
Symposium on Implementing Electronic Monitoring and Reporting in U.S. Fisheries Management

*American Fisheries Society Annual Meeting
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Government leaders and fishery stakeholders are increasingly interested in promoting the use of technology – electronic monitoring and reporting (EM and ER) – in fishery monitoring systems to reduce cost, meet increasing data demands, and improve accountability. The 2007 amendments to the Magnuson Stevens Act highlighted the importance of accountability in management and in August 2014 NOAA Fisheries (NMFS) issued a policy directive and guidance on incorporating electronic technologies into fishery dependent data collection systems. In spring 2015 each NMFS region will have completed an implementation plan for electronic monitoring and reporting in their region.

Fishery managers around the U.S. are now struggling with the practical steps necessary to incorporate these new systems into existing fishery dependent data collection programs while ensuring alignment of management goals, data needs, funding sources and regulations. The objective of the session is to explore some of the principal science and management issues of incorporating greater use of technology into fishery dependent data systems. This symposium will bring together presenters who will help to more fully frame the science and management issues and share information about the ways government scientists and resource managers, stakeholders, and others are working to address them.

This symposium is well timed to take place in 2015 in Portland, Oregon as these challenges are currently being addressed in West Coast fisheries. It will cover a number of current issues that affect science and management of priority marine fisheries, and identifies ideas, strategies and approaches that will help fisheries resources managers, scientist, and stakeholders address the current challenges of implementing electronic monitoring and reporting.

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ABSTRACTS

Data Management & Integration

Principles of Fishery Reporting Systems Design

Mark Brady, National Marine Fisheries Service

Fishery reporting systems accept human input via multiple subsystems, where the subsystems are reporting on the same event, a fishing trip. Human data input presents challenges to the designer as a common source of error and excessive burdens on human reporters. Using multiple subsystems to report on the same event can result in redundancies, inconsistency, and trip matching errors. Furthermore, human data input and multiple reporting subsystems can interact in a way that propagates additional errors within the system. This presentation provides a set of design principles for managing human data input and design principles for proper integration of reporting subsystems. Reporting systems based on these principles are simpler, more efficient, and far more accurate.

Red Herrings: Looking Outside Fisheries for Insights on Data Management

Kate Wing, K/W Consulting

Integrating data collected through new technologies, like electronic monitoring or reporting systems presents, fishery managers with a host of new challenges. Data validation, reconciling multiple information streams, and balancing public transparency requirements with privacy concerns are not issues unique to fisheries. How have financial managers, law enforcement, hospitals, and the IRS handled

similar challenges as they built out new systems to meet compliance requirements, improve efficiency, provide public access, and create interfaces for customers and software developers? This presentation will explore lessons in data modernization from other fields and recommend next steps for improving state, regional, and federal fisheries information systems.

Integrating Electronic Monitoring and Other Data into a Modernized Fishery Dependent Data System

Doug Christel, National Marine Fisheries Service

The needs/uses of fishery dependent data have changed over the past 20 years, yet data collection, storage, and analytical processes have remained relatively static. Emerging data needs require a reexamination of existing collections and processes to provide more detailed, integrated, and timely data for all stakeholders. In 2013, the NMFS Northeast Fisheries Science Center and Greater Atlantic Regional Fisheries Office began an effort to modernize the regional fishery dependent data system by identifying the existing and anticipated data needs/uses of all data stakeholders. By separating the needs and uses from collection mechanisms, data streams were emphasized instead of data collection mechanisms. This approach helped identify ways to reduce redundancy, increase accuracy, and overcome procedural and technical limitations that previously impeded integration of various data sources. Since the intended use of EM (compliance, effort documentation, catch and bycatch quantification) dictates how that data stream is structured, the intended use will also affect how such data are integrated with other data sources and distributed among stakeholders in a modernized system. These considerations are now being used to streamline data collection, evaluation, and distribution processes to more efficiently provide the highest quality data to meet industry, scientific, and management needs.

One Fish, Two Fish, Red Fish, Rockfish: Human-Based Video Review in a Hardware-Focused World

Courtney Donovan, Pacific States Marine Fisheries Commission

Electronic monitoring has recently become an important topic in commercial fisheries. While most discussions tend to focus on the hardware and management aspects, it seems easy to overlook a crucial element of any electronic monitoring program: the point at which data are captured during the human-conducted review of collected video and sensor data. Specialized software is important for expediting the review of raw video data since the integrated features and efficiency of the software affect the resulting review times, and therefore the cost of review, as well as overall data quality. Pre-analysis review of electronic monitoring data could be improved by further research and development of specialized software, and attempts to solve the already existing problems facing current programs. With these improvements, the review of raw data from electronic monitoring systems may become more efficient, and the resulting data more reliable.

The British Columbia Groundfish Electronic Monitoring Experience in Relation to Data Quality and Impact of the Data on Assessment and Management

Rick Stanley, Consultant

Catch in the groundfish hook and line fishery on Canada's west coast has been monitored since 2006 by an interrelated suite of components. In addition to 100% EM coverage, these include full independent dockside monitoring, fisher logbooks and complete retention of rockfishes. Each component, in spite of its weaknesses as a stand-alone monitoring tool, makes an essential contribution without which the overall program would fail to meet the minimum objectives. Over the ensuing eight years, the program

has surpassed expectations in meeting conservation and operational information goals by providing adequate and timely estimates of total catch for all quota and many non-quota species. This presentation will first focus on the impact that the improved data has had on management and stock assessment. Among other issues, it will include examples of how the information on discards was for historical reconstructions of discards as well as how managers and industry are taking advantage of the certainty in the discards estimates to implement fine-scale management devices to address the estimation of rare catch events and impose extremely small vessel discard caps. The presentation will also focus on issues of data quality and completeness, some of which remain unsolved.

Standards

Turning Fishery Information Needs into Performance Standards for an Electronic Monitoring Program

Melissa Hooper, National Marine Fisheries Service (NWR)

Several U.S. commercial fisheries are considering implementing electronic monitoring (EM) systems as an alternative to human observers for at-sea catch and compliance monitoring. Fishery managers, scientists, fishermen, and other partners are in the throes of developing program designs, performance standards, and technical specifications that would meet their objectives, as well as legal requirements of the Magnuson-Stevens Act and other statutes. They are looking to the NMFS for guidance on what specific requirements and minimum standards must be met. In some cases, NMFS is breaking new ground in application of some Federal statutes to EM systems, which have only been implemented on a limited scale in U.S. fisheries. This talk will address the following questions, drawing on examples from current efforts to implement EM in West Coast and Northeast fisheries: What legal and policy “boxes” are managers trying to check when evaluating a prospective EM program? How can these needs be translated into meaningful performance standards for an EM program?

Evaluating the Effectiveness of Dockside Monitoring Using an Electronic Monitoring System in the Maryland Blue Crab Fishery

H. Ward Slacum, Maryland Oyster Recovery Partnership

Self-reporting is a common method to document harvest, but the accuracy of reported harvest is uncertain without independent methods of harvest verification. General documentation errors, forgetfulness and intentional misreporting are common problems and can profoundly impact the accuracy of reported harvest. As mobile accessible electronic reporting systems become more prevalent they have the potential to improve the timeliness and accuracy of self-reported harvest. However sources of misreporting and incentives to misreport will continue unless techniques are in place to evaluate reporting accuracy and report compliance. Independent verification techniques such as at-sea observers, dockside monitoring and dealer reporting can be implemented to establish crosschecking and auditing of self-reported data and to increase incentives for industry to provide accurate self-reported data. The effectiveness of these techniques can also be enhanced by access to fishing information provided by electronic reporting. An electronic harvest reporting system (FACTS™) was designed and evaluated in the Maryland blue crab fishery (2012-2014). A new process of daily reporting was implemented to facilitate verification of harvest by dockside monitoring. The dockside monitoring program used access to fishers hails to schedule and conduct random daily harvest verification. Results and factors effecting dockside monitoring success will be presented.

An Assessment of the Validation Requirements Necessary to Support Greater Use of Electronic Monitoring Tools in the Gulf of Mexico Marine Recreational Charter-for-Hire Fishery

Todd Phillips, Ocean Conservancy

Significant challenges exist in recreational fishing management. One key challenge stems from current recreational fishery monitoring program methodologies. While programs across the US have dramatically improved in the recent past, their continued reliance on legacy data collection methods is hindering their growth and evolution. Embracing the greater use of electronic monitoring technologies can revolutionize monitoring programs. Electronic monitoring (EM) holds promise of alleviating key management obstacles, like timely data deliver. However, the lack of unified data validation system standards to verify reported data is hampering innovation in fishery monitoring. Investing in validation standards to make EM efficient and effective is paramount to the long-term success of electronic monitoring systems more broadly in fishery management. The charter for-hire fishery has a demonstrated track record of testing innovative methods, like electronic logbooks. Shrinking fishing seasons have motivated this group to pursue management reforms that better meet both conservation objectives and the needs of their businesses. We discuss opportunities to advance greater use of through an integrated system that combines proven electronic monitoring tools (VMS, ELBs, etc.) with more efficient dockside validation technologies through the lens of the charter for-hire fishery in the Gulf of Mexico.

Process for Implementation

Developing a Successful Operational EM Program

Howard McElderry, Archipelago Marine Research Ltd.

Electronic Monitoring (EM) has been piloted since 1999 in numerous fisheries across a range of geographies, gears, catch profiles and monitoring objectives. Despite often promising results, few fisheries have adopted EM. In our view, this is because the expectation of EM being a simple replacement for an observer was incorrect. Pilot studies have shown that EM is inherently different and much more complex than an observer program, with key differences being type of fishery data produced, technology dependencies, regulatory framework, incentive systems, program operational requirements (in particular field service and data analysis infrastructure), and vessel obligations to support EM and comply with onboard catch-handling protocols.

A successful EM program is the result of an inclusive design process that optimizes data needs (quantity, quality, and timeliness) with the available funds, the fishery characteristics, the technology, and the operational requirements to support the deployment of EM. In a given application, there may be multiple designs and a business planning approach must be used to evaluate risks, develop alternatives, and identify the most viable approaches within the planning constraints. We draw from an Alaskan case study, highlighting both challenges and opportunities to facilitate more effective planning.

Electronic Monitoring Implementation - a View from the Front Lines

Nancy Munro, Saltwater Inc.

The Atlantic pelagic longline fishery for tuna, sharks, and swordfish takes place from Maine to Texas and a few ports in the Caribbean. It is a fishery with complex rules, some 130-160 registered participants,

and fish that travel long distances crossing multiple domestic and international boundaries.

Concern over bluefin tuna inspired Amendment 7, which implemented multiple conservation measures including individual quotas for bycatch of Bluefin, and the installation of electronic monitoring (EM) equipment on approximately 135 vessels active in the fishery. The Atlantic Highly Migratory Species (HMS) Division of NOAA manages this fishery, and they contracted Saltwater Inc. to implement the use of EM for data acquisition in this fleet.

This presentation describes what an electronic monitoring implementation of this scale requires – detailing some of the planning, logistics, system development, and communications issues involved. We will focus specifically one area, Data Retrieval, to illustrate the many details and issues that are involved in the implementation of an EM program.

Electronic Monitoring in Pacific Groundfish Fisheries-Moving Forward

[Steve Freese, National Marine Fisheries Service \(NWR\)](#)

On the West Coast, there is a great industry-government collaboration underlying the drive to implement electronic monitoring in the Pacific Groundfish Trawl Catch Shares Fishery. Pilot projects are underway that we hope will lead to the implementation of video monitoring in the fixed gear, bottom trawl, and mid-water trawl fisheries. These pilot projects are being done under a series of Exempted Fishing Permits (EFPs). EFPs allow activities that normally are precluded by regulation--in this case, the requirement of 100% observer coverage at-sea and 100% monitoring of fisheries offloads onshore. The Pacific Groundfish fishery is a multispecies fishery that includes species that are hard to distinguish, rockfish that are overfished and under rebuilding plans, and an individual vessel accounting system where each vessel has its individual quota. Therefore, monitoring discards and obtaining accurate data for use in the vessel accounting system is important. Reducing monitoring costs is important to the industry as the industry is footing most of the observer/monitor bill. The presentation will address the following questions: How can pilot projects help to advance electronic monitoring? What are the characteristics of a pilot that moves the ball down the field?

Electronic Monitoring As a Compliance Tool in the U.S. West Coast Groundfish Catch Share Fishery

[Alia Al-Humaidhi, Pacific States Marine Fisheries Commission](#)

The U.S. West Coast groundfish trawl fishery, consisting of approximately 100 vessels, transitioned to an Individual Fishing Quota (IFQ) system in 2011. As a regulatory requirement, 100% at-sea human compliance monitoring was implemented to accurately monitor discards of IFQ species for vessel quota debiting. Human monitors can reduce flexibility in the fishery, increase costs, decrease safety and sometimes eliminate the opportunity to fish when monitors are not available on short notice. Electronic monitoring (EM) systems, where demonstrated to be a viable substitute for human monitoring, could resolve some of the limitations imposed by the need to monitor 100% of fishing activity. Pacific States Marine Fisheries Commission (PSMFC) has developed an EM program with pre-implementation exploration started in 2012. In order to successfully implement EM as a management tool, key players must be involved and systems must be in place. Beginning in May of 2015, EM will be implemented in the IFQ fishery to a limited degree using exempted fishing permits to further explore EM as a management tool. Up-to-date findings will be presented on the EM program within this management structure.

Implementing Electronic Monitoring in the New England Groundfish Fishery

Brett Alger, National Marine Fisheries Service (NERO)

Electronic monitoring (EM) has been used for catch monitoring and reporting compliance in fisheries worldwide. After years of pilot projects, and both regional and national workshops, implementation of EM has been limited in the United States. Understanding legal requirements, data integration, coordination among stakeholders, and costs are some of the challenges facing our fisheries. Despite these challenges, the interest in EM remains high, and in the case of the New England groundfish fishery, we are on the doorstep. The Greater Atlantic Region Fisheries Office and the Northeast Fisheries Science Center is collaborating with the Maine Coastal Community Sector, The Nature Conservancy, the Gulf of Maine Research Institute, and Ecotrust Canada, to fully develop an EM model in 2015. We will build the database infrastructure and processing tools for data collected from EM video footage, conduct comparative analysis to the existing catch monitoring systems in the fishery, and address the legal and logistical hurdles associated with a fully functional EM program. This end-to-end approach tries to tackle the remaining challenges that many of the pilot projects have yet to address, and if successful, we plan to fully implement EM for a portion of the groundfish fishery in 2016.

Electronic Monitoring from a NPFMC Perspective

Bill Tweit, Washington Department of Fish & Wildlife

This presentation will describe the North Pacific Fishery Management Council's (NPFMC) approach to incorporating EM into fishery monitoring programs. The Council is examining the benefits of electronic monitoring for coverage of the pot fleet, primarily cod directed fisheries. The Council approach for developing these program expansions is to establish workgroups comprised of knowledgeable fishermen, EM providers, NMFS staff, enforcement personnel, and others to direct the implementation. The NPFMC has been relying on electronic monitoring as a key element in its fishery monitoring program for large fishing boats for over a decade, and is now broadening its use to supplement fishery information collection in the small boat fleet. Existing efforts include use of cameras to assist onboard observers, vessel monitoring system requirements to assist enforcement efforts and management biologists, and industry developed innovations such as cameras in trawls. The NPFMC has also been expanding the use of electronic reporting, particularly for the large vessel fleet that has sophisticated onboard communication capabilities. In 2013, the NPFMC adopted a Strategic Plan that directs the efforts for further integration of electronic capabilities into fishery monitoring programs. The Council has set a goal for full implementation in 2017.