

Electronic Technologies Implementation Plan Progress Review - Pacific Islands

April 26, 2017

Overall, the NMFS Pacific Islands Regional Office (PIRO) and the Pacific Islands Fisheries Science Center (PIFSC) are on target and ahead of the priorities and activities described in the 2015 Regional Electronic Technologies (ET) Implementation Plan. We focused electronic reporting (ER) activities in early 2017 on completing the installation of upgraded vessel monitoring systems (VMS) on Hawaii and American Samoa longline vessels, further developing elogbooks for the Hawaii longline fishery, further developing ER by observers in the Hawaii longline fishery, and improving ER and data management in the U.S. purse seine fishery. We are ahead of schedule regarding electronic monitoring (EM) activities by developing EM capabilities on vessels in the Hawaii longline fishery and by developing EM systems in several small-scale fisheries to monitor target catch and marine megafauna (e.g. sea turtles) bycatch around the Pacific.

1. Number of FMPs with Fishery-dependent data collection monitoring goals:

While all five fishery ecosystem plans (FEPs) authorize the collection of fishery dependent data to support management, they do not currently have specific goals or objectives that describe fishery-dependent data collection or monitoring. The Western Pacific Fishery Management Council (Council) is comprehensively reviewing its five FEPs to improve the readability and usefulness of the FEPs for managers and the regulated community. In March 2016, as part of this review, the Council recommended revised goals and objectives for their FEPs. The recommended goal for Improved Fishery Monitoring and Data Collection does not specifically mention electronic technology, but it does include the following strategies that may be associated with electronic technology:

- a. Improve the timeliness of data availability.
- b. Improve the quantity and quality of relevant fishery data.
- c. Increase the quality and quantity of monitoring and enforcement data through improved technology.

If NMFS approves the amendments, each FEP would have the Fishery Monitoring and Data Collection goal and objectives. We expect transmittal of the recommended amendments to the FEPs for Secretarial review in 2018.

2. Number of FMPs reviewed to identify fisheries where the adoption of additional electronic technologies would be appropriate for achieving data needs:

Five. We have reviewed all of the fisheries under all of the Pacific Islands FEPs to determine if electronic technology is appropriate. This review is in the 2015 Regional ET Implementation Plan.

3. Number of FMPs with electronic technologies incorporated into fishery-dependent data collection programs

Even though all five FEPs allow ER using elogbooks, none has this technology incorporated into fishery-dependent data collection programs, as the FEPs do not describe these programs. Regardless, NMFS is working towards incorporating electronic technologies into the American Samoa and Hawaii longline fisheries' fishery-dependent data collection program, as authorized by the FEP for Pacific Pelagic Fisheries of the Western Pacific Region.

4. Progress at the fishery level:

Electronic Reporting

Pacific Islands Region Observer Electronic Reporting

The Pacific Islands Region Observer Program (Program) has successfully transitioned from early development of an ER platform (eReporting) to at-sea beta testing with observers and Program staff. The eReporting Working Group established the following three goals: 1) to develop a mobile application to augment observer data collection, 2) improve the timeliness and accuracy of observer data, and 3) reduce program expenses through the successful implementation of goals 1 and 2.

Based on positive user feedback from at-sea beta testers regarding usability and usefulness, the Program seeks to continue the development of the eReporting platform for program-wide implementation (Pre-implementation) and continue meeting the goals established by the eReporting Working Group. One year of beta testing at-sea with observers will begin in May 2017 in three, 4-month testing cycles. The eReporting platform includes both a mobile application for observer data collection (Thorium, developed by technology contractor CLS America), and a program database-management-system (Pacific Island Region Observer Program System (PIROPS)). Phase 2 of the Thorium application development for observer data collection is underway, but the PIROPS development is delayed due to uncertainties with programmatic changes. The Program and PIRO's Operations, Management, and Information Division worked collaboratively to develop PIROPS.

PIROPS integrates the longline debriefing steps and observer procedures for Hawaii and American Samoa longline fisheries into one tool. PIROPS is a web-based intranet application available through a browser that is accessible to observers, debriefers, Program management, contractors, and administrators. The purpose of this web-based application is to standardize and streamline the debriefing process by accessing one portal. This application eliminates the need to use different applications (MS Excel, MS Word, MS Access, Email, etc.) to perform the debriefing duties by having all data in one place. It also ensures that debriefing steps are not accidentally overlooked or missed and that users are on the same page.

Moving forward, the Program obtained funding from the NMFS Science and Technology, Fisheries Information System/National Observer Program (FIS/NOP) to ensure the integrity of the platform throughout the multi-tiered process of Independent Verification and Validation (IV&V). IV&V is the independent, third-party examination to ensure a system is structurally

sound and meets specifications. IV&V would provide the Program with an independent assessment that the eReporting platform is either well engineered or requires further development (verification). Also, IV&V would determine if the platform meets the requirements and specifications of the organization throughout the software lifecycle (validation). Lastly, IV&V would include planning, management, and other programmatic activities involved with ensuring the successful implementation of the eReporting platform. These activities include: redefining the data management and workflow process, developing the equipment support infrastructure, and aiding development of a programmatic framework that optimizes the eReporting platform (funding, records, enforceability, etc.).

The Program completed the second phase of open beta testing November 1, 2016, through February 28, 2017 (Fig. 1). Testing was broken into three cycles with a feedback collation and development stage in between each cycle (~10-12 test per cycle). The eReporting project is ongoing, and program-wide implementation is contingent upon the success of testing objectives. Developers have completed the dataset structure and are developing the ingestion process for the transmitted data. The contractor completed the encryption component and upgraded system hardware.

PIROPS requires funding for future transmission costs, software modifications, tablet hardware, and future tablet upgrades. The Program has not identified any sustained, long-term funding.



Figure 1. Pacific Islands Fisheries Observers Using Tablet for Electronic Reporting

Elogbooks for the Hawaii Longline Fishery

In June 2016, FIS/NOP funded a PIFSC proposal for Hawaii longline fishery elogbooks implementation. PIFSC staff issued a SOW and a solicitation for software development, end-to-end encryption, and transmission costs. A contract was awarded in September 2016 to Quick Access Computing. PIFSC is evaluating the Quick Access Computing software and conducting simulation tests towards software accreditation. The project will support approximately 60 vessels in the Hawaii longline fishery to submit data via ER.

The project will: 1) continue beta testing of two software options, 2) develop a management system for encryption keys and 3) improve ER outreach to fishermen. Implementation of

elogbooks has gone slowly and haltingly. PIFSC has completed the end-to-end data encryption to comply with NOAA Data Security requirements, but needs to develop the system for encryption key management. PIFSC's funding request for 2017 also includes transmission costs and replacement tablets. FIS/NOP notified PIFSC that they intend on funding the FY17 proposal, although PIFSC has not received funds to date to develop a contract.

PIFSC is not entering ER data directly into the operational longline catch database at this time because transmitting and entering these data are not functioning yet. Once the data entry and transmissions are functioning, PIFSC will receive the elogbook data and will incorporate the data into the database. PIFSC uses software to recompile elogbook data to populate a logsheet, which PIFSC then saves as a .pdf file and archives. NOAA Office of Law Enforcement (OLE) requires the recompiled logsheets, which have statements regarding catch, captain's name, commercial marine license, and a check box in lieu of an electronic signature.

Implementation of ER in the Hawaii longline fishery is challenging due to participants belonging to several cultural groups, in particular Vietnamese and Korean. Each cultural group has various levels of English competency and computer technical skills. PIFSC plans to train individual fishermen in 2017, but has not identified personnel resources for training all cultural groups of fishermen in the longline fisheries.

Hawaii Deep-7 Bottomfish Fishery State Electronic Reporting

A form of ER is ongoing in the Main Hawaiian Islands Deep-7 bottomfish fishery as part of the joint State and Federal management of this fishery under the FEP for the Hawaii Archipelago. NMFS supports the State of Hawaii's fishery-dependent data collection on fishing occurring in both state and federal waters. A growing proportion of Hawaii deep-7 bottomfish fishermen use online data submission to make their catch reports. These have been helpful in providing more rapid and up-to-date in-season tracking of catch in relation to the annual catch limit (ACL). The FEP calls for a within-season closure of this fishery when harvests reach the ACL.

U.S. Purse Seine Fishery Electronic Reporting

U.S. Purse Seine vessels have Integrated Fisheries Information Management System (iFIMS) subscriptions, which is a software also developed by Quick Access Computing. The industry provides for the full costs for the software and data transmission. All U.S. purse seine vessels electronically submit non-fishing day claims to Pacific Island Countries (PIC) that accept them. Almost all PICs accept electronic claims through iFIMS, but Kiribati still requires submissions by email. Vessel operators may submit non-fishing day claims or may use the vessel management company to submit the claims. Vessels can submit the claims via their shipboard internet carrier or via transmission from a tablet through a satellite phone. Most vessels relay the information to their companies who then enter the information at the office. An iFIMS manager trained vessel operators in August 2016 on entering data through iFIMS for the regional purse seine logsheet. Starting October 1, 2016, PIRO required operators to report their activity daily preferably by iFIMS and approximately half the fleet is entering its catch and effort data through iFIMS. PIFSC needs to conduct back-end database development in order to incorporate iFIMS catch and effort data when daily reporting is activated within iFIMS.

Electronic Monitoring

Vessel Monitoring Systems for Hawaii and American Samoa Longline Fisheries

The OLE has completed installing upgraded Thorium VMS units and provided reporting tablets for nearly all Hawaii and American Samoa longline vessels. Installing VMS units and providing electronic reporting tablets posed some logistical difficulties for vessels that were formerly Hawaii-based and are now U.S. west coast-based.

EM Feasibility Study for the Shallow-set Longline Fishery in the Pacific Islands Region

In June 2016, FIS/NOP provided funding to PIFSC/PIRO/PIROP for EM cameras in the Hawaii longline fishery. The project will enable approximately seven vessels in the Hawaii longline fishery to obtain data via EM and allow a comparison with at-sea human observers. Saltwater, Inc. installed cameras on five longline vessels in February 2017. The PIFSC completed four vessel trips that included concurrent EM and at-sea observers for comparison of the counts and identification of catch and bycatch by the two methods of data collection. The video is ready for review, and PIFSC will determine the data elements in association with Saltwater, Inc. PIFSC prefers testing on shallow-set longline vessels (swordfish) rather than deep-set longline vessels (tuna) because shallow-set longline vessels have 100 percent observer coverage and catch retrieval occurs during daylight, facilitating species identification. The shallow-set longline fleet comprised 22 active vessels in 2015. PIFSC and the Joint Institute for Marine and Atmospheric Research contractors will review the video, compare the observer and video data, and write the project report.

Low Cost EM System for Target Catch and Bycatch Monitoring in Small-scale National and International Fisheries

In June 2016, FIS/NOP provided funding to PIFSC for the development of a low cost EM system tailored specifically for small-scale fisheries (i.e., artisanal fisheries). The aim is to produce a viable EM system priced below \$1,000 in order to make EM a viable solution for obtaining critical catch data from small scale fisheries. Working in collaboration with World Wildlife Fund and Flywire Engineering, PIFSC developed a system that includes high resolution video linked to a GPS system (Figures 2 and 3).



Figure 2. Flywire Unit for Small Vessel Electronic Monitoring.



Figure 3. Flywire Camera System on Small Vessel

Current development of the EM system has focused on providing the cameras with multiple power supply configurations. This will allow the video systems to 1) be tied into vessel power, 2) use solar power to recharge during multi-day trips, or 3) rely on a 40-hour rechargeable battery. Recent changes to the systems also allow multiple camera systems to be tied into one controller unit to allow for multiple points of view. In addition, current work is focused on developing software that integrates video and GPS to quickly score the video for catch and bycatch data.

To date, PIFSC has tested the systems in Mexico's coastal small-scale gillnet fisheries, Peru's coastal fisheries, Indonesia's coastal gillnet fisheries and in the Hawaii bottomfish fishery. Trials in Mexico are comparing the efficacy of video monitoring systems versus onboard observers, while also characterizing the catch composition of a small scale gillnet fishery in the Gulf of California. Trials in Indonesia and Peru are focused on developing the necessary data management infrastructure to accommodate the heavy data stream derived from EM systems. In addition, both trials are using the EM to capture sea turtle bycatch in order to help understand protected species interaction rates in these fisheries. EM trials in the Hawaii bottom fishery have focused on understanding the best methods to characterize fishing effort in order to calculate catch per unit effort for each fishing trip, as well as developing the necessary data management frameworks (Figure 4).

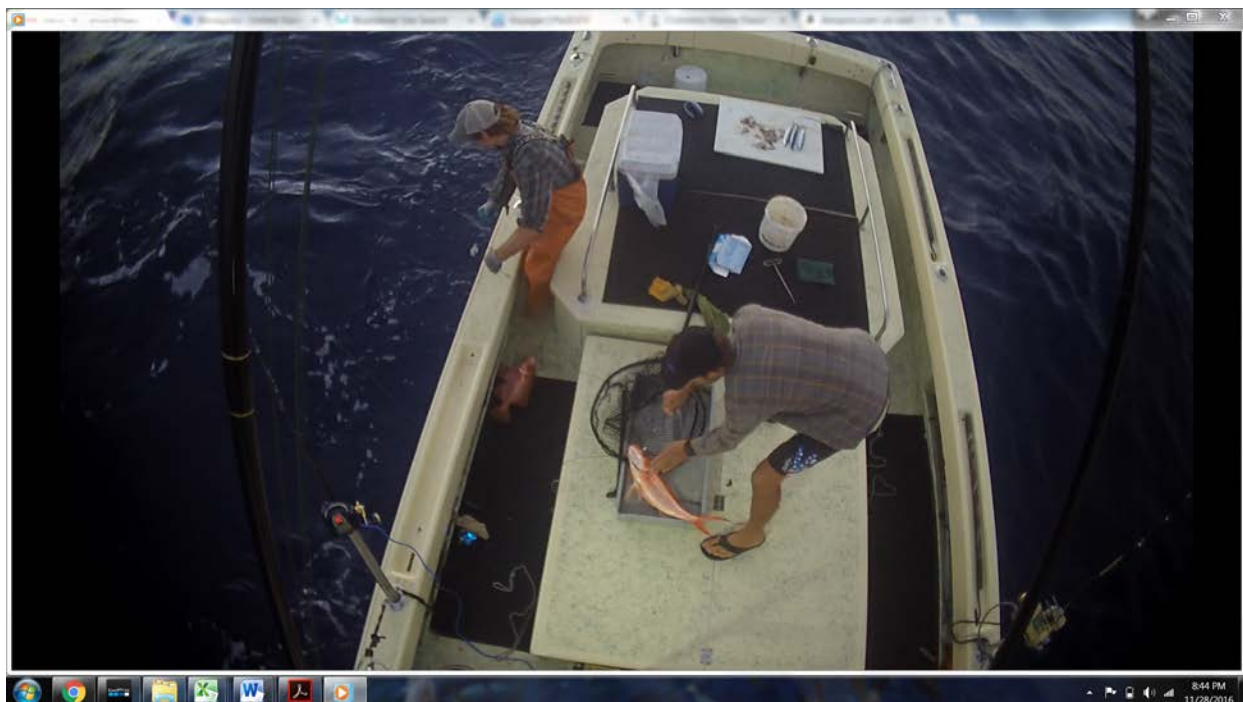


Figure 4. Image of Catch on Hawaii Bottomfish Vessel from Flywire Camera System

5. Information on why other FMPs or fisheries are not being considered for the incorporation of electronic technologies

As described in the 2015 Regional Electronic Technology Implementation Plan, we must carefully evaluate each fishery to determine the need and the practicality of using electronic technology for reporting and monitoring. In reviewing our managed fisheries, we identified those fisheries that have the most urgent need for improved quality and timeliness of data and that may have the capabilities to use electronic technologies. Due to limited resources, we first focus our efforts to implement ER in the Hawaii longline fishery. Learning from this experience, we are working with the next fishery with the greatest need and most likelihood of success with ER, the American Samoa longline fishery. Limited EM projects for the longline fisheries and for small scale fisheries may be applied to Pacific Island fisheries with further development. We will continue to examine the potential for electronic technologies in other fisheries as we build on our successes and as resources allow.

Table 1. 2016 Camera-Based Electronic Monitoring for Hawaii Longline Fishery Costs

Camera-based Electronic Monitoring	Total Cost	% Government cost share?	% Industry cost share?	NMFS budget line (e.g., FRM, catch shares, NOP, etc)
Planning (technical system design, vessel monitoring plans, support system design)				
Specifications setting				
Technical software system design QA/QC, metadata, integration				
Commercial off- the shelf/3 rd party developer option				
Regulation development and implementation				
Hardware				
Camera(s)	\$228,452	100%		72% FIS, 28% PIFSC
Sensors				
Media/storage				
Government IT infrastructure				
Software, database dev., software licenses				
Field Support				
Installation				
---Labor				
---Wiring, connections, etc				
Training (labor, materials, travel)				
Maintenance/Repair/Replacement				
Help Desk				
Data Communications & Reporting				
At sea				
Shoreside				
Government IT infrastructure				
Data Retrieval				
Data Validation				
Data Analysis				
Software				
---development				
---license	\$30,436	100%		FIS
Labor				
System maintenance				
Data Storage/Archiving				
On board				
On shore	\$10,000	100%		FIS
Government IT infrastructure				
Other (specify)				

Table 2. 2016 E-logbooks for Hawaii Longline Fishery Costs

E-logbook Reporting	Total Cost	% Government cost share?	% Industry cost share?	NMFS budget line (e.g., FRM, catch shares, NOP, etc)
System Development & Maintenance				
Specifications setting				
Technical software system design QA/QC, metadata, integration	\$36,000	100%		FIS
System maintenance				
Commercial off- the shelf/3 rd party developer option	\$54,450.00	100%		FIS
Data storage / archiving				
Hardware and Infrastructure				
CPU, GPS, etc.	\$72,000	100%		FIS
Telecommunications Satellite, cellular, (specify)	\$45,324	100%		FIS
Government IT infrastructure				
Field Support				
Installation				
---labor				
---Wiring, backup power, connections, etc.				
Training (labor, materials, travel)				
Data validation				
Maintenance/Repair				
Help Desk				
Data Communications & Reporting				
At sea				
Shoreside				
Government IT infrastructure				
Data Retrieval				
Data Validation				
Data Storage				

Table 3. 2016 Pacific Islands Region Observer Program E-Reporting Program Cost

PIR Observer Program E-Reporting	Total Cost	% Government cost share?	% Industry cost share?	NMFS budget line (e.g., FRM, catch shares, NOP, etc)
System Development & Maintenance				
Specifications setting				
Technical software system design QA/QC, metadata, integration				
System maintenance				
Commercial off- the shelf/3 rd party developer option	\$54,450.00	100%		FIS
Data storage / archiving				
Hardware and Infrastructure				
CPU, GPS, etc.				
Telecommunications Satellite, cellular, (specify)				
Government IT infrastructure				
Field Support				
Installation				
---labor				
---Wiring, backup power, connections, etc.				
Training (labor, materials, travel)				
Data validation				
Maintenance/Repair				
Help Desk				
Data Communications & Reporting				
At sea				
Shoreside				
Government IT infrastructure				
Data Retrieval				
Data Validation				
Data Storage				

Table 4. 2016 EM system for Small Scale Fisheries Costs

EM system for Small Scale Fisheries (2016)	Total Cost	% Government cost share?	% Industry cost share?	NMFS budget line (e.g., FRM, catch shares, NOP, etc)
Camera Engineering and Design	\$45,000	100%		100% FIS
Software Engineering	\$30,000	100%		100% FIS
Cost of Units (10 units X \$1,000)	\$10,000	100%		50% FIS, 50% PIFSC (via S&T SAIP funds)
Contracting fishers for deployment and testing of Units	\$50,000	100%		50% FIS, 50% PIFSC