Southeast Region
Electronic Technologies Implementation Plan

AUGUST 2021
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1 Executive Summary

Data are among the National Marine Fisheries Service’s (NOAA Fisheries) most important assets. Sustained commitment to support data management strategy will ensure that the data needed to support fisheries management in the Southeast Region (Region) are collected. The Region covers the federal waters throughout the South Atlantic, Gulf of Mexico (Gulf), and U.S. Caribbean. This commitment will require adequate infrastructure, technology, staffing, and governance. Partnerships with NOAA Fisheries in the Region have been and will continue to be essential to successful fisheries information management, allowing the Region to share knowledge, leverage capabilities, streamline data discovery and access, and learn from experiences.

The Electronic Technologies Implementation plan (ET Plan) describes the current electronic technology efforts within the region and the next steps forward through 2025, concentrating on current and anticipated future projects. The ET Plan communicates current ongoing electronic technology (ET) efforts in the region, current challenges facing the region, and NOAA Fisheries’ priorities over the next five years. Current work in the region has been primarily focused on electronic reporting within the commercial and for-hire fishing industry. The ET Plan highlights existing and future challenges with implementing and sustaining ET programs, data modernization requirements, data integration objectives, exploration of new technologies, and communication strategies. Timing of the ET Plan during COVID-19 resulted in less than ideal engagement with the Fishery Management Councils (Councils) and other partners. Future status reviews of this ET Plan will occur annually around February/March. NOAA Fisheries will work in coordination with the three Councils to provide feedback and input into the ET Plans during these status reviews.

Currently the region is prioritizing existing ET data collection efforts (e.g., for-hire electronic reporting, catch share reporting) and moving toward new collections (e.g., commercial electronic reporting, observer tablet reporting). Current efforts build on existing data collection needs and streamlining data collection processes. In addition to the electronic reporting (ER) programs, the region is investigating novel techniques using electronic monitoring (EM), artificial intelligence, and machine learning.
2 Introduction

In 2013, NOAA Fisheries developed a Policy Directive (04-115) on Electronic Technologies and Fisheries-Dependent Data Collection, which required each Region and the Highly Migratory Species (HMS) Program to create regional ET Plans. The initial ET Plans were created in 2015 and updated bi-annually for several years. In 2019, NOAA Fisheries revised the Policy Directive to reflect progress on implementation of electronic technologies for fisheries data collection and a new process for the regional implementation ET Plans.


2.1 ET Projects Over the Last 5 Years

Successes in the past few years have included improvements in existing projects, pilot studies, and implementation of the new Southeast For-Hire Integrated Electronic Reporting (SEFHIER) program. Improvements in existing projects have included software and technology updates to the Catch Shares Online System (CSOS), Permit Information Management System (PIMS), Southeast Region Headboat Survey (SRHS) program, and improved data connections between the Southeast Regional Office (SERO) and Southeast Fisheries Science Center (SEFSC). These improvements ranged from ensuring system operation to enhancing mechanisms for data collection and analysis. Two of SERO’s systems, CSOS and PIMS, were approaching end-of-life with current operating software and were in need of modernization to function with current hardware and software. These systems are critical to data collection as the PIMS data provide the backbone of fishery management analyses, containing information about the permit holders and vessels associated with each permit and the CSOS is a real-time data collection program to manage the Gulf Individual Fishing Quota (IFQ) programs. Additionally, the SRHS program improved data connectivity, data quality, and data storage during the past 5 years. Modernizing all of these data collection systems resulted in increases in system security, efficiency, timeliness, and data accuracy for management decisions.

The Region also worked on several pilot studies and coordinated partnerships with interested parties working on Electronic Reporting (ER). These studies included the consideration of electronic logbooks in the for-hire sector; investigating useful approaches to using electronic monitoring (EM) with Mote Marine Laboratory, examination of catch shares in the recreational sector through the Headboat Collaborative exempted fishing permit, and preliminary work on moving towards commercial electronic logbook reporting. Many of the studies helped lead to the implementation of the SEFHIER program, which requires electronic logbook reporting for over 3,000 federally permitted for-hire vessels. While the SEFHIER program differs between the Atlantic and Gulf, the goals of the program in both areas are to produce accurate, timely, and valid data for management and science for the federally permitted for-hire fleet. The large nature of this product, which covers multiple regions and fishery management plans, and vessels created additional design and implementation hurdles. Extremely complex ET systems often have unexpected obstacles that require additional resources (e.g., costs, expertise, infrastructure) to implement that may not be readily available within the agency. The experience with SEFHIER demonstrated the importance of addressing needs related to data flow, storage, integration, security, gathering, and analysis early in the implementation stage. In such a framework, each item identified should contain detailed information about potential obstacles, potential solutions with information relating to costs in time and money.

2.2 Challenges to Implementing/Improving ET Systems

A number of important lessons were learned over the last five years regarding the critical gaps that must be addressed when building, maintaining, or improving ET systems:

- **Knowledge and capabilities** - Ensure that programs obtain sufficient knowledge of current emerging technologies, security concerns, program specific operational needs, and budget/contracting requirements. The Region has worked towards this goal by involvement in ET working groups and professional groups that share ET knowledge across regions. Retaining staff skilled in software development, database systems and
administration, and infrastructure is critical to the operation of any ET program.

- **Infrastructure** – Modernized infrastructure that meets IT security requirements is the critical backbone of any ET program. Past programs had been developed and hosted on local servers. With the recognized benefits of cloud servers for system operation, system backup, and system communications, the agency will be pivoting to cloud infrastructure for many of their ET programs. Cloud infrastructure allows the Region to connect databases and improve data sharing among line offices, across regions, and with state partners. Cloud infrastructure will be critical for future visions of integrated ET systems. Infrastructure improvements or needs are often hampered by insufficient funds to purchase cloud services, resources to migrate systems, and staff to maintain the systems at the level needed to ensure quality data.

- **Resources** - Obtaining adequate resources for building and maintaining systems is key to future and current ET operations. It is important to account for operational staff resources, software or hardware type approval, security processes for industry data submission, and future development. Nearly all the ET systems built within the Region will need continuous improvement, not just simple maintenance. These continuous improvements would improve system operability, allow for regulatory changes, and provide features to ease industry stakeholders operations and compliance. Due to the complex nature of regulations many programs must be custom built and be built with flexibility in mind.

- **Long-term funding** - Funding is critical for ET programs, but is often obtained through one-time sources or temporary funding. While temporary funds provide a mechanism to pilot test applications, it is insufficient for operation of an ET program. ET programs funding needs to cover software development, database administration, data quality and checks, data analysis, and customer service.

- **Information management and governance** - Applying data management maturity matrices to current systems and anticipated future systems would create a baseline index of system maturity and allow for planned modernization events to address emerging needs and technologies. Such a matrix would allow for funding to be sought for modernization in advance of system’s end of life. All regions will be moving forward with plans to work on improved data governance. Data governance is the execution and enforcement of authority over the management of data and data-related assets. Management of data includes the definition, production, and usage of data that provides confidence in the security, protection, and quality of data. Both information management (IM) and information technology (IT) play key roles in data governance. IM resides in the hands of each ET program and focuses on the data quality and data access. IM includes raw data collected, processed data, scientific products, development of products or programs, and the tools to support such IM. IT is the infrastructure support required for such programs, data storage, service agreements, network systems, and security policies. Finalizing a data governance plan will also help with determination of resource needs and knowledge listed above.
3 Vision For 2021-2025

The Southeast region is committed to exploring ET options and implementing new programs. Current fundamental NOAA Fisheries’ priorities related to ET concentrate on providing an operational strategy for maintaining and expanding the use of ET for federally managed fisheries in the Region. The current infrastructure support, resources, and capabilities are inadequate to support additional programs and may limit capabilities in existing programs. These limitations affect data access, data analysis, and incorporation of results into meaningful management actions. ET decisions need to complement or improve existing fishery-dependent data collection programs, while being sustainably cost-effective for both the agency and fishing industry.

ET improvements to be focused on in the next years should improve data timeliness, data accuracy and precision, and data accessibility for managers, scientists, and industry. Secondary focuses of ET projects would include communication and outreach of ET value in data collection, standardized reporting practices, and establishing partnerships for new and innovative technologies. While ET improvements often reduce the burden of reporting, in fisheries with no prior reporting burden, both the burden and cost may increase for both managers and fishermen.

3.1 Improving ER

The Southeast Region is focused on implementing or improving ER in the commercial and recreational sectors, and exploring EM options. ER can improve quality and timeliness of data for use by managers and scientists, which in turn, will aid in catch monitoring, bycatch avoidance, determining management alternatives (e.g., season length, catch limits), and incorporation in scientific and management studies (e.g., stock assessments). It is noted that ER is a data collection method and not a sampling design. Data collected through an ER process will still need to undergo a rigorous scientific evaluation of unreported or misreported catch (landings and discards). Unreported catch can include missing trips and/or missing catch on known trips. An appropriate validation sampling design will allow for the estimation of total catch for a species. Additional calibrations may be required to compare to past data collected using different methodologies (e.g., for-hire logbooks data to the Marine Recreational Information Program [MRIP] survey data).

Another priority is the Gulf shrimp cellular electronic reporting logbooks (cELB), which are used to collect shrimp effort data. These cELBs use antiquated 3G cellular technology and ceased transmitting information to NOAA Fisheries in December 2020. The Gulf of Mexico Fishery Management Council (Gulf Council) is considering actions to replace the system with technology that can continue to record and transmit effort data securely.

3.2 Improving VMS Functionality

NOAA Fisheries and this region seek to improve VMS functionality as an ET priority. While VMS has traditionally been used as an enforcement aid to monitor protected areas or special management zones (i.e. South Atlantic rock shrimp fishery), the use of VMS has evolved over time. Within the Region, VMS is used both as an enforcement and as a reporting tool within the Gulf Catch Share programs. Enforcement is often related to real-time positioning, while reporting aspects can be used to submit information such as notifications of landings and logbooks. The South Atlantic Fishery Management Council (South Atlantic Council) is considering modernizing the Wreckfish Individual Transferable Quota (ITQ) program. One aspect that may be considered is the use of VMS units to aid in the enforcement of the modernized system. Within the emerging for-hire electronic reporting program for the Gulf, cellular and/or satellite VMS devices will be used primarily as a validation and reporting tool. The Region has recently assisted in rulemaking that will allow for cellular VMS units when appropriate for a fishery. Cellular units store the positions of vessels while at sea, but only transmit collected locations when within cellular range. For this reason, these devices are often called store-and-forward units. Since these units do not transmit at sea, the option would be restricted to data collection needs for reporting and validation. Cellular VMS units are authorized for the Gulf for-hire electronic reporting program and could be considered as an option to replace the Gulf shrimp cELB.
where real-time location is not a primary goal. Cellular units would not be appropriate for enforcement of location in real-time, as is often used in the commercial sector or fisheries concerned about closed areas.

3.3 Artificial Intelligence and Machine Learning

Scientific data collection and analysis increasingly exploit advanced technology to improve accuracy, precision, consistency, and efficiency. The Southeast Fisheries Science Center (SEFSC) science priorities include development and implementation of advanced technology including EM systems that implement real time image analyses using artificial intelligence (AI) and machine learning (ML). AI and ML can be used to extract bycatch information such as species composition, length, and count of discard on the vessel. NOAA Fisheries is implementing cloud-computing services in the Region with a view that investment in these technologies will not only improve the quality of the science data collection programs but also improve cost effectiveness for the future. This work will need investment to maintain and expand core expertise in ML, engineering, physics-based sampling, and cutting-edge technology.

Research and development will be required to move forward. Much of this work will be completed within the SEFSC’s Advanced Sampling Technology Branch, which will provide evaluation and development of new, emerging, and existing remote monitoring technology. It will provide state of the art technology and support for fishery-dependent, fishery-independent, and protected resources data collection and analysis efforts across the Region.
4  Regional ET Priorities

The Region will be evaluating ET priorities with respect to alignment with Region priorities and costs. Each new ET project should align with the priorities from the Region’s Geographic Strategic Plan, which was implemented in 2020. For each ET project, the Region will identify and quantify the estimated costs of new or expanded ET programs. These costs will include changes or additions to infrastructure, staffing needed to manage these programs effectively, data connections, and costs to the industry. The Region is also developing a process for reviewing progress made within ER programs, including using post-mortems to compile lessons learned, identify problematic areas for future ER programs, and identify areas where costs savings could occur. Another regional ET priority will be the standardization of data collection and hardware/software type approval. Standardization will be compared across programs to facilitate improved data flow and collection, while remaining flexible to each program’s objectives. These are the first steps towards moving to a one-stop reporting concept. One-stop reporting will allow one submitted report to be distributed to all parties requiring reporting, thus reducing redundant ER reporting across programs within and across regions. Finally, the Region is also interested in ET projects that will advance new technologies to automate the collection and transition of effort, length, and catch information using advanced remote monitoring sensors.

The current specific NOAA Fisheries’ priorities within the Region are related to the following programs:

- SEFHIER
- Commercial electronic logbooks in federally regulated finfish fisheries
- Identify systems that are acceptable replacements for the shrimp cELB 3G units
- Continued Catch Share Modernization
- Permits Modernization
- Modernization of paper-based industry surveys
- Implement real-time image analysis to determine length, catch composition, disposition, and weight from shrimp and reef fish fisheries.
- Modernization of the Wreckfish ITQ data collection program
5 Council Actions

The Region works with three Fishery Management Councils: Gulf of Mexico, South Atlantic, and Caribbean. ET related actions began in the Region in the early 2000s and continues through today.

5.1 Early History

The South Atlantic rock shrimp fleet included the Region’s first ET, with the requirement of VMS in 2003. VMS was used primarily as an enforcement tool to protect habitat. VMS units were added to the Gulf commercial reef fish fleet at the end of 2006 to monitor vessels for area restrictions. While the initial impetus for VMS was enforcement, the Gulf IFQ programs (Red Snapper and Grouper-Tilefish) use VMS units for reporting requirements. Both Gulf IFQ programs are electronic, utilizing a web interface and personal user accounts to track all IFQ-related activity. The Red Snapper IFQ program began in 2007 and the Grouper-Tilefish IFQ program started in 2010. Both are contained within the same system, sharing accounts and tracking mechanisms. Electronic reporting in these IFQ programs includes hail-in or pre-landing notifications that can be entered via website, VMS, or phone service, landing transactions, and transfers of shares and allocation.

Another early adoption of ET was within the Gulf shrimp fishery. Near the end of 2006, the shrimp fleet began requiring ELBs through Amendment 13 to the Fishery Management Plan (FMP) for the Shrimp Fishery of the Gulf of Mexico. The vessels use a simple time-stamped GPS unit to record and hold a vessel’s location at 10-minute intervals. Using these values, vessel speed is estimated between points to evaluate activity. The Gulf shrimp ELB program was implemented to assist in obtaining accurate estimates of juvenile red snapper mortality attributed to the shrimp fishery. In addition, this ELB is used to estimate mortality estimates for a number of other species captured as bycatch in the shrimp fishery and monitoring of effort in this fishery is Reasonable and Prudent Measure 1 of the recent ESA Biological opinion. A framework action in 2014 helped to modernize the shrimp ELB program. The shrimp ELB program is currently being discussed by the Gulf Council, SEFSC and SERO for further modernization as the technology used is outdated.

5.2 Recent Actions

Both the South Atlantic and Gulf Councils worked jointly in 2014 to move the Southeast Regional Headboat Survey (SRHS) program to electronic reporting and to require dealers to report all landings electronically. In 2014 and 2015, an exempted fishing permit (EFP) was used by headboat fishermen to pilot an allocation based program using electronic reporting. This system used an online system and VMS features.

Most recently, both the Gulf and South Atlantic Councils moved forward with electronic reporting for the entire federally-permitted for-hire fleet, not just the subset of headboats captured in the SRHS program. The final rule for these programs became effective the first week of January 2021. Both Councils are also developing amendments to FMPs that, when implemented, would move the paper-based commercial coastal logbook to electronic reporting. Initial pilot studies were successful and mandatory electronic reporting would increase timeliness of data collection and improve quality of data. NOAA Fisheries will work with the fishing industry, Councils, and data collection partners to gather input and develop outreach materials, borrowing lessons learned from past ER implementations.
6 Fisheries using Electronic Technologies

6.1 Fisheries using Electronic Monitoring

EM is currently not required in any federally managed fishery in the Region. Past pilot studies (Pria et al. (2008), Baker (2012), Tate (2012), and Batty et al. (2014)) looking at EM in the Region found that EM, while reliable for documenting fishing effort and retained catch, was not as reliable for determining catch discards or species identification. With the advent of new AI and ML in fisheries, remote monitoring that implements real-time image analyses will have future consideration in the Region.

Current NOAA Fisheries research projects to improve bycatch estimates in the shrimp industry are underway. The NOAA Fisheries Gulf and South Atlantic Shrimp Observer Program, New Advanced Technology Workgroup, LGL Ecological Research Associates, Inc., and Saltwater, Inc., through funding awards primarily by Saltonstall-Kennedy grants, National Fish and Wildlife Foundation, and NOAA Fisheries’ Fishery Information System, are exploring pathways forward to improve bycatch estimation in the Gulf shrimp fishery. These advancements will further enhance the scientific robustness of bycatch estimates, resolve barriers to sustainable fisheries certification, and provide industry with a means of validating supply chain traceability and sustainability claims through increased data collection and application ML and EM in the shrimp and other commercial fisheries in the Gulf.

In 2018, Marine Ecosystem Restoration Research and Consulting, funded by SEFSC, worked on the development of a rapid sampling process in the U.S. Caribbean using cameras mounted above either a small platform or table on which fish were passed under the camera. The fish images were captured and passed through software for species identification and size measurement. The small offloading areas in the U.S. Caribbean made the process difficult for samplers, so additional development will be required before considering implementation of such a system to quickly capture length information from reef fish species in the U.S. Caribbean.

Recently, independent, non-profit Mote Marine Laboratory in Florida has formed the Center for Fisheries Electronic Monitoring (CFEMM). The CFEMM program is dedicated to developing and assessing EM technologies in the commercial Gulf snapper-grouper fishery. In early 2020, CFEMM has three project in progress utilizing EM technology: EM project funded through National Fish and Wildlife Foundation, underwater camera testing through Bycatch Reduction Engineering Program grant, and a Cooperative Research Project looking at bycatch with EM. Mote Marine Laboratory has also completed three EM projects.

6.2 Commercial Fisheries using Electronic Reporting

Electronic vessel reporting uses modern technology (e.g., computers, tablets, or smart phones) to record and transmit data to NOAA Fisheries for analysis and storage. In the Region, electronic reporting data are collected from the commercial sector using a variety of methods (e.g., computer or web-based software, applications on tablets). As of early 2020, commercial entities using electronic reporting include the Gulf shrimp fishery and Gulf IFQ.

In the shrimp industry, selected vessels required to report have GPS recording devices installed that report locations every 10 minutes. These devices are referred to as the cELB. Data from the devices were transmitted to NOAA Fisheries using a cellular connection. The units ceased transmitting information to NOAA Fisheries on December 31, 2020, and National Environmental Satellite Data and Information Service in Stennis shut off the machine receiving the electronic logbook data from 3G cellular units on December 7, 2020. However, the units are still collecting data and the plan for 2021 is for the shrimp fishery to continue to use the units and the data will be manually obtained by the SEFSC on thumb drives. These data are used to estimate vessel speed and fishing activity, which in turn is used to calculate fishing effort and bycatch. The data are essential for shrimp stock assessments and a key component in estimating juvenile red snapper bycatch mortality and protected species takes from the shrimp fishery. This electronic reporting program will need to be modernized and a path forward is being
discussed by the Gulf Council, SEFSC, and SERO. The SEFSC presented an array of potential replacement electronic data collection devices currently in use in other fisheries to the Gulf Council Shrimp Advisory Panel in March 2021 for further discussion.

The Gulf Red Snapper IFQ and Grouper-Tilefish IFQ are electronic reporting programs using a web-based interface. Both programs are housed in the SERO CSOS web system and all transactions are completely online, including share and allocation transfers, pre-landing notifications, and landings. In addition, all commercial reef fish permitted vessels must contain a VMS, that is permanently affixed and always on.

Future initiatives in electronic reporting include moving towards Gulf and Atlantic commercial vessels reporting electronically. The Region is also involved in some initiatives to look at ‘one-stop’ reporting that would allow a trip report to be submitted to more than one region or state. Currently, both SERO and SEFSC are involved in a Fisheries Information System (FIS) funded project relating to One Stop Reporting with the Greater Atlantic Regional Office, Northeast Fisheries Science Center, and the Atlantic HMS program. The project is intended to develop technical specifications for an electronic vessel trip report (eVTR also called e-logbook) system to enable fishing vessel operators to submit a single eVTR to satisfy reporting requirements in all affected federal regions involved in this program.

### 6.3 For-Hire and Recreational Fisheries using Electronic Reporting

The for-hire fleet began ER in 2014 for vessels that participated in the SRHS program. Vessels selected in both the Gulf and the South Atlantic are required to submit trip-level logbook data electronically. These reports may be submitted via a web-based system or through an application on a tablet or phone. In 2019, SRHS developed a tablet application for dockside validation sampling. This application allows port agents to link to the electronic measuring boards and scales via bluetooth, while also providing a mobile device to collect dockside information electronically that can be uploaded later.

In January 2021, the electronic for-hire reporting SEFHIER program was implemented for all federal for-hire vessels. Gulf and South Atlantic federally permitted for-hire vessels are required to report regardless of where fishing occurs, including other regions or state waters. Vessels that have both a South Atlantic and Gulf federal for-hire permits are only required to report to the Gulf system to reduce duplicate reporting. The new reporting requirements will allow for improved monitoring of recreational quotas and are expected to provide more timely data and efficient management of recreational seasons. The data collected by the SEFHIER program are expected to help improve population assessments by:

- providing a more accurate record of federally permitted for-hire vessel landings and locations;
- providing more accurate data on fishing effort (number of trips);
- improving analyses for future Gulf and South Atlantic Council actions;
- helping to assess the negative impacts of disasters (e.g., hurricanes, red-tide events) on for-hire businesses; and
- allowing for better enforcement of fishing regulations.

The South Atlantic federally permitted for-hire fleet is required to report trip-level data weekly for South Atlantic snapper-grouper, Atlantic dolphin and wahoo, and coastal migratory pelagic species. Federally permitted South Atlantic Charter fishermen must report information on the trip (e.g., trip start and end date and times, end port, vessel and captain identification), catch (e.g., species kept and discarded), effort (e.g., fishing location, depth, hours fished, number of anglers, fishing method) and economic information (e.g., charter fee, number of passengers and crew, fuel used and fuel price per gallon). Electronic reports are due by Tuesday following the end of each reporting week (Monday through Sunday). Information can be submitted through computers, smartphones, or tablets with access to the internet. Reporting must be completed through a NOAA Fisheries approved software vendor. South Atlantic federally permitted headboats will continue to report to the SRHS program by Tuesday following the
reporting week.

Gulf federally permitted for-hire vessels are required to report trip-level data prior to the fish offload for Gulf reef fish and coastal migratory pelagic species. Reporting logbook elements are the same as required within the Atlantic. Gulf federally permitted for-hire vessels are also required to declare prior to leaving the dock the type of trip being taken (hail-out). The declaration also includes an estimated time of return and landing location. Vessels may only land at pre-approved landing locations. In addition, the Gulf federally permitted for-hire vessels must install a GPS system that is permanently affixed to the vessel and always on. This GPS system may include any NOAA Fisheries approved unit for this program, including both traditional satellite VMS units as well as cellular store and forward units.

6.4 Federal Dealers/Processors /Tenders using Electronic Reporting

Beginning in August 2014, dealers issued a Gulf and South Atlantic Dealer (GSAD) permit are required to submit a detailed electronic report of all fish received. Dealers submit reports weekly through the electronic trip ticket reporting system. Reports must be received by Tuesday following the reporting week (Monday through Sunday). When dealers do not receive fish during the week, the dealers must submit a report stating no fish were received. Dealers could use either custom built software provided by Bluefin Data LLC or the Atlantic Coastal Cooperative Statistics Program’s (ACCSP) Standard Atlantic Fisheries Information System. For dealers receiving Gulf mackerel harvested by gillnets, a report must be submitted daily during the open season via port agents, telephone, or internet.

6.5 Observer Programs / Study fleet(s) Electronic Reporting Programs

There are multiple ER initiatives active in the Region, including systems in use or scheduled/funded for development in federally-run data collection programs for observers and dockside sampling programs. Commercial dockside biological sampling for most federally managed species in the Southeast is implemented via SEFSC’s Trip Interview Program (TIP). TIP involves not only SEFSC but also partner agencies (in 2019, over 40 individual samplers representing eight agencies collected length information on ~100,000 specimens).

A TIP electronic data collection system for commercial dockside sampling was developed and implemented in 2018. The system consists of a tablet connected via bluetooth to an electronic measuring board; the mobile application was developed in house at the SEFSC. Expansion of this system was funded by a FY18 FIS grant. However, equipment acquisition issues, followed by COVID19 disruptions, have delayed the expansion. Approximately, 21,000 lengths have been collected via this system to date. Prospective future developments include additions of additional wireless peripherals, such as scales and calipers.

Electronic data collection technologies used for recreational dockside sampling of headboats include electronic fish measuring boards and scales, both being Bluetooth compatible. In 2019, a tablet application was developed for dockside validation sampling. This application allows port agents to link to the measuring boards and scales, while also providing a mobile device to collect dockside information electronically that can be uploaded later. This technology will improve efficiency in dockside sampling.

Observer programs in the Region have had limited experience with electronic data collection and reporting. Technology development was done on an exploratory in-house basis (Miami Laboratory’s Pelagic Observer Program) or through small scale FIS funded pilot programs (Panama City Laboratory’s Shark Bottom Longline Observer Program). Both projects explored the development of mobile tablet applications for on-deck data collection and real-time transmittal to shore-side databases. Currently, the SEFSC has an FY21 FIS project funded to develop a tablet application that can work across the various individual programs in the SEFSC Observer Enterprise. This new project will purchase 20 individual hardware/tablet systems for distribution in the observer programs, to supplement existing tablets. However, completion of this project will not fund 100% of the electronic
data collection as the funding was insufficient to purchase enough tablets for all observers. The SEFSC plans to have the application development completed and the systems in use sometime in FY2022. We estimate that 10-15 additional tablets would be needed to completely outfit all SEFSC fisheries observers; however this assumes there are no durability issues with the tablets. Looking ahead, when 30-50 tablet systems are in regular use, it is likely that technical support may become an issue. The SEFSC currently has no staff identified for this support.

6.6 Fisheries using VMS

VMS allows the Office of Law Enforcement (OLE) to use modern technology to monitor compliance, track violators, and provide substantial evidence for prosecution. In addition, VMS aids law enforcement personnel in focusing their patrol time on areas with the highest potential for significant violations. VMS monitors the location and movement of fishing vessels through the use of on-board transceiver units. The transceiver units send position reports that include vessel identification, time, date, and location. For satellite based VMS units, these data are mapped and displayed on the end user’s computer screen in real time. Each vessel typically sends position reports once an hour, but increases intervals when the vessel is approaching an environmentally sensitive area. Alerts can be sent to the VMS technicians and other personnel when a particular vessel location might require additional inquiry or contact with the vessel operator. VMS units are approved for use through a type-approval process. A final rule published on July 8, 2020 (83 FR 40915), that allows for the use of cellular VMS units to be type-approved and used in federally managed fisheries with a VMS requirement. Cellular VMS units are undergoing the type-approval process for use by federally permitted vessels in the Gulf electronic for-hire SEFHIER program.

Satellite-based VMS units are required for Gulf Reef Fish, Atlantic HMS, and South Atlantic rock shrimp. There are currently 11 type-approved VMS units for commercial Gulf reef fish and Atlantic HMS fishermen. Current information on type-approved units can be found on the OLE website. An owner or operator of a vessel that has been issued a commercial vessel permit for Gulf reef fish must have an operating type-approved VMS on board at all times whether or not the vessel is underway, unless exempted by NOAA Fisheries under the power-down exemptions. Prior to departure for each trip, a Gulf reef fish permitted vessel’s owner or operator must declare a fishing trip. Additionally, the Gulf Catch Share programs use the VMS units as one method for submitting pre-landing notifications.

The Gulf federally permitted for-hire fleet will utilize both satellite and cellular VMS units to record location information, declare a fishing trip, and submit a logbook. Alternative methods outside of VMS are available for for-hire trip declaration and logbook submission. Cellular units are only allowed in the Gulf federally permitted for-hire fleet and units are currently undergoing type-approval for use in late-2021.

The VMS Reimbursement Program was established to offset the cost of purchasing a VMS unit for the purpose of complying with fishery regulations pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. The reimbursement program was announced by NOAA Fisheries in July 2006, and has expanded nationally since its inception. The Pacific States Marine Fisheries Commission, in collaboration with OLE, distributes the allocated reimbursement funds to eligible, confirmed vessel owners and operators.

2 https://www.fisheries.noaa.gov/national/enforcement/noaa-fisheries-type-approved-vms-units
7 Implementation Challenges of ET Programs

Data collection, processing, and analysis are a key priority for the Region. Adequate support to collect, process, and store data entails modern infrastructure, utilizing emerging technologies, sufficient staffing, and a strong data governance program. Many of the current data collection systems were built using technology that are now outdated and were developed as independent systems. The four main ET challenges facing the Region are: 1) the need to modernize infrastructure, 2) integrate independent systems, 3) provide sufficient technology support (e.g., programmers, database managers, security support, data stewards), and 4) continue to monetarily support these programs moving forwards. For each data system, a plan should be developed to modernize the existing system, while integrating with other data streams. This requires sufficient prediction of costs and the resources to employ experts to modernize the systems.

In terms of supporting both state and federal data collectors, as well as public stakeholders using ER systems (not to mention development of such systems), additional long-term funding is needed to support the Region’s ET infrastructure. ET infrastructure should include infrastructure, such as servers, operating systems, and databases, as well as ET communication connectivity (e.g., Bluetooth connectivity of peripherals, wireless data connections) and client platforms (e.g., mobile applications, web-based data entry pages). Future benefits could be realized within a region, when staff with ET expertise are shared across programs, offices, and divisions. Retaining qualified staff can be challenging when competing with private businesses while costs for contracting companies could quickly exceed budgets. A NOAA Fisheries priority moving forward should be to train and retain well-qualified federal programming staff to address these concerns.

In the Region, as in other parts of the Country, modernizing the fishery information systems has been identified as both a priority and a challenge. The Region is developing long-term strategies for evaluating existing systems for modernization, prioritizing modernizing systems, integrating systems, and providing adequate resources to support for all future ET systems. The Region works with the national Fisheries Information System (FIS) program on these goals through their request for proposals process and participation in their professional specialty groups, where best lessons are shared across offices from across NOAA Fisheries. In addition, Regional staff are actively participating in national data modernization and data governance efforts coordinated by the NOAA Fisheries’ Office of Science and Technology. Participation in these activities hopefully will result in increased efficiency and effectiveness of the Region’s data enterprise.

Another challenge to implementation of electronic systems has been compliance with Department of Commerce, NOAA, and NOAA Fisheries IT security standards. Many of these security standards did not consider NOAA Fisheries utilizing, building, or supporting data collection from the fishermen in the field (e.g., required frequency of password changes, two-factor authentication). Flexibility for field applications, both in design and functionality, would allow a more robust implementation of ET within the fisheries. Likewise, required color schemes for NOAA applications were not designed for work in the field, on a sunny day. While exceptions can be granted, further evaluation of where flexibilities should be considered would be beneficial. Additionally, pilot studies often utilize emerging technologies, which later may not be used in full implementation because approval lags behind private industry standards.
8 Research and Development

Partnership between the Region and the Northern Gulf Research Institute will greatly enhance the abilities to build on previous NOAA Fisheries advancements of both non-camera and camera-based systems, methods, and tools by improving system(s) functionality and current hardware design of several fisheries intelligent monitoring systems (IMS). This work will also support compiling, writing and publication of a technical engineering documentation to guide future EM providers and researchers for development and deployment of future monitoring systems that integrate real time automation, including an operation manual for the open source operating system. This project will fund future hardware and application development and extension of the current designs for electronic logbooks (eLog), Portable Sampling System, Stereo and Chute systems to support real-time sensor processing requiring high throughput parallel processing hardware, while minimizing power demands. These systems will be tested and used in numerous fishery monitoring applications including conveyor belt image processing, data collection of summary observer information to support catch estimation, enhanced deck sorting for shrimp fisheries to estimate volume and catch size, and accounting for serial catch events from hook and line reef fish fishing vessels.

Currently, the market of EM systems is very limited and there are no systems that provide on-board sensor processing or automated image analyses. This work will provide improvement in hardware processing performance to enable real-time image and sensor analyses through integration of a family of ML and AI algorithms developed in previous research. Development of these systems and open source application development for automation will greatly widen the market of currently available monitoring systems. It is believed these developments will also open the door for many other marine electronics / camera providers, since they do not have to invest money to develop their own independent operating system.

Development of IMS has a number of advantages over standard camera systems because it supports real-time image analyses for automated catch event detection, length measurement, and species identification for many species and can be extended to a wide variety of camera systems. Lowering costs associated with video review and manual processing of effort data will allow for greater coverage rates to a wider range of vessel types and vessel sizes where it is impractical to place an observer. IMS will also provide greater certainty for resource management and support sustainable fishing practices well into the future.

NOAA Fisheries will continue our commitment to develop and implement next generation monitoring tools that incorporate automation to better support fishery monitoring objectives such as bycatch estimation and stock assessment. These tools will be tested and developed for numerous applications including identifying species bycatch on large trawl vessels, automated data collection of observer and port sampling information to support catch estimation, enhanced deck sorting for shrimp fisheries to estimate volume, species, catch size, and enumeration of serial catch events from hook and line reef fish fishing vessels. Development and implementation objectives through fiscal year 2024 include:

- Build an image library to support development of machine learning algorithms to automate species composition and count.
- Develop, test, and implement a portable hardware/software image collection system for remote port sampling through the use of a rugged field sampling toolkit. The toolkit will enhance the ability to collect fishery monitoring data in the U.S. Caribbean.
- Develop, test, and implement an advanced sensing system to automatically determine haul activity for remote effort estimation in the Gulf Shrimp Fishery.
- Develop, test, and implement stereo and chute camera systems on SEFSC survey vessels and in the shrimp and reef fish fisheries to estimate bycatch.
• Develop and test machine learning algorithms to search high definition satellite imagery to identify and enumerate fishing effort in the Gulf of Mexico and South Eastern U.S. waters. This will also identify remote areas of potential illegal fishy.
9 Data Integration and Modernization

SERO is modernizing the Permit Information Management System (PIMS) as the system was last updated in 2006/2007. The new system will streamline and modernize the system to improve internal and external efficiency and data collection, enhance service delivery, and enhance transparency to the public. The new system will have an interactive public user web interface to submit permit renewals, transfers, and new requests. The web interface will include time saving options such as auto-saving application information, chat functionality with permits staff, and allow for electronic signatures. SERO has also modernized the CSOS systems and is now working towards further integration with other systems and SEFSC to improve the ability to access data for needed management (e.g., stock assessments, amendments, reviews). Existing integration of PIMS and CSOS systems are anticipated to be completed by the end of 2021, while any new integrations will be dependent upon funding in the next few years.

SERO is currently considering how to integrate the permits system with a variety of other programs that utilize permit information (e.g., IFQ, logbooks, SEFHIER, etc.). Part of the consideration within SERO is locating the Permits and Catch Share systems in one cloud database system, producing cost savings for both programs. Further discussions are centering around how to more efficiently and effectively combine into cloud systems both SERO and SEFSC databases and data collection procedures. These discussions are in the early stages, but it is expected that combining effort would increase timeliness of data exchanges between SERO/SEFSC, improve connections to partner systems (e.g., ACCSP, Gulf States Marine Fisheries Commission databases, state partners), and result in increased stability (e.g., cloud systems minimize risks to data systems from hurricanes, fail-over systems, etc.). Integration of SERO and SEFSC systems is currently hampered by local servers (on premise), data connectivity, resource allocation, and data governance. Data governance structure and agreement is a new project jointly involving both SERO and SEFSC, but resources are limited in allocating sufficient staff and time to this task. SERO is exploring cloud options that may assist with data connectivity and data sharing.

Both SERO and SEFSC are involved in a project to explore the feasibility of moving towards the concept of one-stop reporting. One-stop reporting would allow a fishermen who was required to report under different regions could submit one report to fulfill all requirements. For example, a for-hire fishermen who holds both an Atlantic and northeast permit would submit one logbook to fulfill each region’s reporting logbook requirement. SERO and SEFSC are working with the Greater Atlantic Regional Office and the Northeast Fisheries Science Center on one-stop reporting. Some existing challenges in the Region in moving forward is the paper-based reporting requirements, data connectivity between regions, and identifying joint permit holders among different regions.
10 Data Standards and Interoperability

The Region is moving towards developing a website to host standards for ER. Prior to the implementation of SEFHIER, standards were internal as applications were built in-house or contracted through a specific vendor. As the Region works with vendors to create applications, standards for ET and method of communication for those standards will be revisited. SEFSC is currently building standards for electronic commercial logbooks, while the standards for SEFHIER are available through the website. Test data being collected from the Region’s EM research are being post-processed to extract species composition on a per haul basis following similar data standards as observer-collected data.
11 Costs of EM Programs

This section is currently not applicable to the Region as all EM efforts are in their development phase. As the Region moves towards EM, additional information will be added in updates. Development and startup costs are usually high at the initiation of a program. Ideally, economies of scale apply such that per-application operational costs are lower.
12 EM Cost Transition Plans

This section is currently not applicable to the Region. As the Region moves towards EM, additional information will be added in updates.
Communications and outreach about electronic technologies is often paired with Council communications and outreach. NOAA Fisheries and Council staff work together to ensure that information is shared on each groups’ various platforms, and needed information is communicated through Advisory Panels, workshops, and Council meetings. For some specific programs, the Region does additional outreach efforts to improve communications, understanding, and compliance with required programs. Within SERO, both the Catch Share programs and the SEFHIER programs have dedicated outreach projects focused on explaining program requirements and functions, answering frequently asked questions, and working to establish increased stakeholder engagement. With the SEFSC, additional outreach efforts have been concentrated lately on upcoming electronic commercial logbook reporting.

Recently, the Catch Share system was migrated to a new platform. In anticipation of that migration, the Catch Share team utilized a variety of tools to inform the stakeholders. The team released Fishery Bulletins, updated the systems’ important messages information, and held two outreach sessions per week leading up to and after the migration. Outreach sessions were split between evening and afternoon sessions, to help accommodate the time difference within the Gulf region and in anticipation of fishing schedules. Webinar recordings are posted on the SERO Limited Access Privilege Program/Data Management Branch page.

Outside of the Catch Share migration, the Catch Share team utilizes a variety of outreach tools to connect with the IFQ stakeholders, utilizing both direct and indirect interactions. Direct interactions include face-to-face dealer meetings, group outreach meetings, and willingness to work with stakeholders at the SERO building, or through the customer support phone line and email. Each year, the Catch Shares team holds quarterly dealer outreach sessions. These sessions move around the Gulf, and include individual face-to-face interactions with dealers and fishermen. During COVID-19, the team has switched to virtual one-on-one meetings. During such meetings, the Catch Share team updates stakeholders on upcoming actions, answers questions relating to the program, and asks for feedback on system features. The Catch Share team has been doing this outreach nearly since the start of the programs, and use these to help establish rapport with stakeholders. Starting a few years ago, the Catch Share team began hosting bi-annual shareholder outreach sessions. These meetings have been held both with and outside of Gulf Council meetings and follow a similar format as the dealer outreach, except that they are in a group dynamic rather than one-on-one. The customer support line is manned Monday through Friday from 8 am to 4:30 pm Eastern time. Catch Shares Support encourages IFQ stakeholders to call during these hours for assistance within the program or to answer any questions about the program. Voicemails left after hours are returned the next business day. Likewise, Catch Shares Support monitors the customer support email during business hours and responds to inquiries submitted.

Indirect interactions include new fishermen user packets, a variety of additional information documents on the website (e.g., Frequently Asked Questions, one-pagers on hot topics, How to go fishing), annual summary reports, Fishery Bulletins, and newsletters. The Catch Share team utilizes Fishery Bulletins to help inform stakeholders of upcoming actions as well as reminders of existing requirements. Each year, at least two Fishery Bulletins are released: the mid-year reminder and end of year reminder bulletins. The mid-year reminder concentrates on system functions that are most commonly asked for more information on, while the end of year Fishery Bulletin reminds fishermen of critical end of year cut-off dates and program requirements. Additional Fishery Bulletins are released as related to management actions. The Catch Share newsletter began a few years ago, although issue releases were negatively affected by loss of staff, IT software hurdles, and COVID-19. The Newsletter, Catch Up on Catch Shares (The hook up to your bottom line), are intended to be released quarterly and were inspired by conversations with IFQ stakeholders. Each newsletter contains information relating to: community perspectives, system functions, industry in depth, IFQ price or landings snapshots, upcoming actions, and dates and resources. The annual reports are released each year and summarize not only the previous year’s work, but also information since the start of each program. Annual reports summarize the program’s overview, objectives and regulations, the
program performance (e.g., participation) and evaluation (catch, effort, economic data, and transactions with the system).

The SEFHIER program reporting requirements for the Gulf and Atlantic began in January 2021. In anticipation of the start of the program, the SEFHIER team utilized lessons learned from the Catch Shares and other programs to build their communication and outreach efforts. In anticipation of reporting, the SEFHIER team utilized several outreach and communication tools. SERO established a for-hire electronic reporting website listing critical information, outreach session dates, and outreach materials. SERO collaborated with the Gulf and South Atlantic Councils on several outreach methods, such as webinars, printed materials and mailings, planned in person informational meetings. During 2020, the in person meetings were cancelled due to COVID-19.

The team designed and produced printed information packets (toolkits) that were mailed to all federal for-hire permit holders as of December 2020. Additional copies were mailed to any captains, or employees upon request. Printed outreach materials were generated and placed in the toolkit packages based on feedback received from previous meetings and knowledge gained from other programs’ outreach efforts. Since the SEFHIER program operate differently for Gulf and South Atlantic federal for-hire permit holders, the toolkits are focused on the different requirements for those areas. Additional information was provided in the toolkits that explained reporting requirements across multiple regions (e.g., dually permitted in the Gulf and South Atlantic). Fishery Bulletins are also a primary method of communication utilized within the Region, and often used to announce regulatory changes or effective dates.

Audience focused webinars allowed for pertinent information about the SEFHIER program in the Gulf and Atlantic to be transmitted to specific audiences, such as for-hire vessel operators or permit holders, state agencies, law enforcement, and the general public. These webinars were tailored to the target audience, held during business and evening hours to accommodate the targeted audience. Many of the webinars also included software demonstrations. During these webinars, other outreach methods were highlighted (website, toolkits, program phone number and email). These webinars were recorded and information for how to request a copy was posted on the program website.

Currently, SERO staff updates the SEFHIER website routinely with the most recent webinar schedule information, program information, and outreach tools. A customer support phone line and email was created to provide support for the program. The customer support phone line is available Monday through Friday 8 am to 4:30 pm Eastern Time. Both the phone line and email are used to assist with general program questions, troubleshooting, and assistance with joining a reporting application system. Callers with significant issues with a vendor’s application are directed to call the vendor’s direct helpline. SEFHIER virtual webinars are still being held routinely through the end of March 2021, but will be revived if there is significant interest from the participants.
# 14 List of Tables

Table 14.1. Summary of Fisheries Participation in Electronic Monitoring Programs

Currently not applicable to the region.

Table 14.2. Summary of Participation in Electronic Reporting Programs for Commercial fisheries

<table>
<thead>
<tr>
<th>Fishery</th>
<th># of ER Vessels</th>
<th># of Active Vessels in Fishery</th>
<th>Data Submitted to/Managed By</th>
<th>Required/Volunteer</th>
<th>Reporting Frequency (Haul, Trip, Week, Month)</th>
<th>Purpose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFQ</td>
<td>414</td>
<td>830</td>
<td>SERO</td>
<td>Required</td>
<td>Real-time, includes transfers of shares and allocation, as well as landings</td>
<td>IFQ</td>
<td>Electronic reporting only</td>
</tr>
<tr>
<td>VMS for reef fish vessels</td>
<td>830</td>
<td>830</td>
<td>OLE</td>
<td>Required</td>
<td>Trip level notifications and declarations; hourly positioning locations</td>
<td>Enforcement</td>
<td></td>
</tr>
</tbody>
</table>

Table 14.3. Summary of Participation in Electronic Reporting Programs for For-Hire and Recreational Fisheries

<table>
<thead>
<tr>
<th>Fishery / survey name</th>
<th>Mode</th>
<th># ER Vessels</th>
<th># Vessels in Fishery</th>
<th>Data Submitted to /Managed by</th>
<th>Validation Method</th>
<th>Required/Volunteer</th>
<th>Reporting Frequency (Haul, trip, week, month)</th>
<th>Purpose of ER</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEFHIER</td>
<td>For-Hire</td>
<td>2946</td>
<td>2946</td>
<td>SERO through ACCSP</td>
<td>Gulf: Mark-recapture validation survey; Audits of logbooks; matching of logbooks to declarations</td>
<td>Required starting Jan 2021</td>
<td>Gulf: Trip level prior to offload; Logbook requirement</td>
<td>All permitted vessels required to report (but many are latent); Much of this program is dependent on funding and this includes the pre-existing SRHS program.</td>
<td>Usage data will depend on validation results.</td>
</tr>
</tbody>
</table>
Note that this is the number of permits not vessels and contains all 7 for-hire permits in the region. Vessels often have more than one permit so this may not accurately reflect vessel counts. The number of reporting will not be able to be determined until the end of the year after logbooks are submitted.

### Table 14.4. Summary of Participation in Electronic Reporting Programs for Federal Dealers/Processors/Tenders

<table>
<thead>
<tr>
<th>Dealer</th>
<th># of Federal Permit</th>
<th>Data Submitted to/Managed By</th>
<th>Required/Volunteer</th>
<th>Reporting Frequency (day, week, month)</th>
<th>Purpose of ER</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf and South Atlantic Dealer permits</td>
<td>388</td>
<td>SEFSC through Bluefin's Trip Ticket system</td>
<td>Required</td>
<td>Weekly</td>
<td>Reporting compliance</td>
<td></td>
</tr>
<tr>
<td>Red Snapper IFQ dealers</td>
<td>114</td>
<td>IFQ Website</td>
<td>Required</td>
<td>Day of offload</td>
<td>IFQ compliance</td>
<td>This is a subset of GSAD permit holders and a requirement of the IFQ programs.</td>
</tr>
<tr>
<td>Grouper-Tilefish IFQ dealers</td>
<td>117</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 14.5. Summary of Participation in Electronic Data Collection for Observer Programs / Study Fleets

Currently the Region does not have study fleets or observer program electronic data collection in place. Electronic data collection within observer programs is anticipated in the near future.

### Table 14.6. Summary of Participation in Electronic Vessel Monitoring System Programs

<table>
<thead>
<tr>
<th>Fishery / Survey Name</th>
<th># of VMS Vessels</th>
<th># of Vessels in Fishery</th>
<th>Data Submitted to/Managed by</th>
<th>Required/Volunteer</th>
<th>Reporting Frequency (Haul, trip, week, month)</th>
<th>Purpose of VMS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf Reef Fish</td>
<td>830</td>
<td>830</td>
<td>VMS</td>
<td>Required</td>
<td>Always On</td>
<td>Enforcement</td>
<td></td>
</tr>
<tr>
<td>IFQ</td>
<td>414</td>
<td>830</td>
<td>VMS</td>
<td>Required</td>
<td>Always On</td>
<td>Reporting and Enforcement IFQ is a subset of the Gulf Reef Fish Fishery</td>
<td></td>
</tr>
<tr>
<td>Gulf For-Hire</td>
<td>1294</td>
<td>1294</td>
<td>Vendors</td>
<td>Required</td>
<td>Always On</td>
<td>Reporting, Enforcement, and Validation Location position requirements to start late 2021</td>
<td></td>
</tr>
<tr>
<td>SA Rock Shrimp</td>
<td>101</td>
<td>101</td>
<td>VMS</td>
<td>Required</td>
<td>Always On</td>
<td>Enforcement</td>
<td></td>
</tr>
</tbody>
</table>

### Table 14.7. Cost template for EM Fishery

Currently the Region does not have any EM programs.
15 References


