter fish handling because of the EM system?

EM Trip Debrief Form

Did you alter fishing practices because of the EM system?

Did you have any issues with system maintenance? (i.e cleaning lenses, etc.)

Did you have any issues with coordinating the install of the EM system or other types of EM service?

Did you need to call for tech support? ☐ Yes ☐ No If yes, please explain.

Did you use an eLog ? ☐ Yes ☐ No If yes, do you have recommendations for improvements?

Do you have any suggestions for improving the EM system (e.g. sensor used, equipment placement, power issues, etc.)?

What types of vessel would/would not be suited for this EM system?

Attachment 2 Example of effort form

EM Fishing Effort Form	Vessel _____
Port departure date/time _____	Port return date/time _____

Trip # _____	Date _____
Fishing start time _____	Fishing end time _____

Set #	Hook Size	Hook Spacing	Skate Length	# Skates set

Set #	Hook Size	Hook Spacing	Skate Length	# Skates set

Set #	Hook Size	Hook Spacing	Skate Length	# Skates set

Set #	Hook Size	Hook Spacing	Skate Length	# Skates set

Set #	Hook Size	Hook Spacing	Skate Length	# Skates set

Attachment 3 Example of Vessel Monitoring Plan



EM Vessel Monitoring Plan

DATE:

1.0 VESSEL INFORMATION

Vessel Name:	Vessel Master:
Vessel ID #:	Gear Type:
Vessel Length:	Gross Tonnage:
Installation Date:	Home Port:

2.0 EM MONITORING OBJECTIVES

Provide the objectives for EM monitoring below:

Objectives:

3.0 GEAR DEPLOYMENT AND RETRIEVAL

Provide details on how fishing gear is deployed and retrieved. Include any mitigation devices.

4.0 CATCH HANDLING

Provide details on how catch is handled including retained and discarded species.

5.0 VESSEL DIAGRAM

Provide a deck diagram including the dimensions of fish holding and storage areas (e.g checkers, baskets, totes, etc.)

6.0 INSTALLATION

	Central Computer	I/O Box	Monitor	Mouse/ Keyboard
Installed	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Location				
Comments				

	GPS	Rotation Sensor	Pressure Sensor
Installed	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Location			
Comments			

Attachment 3 – EMWG minutes, May 15-16, 2014

	IP Camera 1	IP Camera 2	IP Camera 3
Installed	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Location			
View			
Comments			

7.0 EM SYSTEM PICTURES

Provide pictures for the following EM system components:

- Central Computer
- I/O Box
- Monitor & Keyboard
- GPS
- Rotation Sensor
- Pressure Sensor

8.0 IP CAMERA PICTURES

Provide pictures of the location of each IP camera and the view each camera displays.

9.0 DUTY OF CARE

Provide details of the duties the vessel operator and crew need to follow in order to support the EM system.

10.0 RECORD OF EM SYSTEM ADJUSTMENTS

Provide a record for each adjustment made to the EM system below:

Date	Adjustment