

**North Pacific Fisheries Association and Saltwater Inc.
Electronic Monitoring for Small Boats in Alaska**

**National Fish and Wildlife Foundation Project
June 2012 - September 2013**

Context:

This project was conceived in the Fall of 2011 when it became known that:

- The restructure of the North Pacific groundfish observer program would require observer coverage on small (under 60') halibut and sablefish longline vessels starting January 1, 2013.
- Many fishermen in this fishery want the option to carry an electronic monitoring (EM) system rather than a human observer to meet their coverage requirements.
- The North Pacific Fishery Management Council (Council) determined that an EM program for the halibut and sablefish longline fisheries should be a "catch estimation" program that collects information on catch, discards and fishing effort. ("Compliance versus science.")
- At the time this project was conceived (Fall, 2011), there was only one EM service provider and they were based in Canada. NMFS considered that system adequate to gather data on compliance with discard and retention regulations, but not sufficient to gather the information needed for catch estimation. In February 2013, NMFS reiterated this concern:
 - *Despite numerous past and ongoing video monitoring pilot projects there are currently no operational video monitoring programs in NMFS managed fisheries where data extracted from video are used for science or management purposes. (NMFS White Paper, 2.15.13)*
- Fishery managers have indicated that higher quality digital images are needed for EM to become operational in fisheries where the management objective is catch estimation. This includes both higher frame rates and higher resolution.
- In this context, The North Pacific Fisheries Association (NPFA), a Homer-based fishermen's group, partnered with Saltwater Inc., an Alaskan observer company, to develop and test an alternative EM system for small halibut longline vessels.

Project Objectives:

- The primary objective of the project was to utilize local stakeholder expertise to develop, introduce, and test an advanced EM system that would be capable of providing high quality video images adequate for catch estimation and be appropriate to small longline fishing vessels.

- The second objective was to begin to build the local infrastructure necessary to implement a scalable EM program.
- The third objective was to test the utility of alternative, free, open-license data review software for the review of fisheries data.

Project Actions:

- The project began in June 2012 with a dockside meeting in Homer that included fishermen, NPFA members, Saltwater Inc. staff, representatives of the International Pacific Halibut Commission (IPHC) and the Alaska Department of Fish and Game (ADF&G). Saltwater set up and demonstrated the capabilities of a 360-degree digital camera and on-board monitor. Fishermen demonstrated their handling and sorting procedures and provided insights on fishing practices, camera placement and system configuration.
- With input from fishermen and fishery managers, Saltwater Inc. designed and tested a new EM system for this fishery. It was the first EM system to use internet protocol (IP) digital cameras, which provide higher resolution, greater frame rate speed, and more advanced data compression than traditional analog systems.
- The project successfully tested integrated motion detection combined with magnetic drum sensors as triggers for recording.
- The project successfully experimented with integrating a Garmin GPS sensor into the camera housing as a way to simplify the installation process.
- The new EM system was installed and tested on two working halibut boats. Saltwater consulted with both fishermen and NMFS to determine camera placement that would not constrain operations, but would capture the necessary images. The system involved two digital cameras, one that provided full coverage of activities on deck, and one that captured images of fish coming in over the rail. Different camera placement and camera configurations were tested to get the highest quality images of catch.
- The project developed the capacity of three local technicians (two from Anchorage and one from Homer) to carry out EM installs and repairs. We also successfully tested trouble-shooting via WiFi on one of the boats while it was in the Homer harbor. By the end of the project, all technical services were provided by Alaska-based technicians.

Project Outcomes:

- The collaboration between the volunteer fishermen who are intimately involved in this fishery, and Saltwater Inc., an Alaska-based observer company that understands the data requirements of fishery management, has been critical to developing a system that could work for both fishermen and fishery managers.

- The project demonstrated that a more advanced EM system - one that uses digital cameras-- can provide the higher quality images required by fishery managers for a catch estimation system. Partially as a result of this project, NMFS required digital cameras for an EM pilot program in this fishery which began in 2013. It seems likely NMFS will require these higher resolution digital cameras in future projects
- The project demonstrated that on small (under 60') halibut boats, a system that utilized two cameras – one at the rail and the other providing an overall back deck view – could capture the images required for catch accounting in this fishery. The side camera captured images that allow for individual hook counts as well as images of fish discarded at the rail – both important for catch accounting. Images from the deck camera were also of sufficient quality to allow for counts of fish brought on board.
- The project experimented with both motion detection and magnetic drum sensors. The combination worked well, though setting motion boxes for each vessel can be complicated and time consuming. In future projects we plan to further test alternative triggers with the goal of assuring that all fishing events are recorded while simplifying the installation process.
- The project demonstrated the potential of new video review software that is free and open-license. This is consistent with the national guidelines for EM projects, which NMFS issued in May 2013.

NOAA Fisheries encourages the use of electronic technologies that utilize open source code or standards that facilitate data integration and offer long-term cost savings rather than becoming dependent on proprietary software.

- The review software allows viewers to zoom in and enlarge individual frames for closer viewing. This is a significant step forward to the long-standing difficulties in EM of accurately identifying individual fish to the species level by either human reviewers or, in the future, using computer software.
- The project tested various ways to make the video review process more efficient using recorded event logs in the review software. The time-lag traditionally associated with EM data review process is a serious challenge noted by NMFS. Because video review currently represents approximately one-third of the total cost of EM, increasing the efficiency of the review process could mean significant cost savings.

The Road Ahead:

- There is a need to continue to test new technology, develop new efficiencies and find ways to provide better, more timely data to meet fishery manager
- needs if EM is going to be accepted as an alternative to human observers in this fishery. This project did not solve these challenges, but it did advance the process.
- We think competition is a good thing. It will ultimately result in lower costs to industry and the availability of a range of products to meet different needs.

- NMFS, in partnership with fishermen and EM service providers, needs to clearly define the specific objectives for an EM monitoring program in this fishery that align with the broader goals of the fishery management plan.
- Industry members need to get involved. This means sharing ideas with EM service providers and NMFS about how to make a system work for this fishery, volunteering to carry systems, taking responsibility for keeping the systems working at sea, and providing feedback. The best solution will come from the fishing grounds up.