



NOAA FISHERIES

The FIS Mission

We work collaboratively through partnerships to improve access to comprehensive, high-quality, timely fisheries information by investing in three broad areas:

- *Data gaps and data quality;*
- *Efficient technology and data integration; and*
- *Effective coordination and communication in the design, collection, and uses of data.*

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Fisheries Information System Program 2020 Stakeholder Update

Program Overview

The Fisheries Information System program is a state-regional-federal partnership that supports sound, science-based fisheries management. The program does so by fostering cross-disciplinary collaboration and funding innovative projects to improve the quality of fisheries-dependent data.

FIS was created by Congress under the Magnuson-Stevens Act to build stronger relationships among NOAA Fisheries, councils, commissions, FINs, and states. Through a shared governance structure among these partners, FIS addresses the compelling need for fisheries-dependent data that is more timely, accurate, and interconnected within and among regions; easily accessible by a broad array of users; and regionally comparable.

ADDRESSING COMPLEX CHALLENGES

An integral part of FIS is our Professional Specialty Groups (PSGs)—communities of practice that serve as forums for sharing lessons learned and developing strategies that promote common solutions to unique challenges. Currently, there are three PSGs, focusing on electronic technologies, highly migratory species, and quality management and continuous improvement. A new PSG focusing on Software Design and Development launched in 2020.

PROMOTING INNOVATION

FIS also conducts an annual competitive Request for Proposals (RFP) process to support innovative projects, encourage collaboration, reduce redundancy, and help prioritize resource use across regions. The RFP is supported by the National Observer Program's Electronic Technologies program, and the National Catch Share Program.

Since 2013, FIS has funded more than 200 projects, which are detailed by region and category on page 6. Thirty projects, summarized on pages 4-5, were funded for the 2021 fiscal year in the focus areas of:

- Data Improvements, Modernization, and Integration.
- Electronic Monitoring Pre-Implementation and Implementation.
- Electronic Reporting Pre-Implementation and Implementation.
- Fisheries Information Network Development.
- Quality Management and Continuous Improvement.

FIS AND THE FISHERIES INFORMATION MANAGEMENT MODERNIZATION INITIATIVE

In 2020, FIS continued work to support the Fisheries Information Management Modernization initiative, an overarching effort by NOAA Fisheries to modernize its information management systems to better meet scientific needs and respond to legislative and administrative requirements. Along with the Office of Science and Technology, FIS sponsored a 2019 workshop of more than 75 information technology subject matter experts



tasked with developing a strategy for integrating, streamlining, and modernizing fisheries data.

The workshop informed a [set of recommendations](#) to NOAA Fisheries leadership to enhance fisheries data and information management. FIS is currently working with partners, stakeholders, and NOAA Fisheries teams at the national and regional levels to implement those recommendations and facilitate ongoing modernization efforts.

Specifically, FIS will be working with NOAA Fisheries' information architect on rolling out a new data governance framework. FIS is also taking the lead on establishing a Software Design and Development PSG. This new PSG will explore opportunities for innovation and ways to ensure systems and tools under development work in synergy across NOAA and our partners.



Professional Specialty Group Snapshots



ELECTRONIC TECHNOLOGIES

The Electronic Technologies PSG works to promote information-sharing across regions on best practices and solutions related to ET implementation. ET PSG monthly meetings alternate between cross-regional "round robin" exchanges on the status of and lessons learned from current projects, and Center of Expertise (COE) webinars. These presentations provide deep dives into specific ET projects, helping to foster communication across regions and among ET professionals.

The webinars can help regions build upon the work of others, reducing duplication of effort. For example, the Northeast Fisheries Observer Program presentation on its observer web portal software helped facilitate the development of a similar project in the Southeast, including code sharing. The Southeast team, through funding from the FY 2021 FIS RFP, will be able to build upon the Northeast program's foundation and customize from there, rather than starting development from scratch. Over the past year, the PSG focused on increasing attendance for the COE presentations, regularly hosting more than 50 virtual participants representing regional offices, science centers, headquarters, FINs, state agencies, and stakeholders.



HIGHLY MIGRATORY SPECIES

The Highly Migratory Species PSG brings together data managers and users from the Pacific Islands, West Coast, the Atlantic HMS program, and NOAA headquarters with the mission of creating an integrated, accessible Pacific HMS data system and governance program.

In 2020, the HMS PSG successfully completed a project to automate catch and effort reporting to the Western and Central Pacific Fisheries Commission. West Coast and Pacific Islands HMS analysts and data managers in regional offices, science centers, states, and PacFIN review these data for all U.S. HMS fisheries in the Pacific to generate annual reports. Traditionally, partners captured this information in a spreadsheet, pasting their respective aggregated data into one of ten-plus tabs, and emailing it to the next

organization. The PSG streamlined the process by shifting input into a database that automatically generates reports, reducing copy-and-paste errors and improving accessibility to the data. This collaboration also resulted in the creation of an updated, dynamic map of Pacific HMS fisheries. The previous, static version, more than a decade old, was not reflective of the shifts in geographic distributions of various fisheries in recent years. The PSG used the new database to create a map that includes time series animations of effort, and will be updated as new information is entered into the database. This more detailed, timely visualization of Pacific HMS fisheries is already being integrated into West Coast and Pacific Islands regulatory documents and presentations.



QUALITY MANAGEMENT AND CONTINUOUS IMPROVEMENT

The Quality Management and Continuous Improvement PSG promotes and provides resources and funding to implement QM/CI principles and strategies across NOAA Fisheries and our partners. The PSG often works directly with project teams to incorporate QM/CI principles into everyday work.

For instance, the NOAA Fisheries team leading Deepwater Horizon restoration efforts in the Gulf of Mexico is currently implementing a program-level strategic plan developed in conjunction with the QM/CI PSG. The goal of the plan is to advance the vision of a restored, healthy, and sustainable Gulf of Mexico ecosystem that supports resilient, vibrant communities. During an intensive three-day workshop in 2019 co-led by PSG members and a professional facilitator, participants walked through a series of exercises aimed at clearly identifying specific intended outcomes and creating a set of concrete, actionable steps for achieving them. "We had never spent the time since the formation of our program to set a clear mission and vision with team input that would help us prioritize our 'must-dos' in the Deepwater Horizon case," the team notes. The team also saw the critical need in a fast-paced environment to carve out the time and space necessary to focus on setting and following up on strategic priorities. This helps avoid being overwhelmed by short-term needs to the detriment of the broader program.

FIS Case Study: Electronic Monitoring Demonstrates Effectiveness, Efficiency in Pacific Longline Fisheries

Fisheries monitoring and reporting programs have historically relied upon independent fishery observers, real-time vessel position reporting with vessel monitoring systems, fish landings reports, and self-reported vessel paper logbooks. These systems provided a large majority of fishery-dependent data collection. Today, NOAA Fisheries and our partners are exploring how technologies like electronic reporting (ER), electronic monitoring (EM), and other tools can help meet the ever-increasing need to improve the timeliness, quality, integration, cost-effectiveness, and accessibility of fishery-dependent data.

RECENT STUDY YIELDS ACCURATE, EFFICIENT RESULTS

An FIS-funded EM project by the Pacific Islands Fisheries Science Center in the Hawaii shallow-set and deep-set longline fisheries has shown promising results using EM to capture fishing activity. In the project, trained EM video reviewers were able to identify 99 percent of all retained fish species. EM footage also captured all four marine mammal and 18 sea turtle interactions. The study suggested that the optimal video review speed was eight times faster than real time, and also emphasized the importance of strict protocols against skipping through footage. Sixteen times was too fast to catch all interactions, while four times faster was potentially too slow for reviewers to remain engaged, with a couple interactions missed as reviewers mistakenly interpreted them as gear tangles.

Equally important, voluntary industry participants support the EM deployment. “The Hawaii Longline Association has been supportive of EM technology since testing began on Hawaii longline vessels in 2010. We’re looking forward to seeing how it works to supplement observer coverage, recognizing that it can be used to monitor protected species interactions,” says Eric Kingma, Executive Director of the Hawaii Longline Association. There is currently 100 percent observer coverage in the Hawaii shallow-set fishery targeting swordfish, and 20 percent coverage in the Hawaii deep-set fishery targeting bigeye tuna.

Since 2017, 18 EM systems have been installed on Pacific Island longline vessels. Two cameras on each vessel are connected to sensors on the boat’s hydraulic and reel systems. When the hauling starts,



Reviewers were able to detect protected species interactions at a playback speed eight times faster than real time.

the cameras start recording. The hydraulic sensor reveals information about the vessel’s speed and hydraulic pressure. These data can later be used to see when fishing occurred during an 18- to 24-day trip, half of which is dedicated to reaching and returning from the fishing grounds.

BENEFITS FOR VESSEL OPERATORS

“That’s an advantage to EM—it’s much more efficient and cost effective to start observing when fishing happens. There are clear gains in monitoring efficiency,” says Kingma. “It also benefits operators who are navigating the vessel. During a haul, they’re able to see the deck on the video feed while driving the boat.”

Under a fully implemented EM program, trained staff at the Pacific Islands Fisheries Science Center would review only footage of when gear is hauled and fishing is occurring, once vessels return to port. Reviewers would record retained and discarded catch, as well as protected species interactions.

“We don’t expect EM to replace the observer program, but it will likely be an additional data stream to supplement their data collection,” says Jennifer Stahl, a JIMAR Fisheries Monitoring Associate.

Kingma agrees: “Human observers collect important biological data on the water, assist with tagging, and are able to communicate with captains and crew about protected species handling guidelines.”

COLLABORATION IS KEY

One of the hallmarks of the current voluntary program is collaboration between scientists—who check in with captains at the end of every trip—and the captains, who can have the cameras removed from their boats at any time. This involvement of industry in the decision-making process is one of the major reasons for success.

The program is currently working toward full implementation with a steering committee composed of scientists, captains, and stakeholders. An EM implementation plan is slated for completion in early 2021, and a regulatory roadmap will be developed by a fishery policy analyst. Two NOAA technical memos evaluating [pre-implementation](#) and [detection accuracy](#) have been published as guiding documents that will apply lessons learned from the project to the implementation plan.

Future research includes a catch handling study for shark and other discard species to determine the minimum distance needed to capture these species on EM video; machine learning research to facilitate automation of video review; and protected species research to determine if EM can be used to assess marine mammal mortality and serious injury, as well as sea turtle post-interaction mortality.

FY 2021 FIS/ET/CSP-Funded Projects

For a complete list of all FIS/ET/CSP-funded projects, visit www.fisheries.noaa.gov/data-tools/fis-supported-projects.

Project Name	Description	Lead Office
Electronic Monitoring Pre-Implementation and Implementation		
Collaboration, Implementation, and Automation (CIA)—Second Year	Building upon a range of electronic monitoring and machine learning tools to refine, test, and adapt them for release and application, along with developing additional machine learning tools, advancing collection and processing technology, and integrating with existing data systems to provide implemented systems.	Alaska Fisheries Science Center
Integrating Reliable Machine Learning Algorithms into Longline EM Video Review	Developing an integrated, partially automated system of artificial intelligence and human video review for operational use in the fixed gear fleet in Alaska, including extensive testing on operational EM video, refining/retraining existing algorithms, and altering the video review process.	Alaska Fisheries Science Center
Support for Year Three of the Dockside Monitoring Program Component of the Maximized Retention Electronic Monitoring Program in the Groundfish Fishery	Continuing support for the development of a maximized retention electronic monitoring program for groundfish sectors in the Greater Atlantic, in which all catch of allocated groundfish is retained and landed, EM is used to verify compliance with catch handling requirements, and catch data that is normally collected by an observer at sea is collected shoreside by a dockside monitor.	Greater Atlantic Regional Fisheries Office
Administering Electronic Monitoring and Portside Sampling in the Atlantic Herring Fishery	Supporting administrative costs related to the Industry-Funded Monitoring (IFM) amendment allowing electronic monitoring and portside sampling as an alternative to at-sea monitoring of midwater trawl vessels participating in the Atlantic herring fishery, along with offsetting industry costs associated with EM video review, EM data storage, and portside sampling, to encourage vessel owners to use EM/portside sampling as an efficient and effective way to satisfy IFM requirements.	Northeast Fisheries Science Center
Assessing the Feasibility of Electronic Monitoring (EM) Sensor Technology to Record Soak Time in Bottom Longline Fisheries	Assessing whether EM sensors can be used to accurately record soak time, or the length of time a gear is in the water between setting and hauling, on individual bottom longline sets, which could allow for better estimation of total prohibited and protected species mortality in the southeastern region and lead to regulations that may reduce bycatch mortality.	Office of Sustainable Fisheries
The Efficacy and Implementation of Electronic Monitoring to Quantify Mortality and Serious Injury of Marine Mammals and Post-Interaction Mortality of Sea Turtles in Pacific Islands Region Longline Fisheries	Furthering research to determine EM capabilities as a monitoring tool by assessing the potential utility of EM to inform marine mammal mortality and serious injury and sea turtle post-interaction mortality determinations; bolstering the PIFSC's artificial intelligence library with images of protected species interactions to incorporate into publicly available AI algorithms; and consulting with a fisheries policy analyst to analyze regulatory frameworks and options to further efforts on potential implementation of EM.	Pacific Islands Fisheries Science Center
Advancing the Use of Technology for Port Sampling in the U.S. Caribbean Using Image Analysis for Length Composition	Continuing the development of a rapid sampling station prototype in the Caribbean that automatically captures weights and images of landings, which will support the collection of data essential to management and the compilation of an image library for annotation as part of a greater overall effort to develop automated species identification algorithms by the SEFSC	Southeast Fisheries Science Center
Application of Machine Learning and Electronic Monitoring in Gulf of Mexico Commercial Fisheries: Phase II	Continuing the implementation of machine learning technology and establishing EM methods and tools to provide key data products to support catch estimation including protected species bycatch in the shrimp, reef fish, and other commercial fisheries in the Gulf of Mexico, including funding hardware and application development and developing/upgrading current computer systems with high throughput devices to enable real-time image analysis on vessels, eliminating the need to bring video back onshore.	Southeast Fisheries Science Center
Electronic Reporting Pre-Implementation and Implementation		
Commercial Electronic Vessel Trip Reporting in the Greater Atlantic: A Proposal to Support Fishery Management Council Actions to Implement Mandatory Vessel Electronic Reporting Through Outreach, Access and Training	Implementing an outreach and communication strategy that focuses on the widespread adoption of electronic Vessel Trip Reports (eVTRs) in the Greater Atlantic VTRs by creating and implementing a hands-on training program to train vessel operators in how to use eVTR reporting tools and facilitating focus groups with and interviewing eVTR early adopters and industry influencers to solicit feedback on aspects of the eVTR applications that encourage or impede adoption and widespread use.	Greater Atlantic Regional Fisheries Office
Phase Two: Electronic Document Data Interface (EDDI)	Scaling the Electronic Document Data Interface (which allows users to submit required reports, forms and other data to GARFO and instantly receive feedback if submission requirements are not met) into a cloud-based tool that will be readily available to multiple users across NOAA Fisheries and partner organizations and will improve the speed and accuracy of data collection, paving the way for GARFO to eventually offer all transactions online.	Greater Atlantic Regional Fisheries Office
West Coast Groundfish Observer Program Communications Module Development	Expanding the One Touch Reporting project by integrating communication and documentation components for the Observer Trip Selection (OTS) application, used for logging EM trips, determining selection for observer coverage, and for third-party EM service providers, providing users a means to communicate, document and retrieve communications records in a centralized location.	Northwest Fisheries Science Center
Onboard Record Collection Application (ORCA): A Joint Effort Between the West Coast Region Observer Program, Pacific Islands Region Observer Program, and PacFIN to Develop Electronic Reporting for Pelagic HMS Fisheries Observers	Continuing development and testing of the Onboard Record Collection Application (ORCA), an electronic reporting (ER) application to collect data at-sea on rugged mobile devices in extreme marine environments for HMS fisheries observers (e.g., drift gillnet, setnet, deep-set buoy, and longline), as part of a larger effort to develop and implement ER into a single cross-regional ER system that will benefit both the West Coast and Pacific Islands regional observer programs and aid in the consolidation of redundant data management efforts.	Pacific Fisheries Information Network
Electronic Reporting in the U.S. Pacific Islands Bottomfish Fisheries: including American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands	Assessing the feasibility of electronic reporting in the American Samoa, Guam, and CNMI bottomfish fisheries to improve overall data collection—access, quality, timeliness—that meets fisheries monitoring objectives and further improves the ability of the PIFSC to conduct rigorous stock assessments of the relevant managed species.	Pacific Islands Fisheries Science Center
Further Development and Enhancement of SEFSC Observer Programs' Tablet Applications for Electronic Data Collection	Modifying the current SEFSC Shark Bottom Longline Observer Program (SBLOP) tablet application to accommodate other fishing gears and incorporate specific program needs, including equipment for the Miami and Galveston observer programs, with the aim of unifying the data collection processes of the SEFSC's observer programs while also advancing the capabilities of each program through the inclusion of electronic technology.	Southeast Fisheries Science Center
Implementing an Electronic Logbook for the West Coast Groundfish Fishery	Developing an electronic logbook application for the west coast groundfish fixed gear fisheries and generating a list of requirements for an HMS logbook from the west coast HMS Data Visioning Project under development with the Net Gains Alliance, along with developing reporting requirements to support the one-touch reporting project at the Northwest Fisheries Science Center that would facilitate design of an e-logbook that could easily be expanded to other fisheries in the future.	West Coast Regional Office

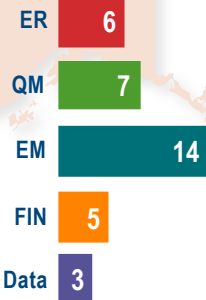
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FY 2021 FIS/ET/CSP-Funded Projects

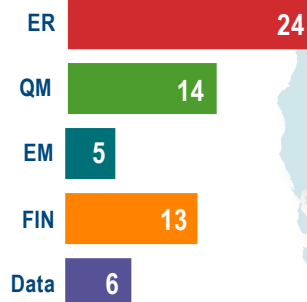
Project Name	Description	Lead Office
Fisheries Information Network Development		
AKFIN Smart Reporting: Enhanced Data Governance Strategy and Reporting Initiatives Through Source Data Archiving, Data Validation, and Metadata Reporting to Improve Data Quality for the Alaska Fisheries Information Network	Redesigning AKFIN source data archival systems, developing enhanced data validation procedures, and improving related metadata and reporting tools for the AKFIN system, resulting in a permanent, queryable system of source data; facilitating data lineage documentation, data upload reporting, error tracking, and comparison between source and target records; and promoting coordination between AKFIN and its partners to improve overall data integrity.	Alaska Fisheries Information Network
Continued Development and Enhancement to the ACCSP Online Data Query Tool and the ACCSP Assignment Tracking Application	Building on previous FIS project funding to continue the development of the ACCSP Data Warehouse into a more user-friendly, flexible, and technologically sound tool, and to update the For-Hire Telephone Survey sections of the Assignment Tracking Application to improve performance of the logic-based survey questionnaire and data tracking metrics.	Atlantic Coastal Cooperative Statistics Program
Add Comprehensive West Coast Fishery Descriptions to PacFIN Data Warehouse	Continuing a collaborative effort between the West Coast region and PacFIN to develop automated frameworks to define and query information about West Coast fisheries as part of the Marine Mammal Protection Act's List of Fisheries (LOF), which categorizes the relative level of marine mammal impacts for all U.S. commercial fisheries, and establish a streamlined and automated process to conduct annual/periodic reviews of the participation in the fisheries described on the LOF.	West Coast Regional Office
Enhancing Efficiency and Accessibility of HMS Stock Assessment and Fishery Evaluation (SAFE) Reporting: Convert to PacFIN APEX Reporting Platform	Converting the reporting of data for the highly migratory species stock assessment and fishery evaluation (SAFE) to PacFIN's APEX reporting system, which features a public dashboard and a secure, confidential, and password-protected portal, instead of the current system, which requires several steps to make certain SAFE report information publicly available. Direct public access would enhance efficiencies in producing the report, while authorized users could access confidential versions of the report through the secure portal; the updated system allows graphic representations of data to be integrated into a report, helping end users to visualize trends in and characteristics of HMS fisheries.	West Coast Regional Office
Quality Management and Continuous Improvement		
Atlantic Coast Project Scoping for Implementation of Automated Data Auditing/Validation for Electronic Logbooks	Developing an infrastructure and process to create real-time automated audits of fishery-dependent fisher reporting of catch and effort data on the East Coast as reporting shifts from paper-based to electronic, with the initial step of conducting a partner-wide Suppliers Inputs Process Outputs Customers (SIPOC) workshop to understand the data flow, inputs, outputs, and specific auditing needs for each partner, and develop an implementation plan and timeline to develop the automated auditing.	Atlantic Coastal Cooperative Statistics Program
GulfFIN Strategic Planning Session	Conducting a facilitated session to generate recommendations for how the Gulf Fisheries Information Network (GulfFIN) prioritizes the activities it conducts to address issues facing fisheries management in the Gulf region.	Gulf States Marine Fisheries Commission
Improving the Annual Survey of Seafood Processors through the Use of Quality Management and Continuous Improvement Tools	Conducting a workshop utilizing QM/CI tools including Value Stream Mapping and Input/Output Process Mapping, to improve the annual survey on the domestic seafood processing sector by bringing together regional port agents and representatives, data users, and headquarters staff to facilitate information sharing and identify the best ways to enhance the survey and better understand the rapidly evolving industry, particularly as it has faced recent natural and man-made disasters.	Office of Science and Technology
West Coast Groundfish Electronic Monitoring Program: Evaluation and Improvement Using Value Stream Mapping	Conducting a value stream mapping exercise as part of a workshop to engage stakeholders in mapping and evaluating the data flow for the West Coast's Electronic Monitoring (EM) groundfish program.	West Coast Regional Office
WCR Permit Program Value Stream Mapping and Application Requirements Documentation	Conducting a value stream mapping workshop to produce a comprehensive and common understanding of the existing West Coast region commercial fishing permit system and identifying current efficiencies and inefficiencies, as the WCR begins the process to modernize the system.	West Coast Regional Office
Data Improvements, Modernization, and Integration		
Developing a Web-Based Application to Streamline Data Processes for Ecosystem and Socioeconomic Profiles in Support of Next Generation Stock Assessments	Expanding the existing stock assessment data platform to include a simple and standardized tool for uploading and managing data, an enhanced dashboard with stock-specific queries, and a public reporting tool to support evaluation and eventual integration of ecosystem and socioeconomic data into stock assessments.	Alaska Fisheries Science Center
Anomaly Detection In Fishery Catch Reporting Data	Implementing an anomaly detection system that leverages modern advancements in machine learning technologies to provide near real-time detection of potentially problematic fishery catch data (which may signal enforcement concerns, unusual fishing behavior, or programming issues) as it enters the Alaska Regional Office's applications and databases, with the primary objective of improving the quality of fishery catch data relied upon by stock assessment authors, fishery managers, universities, economists, industry members, and council staff.	Alaska Regional Office
Fostering Open Science Standards and Collaborative Connections for Analysis and Application of Fishery-Dependent Data	Providing tools and training to scientists and managers to document and discuss how current analyses are done with existing data sets, as part of an overall effort to streamline and centralize fisheries-dependent data collection and move the culture towards more open standards of data collection, management, analysis, documentation, and collaboration.	Northeast Fisheries Science Center
Development of a Web Application Programming Interface (API) for Data Transfer to the Pacific Recreational Fisheries Information Network (RecFIN)	Developing an automated data transfer procedure utilizing a web API between states and RecFIN to improve processing efficiency, reporting timeliness, integrity, and security of West Coast recreational fisheries data by eliminating manual data processing steps, reducing staff workload and lowering the likelihood of data errors.	Recreational Fisheries Information Network
SE Observer Management Portal	Leveraging the investment and successes of the Northeast Fisheries Observer Program (NEFOP) to create a nearly identical web-based observer management portal and paperless data system in the Southeast, through acquiring software, scripts, and necessary hardware to deploy a system similar to the NEFOP's system; identifying and addressing critical gaps (if any); and enhancing the portal software as resources permit, tuning it to the specific needs of the Southeast.	Southeast Fisheries Science Center
Continued West Coast Coastal Pelagic Species Data Consolidation and Integration	Modernizing the coastal pelagic species (CPS) data needed for stock assessments by standardizing and automating data procurement methods and by moving isolated desktop data sets into a centralized database accessible to analysts, researchers, and fisheries managers, enhancing the management of data-poor species like CPS.	Southwest Fisheries Science Center

RFP Project Type by Region FY 2013-2021

Alaska: 35 projects



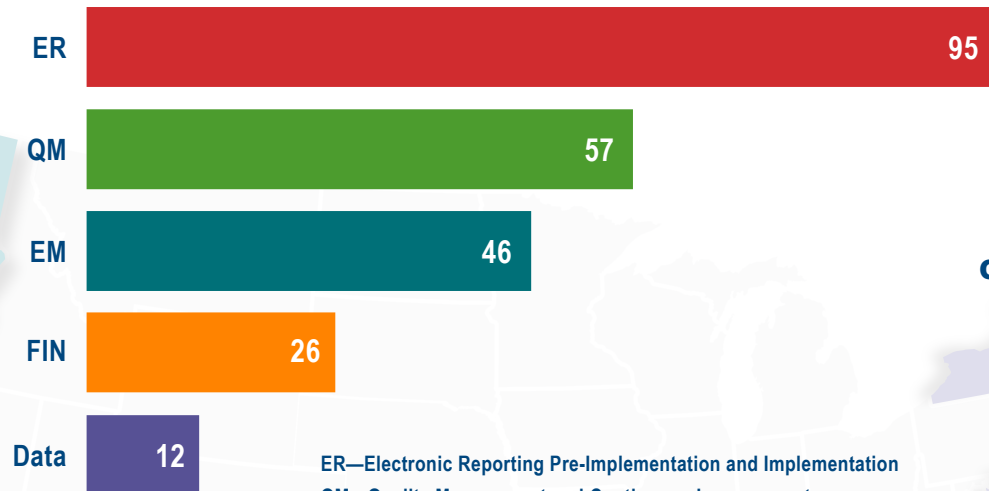
West Coast: 62 projects



Pacific Islands: 24 projects

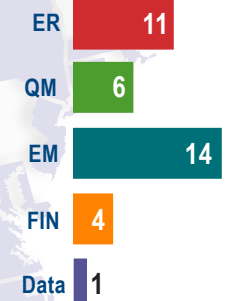


Total: 236 projects*



ER—Electronic Reporting Pre-Implementation and Implementation
 QM—Quality Management and Continuous Improvement
 EM—Electronic Monitoring Pre-Implementation and Implementation
 FIN—Fisheries Information Network Development
 Data—Data Improvements, Modernization, and Integration

Greater Atlantic: 36 projects



Southeast: 73 projects

