



NOAA FISHERIES

Fisheries Information System Program

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.*

FIS Program Contacts

Michael Liddel
Program Director
michael.liddel@noaa.gov

Lisa Peterson
Program Coordinator
lisa.peterson@noaa.gov

fisheries.noaa.gov/national/commercial-fishing/fisheries-information-system-program



Fisheries Information System Program 2022 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.

Created by Congress under the Magnuson-Stevens Act, FIS is charged with building stronger connections among NOAA Fisheries headquarters, science centers, and regional offices, along with councils, commissions, Fisheries Information Networks, and state partners. FIS addresses the inherently regional nature of fisheries-dependent data needs through a shared governance structure that promotes information-sharing and collaboration across professional disciplines and geographic boundaries.

ADDRESSING KEY CHALLENGES

After a pivot to virtual annual meetings in 2020 and 2021, FIS hosted an in-person annual meeting in Seattle, Washington, in August 2022. The convening brought together nearly 50 participants for a joint conference comprising the FIS Program Management Team (PMT) and the program's Professional Specialty Groups. The PSGs are communities of practice addressing issues related to Pacific highly migratory species, software coding, design, and development, and quality management and continuous improvement.

The ambitious four-day agenda included workshops, facilitated discussions, and planning sessions. A full summary of the meeting is available on the [FIS web page](#). From this foundation, attendees identified core challenges in fisheries-dependent data, along with related recommendations.

- **Challenge:** The immense negative impact of technical debt and legacy data systems, and the pressing need for modernization
 - **Recommendation:** FIS should host a workshop on the topic of legacy fishery-dependent data systems modernization. It should include discussions on transition planning to ensure smooth progression through the project lifecycle to avoid accumulating future technical debt. Using the Fisheries Information Management Modernization Workshop as a model, this initiative would provide NOAA Fisheries with aggressive, actionable steps for moving forward.

(Continued on page 2)



Credit: NOAA Fisheries

- **Challenge:** The patchwork nature of data-sharing agreements and the impact on costs and timeliness of providing fishery-dependent data for science and management, and fulfilling treaty obligations.
 - **Recommendation:** Building on the significant work undertaken by the HMS PSG on this issue, elevate the importance of data-sharing needs and collaboration among data providers.
- **Challenge:** The lack of an effective interface between information technology professionals and fisheries scientists and managers, which can lead to delays, bottlenecks, and counterproductive actions in the development of electronic data collection, reporting, and sharing, as well as the management strategies the data support.
 - **Recommendation:** Working with the Coder and Quality Management and Continuous Improvement PSGs, develop specific, actionable strategies to open lines of communications and dialogue among data users, information technology professionals, and software developers.
- **Challenge:** The need for broader adoption of data governance and quality management and continuous improvement principles to provide a framework for addressing the challenges identified at the workshop.
 - **Recommendation:** As they are further developed, NOAA Fisheries leadership should encourage widespread adoption of both data governance and quality management and continuous improvement frameworks.
- **Challenge:** The need for continual communication to NOAA Fisheries leadership on the status of issues and opportunities related to fishery-dependent data quality to inform decision making
 - **Recommendation:** FIS should explore providing regular briefings to the Science Board and Leadership Council, elevating the most pressing challenges and potential solutions identified by the PSGs.

SUPPORTING INNOVATION

Since 2013, FIS has provided funding for innovative fisheries-dependent data projects through a competitive request for proposals process in partnership with the National Observer Program's Electronic Technologies program and the National Catch Share Program. This funding is available to NOAA Fisheries regional offices, science centers, headquarters offices, FIN partners, and state partners (via the interstate commissions), and supports projects in the following focus areas:

- 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.

Initiatives representing each phase of the project lifecycle—from evaluation through implementation and back to re-evaluation—are eligible for funding, with a process designed to spur collaboration, limit redundancy, and effectively target resources.

For fiscal year 2023, 27 projects were funded, bringing the total projects to 295 since the inception of the RFP in 2013. These are detailed by region and category on page 7 of this report, while descriptions of the most recently funded projects are available on pages 4-5.

Professional Specialty Group Snapshots

Professional Specialty Groups are integral parts of FIS, focusing on specific fishery-dependent data challenges. At this year's annual meeting, the Electronic Technologies PSG, which had promoted the adoption of electronic reporting and monitoring for more than a decade, met jointly with the Program Management Team to discuss the PSG's path forward. Ultimately, considering the steady implementation of electronic technologies and the work of other groups within NOAA Fisheries on the topic, it was agreed that the ET PSG had met its original mission and it was an appropriate time for it to sunset. Highlights from the 2022 activities of the current three PSGs are described below.



CODER

Chair: Bradley Gough, Pacific Islands Fisheries Science Center; **Vice-Chair:** Heidi Marotta, Northeast Fisheries Science Center

The Coder PSG convenes experts from across the fisheries-dependent software design and development community to address common challenges related to data information systems.

The PSG explores opportunities for innovation and ways to ensure systems and tools work in synergy across NOAA and our partners.

2022 HIGHLIGHTS

The Coder PSG continued its focus on growing a community of developers and networking across regions and offices. Through monthly meetings and presentations, along with an in-person meeting in August, the PSG has opened discussions on common challenges, including software needs and technical debt. Demonstrations and presentations at monthly meetings have covered data governance and cloud-based infrastructure, among other topics. The group completed an informal survey of information technology staff in each region to gain a better understanding of organizational structures across the agency. Based on the findings, the PSG has started to develop a directory of subject matter experts, including contact information and details of software they have worked with. This centralized knowledge base will enable collaboration and information-sharing on specific applications and platforms across regions.

The connections forged by the PSG have also led to new collaborative efforts. These include a joint project by NOAA Fisheries offices on the Atlantic coast to build a common but regionally flexible electronic Vessel Trip Report (eVTR) application and governance system, as well as a collaboration between the Greater Atlantic Regional Fisheries Office and the Southeast Regional Office on a for-hire reporting application. In the coming year, the PSG will continue highlighting to colleagues and leadership how strong IT and science partnerships can yield world-class science. This work will include supporting FIS efforts to convene a workshop on legacy software and technical debt and developing white papers on IT best practices.



PACIFIC HIGHLY MIGRATORY SPECIES

Chair: Eric Forney, Pacific Islands Regional Office;

Vice-Chair: Jody Van Niekerk, West Coast Regional Office

The Highly Migratory Species PSG brings together data managers and users from the Pacific Islands, West Coast, Atlantic HMS program, and NOAA Fisheries headquarters with the mission of creating an integrated, accessible data system for highly migratory species in the Pacific. The group works in the areas of communications, electronic reporting and modernization, data reporting and business rules, and data sharing.

2022 HIGHLIGHTS

The PSG worked on a range of initiatives. These included continuing to phase two of the Onboard Record Collection Application (ORCA 2), an electronic reporting application for pelagic HMS fisheries observers. Working jointly, and with the help of the Pacific Fisheries Information Network, Pacific States Marine Fisheries Commission, and an independent contractor, the West Coast Regional Observer Program and the Pacific Islands Observer Program are expanding ORCA 2 to cover longline fisheries across the Pacific. At-sea testing of the tablets and the ORCA v2 (longline) software by both WCROP and PIROP observers is underway. Another project tested radio frequency identification readers and tags to track fishing gear in the deep-set buoy gear fishery. The RFID technology has been synced with the ORCA system, which enables the observer to track gear more efficiently without the added work of creating a gear-specific identifier in the application.

The PSG also completed the integration of six logbook datasets into one database for the Southwest Fisheries Science Center, simplifying and streamlining reporting. Other work focused on presenting data sharing issues to regional leadership that exist among NOAA offices, states, territories, and the Pacific Fisheries Information Network, along with a project to identify and describe all Pacific HMS fisheries datasets to better facilitate data integration and sharing.



QUALITY MANAGEMENT AND CONTINUOUS IMPROVEMENT

Chair: Stacy Katasse, Alaska Regional Office; **Vice-Chair:** Vivian Matter, Southeast Fisheries Science Center

The Quality Management and Continuous Improvement PSG helps enhance processes and improve data assets by collaborating across NOAA Fisheries and with our partners to embed QM/CI practices into organizational culture. Whether it's combining complex and divergent information streams into a single, accessible data source, or creating a strategic plan to drive a good idea from the whiteboard to the field, the QM/CI PSG has tools, resources, and funding available to help solve the everyday challenges faced by scientists, managers, and others who work with fisheries data.

2022 HIGHLIGHTS

The PSG assisted two NOAA Fisheries teams with strategic planning exercises. Team members worked with the Southeast Fisheries Science Center's Shipboard at-sea data collection system program to conduct a virtual multiday strategic planning and visioning workshop. The outcomes from the workshop will guide the group as it implements the strategic plan in its day-to-day operations. PSG members supported another SEFSC team working on strategic planning efforts for stock assessments in the Caribbean, training the team on a series of project management and prioritization tools.

The PSG also developed a presentation on how QM/CI can be incorporated into day-to-day operations. The presentation is available on the [QM/CI web page](#), along with an online resource toolkit. Finally, the PSG developed a QM/CI framework intended to provide common language and structure to any offices or teams looking to incorporate QM/CI principles into their work. The PSG will focus on implementing the framework during the coming year, along with incorporating QM/CI into broader NOAA Fisheries initiatives on data governance.



Credit: NOAA Fisheries

FIS Case Study: New System Interface Paves the Way for Paperless Reporting

Electronic Document Data Interface increases speed, accuracy, and efficiency of fisheries data collection in the Greater Atlantic

As of January 2022, NOAA's Greater Atlantic Regional Fisheries Office (GARFO) is a no-paper zone when it comes to trip reports and permits.

And while the move to digital is driven by policy, it's made possible through a new, cloud-based back-end system that has the promise of simplifying the process for going electronic across NOAA Fisheries. Created by in-house developers at GARFO, the Electronic Document Data Interface (EDDI) enables all data submitted from any online form—through virtually any app—to be seamlessly processed, integrated, and entered into the GARFO database. This not only enhances speed and accuracy and reduces costs; it also allows staff to focus on their areas of expertise.

"The highly knowledgeable people whose job it is to interpret the data are now not wasting time ripping open envelopes and trying to decipher poorly filled-out forms," notes Torey Adler, Software Development Manager for GARFO's Technology and Data Management Division.

EDDI lead developer Evert Jan van't Land recognizes the back-end work isn't what generally gets the attention in electronic data collection, but stresses that one can't happen without the other. "It's hard to make people understand why core infrastructure is important," he says. "But if you want the shiny stuff and you want it to be fast, cheap, and effective, you need the infrastructure. It's the foundation for every app in the future that we develop."

What makes EDDI so impactful is its ability to automatically validate—or check the accuracy, quality, and completeness of—source data input by users like vessel captains. Once a form, such as an electronic vessel trip report, has been validated, the information it contains is considered trusted for processing. If

there's an error, EDDI immediately notifies the user and flags which form fields need to be corrected. This way, errors can be fixed quickly and effectively, by the user, before they get transferred to the database and cause delays in data processing and evaluation. Further, the system does this seamlessly in the background. As van't Land quips, "If nobody knows it's there, it's working."

Among its key benefits is the fact that EDDI is compatible with an array of government and third-party apps, and can be used for various transaction types. So instead of having to shoehorn themselves into using a rigid template to create online forms, app developers can compete to build better products using custom interfaces as long as they adhere to a core set of validation standards. This built-in flexibility is an asset in and of itself for NOAA Fisheries. "We are hoping to share the system with other regions if the opportunity arises," Adler says. "It's designed to be something that could be expanded beyond GARFO."

Another strength of the system is its cloud-based technology. Rather than relying on local servers whose downtime can stall everything from data input to processing, working on the cloud means that even if the GARFO servers are down, users can still enter, upload, and sometimes even view their data.

EDDI was developed with support from NOAA's Fisheries Information System program, a state-regional-federal partnership promoting sound, science-based fisheries management. In addition to providing financial resources to projects through a competitive Request for Proposals process, FIS convenes cross-disciplinary teams that collaborate to address pressing fisheries-dependent data issues. "The FIS grant was crucial in the development of EDDI," says Adler, "not only from a funding standpoint but also in terms of intellectual support and credibility."

"The FIS grant was crucial in the development of EDDI, not only from a funding standpoint but also in terms of intellectual support and credibility."

—Torey Adler, GARFO



Credit: NOAA Fisheries

FY 2023 FIS/ET/CSP-Funded Projects

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

Project Name	Description	Lead Office
Data Improvements, Modernization, and Integration		
At-Sea Scale and Video Inspection Database Migration and Application Development	Upgrading the database housing information on at-sea flow scale inspections and developing a more user-friendly front-end data entry application to make data more readily available to users and to improve the ability of NOAA inspectors and industry to track and resolve issues.	Alaska Regional Office
Improving the Management, Security, and Accessibility of NMFS Alaska Region Spatial Data Assets	Improving the management, accessibility, and security of Alaska Regional Office spatial data on North Pacific Fishery Management Council (NPFMC) Fishery Management Plan (FMP) species, including targeted and ecosystem component species and their habitat in the nearshore marine environment, by building a Nearshore Data Portal and implementing a data archival pathway.	Alaska Regional Office
Data Integration to Support Marine Planning and Fisheries Management	Developing the database architecture necessary to create a comprehensive database for all sources of fishery data available in order to make reconciliation of spatial and temporal information and integration of different data types convenient and user-friendly, allowing for more accurate and comprehensive evaluation of economic tradeoffs between fisheries operations and other ocean uses such as energy or aquaculture development	Northwest Fisheries Science Center
Modern Data Governance for the Pacific Islands Logbook Data	Building a modern, user-friendly data warehouse for the Pacific Islands Fisheries Science Center to improve access to comprehensive, high-quality, timely fisheries information that supports fisheries science and management in the region and across the Pacific, and furthers the work by the Pacific Highly Migratory Species Professional Specialty Group to build an authoritative, comprehensive, and integrated database for Pacific HMS data.	Pacific Islands Fisheries Science Center
Migration of the Pacific Coast Marine Recreational Fisheries Statistics Survey (MRFSS) Data to the RecFIN Database	Migrating Pacific coast MRFSS data from its legacy environment to the current RecFIN Oracle database and developing user-friendly, queryable online reporting tools, providing increased data integrity, accessibility, and process efficiency.	Recreational Fisheries Information Network
Integration of Southeast Fisheries Science Center Reef Fish and Shark Observer Programs: Database, Analytics, Field Protocols, and Statistical Design	Integrating SEFSC reef fish and shark observer program databases, analytical procedures, field protocols, and statistical sampling designs, which will eliminate data discrepancies and redundancies, standardize analytical procedures, and improve sampling efficiency and cost-effectiveness while producing more comprehensive historical datasets to better inform stock assessments.	Southeast Fisheries Science Center
Electronic Monitoring Pre-Implementation and Implementation		
Integration of Machine Learning and Artificial Intelligence in Operational Electronic Monitoring Imagery Review to Increase Efficiency	Developing solutions to operationalize machine learning algorithms and models to detect, count, classify, and measure fish in Alaska's electronic monitoring program, and publishing algorithms for use in other regional fisheries and by the public.	Alaska Fisheries Science Center
Electronic Monitoring of Clam Catch in the Northeast U.S. Using Machine Learning and Image Analysis	Testing the ability of machine learning and image analysis to differentiate the species and determine the length of the two primary clam species caught commercially in federal waters in the Northeast Atlantic, through funding placement of cameras and image recording equipment onboard the vessel contracted to conduct the 2023 Northeast Fisheries Science Center (NEFSC) clam survey.	Northeast Fisheries Science Center
Assessing the Feasibility of Electronic Monitoring (EM) Sensor Technology to Record Soak Time in Bottom Longline Fisheries, Phase II	Continuing data collection via electronic monitoring (EM) sensors that record bottom longline soak times for prohibited sharks and protected species to help better predict post-release mortality and support future bycatch monitoring and stock assessments for the bottom longline fisheries.	Office of Sustainable Fisheries
The Feasibility of Protected Species Data Collection from Hawaii's Longline Fisheries Electronic Monitoring (EM) Video Using AI Automated Detection and Through Assessments for Post-Interaction Mortality	Determining the feasibility of collecting protected species data from EM video footage by examining whether artificial intelligence can automate detection of protected species from EM footage and assessing which data EM can collect for protected species to make determinations of post-interaction mortality.	Pacific Islands Fisheries Science Center
Modernize and Automate the Provision of Existing and EM Fishery-Dependent Length Composition Data Required for All US Caribbean Assessments and Wider Research Needs	Modernizing existing commercial length data for species in the U.S. Caribbean and leveraging electronic monitoring efforts to improve the quality, timeliness, and accessibility of data that are important to multiple researchers and essential for all assessments in the Caribbean.	Southeast Fisheries Science Center
Development of an Electronic Logbook Application for the Pacific Albacore Troll and Pole-and-line Fishery	Developing a cost-effective electronic logbook application for the Pacific Albacore troll and pole-and-line fishery to replace paper logbooks, maximize fishery monitoring coverage rates and fishing opportunities, and minimize human data errors.	Southwest Fisheries Science Center
Video Monitoring and Counting System to Evaluate Ocean Recreational Fishing Effort in Washington	Evaluating reliability and accuracy of video monitoring systems by installing video recording equipment and vessel counting software to assess recreational fishing effort via boat counts in all five currently sampled Washington state ocean access ports	Washington Department of Fish and Wildlife

continued on page 5

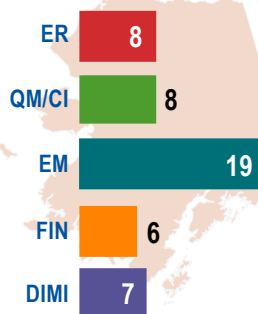
FY 2023 FIS/ET/CSP-Funded Projects

Project Name	Description	Lead Office
Electronic Reporting Pre-Implementation and Implementation		
Development of a Electronic Logbook in Support of Implementation of New Electronic Monitoring Program in the North Pacific	Continuing the transition to electronic reporting for Alaska fisheries by developing an electronic logbook for pollock catcher vessels using pelagic trawl gear, supporting the timely transmission of data for the trawl EM program that is slated to transition from an exempted fishing permit to a regulated program in 2024.	Alaska Regional Office
Oracle Database Proof of Concept	Evaluating the technology and database architecture benefits of hosting a joint database for electronically submitted Vessel Trip Reports that would be accessible to both GARFO and NEFSC, as a proof of concept to thoroughly analyze the technology and cost implications of managing and scaling such a shared database between both offices to address data management and data governance challenges.	Greater Atlantic Regional Fisheries Office
Development and Integration of an Encoded Digital Identification for the Commercial Industry to Provide Seamless Transmission of Participant License Information to a Trip Ticket	Developing and implementing an encoded identification utilizing QR code technology to communicate up-to-date fisher and vessel license information necessary to complete Louisiana's electronic trip ticket report, as part of broader efforts to transition away from paper reporting entirely.	Louisiana Department of Wildlife and Fisheries
A Mobile Development Framework, Governance Policy, and Standards for Cross-Regional Electronic Reporting and Increased Efficiency in Application Development	Building an open-source mobile development framework, governance policy, and standards for new and existing electronic reporting applications, such as logbooks, dealer applications, and observer data, across the Northeast, Southeast, and Atlantic Highly Migratory Species program, along with facilitating discussions among programs and projects on electronic reporting standards, best practices, and lessons learned.	Northeast Fisheries Science Center
Enhanced Reconciliation of Dealer-Reported and Vessel-Reported Landings Information	Creating an automated process to reconcile vessel and dealer datasets between the Southeast Fisheries Science Center and the Atlantic Highly Migratory Species Management Division, to expedite data comparisons and increase quality of assessments and management, including annual catch limits.	Office of Sustainable Fisheries
Electronic Reporting in American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (Year 3)	Improving Catchit Logit, a pilot mobile application collecting catch and effort data from fishermen and vendors participating the commercial fisheries in American Samoa, Guam and the Commonwealth of the Northern Mariana Islands, in order to improve overall data collection efficiency and effectiveness in the territories.	Pacific Islands Fisheries Science Center
Pacific Islands Regional Office Observer Program eReporting: Continue Development of an eReporting Application and Platform (Phase 3)	Migrating data collection from the current paper forms in the Hawaii and American Samoa longline observer programs to a mobile tablet eReporting application, to better provide accurate and timely data to inform fisheries management efforts and reduce program operating expenses.	Pacific Islands Regional Office
Fisheries Information Network (FIN) Development		
West Coast Analysts Fish Ticket System	Building a new tool, the Analysts Fish Ticket System (AFTS), that will allow analysts across NOAA offices and partners to review, and implement edits to fish tickets that will then be made available by PacFIN, ensuring the updates/corrections are more transparent to everyone using the data and streamlining analysis, replacing the current system in which multiple local copies of a given fish ticket can exist.	Northwest Fisheries Science Center
Development of a Data Source Registration Application for the Pacific RecFIN and PacFIN Databases	Implementing a data source registration application for the PacFIN and RecFIN databases to document all incoming data sources, import procedures, and target objects, and to provide import status and metrics for data loads, as part of data governance efforts throughout the region, improving data integrity, increasing efficiency, and reducing staff workload associated with manual monitoring tasks.	Pacific Fisheries Information Network
Pacific HMS Web Reports Phase II	Developing an automated, standard HMS report system required for annual submission to Pacific regional fishery management organizations (RFMOs), as well as the US-Canada Albacore Treaty data exchange.	Southwest Fisheries Science Center
West PacFIN Data Modernization (Year 2)	Continuing to modernize the WPacFIN data warehouse to include multiple disparate datasets collected by Hawaii and the Pacific U.S. territories and to support the newer electronic reporting datasets coming from the Catchit Logit application suite.	Western Pacific Fisheries Information Network
Quality Management and Continuous Improvement		
Automation of At-Sea Observer Law Enforcement Statements	Building on an FIS-funded value stream mapping workshop on the observer debriefing process on regulatory or compliance-related issues by creating a compliance reporting module that will work with the existing software application that observers currently use during deployments, and a companion module to receive the data at the Alaska Fisheries Science Center, removing the need for handwritten notes, reducing debriefing time, and improving data quality.	Alaska Fisheries Science Center
Regional Chesapeake Bay Trip-Level Electronic Reporting for Commercial Seafood Dealers: Requirements Gathering	Identifying specific requirements, challenges, and needs for trip-level dealer electronic reporting in the Chesapeake Bay in order to later support technical development and implementation of trip-level dealer electronic reporting to enhance overall harvest reporting and fisheries management decision making.	Maryland Department of Natural Resources
Improving and Expanding Nationwide Marine Aquaculture Data in the FINs: Phase I - Assessing and Benchmarking State-Level Data Reporting Processes	Completing a nationwide assessment and benchmarking of state-level marine aquaculture data reporting processes in the FINs to determine constraints and potential solutions to optimize efficient reporting and data quality, as part of overarching efforts to support the development of a sustainable marine aquaculture industry in the U.S.	Office of Aquaculture

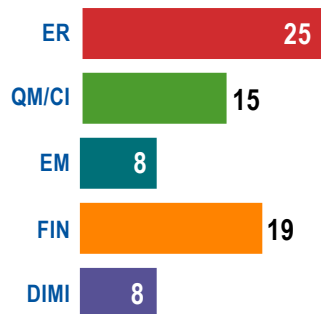
RFP Project Type by Region FY 2013-2023

Total: 295 projects*

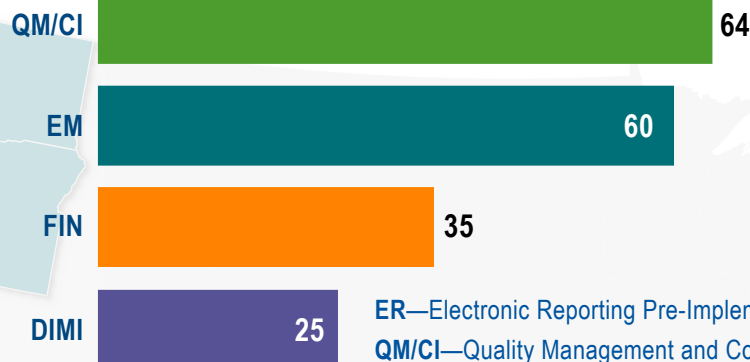
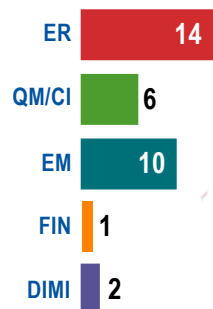
Alaska: 48 projects



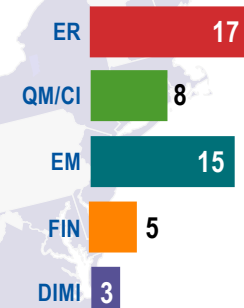
West Coast: 75 projects



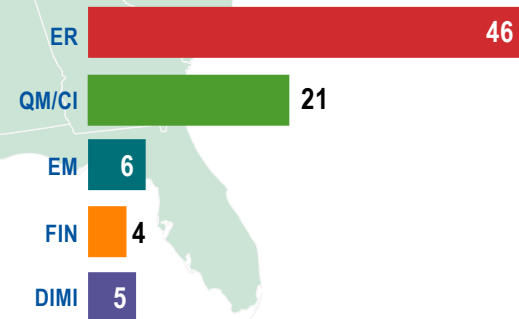
Pacific Islands: 33 projects



Greater Atlantic: 48 projects**



Southeast: 82 projects



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



*Totals include 6 QM/CI, 2 EM and 1 ER headquarters projects

**Totals include projects awarded to the Atlantic Coastal Cooperative Statistics Program, which also serves states in the Southeast