

National Marine Fisheries Service

National Observer Program FY 2017 Annual Report

NOAA TECHNICAL MEMORANDUM NMFS-F/SPO-200



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National Observer Program FY 2017 Annual Report

National Marine Fisheries Service

NOAA Technical Memorandum NMFS-F/SPO-200
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List of Acronyms

ACL	Annual Catch Limit
ADP	Annual Deployment Plan
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
ASM	At-Sea Monitoring
BiOp	Biological Opinion
BSAI	Bering Sea and Aleutian Islands
CDFW	California Department of Fish and Wildlife
CDQ	Community Development Quota
CP	Catcher Processor
EEZ	Exclusive Economic Zone
EFP	Exempted Fishing Permit
EM	Electronic Monitoring
ESA	Endangered Species Act
FFA	Forum Fisheries Agency
FLC	Freezer Longline Coalition
FMP	Fishery Management Plan
FSB	Fisheries Sampling Branch
GARFO	Greater Atlantic Regional Fisheries Office
IFQ	Individual Fishing Quota
LAP	Limited Access Privilege
LL2	Lead Level 2
LOA	Length Overall
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act

MSA	Magnuson-Stevens Fishery Conservation and Management Act
NBR	National Bycatch Report
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NIFS	National Institute of Fisheries Sciences
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOP	National Observer Program
NOPAT	National Observer Program Advisory Team
NPFMC	North Pacific Fishery Management Council
NSP	National Seabird Program
NWFSC	Northwest Fisheries Science Center
OAC	Observer Advisory Committee
ODDS	Observer Declare and Deploy System
OPTECS	Observer Program Technology Enhanced Collection System
PFMC	Pacific Fishery Management Council
PIRO	Pacific Islands Regional Observer Program
POP	Pelagic Observer Program
SBRM	Standardized Bycatch Reduction Methodology
SEFSC	Southeast Fisheries Science Center
SPTT	South Pacific Tuna Treaty
SWFSC	Southwest Fisheries Science Center
TAC	Total Allowable Catch



Since the inception of the observer program in the 1970s, NOAA Fisheries has continually worked to develop and institute world-class training and safety protocols. These include maritime safety drills such as the one pictured above.

Executive Summary

In FY 2017 (October 1, 2016–September 30, 2017), 966 observers provided 73,453 days of fishery observations. NOAA Fisheries, along with commercial fishing fleets in the Alaska, West Coast, and Greater Atlantic regions, invested \$70.5 million to provide this coverage in 54 U.S. fisheries. Of that amount, \$46.7 million was provided from congressionally appropriated funds, and the fishing industry provided \$23.8 million.

The National Observer Program (NOP) in NOAA Fisheries' Office of Science and Technology supported 14 regional observer programs in FY 2017. The NOP also supported the National Observer Program Advisory Team (NOPAT), which helped plan an international observer conference, as well as an observer symposium at the American Fisheries Society annual meeting, in 2017.

The NOP and NOPAT focused on safety issues to a great extent in 2017 through the work of the NOPAT's Safety Advisory Committee (SAC) and through support of an Observer Program Safety Review. The NOP also provided leadership on national bycatch estimation efforts, electronic monitoring (EM) coordination, and seabird conservation efforts.

In addition to providing fisheries-dependent data for stock assessments, quota monitoring, and many other critical needs in FY 2017, the regional observer programs achieved the following milestones:

- Alaska—Finalizing an annual deployment plan, supporting an exempted fishing permit for halibut deck sorting, implementing a cost recovery fee program, and implementing EM in North Pacific fisheries.
- West Coast—Supporting requirements of a biological opinion for West Coast groundfish, helping to plan a seabird mortality workshop, producing high-quality outreach materials, and providing coverage for exempted fishing permits to test deep-set buoy gear.
- Pacific Islands—Developing and testing an electronic tablet eReporting system, assisting with shark release mortality research, and supporting monitoring programs of regional fishery management organizations.
- Greater Atlantic—Providing observer coverage for the region's standardized bycatch reporting methodology, helping to implement EM programs, and planning programs that would support a new omnibus industry-funded monitoring amendment.
- Southeast—Supporting an EM project to document catch of sawfish in the shrimp trawl fishery, collaborating on a cooperative research project to reduce shark bycatch in the Gulf of Mexico reef fish fishery, and helping to develop a report that provided conversion factors for estimating species in terms of pounds rather than individuals.

None of these achievements would be possible without the hard-working and talented scientists who work under challenging conditions as fishery observers to help NOAA Fisheries fulfill its mission to ensure sustainable fisheries.

The preceding milestones represent only a fraction of observer activities in FY 2017, which are detailed elsewhere in this report. None of these achievements would be possible without the hard-working and talented scientists who work under challenging conditions as fishery observers to help NOAA Fisheries fulfill its mission to ensure sustainable fisheries.

1. Introduction

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) deploys fishery observers to collect high-quality catch and bycatch data from U.S. commercial fishing and processing vessels, as well as from some shoreside processing plants. NOAA Fisheries has been using observers to collect fisheries data in the U.S. exclusive economic zone (EEZ) and high seas since 1972. Observers have monitored fishing activities on all U.S. coasts, collecting data for a range of conservation and management issues.

Fisheries observers are trained biological technicians who collect data to support a wide range of conservation and management activities. During FY 2017, NOAA Fisheries administered observer programs in

all management regions (Alaska, West Coast, Pacific Islands, Greater Atlantic, and Southeast). The number of observed fisheries varies depending on the availability of funding, program priorities, and statutory or regulatory requirements.

NOAA Fisheries regional offices and science centers administer the various observer programs (see Figure 1). Each observer program is authorized by one or more of the following federal authorities: the Magnuson-Stevens Fisheries Conservation and Management Act (MSA), the Marine Mammal Protection Act (MMPA), and the Endangered Species Act (ESA). (For more information on these federal authorities, and U.S. observer program history in general, see Brooke 2014.)



Figure 1: Map of regional observer programs

NOP Advisory Team (NOPAT)

Sets policy and budgetary direction for the NOP. Members include representatives from NOAA Fisheries HQ offices, Regions, and Science Centers, as well as a U.S. Coast Guard liaison.

NOAA Fisheries HQ	Office of Science and Technology		Office of Sustainable Fisheries	Office of Protected Resources	Office of International Affairs	Office of Law Enforcement
Regional Offices	Alaska	Greater Atlantic		Pacific Islands	Southeast	West Coast
Science Centers	Alaska	Northeast	Northwest	Pacific Islands	Southeast	Southwest
General Counsel for Fisheries		General Counsel for Enforcement and Litigation			U.S. Coast Guard (liaison)	

Figure 2: **Organizational structure of the NOP Advisory Team**

The National Observer Program (NOP) supports observer programs and increases their effectiveness in meeting the overall goals of NOAA Fisheries through improvements in data collection, observer training, and integration of observer data with other research.

Under ESA regulations promulgated in 2007, NOAA Fisheries is authorized to place fisheries observers aboard commercial and recreational vessels in state and federal fisheries operating in the territorial seas or EEZ where sea turtle interactions may occur. NOAA Fisheries annually identifies which fisheries are eligible for observer coverage under this requirement. The annual determination for 2017 was published in the Federal Register on December 14, 2016 (81 FR 90330¹).

1.1 Program Structure

Within the NOAA Fisheries Office of Science and Technology (ST), the NOP nationally coordinates 14 observer programs in five regions and observer requirements in Atlantic Highly Migratory Species fisheries. In addition to national program administration, budget development, and planning, the NOP works with regional observer programs to develop national policy, standards for observer data quality, and training standards for observer and marine safety instructors.

The NOP has three permanent staff positions: program coordinator (Elizabeth Chilton beginning in August 2017, preceded by Jane DiCosimo), bycatch expert (Lee

Benaka), and safety expert (Dennis Hansford). The NOP hosted Aimee Hoover, a Knauss Marine Policy Fellow, for a one-year term to analyze NOP budget trends and assist with the development of the U.S. National Bycatch Report First Edition Update 3 (Benaka et al. 2019) in FY 2017.

The NOP also provides regional observer programs with a forum to increase collaboration and communication during biannual National Observer Program Advisory Team (NOPAT) meetings. Representatives from all regional fisheries science centers and regional offices, as well as many NOAA Fisheries Headquarters offices with observer expertise, participate on the NOPAT (see Figure 2).

Regional observer programs are responsible for their day-to-day operations, including providing administrative services, responding to data requests from a range of users, and working closely with third-party contracting companies that provide observers and address logistics and operational issues. Program scientists determine the appropriate sampling protocols and necessary observer coverage levels for each fishery. In general, regional programs work with observer provider companies to recruit, train, and deploy observers.

Most observer-related costs are covered by NOAA Fisheries, but in some cases, the fishing industry contracts directly with private observer provider companies to obtain at-sea observer coverage. The full (100

¹ <https://www.gpo.gov/fdsys/pkg/FR-2016-12-14/pdf/2016-29948.pdf>

percent) coverage fisheries managed by the Alaska Observer Program, for example, are funded primarily by the fishing industry, which pays observer salaries, travel costs, and insurance. Onshore infrastructure costs are covered by NOAA Fisheries. The partial coverage fleet in Alaska is paid by an ex-vessel fee determined by the North Pacific Fishery Management Council and implemented in federal regulations. NOAA Fisheries' Alaska Fisheries Science Center administers this program, contracts with an observer provider company, and receives the data for near real-time management of the groundfish fishery. These data are also made available to industry members. Industry funding also occurs in the West Coast Trawl Catch Share Program, New England Multispecies Sectors, and the Atlantic Sea Scallop Fishery.

Regardless of an observer program's funding structure, NOAA Fisheries provides all observers with training in biology and species identification, data collection, fishing and safety regulations, and at-sea survival skills. After a fishing trip, observers are debriefed, and the trip's data are quality checked by NOAA Fisheries before being entered into a database system and made available to regional fisheries biologists for use in stock assessments and fisheries management.

1.2 Use of Observer Data in Fisheries Management

The information compiled by observer programs supports the management of fisheries and conservation of fish stocks, protected resources, and ecosystems throughout the United States. Observer data are also increasingly relied on to monitor compliance with fisheries regulations. Information collected by fisheries observers is used for a wide range of assessment and monitoring purposes, including the following examples:

- In some fisheries, the amount of a specific fish species that can be caught is specified by a total allowable catch (TAC) level. Observer data are used to project total catches for these species and to monitor the level of fishing activity so that the TAC is not exceeded.
- For each managed fishery or stock, the MSA requires development of an annual catch limit (ACL) that is set below the overfishing level to ensure that overfishing will not occur. Setting an ACL for a stock requires scientific data on catch and bycatch,

which has resulted in increased observer days at sea across the country.

- Catch share programs rely on observer data to monitor catch, landings, and discards. In many cases these fisheries require enhanced observer coverage to document vessel-specific or sector-level quotas. Managers and fishermen rely on observer data to ensure that vessels and sectors do not exceed the authorized quota of target or discard species.
- For many fisheries, estimates of the rates of fishing mortality and/or protected species interaction based on observer data are used for monitoring fishery performance and developing stock assessments. Biological samples collected by observers are also essential inputs to stock assessments (e.g., genetic data are used for species or stock identification purposes).
- For stocks that are overfished and in a rebuilding plan, such as Atlantic cod, preseason target catch numbers are provided to the management team. When the fishing season ends, observer data are evaluated to determine total mortality and correspondingly adjust the next season's targets.
- The MMPA provides NOAA Fisheries with authority to monitor levels of fishery-related serious injury and mortalities of marine mammals. NOAA Fisheries reports observer data collected under this authority in annual marine mammal stock assessment reports and uses these data to appropriately classify commercial fisheries according to their levels of incidental mortality and serious injury of marine mammals in the annual MMPA List of Fisheries (16 U.S.C. 1387).
- Observer data are used by industry in innovative bycatch avoidance programs, such as salmon bycatch monitoring in Alaska.
- Observer data support NOAA Fisheries' series of National Bycatch Reports (e.g., Benaka et al. 2019), which provide regular estimates of fish, marine mammal, sea turtle, and seabird bycatch for major U.S. fisheries.
- Under ESA Section 7 consultations, observer programs may be required or recommended to ensure that anticipated take levels of threatened or endangered species (e.g., sea turtles and Atlantic sturgeon) are not exceeded in federal fisheries.

1.3 Funding History for Observer Programs

The NOP was formed in 1999 to improve regional and national coordination among the observer programs. Before 1999, the majority of funding for regional observer programs was provided through indirect sources such as congressional allocations supporting fisheries management and protected species conservation and recovery, or were funded by industry. For example, beginning in 1990, industry funds were also used to support the domestic observer program in Alaska. Industry funding has increased over time as mandatory coverage requirements have increased.

In 1999, the first congressional funds were directly appropriated to specific regional observer program budgets or Program, Project, and Activity (PPA) lines, and the NOP was established to coordinate observer program activities. The number of observed fisheries has increased as available funding provided the means to develop observer programs for new or experimental fisheries while maintaining established monitoring programs (Figure 3).

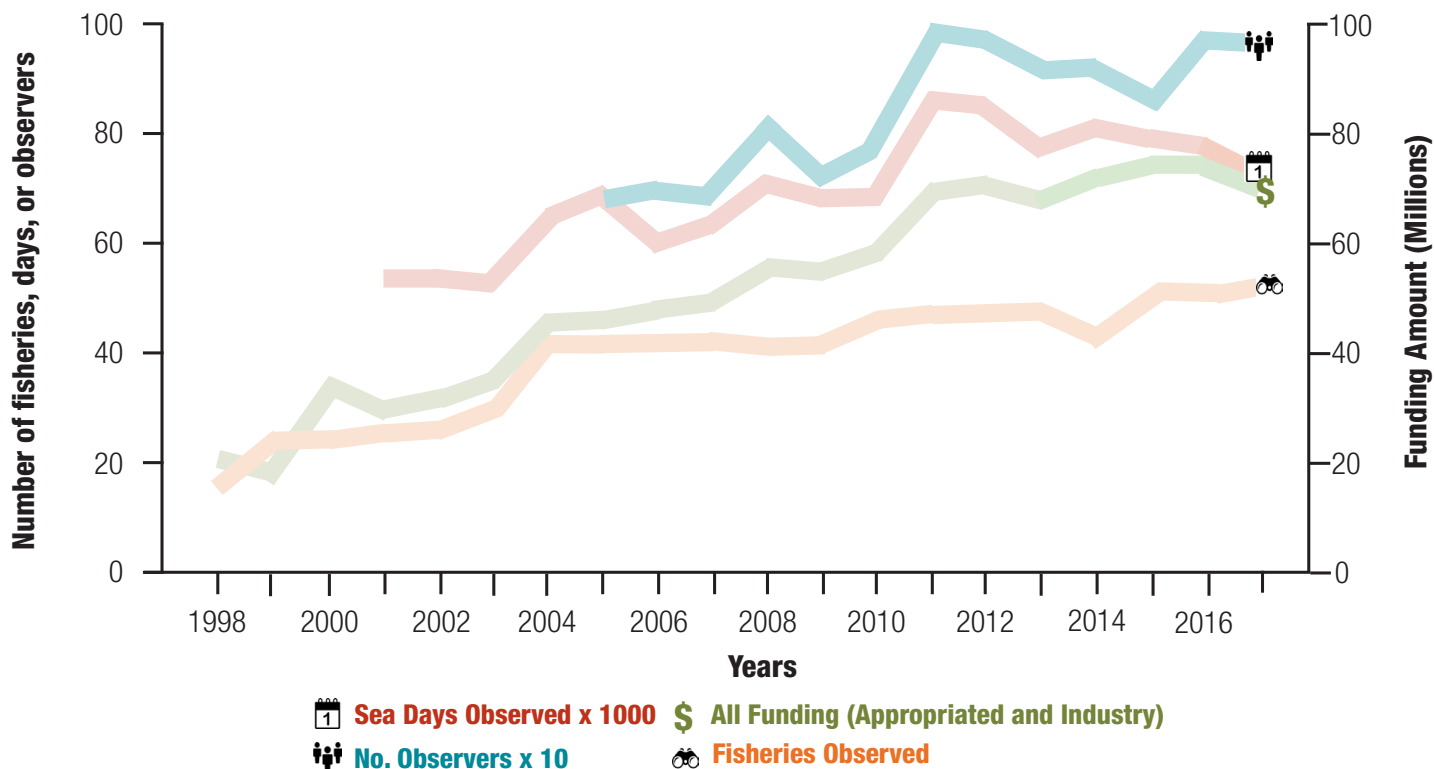


Figure 3: U.S. observer program sea days observed, appropriated and industry funding (not adjusted for inflation), and number of observed fisheries and observers from 1998 to 2017.

2. Budget Summary

In FY 2017 (October 1, 2016–September 30, 2017), 966 observers provided 73,453 days of fishery observations. NOAA Fisheries, along with commercial fishing fleets in the Alaska, West Coast, and Greater Atlantic regions, invested \$70.5 million to provide this coverage in 54 U.S. fisheries. Of this amount, \$46.7 million was provided from congressionally appropriated funds, while the fishing industry provided \$23.8 million. (See Table 1).

The tables in Appendix A provide regional details on numbers of observers, sea days covered, observer coverage targets and expenditures for observer coverage. Appendix B lists the 54 fisheries covered in FY 2017. Industry funds were used to support observer coverage of fishing vessels in North Pacific and West Coast groundfish fisheries as well as Greater Atlantic scallop fisheries.

As shown in Figure 1, observer programs are administered by NOAA Fisheries Regional Offices and Science Centers around the country. Funding received by each program is used to operate existing programs, develop observer programs for new or experimental fisheries, and conduct outreach to industry members and the



An instructor demonstrates data gathering techniques to a group of observers.

public. Research priorities and observer coverage levels are determined by the regional programs. Coverage levels are influenced by available funding, the number of active participants in the fishery, fishing conditions, fishery quotas, management needs, and program goals. Sections 4 through 8 of this report summarize the FY 2017 achievements of NOAA Fisheries regional observer programs.

Table 1: FY 2017 Observer Funding Summary (in millions)

Region	Appropriated	Industry	Total
Alaska	\$9.3	\$18.1	\$27.4
Greater Atlantic	\$14.8	\$2.9	\$17.7
Pacific Islands	\$7.3	\$0	\$7.3
Southeast and Caribbean	\$5.6	\$0	\$5.6
West Coast	\$8.8	\$2.8	\$11.6
NOAA Fisheries Headquarters	\$0.8	\$0	\$0.8
Totals	\$46.7	\$23.8	\$70.5

Appropriated amount shown includes FY 2017 enacted funding.

3. National Observer Program Activities

In addition to coordinating activities among the regional observer programs and overseeing allocation of NOP funding to regional observer programs, the NOP facilitated and coordinated several activities that were national in scope. These activities are described below.

3.1 National Observer Program Advisory Team

The NOPAT met twice in FY 2017 and discussed the observer program budget, program priorities, strategic planning process and implementation for electronic monitoring and electronic reporting, observer safety and training, standards for observer medical/physical condition, and other topics. In addition, NOPAT members helped plan the 9th International Fisheries Observer and Monitoring Conference. NOPAT members also supported a symposium entitled “Observer Contributions to Fisheries Science, Management, and Safety,” which was held in August 2017 at the 147th Annual Meeting of the American Fisheries Society in Tampa. This symposium included presentations by NOAA Fisheries managers and scientists from NOAA Fisheries’ Pacific Islands, Alaska, Southeast, and Northwest regional offices and fisheries science centers.

3.2 Safety Advisory Committee

The NOPAT has a Safety Advisory Committee (SAC) that comprises safety representatives from each regional observer program, the NOAA Fisheries Office of Law Enforcement, and the U.S. Coast Guard. The SAC provides recommendations to the NOPAT on safety and health issues. Committee members meet in person at least once every two years, coincident with a NOPAT meeting. The SAC amended its Terms of Reference in 2017 to expand its membership and modified its emergency action plans and emergency notification plans to include the NOP Coordinator in the communication chain. The SAC made recommendations to the NOPAT in 2017 regarding a physician examination form used by observer programs, as well as observer physicals. In addition, the SAC and NOPAT discussed reporting requirements related to “less-serious incidents,” as well as after-action reports that document lessons learned from safety-related incidents.

3.3 2016 Observer Safety Program Review

At the end of FY 2016, NOAA Fisheries launched a comprehensive review of all aspects of fishery observer and at-sea monitor safety and health. Led by a team of outside auditors, the review focused on seven key areas: safety reporting, communications, practices and policies, training, regulations, equipment, and international issues. The auditors gathered and assessed information from stakeholders and partners, recommended improvements, and developed continuing self-evaluation tools for the regional observer programs. NOAA Fisheries is working with national and regional observer programs, as well as fishery management councils, observer provider companies, observers, vessel owners, and other stakeholders, to implement recommendations from the report, ensuring all observers have what they need to stay safe and healthy on land and at sea. For more information, please visit the [NOAA Fisheries Observer Safety Program Review Recommendations website](#).

3.4 Bycatch Science and Policy

NOP staff support the National Bycatch Report (NBR) Steering Committee and coordinate the development and publication of the U.S. NBRs. The U.S. NBR First Edition (NMFS 2011) documented bycatch estimates using observer data and self-reported logbook data for all fisheries for which this information was available in 2005. NOAA Fisheries subsequently published the U.S. NBR First Edition Update 1 (NMFS 2013); this report included bycatch estimates for 2010. In 2016, NOAA Fisheries published the U.S. NBR First Edition Update 2, which included bycatch estimates for fish, marine mammals, sea turtles, and seabirds in federal commercial fisheries for 2011, 2012, and 2013 (NMFS 2016a). These reports would not be possible without the valuable bycatch data collected by observers in fisheries around the country. NOP staff began to develop the U.S. NBR First Edition Update 3 in 2017. For more information, please visit the [NOAA Fisheries National Bycatch Report website](#).

NOP staff also supported a variety of bycatch-related initiatives during FY 2017, including working with the Food and Agricultural Organization of the United

Nations to provide U.S. bycatch estimates for a global discards report. NOP staff also helped to develop a final rule related to standardized bycatch reporting methodology, which was published on January 19, 2017 (82 FR 6317). In addition, NOP staff helped organize a 2.5-day release mortality symposium that took place in June 2017 at the 8th World Recreational Fishing Conference in Victoria, Canada.

3.5 Electronic Monitoring and Reporting

Electronic monitoring and reporting continued to be a major focus on NOP activities during FY 2017. Brett Alger was hired as NOAA Fisheries Electronic Technologies Coordinator in August 2017. NOAA Fisheries supported several internal projects for a total of \$2.2 million in FY 2017, including two projects at the NOAA Fisheries Alaska Fisheries Science Center focusing on electronic monitoring pre-implementation and stereo cameras, an electronic monitoring comparative analysis project in the NOAA Fisheries Greater Atlantic Region, and an electronic monitoring pre-implementation project at the NOAA Fisheries Pacific Islands Fisheries Science Center for the Hawaii-permitted longline fisheries.

In addition, NOAA Fisheries partnered with the National Fish and Wildlife Foundation and other foundations to support a third year of funding for the Electronic Monitoring and Reporting Grant Program.

In 2017, the program awarded a total of more than \$3.59 million in grants for 12 projects for New England groundfish, Alaska longline, and Alaska pot fisheries, as well as projects focused on computer vision tools and machine learning software.

Overall, in 2017, 150 vessels participated in electronic monitoring programs in Alaska fisheries, 49 in West Coast fisheries, 25 in Greater Atlantic fisheries, and 112 vessels in the Atlantic highly migratory species fishery. These various electronic monitoring programs were designed to provide compliance monitoring in combination with observers, catch accounting, monitoring of slippage (partially or fully released catch) requirements, and an audit of bluefin tuna reporting.

3.6 National Seabird Program

The National Observer Program continued to provide limited support to the National Seabird Program (NSP) for observer-program-related seabird projects in FY 2017. These funds support seabird identification training for observers, as well as seabird necropsy studies with birds captured at sea on fishing gear, seabird distribution research in the central tropical Pacific and California current, and distribution of free seabird avoidance gear to Alaska fishing vessels, along with bycatch mitigation in the Pacific coast groundfish fishery. Table 2 describes the projects funded and their costs.

Table 2 National Seabird Program internal award recipients, FY 2017.

NMFS Center/Region	Project Name	Amount (\$)
Southeast Fisheries Science Center	Pushing the Limits on What Can be Learned from a Small Amount of Data	15,000
Pacific Islands Regional Office	Illustration of Seabird Handling Instructional Guide	2,000
Alaska Fisheries Science Center	Pacific Seabird Necropsy Program	12,000
Alaska Fisheries Science Center	Seabird Training for Alaska Groundfish Observers	12,000
Northwest Fisheries Science Center	Collaborative Workshop to Develop Trawl Gear Modification Proposals to Reduce Seabird Bycatch	5,500
Northwest Fisheries Science Center	Quantifying Unobserved Seabird Bycatch in the At-Sea Hake Catcher-Processor Fishery	7,380
Northwest Fisheries Science Center	Seabird Communities and Ocean Conditions during the Winter Downwelling Season in the Northern California Current	10,000
Northwest Fisheries Science Center	Estimating Fishery-Seabird Interactions in the Northwest Atlantic	20,000
Southwest Fisheries Science Center	Distribution and Abundance of Seabirds in the Hawaiian Archipelago	16,120
Total		100,000

4. Alaska Program Activities

The North Pacific Groundfish and Halibut Observer Program (Observer Program) deployed 410 observers for a total of 38,781 sea days across the groundfish fisheries in Alaska, and an additional 2,283 days at shoreside processing plants bringing the total coverage days to 41,064 for FY 2017.

4.1 North Pacific Groundfish and Halibut Observer Program

In 2013, the Observer Program was restructured to reduce the potential for bias in observer data, authorize the collection of observer data in previously unobserved sectors, and assess a broad-based fee to more equitably distribute the costs of observer coverage. Restructuring also established an iterative process of reviewing and revising the program annually. In June of each year, NOAA Fisheries provides an annual report to the North Pacific Fishery Management Council on the previous year's Observer Program deployment performance. Based on the analysis and recommendations in the report, a proposed Annual Deployment Plan (ADP) for the coming year is provided to the council in October. This process allows fishery managers to adapt and respond to management needs of North Pacific fisheries.

The ADP describes how NOAA Fisheries plans to deploy observers to vessels and processors in the partial coverage category in the upcoming year. The following year, the agency provides an Annual Report with descriptive information and scientifically evaluates the deployment of observers. The ADP and Annual Report process provide information to assess whether the objectives of the Observer Program have been met, and a process to make recommendations to improve implementation of the program to further these objectives.

In October 2016, NOAA Fisheries released its 2017 Annual Deployment Plan (NMFS 2016b), based on recommendations from the 2015 Annual Report.² One of the primary recommendations from the 2015 Annual Report was to evaluate two additional strata for the 2017 ADP that included vessels delivering

to tenders and partial coverage catcher processors. NOAA Fisheries also recommended continuing to allow hook-and-line and pot vessels less than 57.5 ft length overall (LOA), where taking an observer can be problematic, an opportunity to “opt-in” to the electronic monitoring (EM) selection pool to participate in the EM cooperative research. NOAA Fisheries also recommended that vessels participating in the EM selection pool be required to log trips in the Observer Declare and Deploy System (ODDS). This was intended to improve the ability of NOAA Fisheries to determine which vessels are in the EM selection pool and when they are fishing, and to provide a necessary compliance monitoring tool.

The 2017 ADP made the following observer coverage recommendations:

- Hook-and-line – 11%
- Tender hook-and-line – 25%
- Pot – 4%
- Tender pot – 4%
- Trawl – 18%
- Tender trawl – 14%
- Catcher vessels less than 40 ft LOA, or vessels fishing with jig gear – 0%
- EM selection pool: Fixed gear vessels that have opted-into the EM selection pool. For 2017, 73 longline and 18 pot vessels 40-57.5 ft LOA will participate in the EM selection pool and will carry EM systems as described in the EM Pre-Implementation Plan. An additional three vessels greater than 57.5 ft have volunteered to carry stereo camera equipment and will also be placed in the no selection pool.

Additionally, NOAA Fisheries stopped granting conditional releases or temporary exemptions (e.g., for insufficient bunk space or life-raft capacity) for vessels subject to observer coverage in 2017. Instead, NOAA Fisheries allowed vessels to be in the EM selection pool with no requirement to carry an observer. Vessels

² <https://www.fisheries.noaa.gov/resource/document/north-pacific-groundfish-and-halibut-observer-program-2015-annual-report>

that had received a conditional release or temporary exemption in previous years (2013-2015) had an opportunity to opt-in to the EM selection pool and were given priority to participate in the EM research.

In June 2017, NOAA Fisheries provided the North Pacific Observer Program 2016 Annual Report (AFSC and AKRO 2017) to the North Pacific Fishery Management Council (NPFMC). This report assessed the degree to which the objectives of the 2016 ADP were met and made recommendations to improve the program. Chapter 3 of the report, “Deployment Performance Review,” was formalized as a NOAA Technical Memorandum (Faunce et al. 2016).

4.2 Exempted Fishing Permit for Halibut Deck Sorting

In December 2015, NOAA Fisheries received an application from the Alaska Seafood Cooperative and co-applicants, for an exempted fishing permit (EFP) to allow operators of non-pelagic trawl catcher/processors in the Bering Sea and Aleutian Islands (BSAI) to sort halibut on deck rather than weighing halibut on the flow scale in the factory. The purpose of the experiment was to continue to test methods that reduce halibut mortality in flatfish fisheries by reducing the amount of halibut handling and time out of water.

The study began May 2016. In 2017, two or three NOAA Fisheries-certified observers were deployed on each participating vessel to collect halibut lengths and viabilities on a subsample of deck-sorted halibut and species composition samples in the factory. NOAA Fisheries was responsible for documenting and recording all deck-sorted halibut and estimating halibut discard mortality rates through the NOAA Fisheries Catch Accounting System, using observer program decksheets and random systematic sampling. EFP applicants reported a net savings for halibut mortality for 2016 as compared to 2015, and a comparison of observer program estimates of halibut in the factory and a census by EFP applicants found similar preliminary estimates. Further modifications to the EFP process were proposed for 2018.

4.3 Cost Recovery Fee Program Implementation

In 2016 NMFS implemented a limited access privilege cost recovery fee program for the American Fisheries

Act (AFA), Aleutian Islands Pollock, and Amendment 80 programs. The proposed action would also implement a cost recovery fee program for the Community Development Quota (CDQ) Program halibut and groundfish fisheries in the BSAI management area. The MSA authorizes and requires the collection of cost recovery fees for Limited Access Privilege (LAP) programs and CDQ programs. MSA cost recovery fees may not exceed three percent of the ex-vessel value and must recover costs associated with the management, data collection, and enforcement of these programs that are directly incurred by government agencies tasked with overseeing these fisheries.

4.4 Electronic Monitoring Implementation in the North Pacific

Building on the work of the NPFMC’s Fixed Gear Electronic Monitoring Workgroup and cooperative research that began in spring 2014 with deployment of EM systems on nine vessels in two home ports, EM remained a high priority for the Observer Program in 2017. The NPFMC and NOAA Fisheries developed EM for data collection for the nontrawl gear fisheries to address their desire for an alternative way to collect fisheries data in consideration of the operating requirements in these fisheries. EM systems can collect at-sea data for NOAA Fisheries to estimate discards of fish, including halibut, and mortality of seabirds.

The council approved the 2017 EM Pre-Implementation Plan in December 2016 that continued the operational testing of EM systems in 2017, including developing methods for incorporating the data into the Catch Accounting System.

The Final EM Pre-Implementation Plan described the selection process and number of vessels that will be in the EM selection pool:

- Size of EM selection pool: 86 vessels were in the EM selection pool, including 75 predominantly hook-and-line vessels and 11 predominantly pot vessels.
- Vessel selection process: Vessels in the EM selection pool in 2017 used the ODDS with 30% of trips randomly selected to determine whether the EM system must be turned on for a given trip. In order for this approach to succeed, all vessels had to have an EM system installed prior to logging a trip in ODDS.

- Target coverage level: In 2017, the target selection rate was set at 30% of logged trips for vessels in the EM pool.

The EM pre-implementation plan included information on deployment model, service ports, EM hardware, operator responsibilities, feedback systems, and data turnaround times. In addition, the plan includes other EM research and development that took place in 2017.

On August 8, 2017, NOAA Fisheries published a final rule to incorporate EM into the North Pacific Observer Program (82 FR 36991). The final rule established a process for owners or operators of vessels in the partial coverage category using nontrawl gear (i.e., hook and line or pot gear) to request to participate in the EM selection pool, beginning with the 2018 fishing year. Vessels that are approved to participate in the EM selection pool will be required to log fishing trips and comply with EM deployment requirements; these vessels will not be required to carry an observer. Highlights of the final rule included:

- Proposed implementation date of January 2018.
- Use of EM data for catch accounting purposes (not audit or compliance monitoring).
- Handling of deployment method, rates, and strata through the ADP – the optimization scheme will allocate the appropriate number of trips to various strata based on variance and cost.
- Using observer fees for EM deployment as well as human observer deployment in partial coverage category fisheries (once implemented through regulation).

4.5 Low Deployment Rate Subgroup

In April 2017, the NPFMC directed its Observer Advisory Committee (OAC) to consider options for increasing partial coverage selection rates. To address this, the OAC created a subgroup to assess whether there are viable options that could increase selection rates and be an alternative to raising the observer fee. The subgroup presented at the OAC meeting in September 2017 to summarize the initial scoping of the following options:

- Federal funding (through congressional appropriations).

- Changes to the definition of the no selection pool (the group of vessels that currently do not take observers).
- EM optimization.
- Monitoring cooperatives.
- Voucher program.
- Raising the observer fee.
- Options to modify deployment design to increase efficiency.

4.6 Lead Level 2 Analysis

Since 2012, the Observer Program has been working with the Freezer Longline Coalition (FLC) and observer provider companies to address an apparent shortage in Lead Level 2 (LL2) observers. Under regulations, catcher processor (CP) longline vessels with flow-scales are only required to carry one observer, but the observer is required to be certified as LL2. To gain the certification, the observer must have deployed 60 days on two different contracts and sampled 30 hauls on a longline vessel. The FLC and observer providers have been sending a “voluntary second” observer on some of these vessels to gain the necessary experience to become LL2-certified.

The Observer Program led an LL2 discussion with the NPFMC in October 2016 and shared regulatory options to address the shortage. The NPFMC’s OAC expressed a preference for options that address how to get observers the longline experience they need for LL2 certification, rather than allowing inexperienced observers in the fleet.

The NPFMC took final action in June 2017. NOAA Fisheries subsequently developed a proposed rule based on the following recommendations:

- Modify the nontrawl LL2 observer coverage requirement and require the vessel owner operator or manager to participate in a precruise meeting if requested to do so by NOAA Fisheries.
- Modify the nontrawl LL2 endorsement to allow sampling experience on trawl CPs to count toward nontrawl LL2 endorsement with an additional training requirement.

4.7 International Observer Activities

The Observer Program has been working with South Korea's National Institute of Fisheries Sciences (NIFS) on developing a more comprehensive observer debriefing process of both automated and interview-based quality control. To facilitate this cooperative objective,

two Observer Program staff traveled to South Korea in September 2016 to provide additional training for NIFS staff, while NIFS staff in turn traveled to Seattle in May 2017 to learn more about the debriefing process and information technology infrastructure used to facilitate the debriefing process.

5. West Coast Program Activities

On October 1, 2014 (beginning of FY 2015) the Southwest Region and Northwest Region merged to become the West Coast Region. However, for the purposes of this report, program reporting is still organized into the two subregions.

5.1 Northwest

The activities of the Northwest Fisheries Science Center's (NWFSC) West Coast Groundfish Observer Program (WCGOP) can be divided into two components: Catch Share, which is industry funded, and Non-Catch Share, which uses federally funded observers. The WCGOP deployed 142 observers for a total of 7,816 days in FY 2017.

5.1.1 West Coast Trawl Catch Share Program

The West Coast Groundfish Trawl Catch Share program was implemented January 11, 2011. Under the trawl rationalization program, the portion of total allowable catch for the fishery is divided into individual quota shares that are allocated to permit owners. Quota shares can be leased or sold, and both landed and discarded catch count against quota pounds for fishers. Individual accountability is a core component of this catch share program, and all trips and landings are monitored. At-sea observers or EM are used to account for discarded catch at-sea, and catch monitors work shoreside to verify and monitor all landings. Catch share sectors include vessels participating in the shore-based Individual Fishing Quota (IFQ) program (including hake and groundfish bottom trawl and fixed gear vessels); motherships and mothership catcher vessels participating in the at-sea hake fishery; and catcher-processors participating in the at-sea hake fishery.

5.1.2 West Coast Non-Catch Share Fisheries

Funds appropriated to NOAA by Congress covered 100 percent of the cost of observer coverage in the non-catch share fisheries. Non-catch share observers were deployed in the following fisheries: Limited Entry Sablefish Endorsed Fixed Gear; Open Access Fixed Gear; Directed 2A Pacific Halibut Derby Fixed Gear; Open Access Nearshore Fixed Gear (Oregon and California); Open Access California Halibut Trawl (California); California Ridgeback Prawn Trawl (California); California Sea Cucumber Trawl (California); and Open Access Pink Shrimp Trawl (Washington, Oregon, and California).

The WCGOP provided coverage for these sectors for 2,201 sea days in 2017. Although many of these sectors may be lower volume or do not target groundfish, they all interact with groundfish species and protected species and are an important component for accounting total mortality of groundfish species and stocks.

5.1.3 Biological Opinion for West Coast Groundfish

An ESA Section 7 consultation Biological Opinion (BiOp) on the West Coast Groundfish Fishery Management Plan was issued in March 2012.³ This BiOp impacted five West coast protected species: green sturgeon, eulachon, humpback whales, short-tailed albatross, and leatherback sea turtles. Elements of the BiOp included new requirements for observer data and specimen collection, sampling, reporting, and elements of observer training. The WCGOP has been instrumental in implementing the new measures and conservation recommendations and producing bycatch reports in 2015 and 2017 for these protected species as outlined in the BiOp.⁴

³ http://www.pcouncil.org/wp-content/uploads/F3b_ATT3_BO_MAR2012BB.pdf

⁴ https://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/protected_species.cfm

5.1.4 California Sea Cucumber and Ridgeback Prawn Trawl Fisheries Pilot Expansion

In 2017, the WCGOP continued to collaborate with the California Department of Fish and Wildlife (CDFW) on a pilot study to determine groundfish impacts on the California sea cucumber and ridgeback prawn trawl fisheries. The study was partially funded by the CDFW and required implementation of a new memorandum of understanding between CDFW and NOAA Fisheries to obtain permit information from the state. Among other anticipated outcomes, the pilot study has reinforced strong state and federal ties in fishery-dependent monitoring.

5.1.5 Electronic Monitoring Exempted Fishing Permits (EFPs)

During 2017, electronic monitoring in the catch share fishery continued under the same EFPs and rules as 2016. These compliance-based EM EFPs demonstrated the feasibility of using EM for compliance monitoring on selected commercial fishing vessels as an alternative to human observers. Recognizing the importance of identifying and implementing ways to reduce costs associated with the program, the EM EFPs continued to examine how an integrated EM program (cameras plus logbooks) could support catch accounting requirements in future regulations. Operation of these EFPs are designed to support regulatory changes in 2018 for the whiting and fixed-gear sectors of the IFQ program. EM systems were deployed on 45 vessels for a total of 3,760 sea days in 2017.

5.1.6 Electronic Reporting

The WCGOP continued to make improvements to its observer database, which contains catch and biological data. These improvements included the development of a web-based declaration and selection system modeled off of the North Pacific's Observer Declare and Deploy System. The program also made progress on its electronic back-end data collection system, called the Observer Program Technology Enhanced Collection System (OPTECS), including the first at-sea deployment of OPTECS on a commercial trip with an observer. Software field testing continued, as did efforts to test appropriate hardware (rugged tablets),

a system designed to be an electronic data capture system allowing observers to enter data directly into tablets while working on deck. This method is designed to reduce transcription errors, increase front-end data validation, and decrease data processing time while increasing the efficiency and accuracy of observer data collection.

5.1.7 Protected Species

The NWFSC supported several protected species projects in 2017, including continuing a study on the effects of trawl cables on the mortality of seabirds in the at-sea processing fleet. Program staff also participated in the Protected Species Assessment Workshop in Seattle to present research on green sturgeon and short-tailed albatross. In addition, the WCGOP made preparations to co-host a public workshop with Alaska program staff on mitigation strategies for reducing seabird mortality. Workshop results were summarized in Jannot et al. 2018.

5.1.8 Outreach and Communications

The WCGOP released a new species identification manual, which has found widespread use in West Coast groundfish surveys, by tribes, and by the U.S. Coast Guard. The WCGOP also continues to conduct quarterly outreach to observers via its "Word on the Waves" publication⁵, which has been received positively by observers.

5.2 Southwest

The West Coast Regional Observer Program (Observer Program) deployed 11 observers for a total of 476 sea days in FY 2017. NOAA Fisheries' Southwest Fisheries Science Center (SWFSC) uses observer data to estimate incidental take of marine mammals in preparation of the annual Stock Assessment Reports and to document the incidental take of sea turtles, seabirds, and target and non-target fish species. A summary of observer program reports is posted online.⁶

The Observer Program continued to work with the Pacific Fishery Management Council (PFMC) to monitor the California Large-Mesh Drift Gillnet Fishery. Observer Program coverage supported development of National Bycatch Report bycatch estimates for the drift

⁵ For example, see <https://www.nwfsc.noaa.gov/research/divisions/fram/observation/pdf/obsnews%20fall%202017.pdf>

⁶ http://www.westcoast.fisheries.noaa.gov/fisheries/wc_observer_programs/sw_observer_program_info/data_summ_report_sw_observer_fish.html

gillnet, as well as the California Halibut Trawl, fisheries in 2017. In addition, Observer Program data were used by the SWFSC to develop regression tree and ratio estimates of marine mammal, sea turtle, and seabird bycatch in the drift gillnet fishery for 1990-2015 (Carretta et al. 2017).

The Observer Program also worked with the PFMC to support exempted fishing permits (EFPs) to test deep-set buoy gear, which was developed as an alternative to draft gillnet gear. The Observer Program trained

observers who monitored bycatch under these EFPs. The PFMC has continued to approve additional EFPs, which has resulted in additional support responsibilities for the Observer Program.

Finally, the Observer Program continued to provide coverage for California Deep-Set Pelagic Longline Fishery and the California Drift Gillnet Fishery. California Set Gillnet coverage resumed in 2017 and was expected to continue for the foreseeable future.

6. Pacific Islands Program Activities

The Pacific Islands Regional Observer Program (PIROP) supports observer coverage in three fisheries with the following observer coverage targets: 20 percent observer coverage in the Hawaii pelagic longline deep-set tuna and American Samoa pelagic longline fisheries, and 100 percent coverage in the Hawaii pelagic longline shallow-set swordfish fishery. In FY 2017, the PIROP deployed 60 observers for a total of 8,709 sea days across all three fisheries.

In FY 2017, the PIROP continued to develop and test its electronic tablet eReporting system, and the project remained on schedule. Some outside experts provided an independent verification and validation review for the project. The review was positive, but identified some significant issues that need to be resolved still, including:

- Staff needs as workload changes and shifts.
- New training needs related to the tablets.
- Getting more tablets out in the field for testing.
- Lack of ownership of source code for the product.

This tablet project is only being planned for the Hawaii-based longline fisheries, not American Samoa. American Samoa may be incorporated after the system is up and running in the Hawaii-based fisheries.

Observers continued to assist with a release mortality study that involved observers deploying pop-up satellite archival tags on sharks. Shark tagging can be challenging, and the PIROP advised observers to only try to tag sharks if they could tag the sharks without

putting themselves in danger. Observers had tagged over 100 sharks as of the end of FY 2017.

The PIROP in 2017 noted an increase in seabird bycatch in the Hawaii longline fisheries. As a result, the Western Pacific Regional Fishery Management Council and NOAA Fisheries began to plan a workshop to review seabird bycatch mitigation measures for Hawaii pelagic longline fisheries. The PIROP also continued to salvage whole dead longline-caught albatross, and coordinated with Alaska and the non-governmental organization Oikonos to have necropsies performed.

The PIROP's staff members in American Samoa continued to support regional fishery management organizations, including collecting and reviewing forms from U.S. purse seine vessels operating under the South Pacific Tuna Treaty (SPTT). The staff members also coordinated and facilitated the implementation of U.S. obligations and requirements under the SPTT, including the placement of Forum Fisheries Agency (FFA) observers onboard U.S. purse seine vessels licensed to fish under the SPTT; providing a point of contact for the collection of treaty-related data and other fishery data collection programs in American Samoa; coordinating with the FFA, the South Pacific communities, and NOAA Fisheries on the development of fisheries data collection efforts; coordinating fisheries data collection activities with Pacific Island parties to the SPTT; assisting the FFA and purse seine vessel management with their efforts to collect fishery data; coordinating observer placement, including travel and accommodation; and assisting with the boarding and departures of purse seine vessels.

7. Greater Atlantic Program Activities

In FY 2017, the Fisheries Sampling Branch (FSB) observer and monitoring programs deployed 269 observers for a total of 13,112 sea days. More than 60 fleets are observed in New England and the mid-Atlantic (Maine through North Carolina), including the New England multispecies groundfish, monkfish, dogfish, and skates (trawl, gillnet, hook, and pot gear); Atlantic sea scallop (dredge and trawl) fishery; lobster pot, ocean quahog, and surfclam dredge; mid-water paired and single trawl (herring, mackerel, and squid); and purse seine, shrimp trawl, and conch and crab pot.

Fishery Management Plans adopted by the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council include mandatory observer coverage requirements for several fisheries. The FSB provides observer coverage for the Standardized Bycatch Reporting Methodology (SBRM)⁷ for stock assessments, and at-sea monitoring for estimating discard rates to ensure annual catch limits are not exceeded. (Compared to observers, at-sea monitors collect a reduced set of data and perform little biological sampling.) In addition, the FSB collects data on gear performance and characteristics, protected species interactions, and monitoring of experimental fisheries. Reports from the NEFOP are posted online.⁸

There are two types of coverage in the groundfish fishery: the NEFOP (with sea-day coverage dictated by SBRM); and the At-Sea Monitoring coverage (ASM). For the 2017 groundfish fishing year, the FSB achieved a total of 1,240 ASM days and 1,359 NEFOP groundfish days, for a total of 2,599 groundfish sea days. The observer coverage rate for the fishing year was targeted at 16 percent, achieved through a combination of at-sea monitoring (8 percent) and NEFOP observer coverage (8 percent). The realized coverage level for that year was 17 percent.

During the 2016 fishing year, the full funding of the SBRM program led to a decision in June 2016 to use the remaining Northeast observer funds to partially fulfill the Industry-Funded ASM requirement. In July 2016, a grant was funded to reimburse the sectors for 85%

of their costs from ASM providers, through April 2017. In FY 2017, 6,047 sea days were completed under the SBRM sea-day schedule.

7.1 Electronic Monitoring Projects

The FSB continued to support efforts to implement EM technologies to augment data collection by observers, working with the regional EM working group, the NOAA Fisheries Greater Atlantic Regional Office (GARFO), the fisheries management councils, industry, EM vendors, and other stakeholders to determine how to best incorporate EM into fisheries monitoring. In particular, GARFO and NOAA Fisheries' Northeast Fisheries Science Center (NEFSC) continued work in the development of EM programs in the groundfish and herring/mackerel midwater trawl fisheries. These fisheries have been identified as potential candidates for an EM program in order to (1) provide an alternative to other types of monitoring programs and (2) provide a means to meet monitoring needs or increase monitoring coverage.

In FY 2017, the FSB supported the following EM projects:

- Groundfish Audit Model project, wherein The Nature Conservancy was issued an EFP that allowed vessels from groundfish sectors to use EM instead of human at-sea monitors; the FSB reviewed these trips to help develop standards for EM data review.
- Groundfish Maximized Retention Model project, wherein participating vessels retain 100 percent of certain species and discard others, with EM used for catch retention compliance monitoring; the FSB helped develop business practices necessary to support an EM program, including data analysis protocols and design for the audit model.
- Atlantic Herring and Mackerel Midwater Trawl project, wherein the FSB reviewed EM on a portion of trips in order to help examine the utility of EM in an operational setting and evaluate the information that can be gathered with EM systems.

⁷ For additional details on sea-day schedule deployments and fishing fleet characterization, please see the SBRM reports at <http://www.nefsc.noaa.gov/fsb/SBRM/>.

⁸ <http://www.nefsc.noaa.gov/femad/fsb/>

Additional information about some of the above projects can be found on the Gulf of Maine Research Institute's website.⁹

NMFS also worked to build the database infrastructure and processing tools for data collected from EM video footage, conducting comparative analysis to the existing catch monitoring systems, and addressing the final legal and logistical hurdles. The FSB continued to work on the development of its web portal, which is accessible for FSB staff, observers, and providers. This work included updates and follow-up procedures to the Incident Reporting system, Species Verification Program information available to observers, bi-annual reviews available to observers, and captain interview and exit interview module enhancements. Additionally, the FSB worked to provide U.S. Coast Guard and Office of Law Enforcement staff with access to information on at-sea trip deployments, boarding reports, summaries of incident reports, and vessels of concern.

7.2 Industry-Funded Omnibus Amendment and Herring and Mackerel Monitoring

In FY 2017, the Mid-Atlantic Fishery Management Council (MAFMC) and New England Fishery Management Council (NEFMC) continued to develop an Omnibus Industry-Funded Monitoring Amendment that would implement industry-funded monitoring coverage in some fishery management plans (FMPs) above levels required by the SBRM in order to assess the amount and type of catch, monitor annual catch limits, and/or provide other information for management.

In 2017 the FSB led the development of a new training program for observers that will be deployed under the authority of this new amendment. This amendment eventually could result in the addition of approximately 1,200 sea days to the FSB's schedule.

8. Southeast Program Activities

The Southeast Fisheries Observer Program observed 4,559 sea days in FY 2017, with a total of 74 observers. A total of nine fisheries were observed in 2017.

8.1 Southeast Shrimp Trawl Observer Program

The Shrimp Observer Program maintained approximately 2 percent observer coverage in the offshore Gulf of Mexico penaeid and rock shrimp otter trawl fisheries. Mandatory coverage of the shrimp skimmer trawl fishery in the northern Gulf of Mexico also continued. Observers were placed on randomly selected, state-licensed skimmer vessels to document interactions with sea turtles. Similarly, coverage of state otter-trawl shrimp vessels increased to monitor mammal and sea turtle incidental takes. During 2017, scientists at the NOAA Fisheries Southeast Fisheries Science Center used observer program data to develop estimates of sea turtle bycatch in shrimp trawl fisheries (Babcock et al. 2018). Additionally, observers continued to collect data to evaluate turtle excluder devices aboard skimmer trawl vessels in Louisiana and North Carolina.

A 2014 BiOp for the shrimp trawl fishery recommended additional efforts to determine sawfish abundance.¹⁰ In response, beginning in 2014 the Galveston and Panama City observer programs initiated an EM project to document any take of sawfish in the shrimp trawl fishery, with testing of the system continuing in 2017. Preliminary testing on a contracted commercial shrimp trawl vessel found the system performed well in capturing video for a total of 109 hauls over 62 days at sea. The hardware held up for the duration of the trips with no water ingress to the deck components and there was only one significant gap that may have been caused by a system component malfunction. Although no sawfish were observed, many sightings of dolphins occurred, which suggests interactions with other protected species could be captured with these systems. Pairwise comparison of video versus data collected by observers found little difference in monitoring of larger species of teleosts and elasmobranchs. Despite some positive preliminary results, project investigators found a need to further test this system and expand coverage to areas outside southwest Florida prior to EM implementation.

⁹ <http://gmri.org/our-work/fishing-industry-innovation/electronic-monitoring/our-progress>

¹⁰ https://sero.nmfs.noaa.gov/protected_resources/sea_turtles/documents/shrimp_biological_opinion_2014.pdf

In addition, discussions began in 2017 to develop an observer program for the Gulf of Mexico menhaden purse seine fishery using Deepwater Horizon Open Ocean Restoration funding. This project would build upon the 2011 Galveston pilot observer effort and lessons learned regarding how to appropriately observe for sea turtles in this fishery. In addition to improving the understanding of sea turtle interactions with the menhaden fishery and helping to inform the direction of future bycatch reduction conservation measures, this project would also benefit marine mammals.

8.2 Atlantic Pelagic Observer Program

The Pelagic Observer Program (POP) completed the second year of the two-year Mid-Atlantic Bight Enhanced Coverage, as well as 2017 Gulf of Mexico Enhanced Coverage, and continued mandated eight percent coverage in 12 statistical areas throughout the Western Atlantic Ocean (Canada, along the U.S. coast, the Gulf of Mexico, and throughout the Caribbean to Trinidad). The POP deployed observers on a project designed to test alternative “green stick” gear in the Gulf of Mexico. In addition, the POP continued to develop an electronic reporting tablet device, as well as scan all trip data so that images of trip data forms can be viewed.

Amendment 7 to the 2006 Consolidated Highly Migratory Species Fishery Management Plan prohibited vessels with Atlantic tunas longline category permits from fishing without an installed, operable, and certified electronic monitoring system. As of 2017, 111 of the 136 qualified vessels in this fleet had such systems installed.

8.3 Gulf of Mexico Reef Fish Fishery Observer Program

The Reef Fish Observer Program continued to provide limited observer coverage in 2017. Reef Fish Observer Program data from 2017 were used in a NOAA Fisheries analysis of factors that influence discarding in the Gulf of Mexico commercial grouper-tilefish individual fishing quota reef fish fishery.

8.4 Shark Bottom Longline Observer Program

The Shark Bottom Longline Observer Program (Program) continued to operate with a focus on monitoring catch and bycatch in the shark research and shark bottom longline fishery. Within the research fishery, experiments have been conducted using hook timers and time-depth-recorders to develop methods to reduce bycatch for dusky, scalloped hammerhead, and sandbar shark. The Program also contributed data to a 2017 report that provided conversion factors for estimating species in terms of pounds rather than individuals (Gulak et al. 2017).

The Program began field-testing of an at-sea electronic reporting tablet computer. In addition, the Program successfully applied for a grant from the Atlantic Coastal Cooperative Statistics Program in order to collect information on discards (quantity and size and age samples) from commercial vessels targeting reef fish species in the U.S. South Atlantic vertical line fishery via on-board scientific observers and compare observer data to previous data sets, including self-reported data.



An observer takes measurements of biological specimens.

The Program also continued observer coverage of vessels in the shark bottom longline fishery that also target reef fish. These are “mixed” trips where the vessel may target sharks and reef fish. Funding to expand coverage was awarded through the NOAA Fisheries catch shares program. Observer coverage was targeted at five percent of total fishing effort.

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Appendix A:

NMFS Fisheries Observer Programs Funded in FY 2017 by Region

Alaska

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target % Coverage	Actual % Coverage	Target Sea Days	Actual Sea Days*	Number of Observers
North Pacific Groundfish Observer Program, Alaska Fisheries Science Center, 7600 Sand Point Way NE, Seattle, WA 98115										
Program Manager: Jennifer Ferdinand, 206-526-4076, Jennifer.Ferdinand@noaa.gov, website: https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program										
Bering Sea, Aleutian Islands (BSAI) Groundfish trawl cooperatives (AFA, A80), BSAI voluntary Longline Pacific cod cooperative, Gulf of Alaska (GOA) Groundfish Trawl Rockfish Program (RP), and Catcher Processors	1,270 vessels (172 in 100% coverage); 7 shoreside plants	MSFCMA (50 CFR 679.50)	Various	Obs/Trn-North Pacific Marine Resource Observers/ North Pacific Observer Program ¹	1973- present (Observer program); 1998 - present (AFA); 2007 - present (A80, CDQ); 2013-present (RP)	100%	100%	Defined by regulation	35,303	343
National Observer Program ¹										
Reducing Bycatch										
Other Congressional Funding										
Industry Funding										
BSAI and GOA Groundfish Trawl, Longline and Pot Fisheries; US Pacific halibut Fishery			Year-round	Obs/Trn-North Pacific Marine Resource Observers/ North Pacific Observer Program ¹	2013 - present	14-18% trawl catcher vessels; 4-25% fixed gear catcher vessels 40-57.5 ft	19-21% Trawl; 5-12% Fixed gear	Defined by available funds and contracts with observer providers in Annual Deployment Plan	3,478	67
				National Observer Program ¹						
				Reducing Bycatch						
				Other Congressional Funding						
	Industry Funding									
Alaska Marine Mammal Observer Program, Alaska Fisheries Science Center, 7600 Sand Point Way NE, Seattle, WA 98115										
Website: https://www.fisheries.noaa.gov/alaska/fisheries-observers/alaska-marine-mammal-observer-program										
Southeast Alaska drift gillnet fishery	480 permits	MMPA (50 CFR 229)	May - Oct	Marine Mammals	0	0	0	0	0	0
TOTAL ALASKA REGION OBSERVER PROGRAM FUNDING (APPROPRIATED): \$9,305,276										
TOTAL ALASKA REGION OBSERVER PROGRAM FUNDING (INDUSTRY): \$18,090,529										
TOTAL ALASKA REGION OBSERVER PROGRAM FUNDING (ALL SOURCES): \$27,395,805										
*Actual sea days does not include 2,283 shoreside plant coverage days (some of which are also co-occur with sea-days), bringing the total coverage days to 41,064.										

West Coast

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target Coverage	Actual Coverage	Target Sea Days	Actual Sea Days	Number of Observers
West Coast Region Observer Program, West Coast Regional Office, 501 West Ocean Blvd, Long Beach, CA 90802-4213										
Program Manager: Charles Villafana, 562-980-4033, Charles.villafana@noaa.gov, website: http://www.westcoast.fisheries.noaa.gov/fisheries/wc_observer_programs/sw_observer_program_info/observer_program_sw_fish.html										
California Large-Mesh Drift Gillnet Fishery	20 vessels	MMPA (50 CFR 229), MSFCMA (50 CFR 660)	Aug–Jan, May	National Observer Program	1990–present	20%	18.6%	200	150	11
Deep Set Buoy Gear Exempted Fishing Permit	6 vessels	MSFCMA (50 CFR 660)	June–Dec	National Observer Program	2017–present	30%	40%	126	126	
California Set Gillnet Fishery	20 vessels	MMPA (50 CFR 229) ESA	Jan–Dec	National Observer Program	2007, 2010–2013, 2017	10-20%	10-20%	120	73	
California Deep-Set Pelagic Longline Fishery	>3 vessels	MSFCMA (50 CFR 660)	Nov–May	Reducing Bycatch National Observer Program	2001–present	100%	100%	127	127	
PSMFC Data Management and Bycatch Estimates	N/A	N/A	Year-round	National Observer Program	N/A	N/A	N/A	N/A	N/A	N/A
West Coast Groundfish Observer Program, Northwest Fisheries Science Center, 2725 Montlake Blvd East, Seattle, WA 98112-2097										
Program Manager: Jon McVeigh, 206-302-2423, jon.mcveigh@noaa.gov website: https://www.nwfsc.noaa.gov/research/divisions/fram/observation/index.cfm										
West Coast Trawl Catch Shares (shoreside and at-sea fleets)	154	MSFCMA (50 CFR 660)	Shoreside: year-round; at-sea May–Dec	National Catch Share Program	Jan 2011 – present (Note: Includes historical fisheries LE Trawl 2001–2010 and At-Sea Hake 1975–2010.)	100%	100%	Defined by regulation (100% coverage, shoreside 1 observer; at-sea 2 observers) or EM	Shoreside: 3,655 At-Sea: 1,960	99
				West Coast Observers						
				Industry Funding						
				National Observer Program						
				Cost Recovery						
Catch Share using Electronic Monitoring				National Catch Share Program for Electronic Monitoring	EFP in FY 2017				EM: 3,760	# Vessels used EM: 45
West Coast Groundfish Non-Catch Share Fisheries (Limited Entry Fixed Gear, Open Access fisheries including state-managed fisheries)	LE: 190 longline, 33 trap permits; OA: approx 1,000	MSFCMA (50 CFR 660)	Year-round	National Observer Program	2001–present	LE: 10–20% OA: < 1–10%	LE: 15–30% OA: 1–8%	LE: 400 OA: 800	LE: 530 OA: 1,671	43
				West Coast Observers						
				Reducing Bycatch						
NOP/FIS Electronic Reporting RFP–OPTECS	N/A	N/A	N/A	National Observer Program	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL WEST COAST REGION OBSERVER PROGRAM FUNDING (APPROPRIATED): \$8,838,896										
TOTAL WEST COAST REGION OBSERVER PROGRAM FUNDING (INDUSTRY): \$2,799,826										
TOTAL WEST COAST REGION OBSERVER PROGRAM FUNDING (ALL SOURCES): \$11,638,722										

Pacific Islands

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target Coverage	Actual Coverage	Target Sea Days	Actual Sea Days	Number of Observers
Hawaii Fisheries Observer Program, Pacific Islands Regional Office, IRC, 1845 Wasp Blvd., Bldg. 176, Honolulu, HI, 808-725-5100										
Program Manager: John Kelly, 808-725-5100, john.d.kelly@noaa.gov, website: http://www.fpir.noaa.gov/										
Hawaii Pelagic Longline Fishery	164 vessels with permits (125 active)	MSFCMA (50 CFR 665), MMPA (50 CFR 229)	Year-round	Obs/Trn-Hawaii Longline Observers	1994-present	20% Tuna	20%	6,110	6,401	60
						100% swordfish	100%	2,970	1,737	
American Samoa Pelagic Longline Fishery	30	MSFCMA (50 CFR 665) in Jan 2005	Year-round	National Observer Program	2005–present	20%	20%	1,204	571	
Program support for the Western and Central Pacific Fisheries Commission	N/A	N/A	Year-round	Reducing Bycatch	2008	N/A	N/A	N/A	N/A	N/A
Support for PIRO Observer Data Dissemination/Access Activities	N/A	N/A	Year-round	National Observer Program	2007– present	N/A	N/A	N/A	N/A	N/A
TOTAL PACIFIC ISLANDS REGION OBSERVER PROGRAM FUNDING (APPROPRIATED): \$7,346,956										
TOTAL PACIFIC ISLANDS REGION OBSERVER PROGRAM FUNDING (INDUSTRY): \$0										
TOTAL PACIFIC ISLANDS REGION OBSERVER PROGRAM FUNDING (ALL SOURCES): \$7,346,956										

Greater Atlantic

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target Coverage	Actual Coverage	Target Sea Days	Actual Sea Days	Number of Observers
Northeast Fisheries Observer Program, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA 02543-1097										
Program Manager: Amy Martins, 508-495-2266, amy.martins@noaa.gov, website: http://www.nefsc.noaa.gov/femad/fsb/										
New England Multispecies Groundfish Sectors (At-Sea Monitoring)	1,000 trawl vessels, 400 gillnet vessels, and 40 longline	MSFCMA (50 CFR 648); MMPA (50 CFR 229)	Year-round	National Observer Program	2010–present	30% coefficient of variation on bycatch species; 8% common pool; 16% for groundfish sectors (8% NEFOP + 8% ASM)	17%	Targets are set by SBRM (April through March), based on CV and adjusted for funding availability and/or resource set-aside	1,240 (ASM) 1,359 (NEFOP)	56
New England Multispecies Groundfish Sectors Standardized Bycatch Reporting Methodology Prioritized Fleets NEFOP Coverage				Other Congressional Funding						
				Northeast Fisheries Observer (NEFOP)	1990–present					
Standardized Bycatch Reporting Methodology Prioritized Fleets, and ASMFC NEFOP Coverage (non-groundfish)	>1,300 permits	MMPA (50 CFR 229); MSFCMA (50 CFR 648)	Year-round	Atlantic Coast Observers	2001–present	30% coefficient of variation on bycatch species (SBRM)	N/A	SBRM targets	6,047	154
				Reducing Bycatch	2010–present		N/A	SBRM targets		154
Protected Species NEFOP Coverage	>600 permits	MMPA (50 CFR 229)	Year-round	Other Congressional Funding	1994–present	30% coefficient of variation on critical marine mammal stocks	N/A	SBRM targets	718	154
Atlantic Sea Scallop Fishery (Dredge and Trawl; General Category and Trawl; Access Area Permits; Open and Access Areas)	600 vessels	MSFCMA (50 CFR 648)	Year-round	Industry Funding	1999–present	10–20% by permit type/area fished, determined by SBRM and amount of set-aside	N/A	2,741	3,748	59
				National Observer Program	1999–present					
TOTAL GREATER ATLANTIC REGION OBSERVER PROGRAM FUNDING (APPROPRIATED): \$14,787,539										
TOTAL GREATER ATLANTIC REGION OBSERVER PROGRAM FUNDING (INDUSTRY): \$2,904,700										
TOTAL GREATER ATLANTIC REGION OBSERVER PROGRAM FUNDING (ALL SOURCES): \$17,692,239										

Southeast and Caribbean (page 1 of 2)

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target Coverage	Actual Coverage	Target Sea Days	Actual Sea Days	Number of Observers
Southeastern Atlantic and Gulf of Mexico Shrimp Otter Trawl Fisheries (including rock shrimp) Skimmer Trawl	Approx. 1,467 (GOM) and 534 (SA) USCG federally permitted vessels, unknown number of state vessels, ~106 rock shrimp vessels	Voluntary through July 2007; Mandatory– July 2007 MSFCMA (50 CFR 622)	Year-round	Obs/Trn-South Atlantic and Gulf Shrimp Observers	1992–present	~2%	~2%	~1,500 + Special Projects	2,113	43
				Obs/Tm-Atlantic Coast Observers						
Atlantic Pelagic Longline Observer Program, Southeast Fisheries Science Center, 75 Virginia Beach Dr, Miami, FL 33149-1003										
Program Manager: Larry Beerkircher, 305-361-4290, Lawrence.r.beerkircher@noaa.gov website: http://www.sefsc.noaa.gov/										
Atlantic, Gulf of Mexico, Caribbean Pelagic Longline Fishery	~70–80 active vessels	MSFCMA (50 CFR 635); MMPA (50 CFR 229); ATCA	Year-round	Obs/Trn-Atlantic Coast Observers	1992–present	8% by vessel sets	~13%	572 sets	~1,431	~22
				Obs/Trn-East Coast Observers						
				Deepwater Horizon Sea Turtle Early Restoration						

Southeast and Caribbean (page 2 of 2)

Fisheries Observed	Fleet Size	Authority to Place Observers	Season of Operation	Funding Source	Program Duration	Target Coverage	Actual Coverage	Target Sea Days	Actual Sea Days	Number of Observers
Southeast Shark Driftnet Observer Program & Shark Bottom Longline Observer Program, Southeast Fisheries Science Center, Panama City Laboratory, 3500 Delwood Beach Rd, Panama City, FL 32408										
Program Manager: Dr. John Carlson, 850-234-6541, john.carlson@noaa.gov, website: https://www.fisheries.noaa.gov/southeast/fisheries-observers/southeast-shark-bottom-longline-observer-program										
Southeast Shark and Coastal Teleost Gillnet Fishery	Directed Shark Permits: 216 Indirect Shark Permits: 262	MMPA (50 CFR 229); MSFCMA (50 CFR 635)	Year-round	Obs/Trn-Atlantic Coast Observers	1998–present	100% shark strike, 38% shark drift, 5% shark and teleost sink net	100% shark strike, 38% shark drift, 5% shark and teleost sink net	100% shark strike, 38% shark drift, 5% shark and teleost sink net	117	9
Atlantic and Gulf of Mexico Directed Large Coastal Shark Bottom Longline Fishery	Directed Shark Permits: 216 Indirect Shark Permits: 262 Reeffish Longline Exemption Permits: 65	MSFCMA (50 CFR 635)	Year-round-open until quota is filled	National Observer Program	1994–present	100% shark research fishery; 4–6% non-sandbar shark fishery	100% shark research fishery; 4–6% non-shark fishery	100% sandbar shark research fishery; 4–6% non-sandbar shark fishery; 8–10% reeffish longline	291 shark research, 65 shark bottom longline, 77 mixed reeffish/shark	9
Gulf of Mexico Reef Fish Fishery Observer Program, Southeast Fisheries Science Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77551										
Program Manager: Elizabeth Scott-Denton, 409-766-3507, elizabeth.scott-denton@noaa.gov										
Gulf of Mexico Reef Fish Fishery-All Gear Types	Approx. 831 permitted USCG documented vessels	Mandatory	Year-round	Reducing Bycatch National Observer Program	2006–present	~1%	~2%	~300	366	43 (included in shrimp fishery)
Gulf of Mexico Reef Fish Fishery-Longline Emphasis (Expanded Coverage)	Approx. 831 permitted USCG documented vessels	Mandatory	Year-round	National Observer Program	August 2011 – 2016	~6%	~6%	~60	99	43 (included in shrimp fishery)
Gulf of Mexico Purse Seine (Menhaden) Observer Program, Southeast Fisheries Science Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77551										
Program Manager: Elizabeth Scott-Denton, 409-766-3507, elizabeth.scott-denton@noaa.gov										
Gulf of Mexico Menhaden Fishery	Approx. 41 permitted USCG documented vessels	MMPA (50 CFR 229)	April–November	Other Congressional Funding	2011	0.00%	0.00%	0	0	0
TOTAL SOUTHEAST REGION OBSERVER PROGRAM FUNDING (APPROPRIATED): \$5,593,300										
TOTAL SOUTHEAST REGION OBSERVER PROGRAM FUNDING (INDUSTRY): \$0										
TOTAL SOUTHEAST REGION OBSERVER PROGRAM FUNDING (ALL SOURCES): \$5,593,300										

Office of Science & Technology

Fisheries Observed	Funding Source	Program Duration	Program Description
National Observer Program, Office of Science and Technology, 1315 East West Highway, Silver Spring, MD 20910			
Manager: Elizabeth Chilton, 301-427-8201, Elizabeth.chilton@noaa.gov, website: https://www.fisheries.noaa.gov/topic/fishery-observers			
Science & Technology	Reducing Bycatch	1999–present	National Seabird Program support for observer program-related projects.
	Atl Coast Observers		National Seabird Program support for observer program-related projects.
	National Observer Program		Program staff salary and travel, and support for the Safety Advisory Committee, Knauss Marine Policy Fellow, Interational Fisheries Observer and Monitoring Conference, and communications contract.
TOTAL SCIENCE AND TECHNOLOGY PROGRAM FUNDING (APPROPRIATED): \$789,286			
TOTAL SCIENCE AND TECHNOLOGY PROGRAM FUNDING (INDUSTRY): \$0			
TOTAL SCIENCE AND TECHNOLOGY PROGRAM FUNDING (ALL SOURCES): \$789,286			

Grand Totals - All Observer Programs

OBSERVER PROGRAM FUNDING (APPROPRIATED)¹: \$46,661,263
OBSERVER PROGRAM FUNDING (INDUSTRY): \$23,795,055
OBSERVER PROGRAM FUNDING (ALL SOURCES): \$70,456,308
ACTUAL NUMBER OF SEA DAYS OBSERVED²: 73,453
NUMBER OF OBSERVERS³: 966

¹ Appropriated funds include \$45.0 million from the Observers and Training PPA, \$6.6 million from other PPAs: Marine Mammals, Sea Turtles, and Other Species; Fisheries and Ecosystem Science Programs and Services; and Fisheries Management Programs and Services. Portion of funds are used for management activities for observers.

² Includes days deployed for electronic monitoring and at-sea monitoring; does not include Alaska shoreside plant coverage days or programs that target permits, sets, or trips instead of sea days)

³ Does not include deployments for electronic monitoring.

Appendix B: Fisheries Observed in FY 2017

Region	Fisheries With Adequate or Near Adequate Coverage	Fisheries With Pilot or Baseline Levels of Coverage
AK	Bering Sea/Aleutian Islands Groundfish Trawl	Salmon Gillnet, Setnet, and Driftnet: Southeast Alaska drift gillnet 6,7a, and 8; Yakutat salmon setnet; Kodiak salmon gillnet; Cook Inlet salmon driftnet and setnet
AK	Bering Sea/Aleutian Islands Groundfish Longline	
AK	Bering Sea/Aleutian Islands Groundfish Pot	
AK	Gulf of Alaska Groundfish Trawl	
AK	Gulf of Alaska Groundfish Longline	
AK	Gulf of Alaska Groundfish Pot	
AK	Limited Access Privilege Program Halibut Fixed Gear	
NE	New England Large Mesh Otter Trawl (includes Ruhle and Haddock Separator Trawl)	Gulf of Maine Shrimp Trawl
NE	New England Small Mesh Otter Trawl	New England Hydraulic Dredge (Surfclams, Ocean Quahogs)
NE	Mid-Atlantic Large Mesh Otter Trawl	Mid-Atlantic Hydraulic Dredge (Surfclams, Ocean Quahogs)
NE	Mid-Atlantic Small Mesh Otter Trawl	Mid-Atlantic Longline
NE	New England Twin Otter Trawl	Mid-Atlantic Purse Seine
NE	Mid-Atlantic Twin Otter Trawl	Mid-Atlantic Fish/Conch Pot/Trap
NE	Atlantic Sea Scallop Dredge	Mid-Atlantic Lobster/Crab Pot/Trap
NE	Mid-Atlantic Scallop Dredge	New England Weirs (Includes Floating Trap)
NE	Mid-Atlantic Scallop Trawl	
NE	New England Gillnet (Small, Large, Extra Large; Sink/Drift)	
NE	Mid-Atlantic Gillnet (Small, Large, Extra Large; Sink/Drift)	
NE	New England Longline	
NE	Mid-Atlantic Handline	
NE	New England Handline	
NE	New England Purse Seine	
NE	New England Paired and Single Mid-Water Trawl	
NE	Mid-Atlantic Paired and Single Mid-Water Trawl	
NE	New England Fish/Conch Pot/Trap	
NE	New England Lobster/Crab Pot/Trap	

(continued on page 28)

Region	Fisheries With Adequate or Near Adequate Coverage	Fisheries With Pilot or Baseline Levels of Coverage
NW	West Coast Groundfish Bottom Trawl Catch Shares	West Coast Groundfish Nearshore Fisheries
NW	West Coast Groundfish Limited Entry Fixed Gear	California, Oregon, and Washington Pink Shrimp Fisheries
NW	West Coast Mid-Water Trawl for Whiting (Hake), At-Sea Processing	California Halibut Trawl Fishery
NW	West Coast Mid-Water Trawl for Whiting (Hake), Shoreside Processing	West Coast Open Access Fixed Gear Fisheries
PI	American Samoa Pelagic Longline Tuna	
PI	Hawaii-based Pelagic Longline (swordfish, tuna)	
SE	South Atlantic and Gulf of Mexico Directed Coastal Gillnet Fishery	South Atlantic and Gulf of Mexico Shrimp Otter Trawl (including rock shrimp)
SE	Atlantic, Gulf of Mexico, and Caribbean Pelagic Longline (swordfish, tuna, sharks)	South Atlantic Reef Fish Fishery
SE	Atlantic and Gulf of Mexico Directed Large Coastal Shark Bottom Longline	Gulf of Mexico Reef Fish Fishery
WC	California Large-Mesh Drift Gillnet	
WC	Deep-set Pelagic Longline	
WC	Deep-set Buoy Gear Exempted Fishing Permits	
Total	38	16

Definition of adequate or near-adequate levels of observer coverage: Observer programs that have adequate or near-adequate levels of observer coverage have observer programs that are either “mature or developing” as defined in the 2004 NMFS report Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs. The definition of a developing program is one in which an established stratification design has been implemented and alternative allocation schemes are being evaluated to optimize sample allocations by strata to achieve the recommended goals of precision of catch, bycatch and discard estimates for the major species of concern. The definition of a mature program is one in which an optimal sampling scheme has been implemented. A mature program is flexible enough to achieve the recommended goals of precision of catch, bycatch and discard estimates for the major species of concern considering changes in the fishery over time.



U.S. Secretary of Commerce

Wilbur L. Ross, Jr.

Assistant Secretary of Commerce for
Environmental Observation and
Prediction, performing the nonexclusive
duties and functions of Under Secretary
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Dr. Neil Jacobs

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November 2019

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