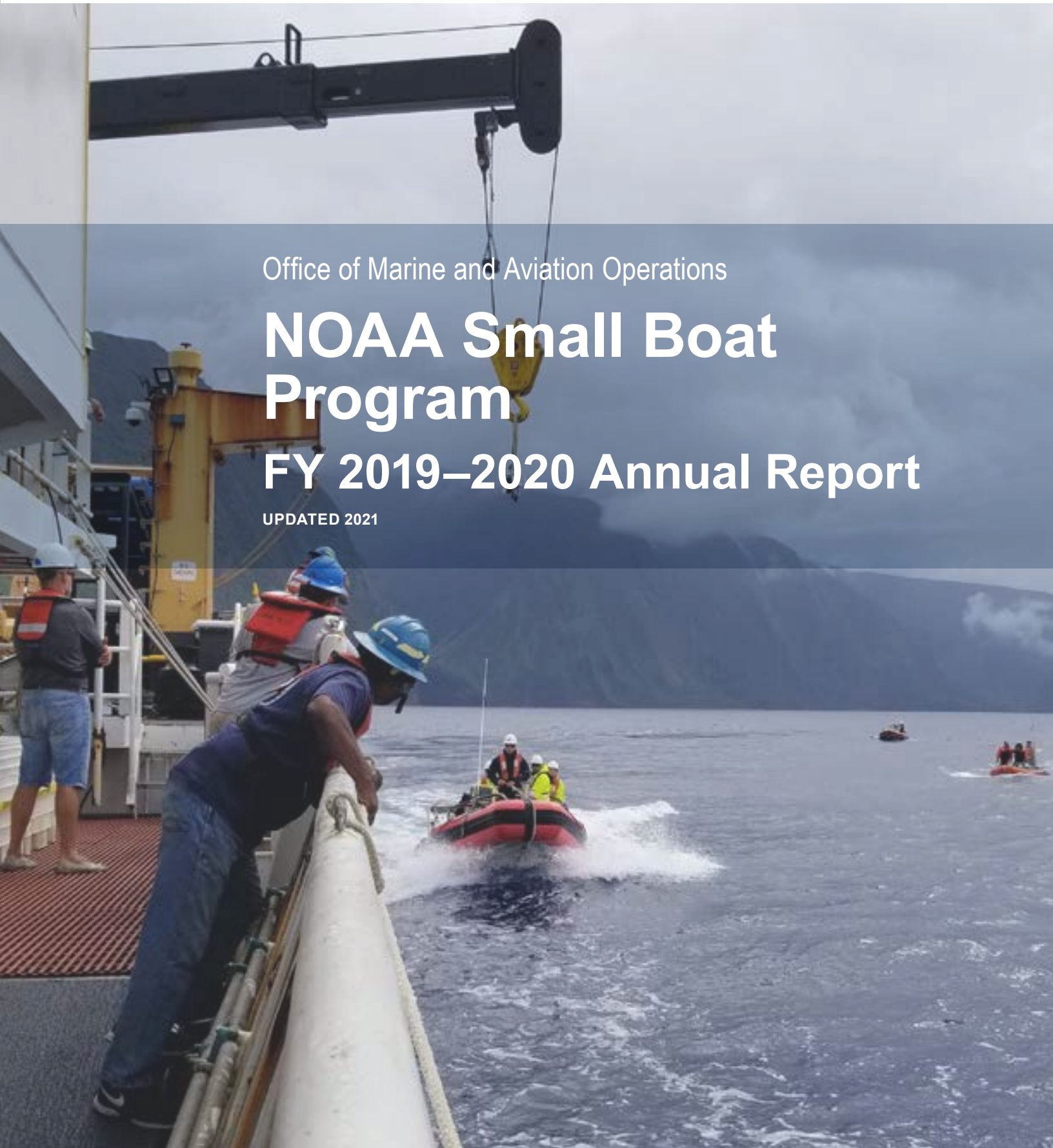
National Oceanic and Atmospheric Administration

U.S. Department of Commerce



Office of Marine and Aviation Operations

NOAA Small Boat Program

FY 2019–2020 Annual Report

UPDATED 2021

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Office of Law Enforcement Patrol Vessel *Cape Elizabeth* (F3702) on patrol in Halibut Cove, Homer, Alaska. Photo: NOAA

INTRODUCTION

The National Oceanic and Atmospheric Administration's Small Boat Program is administered through the Office of Marine and Aviation Operations and is headquartered in Seattle, Washington. It establishes policies and procedures that promote a safe small boat program to support NOAA's program needs. It identifies applicable regulations, provides operator training, staffing guidance, and marine engineering assistance on boat alterations, boat design, and selection criteria. NOAA boats are cost-effective, responsive platforms that are critical to the priorities and mandates of the agency. NOAA relies on hundreds of small boats located throughout the country to support NOAA's mission of science, service, and stewardship through safe, efficient, effective and professional small boat operations. The vision of NOAA' s Small Boat Program is to be the industry leader for diverse, multi-mission small boat operations.

NOAA SMALL BOAT PROGRAM HISTORY

Since its formation in 1970, NOAA has relied on both small boats and ship operations to meet strategic goals of the agency. NOAA's fleet of ships support oceanic requirements and are often the focal point of at sea operations. Smaller vessels owned and operated by NOAA also play a critical role in the agency's mission. Prior to 2002, small boat operations, maintenance, and operator training were managed at the regional level, or in some cases local level. A well-defined policy that included minimum standards and procedures did not exist across NOAA. In 2002, NOAA Administrator Vice Admiral Lautenbacher (ret.), instructed NOAA to establish universal standards, procedures, and policies for conducting safe small boat operations. From this mandate, both the Small Boat Program (SBP) and the Small Boat Safety Board (SBSB) were formally established. One of the first actions by the SBSB was development of a NOAA Administrative Order (NAO) specifically to address small boat operations along with supporting documents to enhance safety.

Location and concentration of active NOAA small boats as of February 2019

NOAA operates a fleet of over 400 small boats across the following line offices:

- Office of Marine and Aviation Operations (OMAO)
- National Marine Fisheries Service (NMFS)
- National Ocean Service (NOS)
- Office of Oceanic and Atmospheric Research (OAR)
- National Weather Service (NWS)

R/V *Steel Toe* at Rose Atoll, American Samoa. Photo: James Morioka/NOAA

The small boats range in size from a 10-foot kayak to a complex 85-foot research boat capable of extended overnight operations. They are located throughout the United States and its territories and conduct a wide range of operations:

- hydrographic surveys
- fishing
- diving
- scientific instrument deployment and recovery
- water and air quality monitoring
- law enforcement
- marine mammal surveys
- educational outreach

NOAA's small boats are owned, maintained, and operated by the individual line offices. OMAO, through the SBP Office, provides administrative oversight and is the point of contact for support regarding engineering, inspections, and policy related questions. The SBP Office develops safety and operational guidelines for both small boats and operators with support from subject matter experts from NOAA line offices, other federal agencies, and industry.

The SBP Office ensures NOAA-owned boats meet or exceed regulatory and industry standards for construction, safety, and operation through comprehensive inspection and training programs tailored to the small boat and mission. In addition, the SBP Office provides technical expertise in the design and acquisition of new small boats,

assists with contracting repairs and modifications for existing platforms, administers small boat inspections, and conducts training on small boat inspections and maintenance.

The SBP Office, in coordination with the NOAA SBSB, develops and implements operational requirements to improve safety on the water. The SBSB is an advisory panel composed of representatives from each line office as well as members from the NOAA Safety and Environmental Compliance Office, SBP Office, and NOAA Fisheries' Office of Law Enforcement (OLE). The SBSB initiates, reviews, revises, and provides recommendations to the Director, OMAO on policies and operating procedures pertaining to the agency's small boats. The small boat NAO and Small Boat Standards and Procedures Manual (SBS&PM) govern the operating requirements under the authority of NOAA. The SBSB is responsible for initiating and endorsing revisions before final approval.

Day-to-day operations are overseen by the Vessel Operations Coordinator (VOC) at each facility who ensures NOAA boats are properly maintained and crews are appropriately trained for their respective operations. VOCs work with their respective program manager and with the line office small boat officer to carry out safe and effective small boat operations in compliance with all safety and environmental policies. NOAA line offices that have extensive boat inventories utilize a regional Vessel Program Coordinator (VPC) to assist with oversight and inspections within each region. In addition, VPCs assist the line office small boat officer in better understanding the operations and challenges within each region.

NOAA Small Boat loading personnel and gear for dive operations from a NOAA Ship. Photo: Nick Jeremiah/NOAA

Personnel List (2019–2020)

LINE OFFICE SMALL BOAT OFFICER

Dennis Donahue (OAR & NWS)
Wayne Hoggard (NMFS)
Richard Chesler (NMFS/OLE)
Dave Slocum (NOS)
Michael Davidson (NOS)
John Humphrey (OMAO)
LCDR Steven Loy (NOS)

SMALL BOAT SAFETY BOARD MEMBERS

Dennis Donahue (OAR & NWS, Chairperson—FY19)
Wayne Hoggard (NMFS)
Richard Chesler (NMFS/OLE)
Chad Yoshinaga (NMFS)
Dave Slocum (NOS)
Michael Davidson (NOS, Chairperson—FY20)
John Humphrey (OMAO)
Kevin Ivey (OMAO)
LCDR Nicola VerPlanck (OMAO/SBP—FY19)
LCDR Brian Elliot (OMAO/SBP—FY20)
Joe Duran (SECO)
Ann Byar (SECO)

SMALL BOAT PROGRAM OFFICE STAFF

LCDR Nicola VerPlanck (Manager—FY19)
LCDR Brian Elliot (Manager—FY20)
LCDR Brian Elliot (Executive Officer—FY19)
Darel McCormick (Inspection Coordinator)
Jeff Kingrey (Engineering Coordinator)
Paul Moreno (Training Coordinator)

VESSEL PROGRAM COORDINATORS

Peter Plantamura (NMFS)
Wes Parker (NMFS)
Brad Weinlaeder (NMFS)
CDR John Crofts (NMFS)
Chad Yoshinaga (NMFS)
LCDR Justin Ellis (OMAO)
LCDR Colin Kliewer (OMAO)
Dana Wilkes (NOS)
CDR John Lomnicky (NOS)
LCDR Carl Rhodes (OMAO)
LCDR Emily Rose (OMAO)
CDR Fionna Matheson (OMAO)
LCDR Joseph Carrier (OMAO)
LCDR Ryan Wartick (OMAO)

VESSEL OPERATIONS COORDINATORS

NMFS

LT Rosemary Abbitt
Carl Alderson
LTJG Justin Boeck
John Brusher
Eric Chavez
Connor Cleary
LT Blair Delean
Jennifer Doerr
Matthew Eagleton
LT Erick Estela Gomez
LTJG Tyler Fifield
Brian Fite
Robert Foy
LTJG James Freed
LT Christopher Gallagher
Annie Gorgone
James Hackett
LT Keith Hanson
Pete Harwell
James Hawkes
Michael Hendon
Brandon Howard
Paul Iseri
Christopher Jacobsen
LTJG Daniel Jessurun
Thomas Kearns
Kenneth Keene
Kyle Koyanagi
Jesse Lamb
Jay Lazar
LCDR Aaron Maggied
Robert Marvelle
Camilla McCandless
LT David McVay
Tom Moore
James Morioka
David Morin

Ryan Nichols
Erik Norris
Patrick O'Shaughnessy
Wes Parker
LT Bryan Pestone
Peter Plantamura
Russell Reardon
LTJG Lyle Robbins
Sean Rooney
Kate Savage
Steve Sessions
Brian Simpson
Jennifer Spencer Smith
Mark Sramek
Erin Strange
LT Ben VanDine
Brad Weinlaeder
Frederick Wenzel
Timothy Wilmarth
Barb Zoodsma

NOS

Andy Armstrong
LTJG Nick Azzopardi
Joshua Bergeron
Keith Brkich
LTJG Brian Caldwell
LT Bill Carrier
LTJG Sarah Chappel
CDR Sean Cimilluca
James Daugomah
Jean de Marignac
LT Patrick Debroisse
Brian Degan
LTJG Nick DeProspero
LT Terril Efird
ENS Luke Evancoe
LTJG Alisha Friel
Mike Geagel
Russ Green
LTJG Anna Hallingstad
LT Marybeth Head
Dan Jacobs
Brian Johnson
LT Ben Kaiser
LT John Kidd
James Kirkpatrick
LT Dylan Kosten
LTJG Patrick Lawler
Atuatasi Lelei Peau
LTJG Michelle Levano
Jay Lewis
LTJG Justin Miyano
Wayne Nowocien
LT Dustin Picard
LT Kristin Raja
Eddie Roggenstein
Dave Slocum
Hanae Spathias
Lisa Symons
LT Melissa Trede
LTJG Collin Walker
Robert Warner
LTJG Sara Wood
LT Brian Yannutz

OMAO

LTJG Mike Card
LCDR Joseph Carrier
LTJG Sean Digre
LCDR Justin Ellis
CAPT Keith Golden
CAPT Robert Kamphaus
LCDR Colin Kliewer
LCDR Faith Knighton
CAPT Mike Levine
CDR Mike Levine
CDR Fionna Matheson
CAPT Jeff Shoup
LCDR Ryan Wartick
LT Aras Zygas
Ship Commanding Officers

OAR

LTJG Hunter Brendel
John Bright
Nick Delich
LTJG Daniel Devereaux
Dennis Donahue
Stephanie Gandulla
LTJG Alyssa Thompson
ENS Cabot Zucker

NWS

LTJG Lauren Jarlenski

Small Boat Program Office Priorities

NOAA Small Boat Program Priorities and Accomplishments

The NOAA SBP continues to evolve to best address the needs of the fleet, maturity of the program, and the diversity of small boat operations across NOAA line offices. The program has grown from a primarily administrative and regulatory effort to become a forum for the larger issues facing the management and use of the NOAA small boat fleet.

Since its initial charter, the board and program have recognized the complex relationship of the drivers that ultimately influence risk to safety and mission success. A greater emphasis on these operational drivers has proven to be effective in achieving high safety performance. The holistic and balanced approach to managing risks and addressing program and policy concerns throughout the fleet defines the SBP.

The board maintains a list of priorities to provide focus for program products and initiatives, direct resources, and draft sound policy. The associated action plans ensure compliance with the Board Charter and the NOAA Administrative Order for the SBP.

Figure 1. *The drivers that influence risk to safety and mission success are displayed in the chart.*

NOAA Small Boat Program—Priorities and Action Plans

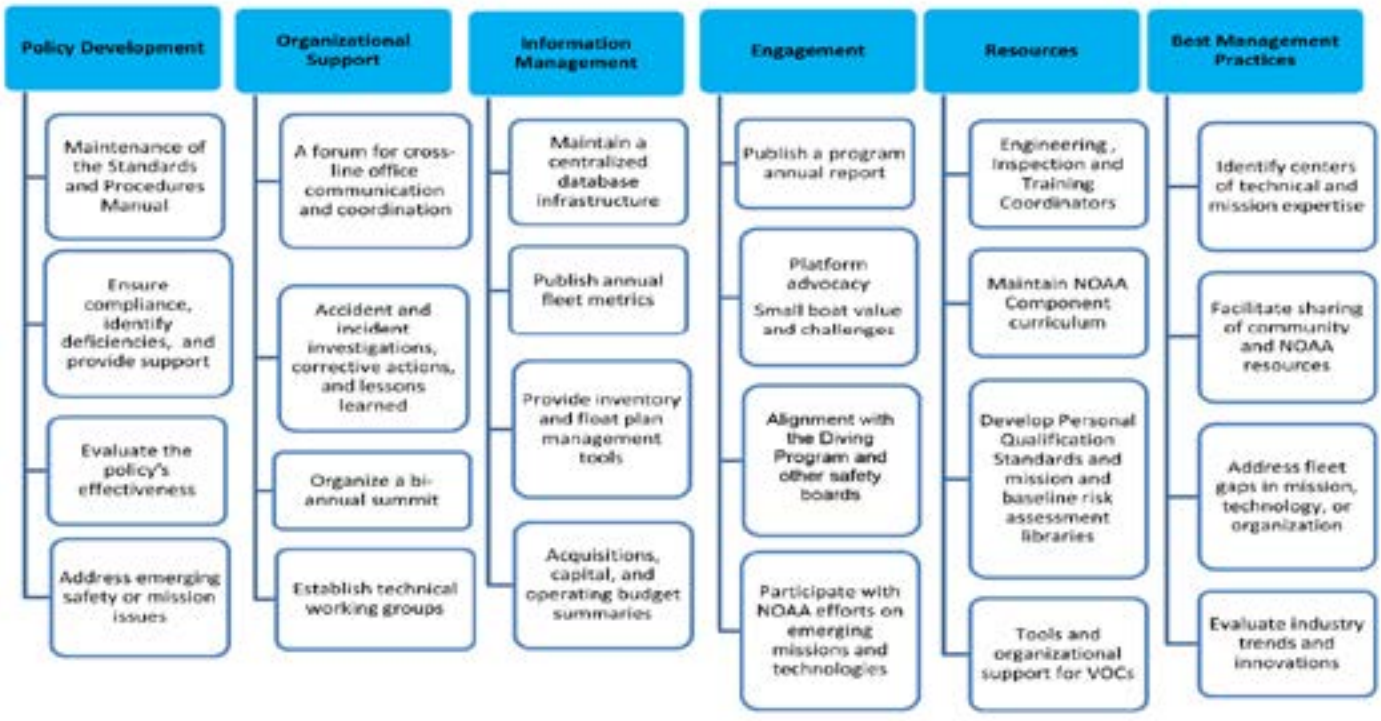


Figure 2. *The Priorities and Action Plans chart breaks down the various responsibilities of the SBP.*

Policy Development

Issuance of the 4.1 edition of the Standards and Procedures Manual was rolled out in 2017. As a result, a number of edits, clarifications, and additions have been identified for the 4.2 edition due for release in FY21. In the interim, the board is continually reviewing emerging topics, developing guidance and issuing Special Safety Notices when appropriate to disseminate critical safety information to the small boat community..

Recognizing the significant advancements in Electronic Navigation Charts (ENCs), charting hardware and software, new policy for onboard system configuration and management was adopted.

SBP has required all operators to maintain first aid and CPR accreditation and that each boat maintains an emergency medical response kit. This training and onboard resources provide critical immediate response to an injury or medical emergency but could increase risk of exposure to blood borne pathogens (BBP). New policy has been adopted to ensure that BBP awareness training, exposure mitigation, and response plans are in place.

Lessons learned from maritime industries and partner agencies have prompted review of SBP vulnerabilities and raise awareness in the community. The tragic M/V *Conception* dive boat fire and loss of life initiated an immediate review of the NOAA fleet and operating policies. Safety notices and new directives were issued, including review of egress routes, crew orientations, berthing areas, and fire suppression systems. New policies were adopted for the handling of lithium batteries onboard to address potential fire hazards.

Organizational Support

SBP successes are largely attributed to the program's strong connections to the realities of field operations. It is built upon the community of dedicated individuals responsible for safety and operational efforts on the waterfront—VOCs. VOCs are the foundation of small boat safety, platform management, and mission support.

SBP oversight is dependent upon both OMAO administrative support through program staff and the collaborative efforts of the NOAA line offices. The board provides critical oversight when safety has been compromised. All accident/incident and near-miss reports are reviewed to assure thorough investigation, establishment of root cause, and sharing of lessons learned. Additionally, reports from fleet inspections provide insight to the material condition and asset management challenges that ultimately influence safety margins. New procedures have been developed to process this information to determine fleet exposure or initiate policy changes.

There is a renewed focus on near-miss events to identify potential vulnerabilities and operational challenges that did not evolve into a personal injury or property loss. A working group was formed to explore reporting mechanisms through the Office of Chief Information Officer's (OCIO) online safety incident reporting portal (NOAASafe) and to refine investigation procedures. Community involvement is critical to capturing this near-miss information so lessons learned can be shared in an effort to prevent injury or property loss in future occurrence.

Information Management

Effective policy development and risk management are dependent upon data that accurately characterizes small boat assets and operations. This information supports the entire scope of the program and serves to quantify the value of NOAA small boat operations. These tools provide vessel management efficiencies at the local level and allow for oversight at the line office and program levels

Two programs, Vessel Inventory Management (VIM) and Vessel Operations Program (VOP), provide critical insight of fleet assets and missions. The VIM details the fleet inventory of more than 400 boats and over $100M

in capital investment. The VOP is an essential float plan system that provides real-time measure of underway activity and initiates response to overdue boats. Additionally, this tool provides measures of mission value and accounting of underway effort.

The program has realized improvements in response to data calls, safety compliance measures, and identifying areas of risk exposure. The small boat community has realized significant operational improvements with the addition of mobile access version of the VOP.

Under the leadership of the NMFS information technology support, working groups have identified enhancements and extensions to the VIM and VOP databases. New tools have been developed to manage training records and vessel maintenance, capture suggested system improvements, enhance dashboard, and report information.

These tools integrate information from all facets of vessel operations and are the foundation for risk- and performance-based decisions. Securing commitments for long term funding of these critical tools remains a top priority.

Engagement

Many program initiatives are devoted to raising the general awareness of fleet value and challenges. An overarching theme is to improve communication to ensure that the agency is supportive of the safe and efficient use of NOAA small boats. A program priority is to act as an advocate of small boat platforms across all line offices and agency interests.

Steps have been taken to improve the visibility of NOAA small boats to a broader audience of potential users. Increased sea days better support fixed operating costs and add mission value.

The SBP is working in closer coordination with the NOAA Diving Program to address boat support during diving missions. The two programs are closely aligned in mission and organization as more than 60 percent of NOAA dives are supported by NOAA small boats.

Near term plans include engagement with groups that are coordinating use of uncrewed systems from boat platforms. These emerging technologies are often dependent upon small boat platforms for deployment and retrieval. Close coordination of these allied operations will ensure mission success. There are centers of expertise in handling this equipment for the small boat community. Disseminating best management practices, platform requirements, and mission protocols are program priorities.

Engagement initiatives include the field perspectives and leadership interests. Significant progress has been on both fronts through the 2019 summit held in St. Petersburg, Florida and an OMAO funded study to explore small boat recapitalization options.

The recapitalization study was initiated at the request of several line offices and programs to address the challenges of maintaining small boat assets, particularly the Class III and small research vessels (SRVs). The study is based upon quantifying the fleet assets, following their mission value, and supporting their organizational structure. It is expected to offer an objective review of the current program and propose recommendations that will ensure long term sustainability and new mechanisms to fund new construction and investment in existing platforms.

The line office stakeholders, the board, and the program office have been fully engaged with the recapitalization study which is expected to be complete in the first quarter of FY21.

Resources

The Core Program staff responsibilities include maintaining program documents and web content, producing fleet metrics, facilitating training, conducting inspections, and providing technical support.

Best Management Practices

The culmination of these priorities is development of best management practices. The program is formalizing procedures and creating products that institutionalize safety and mission expertise found throughout the fleet. Key to these efforts is the strong support for the bi-annual summit, creation of working groups, and the collaboration amongst crosslines.

NOAA personnel equip side scan sonar and positioning equipment aboard a small boat. Photo: NOAA

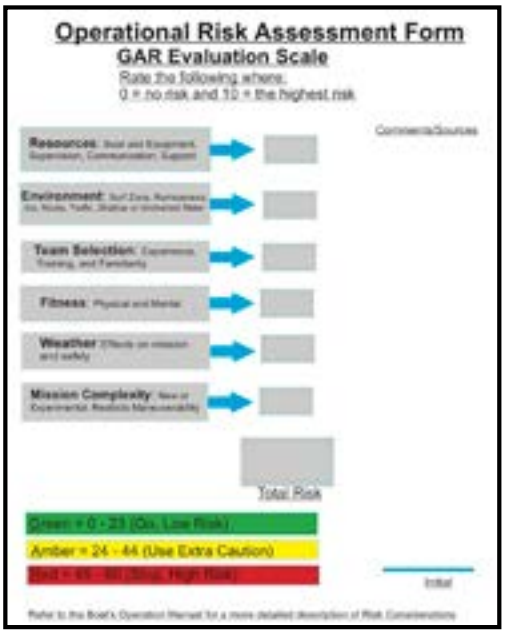
Risk Mitigation, Planning, and Preparedness

The NOAA SBSB employs a comprehensive approach to risk management for all small boat operations. The goal of operational risk management is to minimize risks of harm or loss while fulfilling our missions.

The SBS&PM section 5 established an operational risk management process and specialized tools to help NOAA programs identify hazards, assess risk, mitigate or eliminate risks, and identify acceptance authority levels.

Due to the diversity and complexity of our small boat operations, the manual outlines a stepped approach to the risk management process. This approach recognizes that each small boat operation has different purposes and timelines. Therefore, it breaks up an operation into three component to better assess and mitigate risks. The COVID-19 pandemic created the need for an additional risk assessment. These risk assessment components are as follows:

	The Baseline Assessment documents the boat's specifications (age, capacity), installed equipment, and operational capabilities.
	The Mission-Based Risk Assessment articulates what resources and capabilities are limiting or critical to a particular mission. Boats in the same class, configured and outfitted differently, may provide different safety and mission success margins. The assessment will define aspects of the selected boat that will have an elevated risk or narrowed operating margin. It is updated annually or any time the mission parameters change.



The Green-Amber-Red (GAR) Operational Risk Assessment Form is a day-of tool to help the team identify, manage, and communicate risk levels for vessel operations so that the team can focus mitigation efforts on the highest risks. Applying all three components will help to ensure all aspects of the operation are considered when assessing risk, both prior to getting underway and during the operation. The Baseline Assessment and the Mission-Based Risk Assessment define parameters that can then be applied to the GAR evaluation. For example, if the Baseline Assessment says the boat can operate safely in winds up to 25 knots, but the Mission Assessment says data can only be collected in winds less than 15 knots, then the "Weather" element on the GAR is a 1 to 10 scale based on the Mission Assessment's 0 to 15-knot wind parameters.

COVID-19 Risk Assessment

The COVID pandemic presented unique challenges to operational safety due to the wide variety of vessel capacities and configurations in the NOAA small boat fleet. The SBSB and program office developed the COVID-19 Operational Risk Assessment using the GAR evaluation scale to assess the additional risk that the pandemic posed to personnel. The risk assessment is based on four variables that directly relate to the transmission risk of COVID-19:

1. the size of the vessel based on class
2. the duration of operations or length of exposure
3. the number of persons on board and the type of vessel
4. the ability to social distance either inside or outside

Due to the guidance, risk assessment, and diligence from personnel on the waterfront, there was not a single case of COVID-19 transmission aboard a NOAA small boat during FY20.

Figure 3. *The pictured operational risk forms can be found on the SBP website and are also discussed in detail in section 5 of the SBS&PM.*

Leveraging Technology to Improve Communication

The SBP has leveraged technology to improve communication among members of the NOAA small boat community. Feedback from the NOAA small boat community consistently ranks communications as an area of high importance. The SBP and SBSB have listened and in 2019, unveiled a new communications tool to support the NOAA small boat community. The NOAA SBP Google Site is an intranet site that provides a wide range of information and functionality. The information on the NOAA SBP Google Site complements the public-facing NOAA SBP website. These two sites ensure that the SBP can keep the NOAA small boat community informed and connected.

The extremely knowledgeable and talented people who work in the field are the SBP's best resources. Borne out of the 2015 NOAA Small Boat Summit, the NOAA Small Boat Forum connects users and encourages and facilitates communication among field units that otherwise may not have many opportunities to interact. There was a great deal of initial interest and use, but activity on the forum waned over time. In 2019, in conjunction with the debut of the NOAA SBP Google Site, the SBP held a membership drive to re-invigorate use of the NOAA Small Boat Forum. There are now 159 members and counting, and the forum receives posts on a weekly basis. Complete the NOAA Small Boat Forum Registration form to join.

Together, these resources are building a stronger and more tightly-knit NOAA small boat community.

Drifter deployment from R/V *Shearwater.* Photo: Claire Fackler/NOAA

NOAA Small Boat Summit – Summary, November 5–7, 2019, Saint Petersburg, FL

The NOAA Small Boat Summit was held November 5–7, 2019 at the Florida Fish and Wildlife Research Institute (FWRI) in Saint Petersburg, FL. Photo: NOAA

Every two years, the SBSB and SBP office host a small boat summit for all VOCs, small boat operators, and representatives from NOAA line offices and programs. The focus of the 2019 small boat summit was on safety, new technologies, and resources for small boat operations. The summit was designed to provide training, an exchange of best industry practices, and networking opportunities for the NOAA small boat community who are responsible for maintaining safety and ensuring mission success. Topics provided were addressed in a community forum and in smaller breakout sessions.

A total of 118 NOAA and industry partner personnel attended, including the SBSB, SBP office, VPCs, VOCs, and NOAA and FWRI waterfront personnel. The keynote speaker was Benjamin Friedman, NOAA's deputy under secretary for operations, accompanied by Mark Seiler, NOAA's chief financial officer.

The following highlight the major discussion topics and takeaways from the small boat summit:

- introduced the VOP training and encouraged an open discussion for future enhancements
- discussed significant roles and responsibilities of the VOCs and VPCs to sustain efficient and safe small boat operations.
- presented and introduced the small boat training coordinator position, improvements to the training program and new training tools available to the community.
- clarified the difference between the baseline, mission based risk assessment and GAR processes for risk management.
- presented and discussed lithium battery incidents, lesson learned, and mitigations.
- highlighted requirements, resources and support available in boat selection, acquisition.
- rolled out the new interactive Small Boat Google Site to enhance small boat visibility and improve communication.

Multiple breakout sessions were held by platform size and mission category. These breakouts allowed focused discussions; sharing of strengths, weaknesses, and opportunities for the individual units and operators.

A poster session was held on the first day to showcase the diverse operations and successes of the units. Posters represented each line office and region. Posters may be viewed on the SBP Google Site.

Based on feedback from all those attending this event, the three-day summit was a success. Listed below are key areas for future focus:

- gaining a better understanding of the VOC's scope of responsibilities and the resources and support available
- suggesting improvements to the SBS&PM version 4.2
- increasing opportunities for networking and communications which are critical elements for summits
- incorporating breakout sessions in future summits; breakouts proved valuable during past summits
- adding an additional day to the summit to allow for more presentations by both internal and external subject matter experts

The following are action items and next steps for the SBP:

- rolling out the SBS&PM 4.2
- rolling out the VOP in the 4.2 manual
- providing clarity and information for chartering boats and NOAA personnel on chartered boats
- creating new VOC specific training
- collecting additional metrics to showcase the impact of small boats within NOAA

Throughout the summit, the importance of metrics for the program and NOAA organization was communicated. The 2019 Small Boat Summit summary is posted on the Summit 2019 page of the SBP website. Posters, presentations, supporting documents, and a compilation of the post-summit feedback are on the SBP Google Site.

Small boat operations in the Northwest Hawaii Islands, off NOAA Ship *Rainier*. Photo: Nick Jeremiah/NOAA

Engagement with NOAA Partners

NOAA Diving Program and NOAA Small Boat Program Coordination

With 60 percent of all on-duty dives occurring from a NOAA small boat during FY19 and 40 percent during FY20, there is a great overlap of responsibilities between the NOAA Diving Control and Safety Board (NDCSB) and the SBSB. We have been working to increase the communications and relationships between the safety boards. Members from the NDCSB have attended SBSB in-person meeting and the NOAA Small Boat Summit. The SBP Manager has participated in a NDCSB in-person meeting and works closely with the Executive Officer of the NOAA Diving Center (NDC). Both the SBP Office and the NDC are located on the Western Regional Center campus in Seattle, WA. The co-location allows easy in-person meetings and direct communications between the programs. Both programs are excited to continue their work together by updating and clarifying the roles and responsibilities of both NOAA divers and NOAA small boat operators in their respective manuals, eliminating any conflicts or confusion. This will lead to safer operations both above and below the surface.

New, Repurposed, and Updated Small Boats

Many major improvements occurred to the small boat fleet in FY 2019. The program targeted specific capital improvements to safety, vessel longevity, and environmental footprints. The 52-foot R/V *Storm* at the Great Lakes Environmental and Research Laboratory (GLERL) in Muskegon, MI, replaced decades-old original power plants with new environmentally compliant engines. The new propulsion system will greatly enhance fuel economy, emissions, and increase the operational life of the vessel. The 74-foot SRV *Laurentian*, also located at GLERL, installed upgraded deck hatches including a new forward escape hatch for the forward berthing area. These enhancements significantly improve the safety and watertight integrity of the vessel, demonstrating NOAA's commitment to continuous improvement and unwavering dedication to the safety of its personnel.

The R/V *Chesapeake* in Oxford, MD, completed an inclining experiment to evaluate its stability and to determine the effects of a newly installed work crane. This evaluation determines how external loads such as deck loaded scientific equipment and lifting gear affect the vessel's ability to operate safely under all anticipated conditions. These evaluations are periodically conducted over the life of the vessel as modifications and updates are completed as the vessel changes or takes on additional missions.

Electronic Navigation

The Electronic Navigation (E-Nav) Policy was newly approved and promulgated in FY 2019. This requires all Class III and SRVs to regularly update all ENCs while easing the burden of updating paper charts. The NOAA SBP recognized that electronic navigation technology was used unilaterally throughout the fleet with little to no available guidance. This policy standardizes minimum equipment requirements, provides requirements for the routine updating of ENCs, and greatly enhances safety while embracing modern technology.

Response to COVID-19

The COVID-19 pandemic had a great impact on the SBP. In mid-March 2020, operations were reduced to emergency and mission-critical to limit the exposure to and transmission of COVID-19. The program published a "Guidance and Best Management Practices" document on "COVID-19 Risk Management for Small Boat Operations." This document provided procedures to best mitigate the risk of COVID-19 exposure aboard NOAA small boats.

Operational authorization was completed through each line office to ensure mission-critical and emergency responses could be conducted rapidly.

The SBP utilized innovative solutions to the challenges of COVID-19. Inspections on Class III and SRVs were conducted remotely by the inspection coordinator and VOC on each vessel. Local marine surveyors were identified to conduct inspections of Class I &II vessels. These actions have allowed the SBP to ensure the highest level of safety was maintained while eliminating SBP personnel travel and exposure to COVID-19.

The SBP has provided remote substitutes to in-person training to further reduce the exposure of personnel while maintaining all requirements and continuing the highest level of safety possible. The training coordinator worked with the U.S. Coast Guard Auxiliary to present the Basic Boating and Seamanship course remotely, eliminating the need for in-person courses while maintaining training requirements. Online tests were created for knowledge checks of the NOAA SBS&PM and the content of the NOAA Component Course. The completion of these tests enables a 3-month extension in addition to the existing 6-month waiver for the NOAA Component Course, which is now in place. Online courses for first aid and CPR allow 3-month extensions of expired certifications, further reducing the need for in-person training.

All of these proactive steps have led to no known COVID-19 exposures or transmissions in 2020 on NOAA small boats. The program has maintained its full capacity to complete mission-critical and emergency response operations in service to the nation.

Shipboard Oil Pollution Emergency Plan

As leading stewards of the environment, NOAA and the SBP have taken proactive steps to protect and minimize adverse effects that can occur during normal boat operations. The Shipboard Oil Pollution Emergency Plan (SOPEP) provides guidance and procedures for the initial response to an oil or fuel spill. A key element of the SOPEP is a proactive approach and well-defined plan before an incident occurs. While no single hazardous or oil spill response group can support the entire SBP, the Vessel Program Coordinators and VOCs have identified capable response companies within each region. Rapid response is key, and a critical component within each line office is the procurement personnel that have an adequate warrant to initiate a quick response. Delaying a response due to restricted spending limits or waiting for internal approval was a concern. The SBP has taken steps to identify multiple contacts within the agency who have adequate spending authority and can support each line office. In addition, each line office has taken steps to train operators, crew, and support staff along with providing the necessary spill kits so a rapid response can be initiated prior to the oil response team arriving on the scene.

Key Elements of SOPEP

SOPEP responsibilities are for all personnel. To keep our personnel, property, and environment safe, we encourage all crew to do their part to prevent and respond to emergency spills. The key elements of SOPEP contain directions on the following:

- procedures on how to report an oil, fuel, or other pollution incident
- required details on the potential pollutants, quantity, and location
- contact information for local responders in the event of an incident
- onsite actions to reduce or control the discharge of oil/fuel following an incident
- coordination and reporting to national and local authorities
- a practiced (drill) response plan when an oil spill occurs
- notification list of key NOAA personnel

Blood Borne Pathogen Training

Scientific boat operations often occur in remote locations with limited to no access to emergency medical assistance. A NOAA small boat operator is required to maintain a valid first aid and CPR certification. With their expanded availability, automatic external defibrillator (AED) training has become a requirement in most locations.

In addition to these required training, the SBP identified the transmission of BBP as an area that awareness and training should be expanded. Boat operators are sometimes called on to render first aid to a victim where blood or bodily fluids may be present. The operator must now be aware of preventative measures and proper handling procedures.

The SBP, in conjunction with the Safety and Environmental Office, is now requiring an Exposure Control Plan to be incorporated into their operations. Part of the plan now requires preventive BBP training for all full-time employees that operate NOAA small boats. These guidelines are also strongly encouraged for crew, contractors, and volunteers who may serve on NOAA small boats.

Lithium Battery Safety Notice

Recent events both within and outside of NOAA have heightened awareness of the potential risks associated with lithium batteries. The use of lithium batteries and their risks must be considered on a small boat since space and egress points are limited.

Lithium-type batteries are common in many of the electronics and sampling tools used by NOAA. Their use is also widespread in our day-to-day activities and even our cell phones. Exceptional battery performance and longevity are one reason their use has become so popular. In response, the NOAA SBSB has issued a Lithium Battery Safety Notice. The notice applies to all operations and personnel that use lithium batteries. VOCs must incorporate this notice into the vessel's operations manual and brief all boat operators and crew on its contents. In addition, all principle investigators who utilize small boats, either NOAA or charter, should receive a copy and be made aware of their responsibilities.

Universal Policy on Lithium Battery Use on NOAA Small Boats

Lithium batteries are common in the workplace and in personal use; unfortunately, sudden fires can occur and cause fatal maritime casualties. Follow these guidelines to keep our personnel, property, and the environment safe:

- Distinguish between consumer devices (cell, laptop, cordless tools, radios) and mission devices (higher voltage science gear, submerged devices, autonomous vehicles, custom built instruments).
- Maintain an inventory of standard consumer devices and their locations.
- Identify projects that include mission equipment powered by lithium batteries.
- Incorporate lithium battery fire hazards and response into existing fire drills and training.
- Explain the battery device policy and local procedures during vessel orientations.

Requirements for Consumer Devices

Nearly all people rely on lithium-powered electronic devices, so it is imperative to be cognizant of their potential hazards especially while confined on small boats at sea. To ensure the safety of lithium-powered electronics, follow the guideline below:

- Prohibit unattended charging of consumer devices in berthing spaces.
- Use only chargers that are compatible with the device as defined by the manufacturer.
- Attend to all devices during charging on any surface that is potentially flammable.
- Require regular inspection (monthly, each use, etc.) of battery powered devices.
- Remove from service, and the vessel, battery cases or devices that are physically damaged, swollen, cracked, or show evidence of overheating.
- Do not store or charge devices in proximity to flammable materials.

R/V *Sashin* and F1518 conducting whale entanglement response in Juneau, Alaska. Photo: NOAA

Requirements for Mission Devices

Open communication about scientific equipment powered by lithium batteries is key. Alert the boat crew early and often so they can plan ahead for lithium battery-related mishaps. To avoid lithium battery related mishaps, read the following guidelines:

- Require device specific procedures and responsibilities for proper handling, charging, and monitoring.
  - Identify any custom/prototype chargers that do not have rate, overcurrent, or heat monitoring features and consider them high-risk devices.
- Identify and maintain areas suitable for high risk recharging and service.
  - post safety signs, monitor active charging stations, and ensure means of fire containment. Containment may include the use of charging bags, metal dividers, or cans.
  - Ensure location is dry, well ventilated, and accessible for overboard jettison if necessary
  - Avoid locations that contain flammable surfaces or any disruptions to egress.
  - Place suitable fire extinguishers—Class B or ABC rating—within close proximity of any designated charging station. Provide posting and instruction on fighting a lithium battery fire.
- Avoid storing or charging devices in proximity to flammable material storage

In addition, VOCs and program leads shall review operations that require the use of lithium batteries and develop supplemental procedures for any specialized operation not covered under this policy.

R3603 deploys inflatable vessel to assist with humpback whale entanglement response in Maui. Photo taken under NOAA scientific permit. Photo: NOAA

FY2019–2020 Metrics

NOAA maintained 432 active small boats in FY19 and 428 in FY20. These vessels range from kayaks and small skiffs to 80-foot SRVs. The capabilities and configurations of these platforms are a reflection of the diverse missions across NOAA.

The chart below displays the number of assets, days underway, and personnel used during small boat operations from FY17–20.

Measures	FY17	FY18 (% change from previous FY)	FY19 (% change from previous FY)	FY20 (% change from previous FY)
Assets—Active Boats (boats)	421	454 (+7%)	432 (- 4.8%)	428 (-0.9%)
Utilization—Days Underway (days)	5,018	5,375 (+6%)	6,616 (+23.1%)	2,860 (-56.8%)
Exposure—Persons Carried (days)	15,898	19,422 (+11%)	22,992 (+18.4%)	8,233 (-64.2%)

Figure 4. *The chart displays the number of days and assets each measure was exposed and operational. Each measure provides the following information: assets—the number of active boats within the small boat program; utilization—the number of days small boats went underway; exposure—the number of days small boat personnel went underway (average persons carried per FY included the following: FY17—3 persons carried; FY18—4 persons carried; FY19—4 persons carried; FY20—3 persons carried)*

FY19 produced 6,600 days underway and 23,000 persons logged. This resulted in a 23-percent utilization increase and an 18-percent exposure increase from FY18 to FY19; an impressive increase. FY19 and FY20 show a stark difference in utilization and exposure purely due to COVID-19 safety precautions reducing the number of small boat operations for a majority of the FY20 field season. Traditionally, summer months (Q3 and Q4) are the most operationally dense. Unfortunately, Q3 and Q4 operations were heavily reduced to only mission-critical and emergency operations due to COVID-19 safety protocols. Regardless, nearly 6 months of operations took place from October 2019 through mid-March 2020 prior to the pandemic. In FY20, utilization declined to 2,900 days underway (57-percent decrease) and 8,200 people carried (64-percent decrease), these percentages reflect fewer people onboard small boats in relation to the number of operations. This demonstrates the small boat fleet's commitment to COVID safety protocols; the fleet utilized fewer personnel in an effort to stop the spread of the virus. By committing to essential personnel and COVID safety protocols, the fleet had no known COVID cases reported in FY20.

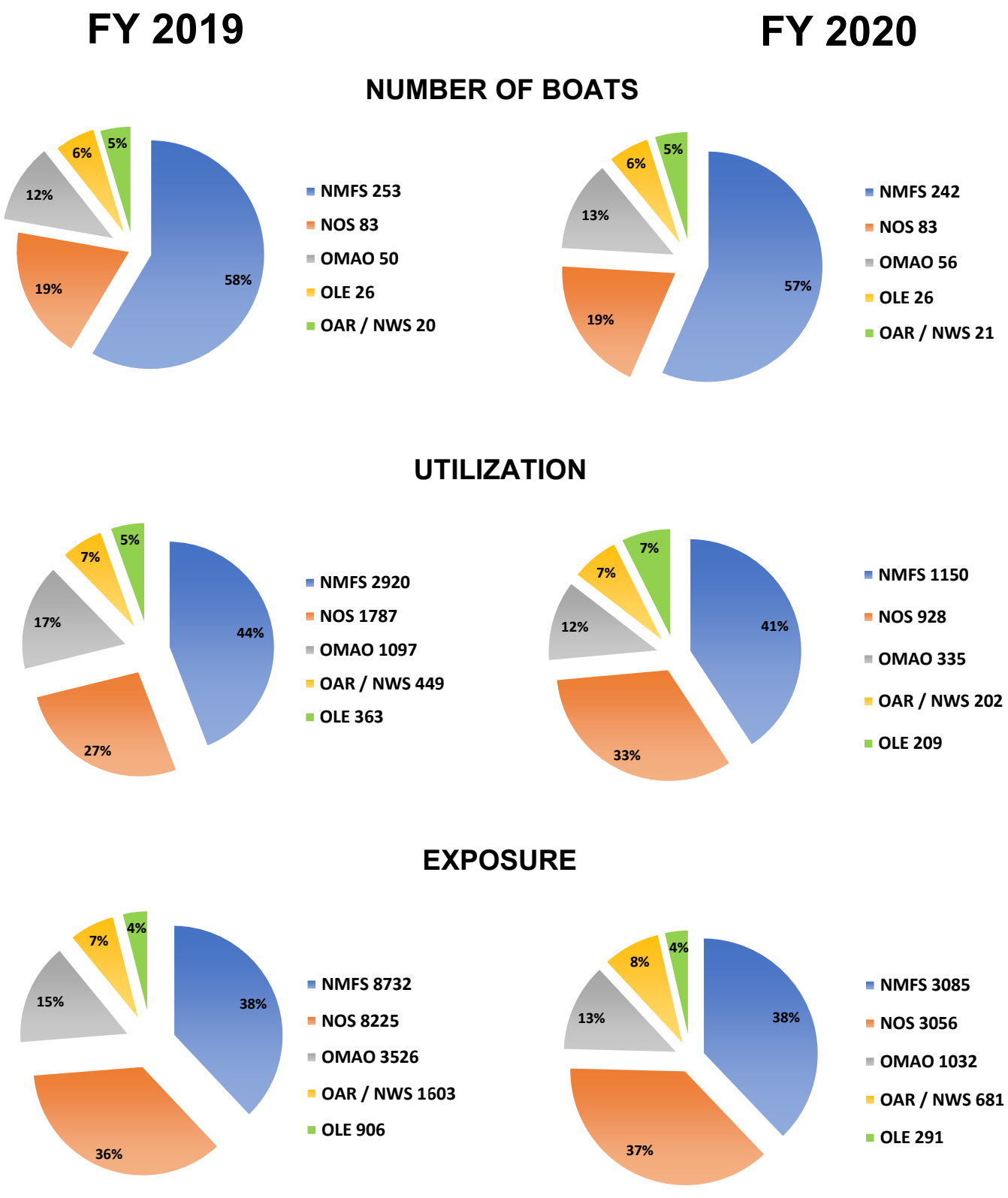


Figure 5. *The diagram displays a pie chart containing the same data from* **Figure 4**.

FY 2019–2020 Small Boat Incidents

The SBSB investigates all reported incidents, accidents, and near misses to ensure that the root cause is identified and that corrective actions are taken. This information is also used to establish trends, direct program resources, and draft policy. The SBP's exceptional safety record is primarily due to the talent and engagement of vessel operators and coordinators who manage risks on the waterfront.

FY19 was the second year that version 4.1 of the Small Boat Standards and Procedures Manual was implemented. The SBP's new approach to risk management supports an open and educational culture; the waterfront is encouraged to report near misses and incidents with the reassurance that their unit will not be negatively impacted. VOCs and SBOs now have the confidence to share near misses and incidents with the fleet, so we can learn from each other's mistakes and grow together as a program. As expected, the SBP saw an increase of incident and near miss reports. With almost 23,000 people carried aboard small boats, there were 13 minor injuries. The small boat fleet was underway for a combined 6,600 days with 27 incidents of damage or loss, resulting in a cost of $85,000. However, 87-percent of that cost was caused by a single piece of lost equipment.

COVID-19 slowed operations in FY20. Regardless, it was a safe and successful year. In FY20, the small boat fleet carried 7,500 people over a combined 2,600 days underway. There were only nine incidents, resulting in a minimal $5,300 in damages and five minor injuries. FY20 had a 57-percent decrease in days underway compared to FY19, but a "pre-COVID" analysis of Q1 & Q2 in FY19 compared to Q1 & Q2 of FY20 shows the number of incidents were similar to the annual Q1 & Q2 average (2–3 incidents per quarter). FY20 incidents caused $2,789 in loss, which is a great improvement from years past and shows a positive trend of more alert and well-trained crew members.

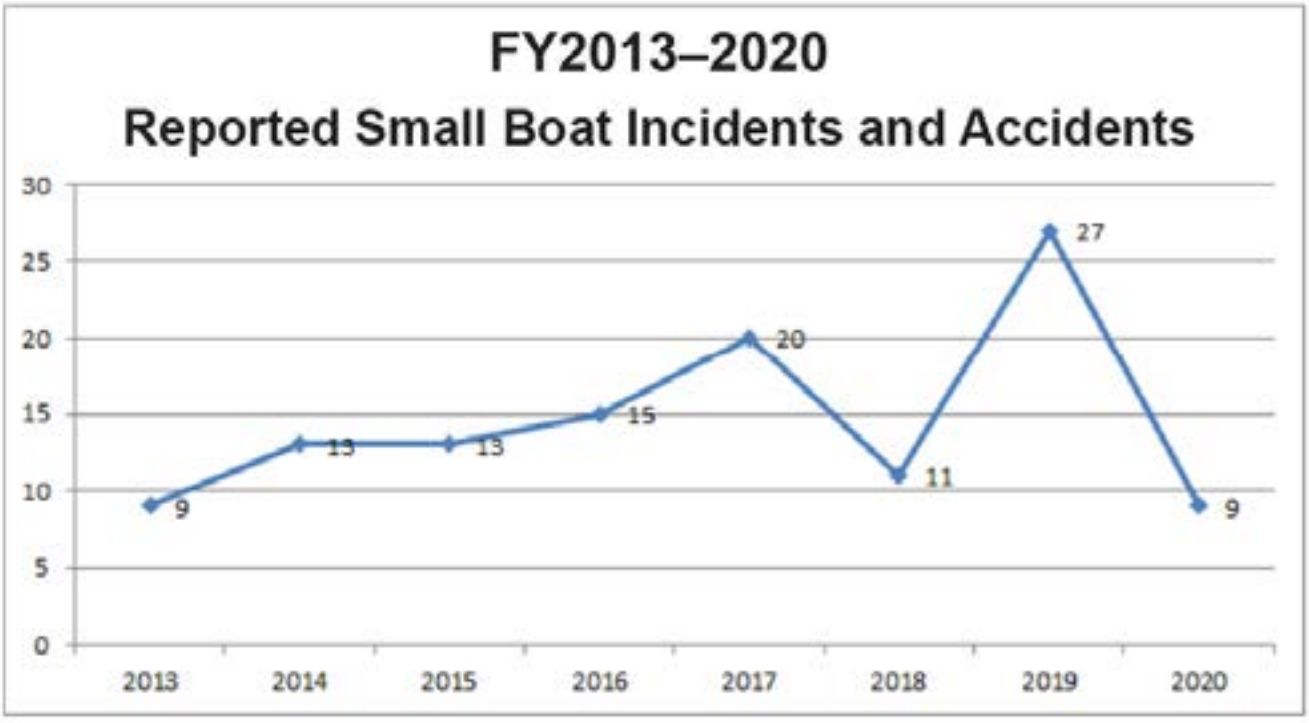


Figure 6. *The line graph displays the total number of small boat incidents and accidents from 2013 to 2020.*

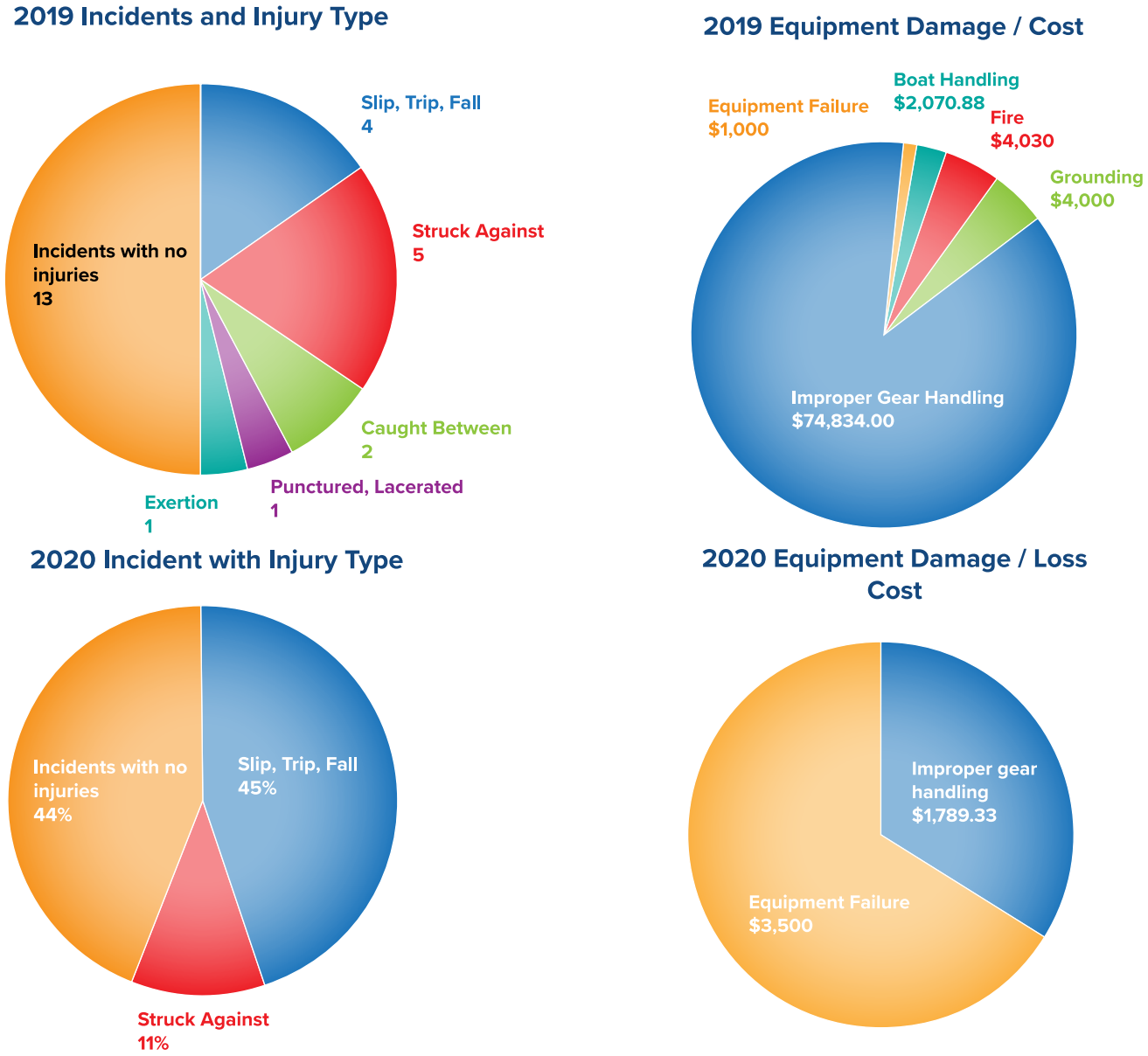


Figure 7. *The pie charts break down incidents that resulted in injury and equipment damage by dollar value. Tracking these metrics allow the SBP to consider and recognize trends and implement mitigation strategies.*

FY 2019–2020 Inspections Metrics

Annual, biennial, and triennial inspections across the fleet greatly increase safety and ensure the highest level of material condition of the vessels. Inspections completed by the SBP, alongside the VOCs and officers in charge, also provide a great training opportunity for the personnel on the waterfront. They keep them informed on emerging requirements as well as industry-leading advice and guidance on operations, maintenance, and repair of their vessels. Inspections also provide an excellent avenue for the waterfront personnel to ask specific questions and bring potential issues up to the SBP and the SBSB. The SBP's vessel inspection coordinator completed 25 Class III and SRV inspections, and 67 Class II and I inspections in FY19. Due to COVID-19 travel restrictions, the SBP vessel inspection coordinator conducted inspections remotely on 16 Class IIIs and SRVs in FY20. These vessels were operational on a limited basis by their requisite programs. Three Class III/SRVs have not been inspected and remain inactive. Local qualified marine surveyors conducted Class I and II vessel inspections in close coordination with the SBP vessel inspections coordinator as health and accessibility conditions permitted.

FY 2019–2020 NOAA Diving Metrics

The NOAA Diving Program oversees approximately 385 divers from NOAA and our partners. There were 8,860 total on-duty dives performed in FY19. Of those dives, 5,563 (61 percent) were performed from NOAA small boats. This represents a large overlap between the two programs, and coordination between the SBSB and the NDCSB is critical. Both programs are working together to properly mitigate risks and increase safety.

In 2020, 2,360 on-duty dives were performed. Of those dives, 954 dives (40 percent) were conducted from NOAA small boats. The 57-percent reduction in NOAA on-duty dives from FY19 was due to the pandemic. Regardless, there was only a proportional 21-percent reduction in dives occurring from NOAA small boats. This further emphasizes the relationship between the two programs. Both programs continue to work together, participating in each other's workshops and meetings to promote the highest level of safety possible for NOAA personnel.

FY 2019–2020 Training Course Metrics

NOAA Small Boat Component Course

The NOAA Small Boat Component Course is a 1-day (8-hour) instructor-led classroom session. The course covers NOAA's small boat policies, risk assessment, and team coordination training. The following metrics list the number of courses completed and operators qualified for FY19 and FY20:

- FY19: Eighteen courses completed, which resulted in 148 qualified small boat operators
- FY20: Ten courses completed, which resulted in 106 qualified small boat operators

Annual Small Boat Evaluation Course

This course seeks to train students on effective evaluation of Class A, I, and II boats, using the Annual Small Boat Evaluation (ASBE) checklist standards. The class is a combination of lectures and hands-on evaluations of small boats. It is recommended for anyone who conducts or supervises ASBE courses. The course is a 4-day (32-hour) course, with a required early enrollment. The SBP inspection coordinator is the lead instructor with assistance from five assistant instructors. The following metrics list the number of courses completed and operators qualified for FY19 and FY20:

- FY19: One course taught, resulting in 12 personnel qualified to conduct ASBE inspections
- FY20: One course taught, resulting in 11 personnel qualified to conduct ASBE inspections

NOAA Component Instructor Train the Trainer Course

The NOAA Component Instructor Train the Trainer Course is a 2-day (16-hour) classroom "train the trainer" session with a hands-on environment that covers adult learning, teaching methods, classroom preparation, and PowerPoint presentation techniques. A total of five NOAA component senior instructors are currently qualified to teach the course. The following metrics list the number of courses completed and operators qualified for FY19 and FY20:

- FY19: Four courses that qualified 6 NOAA component instructors
- FY20: Four courses that qualified 6 NOAA component instructors

FY 2019–2020 Vessels Added and Excessed

Six vessels were added to the fleet in FY19 and nine in FY20. In FY19, two new rescue boats were procured for the NOAA Ships *Ronald H. Brown* and *Henry B. Bigelow* from OMAO. Two vessels were procured for the NMFS Southwest Fisheries Science Center in Santa Cruz, CA; a Class A and a Class I. Two 19-foot SAFE Boats were also added to the fleet in Honolulu, HI at the NMFS Pacific Islands Fisheries Science Center. In FY20, the Humpback Whale National Marine Sanctuary in Maui received three new kayaks and one Class A vessel. The OAR Great Lakes Environmental Research Lab procured a Class II and a Class III vessel. The NMFS Pacific Islands Fisheries Science Center and Southeast Fisheries Science Center both procured Class I vessels. The NOS West Coast Regional Office in Monterey, CA also procured a Class I small boat. Replacing aging or unrepairable platforms with new assets greatly increases the operational capacity and safety of the fleet.

The program excessed 26 vessels in FY19 and 3 in FY20. These vessels were either not in use or beyond repair. Twenty vessels were sold at General Services Administration auctions and the remaining were unseaworthy and recycled. As is the case with adding new vessels to the fleet, excessing unused and unsafe vessels further increases the safety of the fleet and reduces overall costs.

NOAA Ship *Rainier's* three hydropgraphic boats in Ugak Bay, Kodiak Island, Alaska. Photo Credit: Harper Umfress, ENS/NOAA

Small Boats Supporting Scientific Operations

Uncrewed Aerial Survey

A NOAA affiliate launches the APH-22 from a Pacific Islands Fisheries Science Center SAFE Boat. Photo: NOAA

NMFS Alaska Fisheries Science Center

Aerial drones are useful for looking at whale entanglement before a close approach by boat.

NMFS Pacific Islands Fisheries Science Center

The Hawaiian Monk Seal Research Program deployed and recovered the APH-22—a vertical takeoff and landing hexa-copter—platform from boats to survey marine mammals. The Cetacean Research Program tested uncrewed aerial surveys (UAS) for photogrammetry and population surveys of cetaceans.

Non-motorized Watercraft

NOAA personnel prepare for kayak operations. Photo: NOAA

NMFS Southeast Fisheries Science Center

Kayaks are an ideal platform for evaluating shallow coastal habitats that are too shallow for motorized vessels.

NMFS Pacific Islands Fisheries Science Center

Non-motorized watercrafts were used to access remote offshore islets for marine mammal and turtle surveys.

Team members from the West Coast Region use a paddle craft to perform site surveys in one of California's many river systems. Photo: NOAA

NMFS West Coast Regional Office

Santa Rosa office has been successful in using inflatable paddle crafts to survey remote locations during Endangered Species Act (ESA) consultations.

Autonomous Surface Vehicles/Autonomous Underwater Vehicles

An ASV is deployed for survey operations. Photo: NOAA

NOS Navigation Response Branch

The Navigation Response Branch (NRB) utilizes autonomous surface vehicles (ASV), autonomous underwater vehicles (AUV), and portable sonar equipment which can be deployed from vessels of opportunity. This suite of technologies serves as force multipliers, acquires data in areas that may be unsafe for crewed vessels, and allows for rapid response in remote locations not easily reached with the Navigation Response Team (NRT) boats (e.g. Caribbean and Pacific Islands).

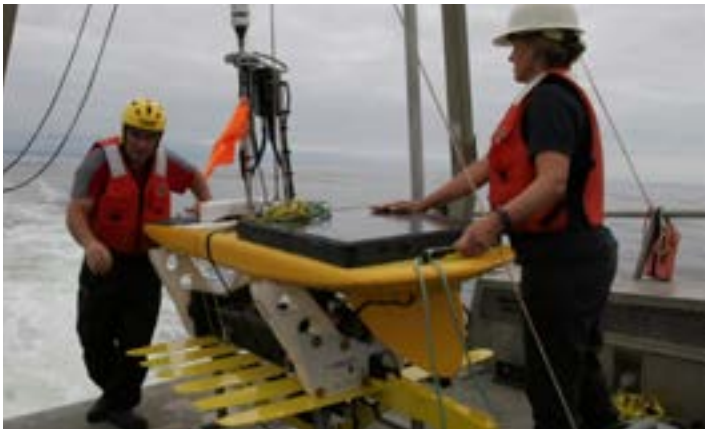
Technical Rebreather Dive

ONMS rebreather divers prepare to enter the water. Photo: NOAA

NOS Office of National Marine Sanctuaries, Pacific Islands Region

Boats support rebreather divers to conduct research dives to depths of 330 feet, lasting 3 hours. Technical diving operations require two vessels working in concert to support not only the rebreather divers but also a team of science support divers who monitor the deep divers during their long-staged decompression ascents. Support vessels require large deck space, high quality sounders, and skilled operators to deploy and recover these divers safely in open ocean conditions.

Gliders



A wave glider—an uncrewed system powered by wave and solar energy—is deployed at the Olympic Coast National Marine Sanctuary. Photo: NOAA

NOS Office of National Marine Sanctuaries, West Coast Region

Gliders are used for various reasons including detecting minute amounts of spilled oil and collecting meteorological and oceanographic data using a solar powered weather station

NMFS Southwest Fisheries Science Center

Gliders are deployed from small boats in the Antarctic for krill abundance surveys.

Small Portable buoys for measuring currents

A small boat aids in the deployment of a small portable buoy that collects data for current meter surveys. Photo: NOAA

NOS Center for Operational Oceanographic Products and Services Ocean System Test and Evaluation Program

Developing and implementing small portable buoy for measuring currents. The National Current Observation Program conducts current meter surveys that are used to recalculate tide and current predictions for given harbors or regions.

Physical Oceanographic Real-Time Systems

R1904 aids in the maintenance of the PORTS sensor. Photo: NOAA

NOS Center for Operational Oceanographic Products and Services

Developed, supports, and operates the Physical Oceanographic Real-Time Systems (PORTS) network of sensors. PORTS measures and disseminates observations for water levels, currents, waves, bridge air gap, water temperature, salinity, and meteorological parameters.

Field Unit Summaries

The following are summaries of NOAA field units and their small boat activities as reported during the NOAA Small Boat Summit in November 2019. As such, these highlights may not reflect the full scope of operations in FY20.

Great Lakes Environmental Research Laboratory

Lake Michigan Field Station, GLERL. Photo: NOAA

Lake Michigan Field Station

GLERL is in a unique position within the NOAA SBP. The majority of GLERL customers are not within the OAR. Approximately one-third of customers are OAR, one-third are NOS, and one-third are NOAA affiliates and non-NOAA entities. Vessel bases, such as the OAR Lake Michigan Field Station, are operational year-round.

R/V Laurentian. *Photo: NOAA*

R/V *Laurentian*

The R/V *Laurentian* is stationed at the NOAA Lake Michigan Field Station and serves as the primary platform of the NOAA Great Lakes fleet. It has operated for over 45 years and is a multi-mission research vessel capable of trawling, conducting remote sensing surveys, tending buoys, and obtaining speciments using vertical sampling methods. In 2019, *Laurentian* conducted physical observation surveys and long-term ecology research, and afterwards had a shipyard period.

Surplus to Service

GLERL prides itself on converting surplus vessels, including decommissioned U.S. Coast Guard buoy tenders, into operational scientific platforms. Nearly all maintenance is conducted in-house.

GLERL continues to fulfill vessel operations needed for NOAA and external entities in the Great Lakes Basin. In total, the 7-month field season supports over 500 days at sea. The Great Lakes provide drinking water for 38 million people, are home to sensitive cultural heritage sites, and are a vital strategic resource for the U.S. economy.

R5501. Photo: NOAA

R5501—R5501 is stationed at the NOAA Lake Michigan Field Station. R5501 is a prior Coast Guard aids-to-navigation vessel refitted to serve NOAA's needs on the Great Lakes. The vessel is uniquely suited to service NOAA's observation buoy and mooring systems in the Great Lakes. In 2019, R5501 conducted physical observation surveys and benthic habit research.

R5503. Photo: NOAA

R5503—R5503 is stationed at the NOAA Lake Michigan Field Station. The same make as R5501, R5503 is a prior Coast Guard aids-to-navigation vessel refitted to serve NOAA's needs on the Great Lakes. R5503 also services NOAA's observation buoy and mooring systems in the Great Lakes. The lab's 55-footers are unique in that they offer heavy lift capabilities on high-speed platforms. They are able to quickly transit to site to perform day operations and have the draft

to harbor in many Great Lakes marinas. In 2019, R5503 serviced coastal observation buoys, physical observation instrumentation moorings, and benthic habitat research.

R5002 R/V Storm. *Photo: NOAA*

R5002—R5002 (R/V *Storm*) is stationed in Alpena, MI and mostly serves the needs of the Thunder Bay National Marine Sanctuary. R5002 is a prior Coast Guard vessel that has been refitted to conduct a range of operations in the Great Lakes. R5002 is the primary dive platform for the sanctuary and services the sanctuary's network of shipwreck designation moorings. In 2019, *Storm* performed remote sensing surveys in an inter-organizational effort to map the shipping lanes in the sanctuary. *Storm* also serviced buoys and was the primary platform for a range of sinkhole studies.

R4108. Photo: NOAA

R4108—R4108 is stationed in La Salle, MI and mostly supports Lake Erie harmful algal bloom monitoring. R4108 is a prior Coast Guard vessel that has been refitted to conduct a range of operations in the Great Lakes. In 2019, R4018 supported harmful algal bloom monitoring, glider launch and retrieval, and coastal observation buoys maintenance.

NMFS Office of Law Enforcement

OLE boat patrols the waters of the Pacific Islands. Photo: NOAA

Office of Law Enforcement logo

OLE patrol boat F3402 on patrol in Florida Keys National Marine Sanctuary. Photo: NOAA

Diversity of Fleet—customized platforms for specific missions

Around the main Hawaiian Islands, 3503 is a 33-foot SAFE Boat that is utilized for marine mammal, endangered species, and fisheries regulatory patrols. The vessel is primarily kept at the NOAA Inouye Regional Center in Honolulu. It has been the primary patrol vessel for the annual humpback whale season patrol in Maui since 2009.

The Northeast Division has two 36-foot Metal Shark vessels for long range offshore patrols targeting commercial and recreational vessels fishing in the Atlantic Exclusive Economic Zone. These vessels are fully transportable and have been used in operations throughout the East Coast.

The Southeast Division has four rigid-hulled inflatable boats that were refurbished in 2016. These patrol vessels are primarily used for inland and nearshore Sanctuary, Turtle Excluder Device (TED), ESA, and Marine Mammal Protection Act (MMPA) patrols.

Thirty-six-foot Metal Sharks are utilized to conduct long-range offshore patrols targeting commercial fishing vessels and closed areas.

The West Coast Division has two 27-foot SAFE Boats that are utilized for ESA, MMPA, and fishery patrols along the West Coast. One is also used to conduct patrols along the U.S./Canadian border. West Coast Division also has two Class I vessels used to patrol nearshore and inland waters targeting illegal ESA salmon harvesters.

Three of Alaska Division's patrol vessels include the following: F3005 in Ketchikan, F3703 in Homer, and F2702 in Juneau. Alaska Division covers the largest area of responsibility and enforces international boundaries, commercial fishing, MMPA, and ESA regulations.

NMFS Southeast Fisheries Science Center

R/V Southern Journey. *Photo: NOAA*

R/V *Southern Journey*

The R/V *Southern Journey* is truly a success story; one that demonstrates how repurposed vessels can play an important role in supporting many of NOAA's mandates. This former U.S. Geological Survey (USGS) vessel spent its early career in the Great Lakes and was acquired by NOAA in 2014. After enhancements and repairs, the boat was put back into service supporting surveys and assessments in the Gulf of Mexico.

Personnel release a marine mammal from R/V Megamouth. *Photo taken under NOAA scientific permit. Photo: NOAA*

R/V *Megamouth*

Bottlenose dolphins are an important barometer to the overall condition of the marine environment. The R/V *Megamouth*, with its landing craft bow and overhead lifting capability, is a specialized platform used for conducting health assessments. These operations involve multiple boats and numerous personnel to help ensure the safety of the dolphins and personnel involved.

Scientists collect blood samples and conduct ultrasounds and ECGs to assess overall health of a leatherback turtle. Photo taken under NOAA scientific permit. Photo: NOAA

R/V *Julius*

Small boats are an essential platform for capturing leatherback sea turtles. The R/V *Julius* has a modified bow pulpit for this purpose. Once the turtle is aboard, researchers measure their bodies and collect blood samples, and conduct ultrasounds and other tests to assess their overall health. Before returning them to the water, a satellite tag is attached that will track their movement in the coming months.

TEDs are evaluated with divers using head started juvenile sea turtles. These tests are used to certify new or modified TEDs to ensure turtles are able to escape shrimp trawls within a predetermined time. The leatherback turtle shown in the image to the left just completed the trial and was then sent to the surface with the attached float. At the end of the study, the turtles are taken offshore and released into the wild.

NMFS Pacific Islands Fisheries Science Center

A team diver cuts and removes derelict nets that entangle a reef. Photo: NOAA

The debris team operates at Pearl and Hermes Reef in the Northwestern Hawaiian Islands. Photo: NOAA

Unique Aspects of Platforms

PIFSC has been engaged in the large-scale removal of hazardous marine debris in the Papahānaumokuākea Marine National Monument for over 20 years. The monument stretches approximately 2,000 nautical miles northwest of the main Hawaiian Islands. All of the islands, with the exception of Midway Atoll, are only accessible by ship.

Large conglomerates of derelict fishing gear, cargo nets, and lines wash into the shallow reefs and atolls which entangles the reef structures and destroys corals, posing a hazard to marine life. Therefore, PIFSC must utilize 5-meter inflatable boats to access the shallow reef areas. The shallow draft, high lateral stability and low freeboard of these inflatable boats make them ideal for recovering the conglomerates of debris and transporting them through the reef structure back to the ship. The relatively small footprint these boats take up on deck allows the ship to carry multiple boats to maximize the shiptime on site.

After SE-4 is launched from the Oscar Elton Sette*, the personnel collect bottomfish data with their fishers. Photo: NOAA*

Contributions to NOAA Priorities

The Fisheries Research and Monitoring Division conducts fishery-independent bottomfish sampling for life history and ecological research. The focus is on commercially important deep-water bottomfish in the Hawaiian Islands to better inform stock assessment models to promote sustainable fisheries management.

The Modular Optical Underwater Survey System (MOUSS) was developed as a sampling platform for the Bottomfish Fishery-Independent Survey. The MOUSS is used to collect fishery-independent species-specific size-structured abundance data on the commercial bottomfish fishery in the Hawaiian Islands. PIFSC has operationalized MOUSS deployment and recovery from 19-foot SAFE Boats using an electric pinch-puller. The high lateral stability and weight capacity make these boats ideal for deploying and recovering gear over the side. The system has also been successfully tested using local commercial bottomfish boats. Each element of the MOUSS can be assembled as the system is put in the water, then disassembled during recovery

Highlight Local Impacts

PIFSC conducts reef assessment surveys in the Hawaiian Archipelago and U.S. territories throughout the Pacific basin. They use 19-foot SAFE Boats as the primary platform for dive operations to survey reef areas and collect scientific information that supports an ecosystem approach to management and conservation of coral reefs. These data are pivotal to long-term biological and oceanographic monitoring of coral reef ecosystems in the Pacific Islands region.

The 19-foot SAFE Boats are uniquely designed to serve as the platform for various types of reef survey and monitoring. The boats have a large deck space and high load capacity for carrying the dive team and all equipment for a full day of surveying. The boats can be launched and recovered from NOAA ships, making them an ideal platform for surveying remote reef sites.

NMFS Northwest Fisheries Science Center

Team members load listening platforms to test for noise pollution. Photo: NOAA

Mortlake Southern Resident Killer Whale Program

Team members from Mortlake's Southern Resident Killer Whale Program (SRKW) load listening platforms to be deployed at designated sites throughout the San Juan Islands and Straights of Juan de Fuca. Research is targeting noise pollution borne from increased Liquefied Natural Gas tankers transiting waters inhabited by SRKW.

Training for the USGS and Washington Department of Fish and Wildlife takes place on the R/V Stickleback. *Photo: NOAA*

R/V *Stickleback*

The R/V *Stickleback* collaborating and training with small boats from USGS, Washington State Department of Fish and Wildlife, Suguamish, and Nisqually Tribal small boats. Tribal small boat operators demonstrated how to safely Lampara fish with two small boats, targeting juvenile salmonids.

While bottom trawling at a designated superfund site near Tacoma, WA, members from the Washington Department of Fish and Wildlife haul aboard an automobile fender while onboard NOAA R/V *Emmett*.

Research Station Point Adams in Hammond, OR monitors juvenile salmonid ecology through the lower Columbia River and estuary, utilizing a variety of trawling and seining methods. Projects include flexible Passive Integrated Transponder tag array, pair trawl matrix antenna array, and beach and wetland habitat seining.

NOS Office of Coast Survey

NRT response following Hurricane Sandy. Photo: NOAA

What are the Navigation Response Teams?

The NOAA Office of Coast Survey's Navigation Response Teams (NRTs) use 30-foot boats to improve navigation safety, speed economic recovery, and support homeland security. NRT boats are operated by a two- or three-person team of surveyors and are equiped with multibeam and side scan sonar technology to gather survey data. Each NRT is also equipped with technology for processing survey data and reporting results. NOAA has five NRTs stationed in New London, CT; Fernandina Beach, FL; two teams at Stennis Space Center, MS; and Seattle, WA. In addition, R/V *Bay Hydro II* is stationed in Solomons, MD. R/V *Bay Hydro II*

has greater endurance and seakeeping abilities than the NRT boats and shares many technological features of the larger hydrographic ships.

S3005 surveys out of Stennis, MS. Photo: NOAA

Emergency Response

NRTs are strategically placed to arrive at any coastal continental location within 24–48 hours in the event of an emergency. For example, surveying may be required following a hurricane to identify underwater debris and shoaling in order to protect incoming ships and property from submerged hazards.

NRT5 surveys the ruins of a former pier. Photo: NOAA

Nautical Chart Updates

Changes in the seafloor are constantly occurring due to storms, erosion, and development. This requires NOAA to regularly update its repository of more than 1000 nautical charts. NRTs conduct surveys in ports and harbors to ensure that charts reflect accurate depths, areas of obstructions, and dangers to navigation.

NRTs played a key role in the response to Hurricane Dorian. The NRT based at Stennis Space Center pre-staged a boat in Tallahassee, FL, and deployed it to Brunswick, GA, after the storm struck. The team completed surveying on September 9, 2019. NOAA's NRT homeported in Fernandina Beach, FL, pre-staged a boat in Miami in preparation for a possible more southerly storm impact. However, as Dorian tracked north with relatively minimal impact to southern Florida, they returned to their homeport area and surveyed St. Mary's River nearby. The mobile integrated survey team—led by NRT members who quickly mount, configure, and operate portable survey equipment on a vessel of opportunity or deploy autonomous vehicles—also pre-staged in Tallahassee. The team mobilized to South Carolina to survey the Little River Inlet. One of Coast Survey's hydrographic survey contractors, eTrac, surveyed Beaufort and Morehead City, NC, and the approaches to Wilmington.

Preliminary survey products identifying dangers to navigation were developed and delivered to the U.S. Coast Guard by NOAA NRTs to aid in decision-making in reopening ports.

NOS Office of National Marine Sanctuaries East

R2001 conducts beach cleanup in Lower Florida Keys. Photo: NOAA

Marine Debris Recovery

Two personnel from Florida Keys National Marine Sanctuary participated in the 2016 International Coastal Cleanup Day while operating the R2001. The event involved a cleanup of the Boca Chica Beach in Lower Florida Keys. The personnel from R2001 collected trash from isolated locations that volunteers had gathered at designated spots on this beach that is the shoreline of the Western Sambo Ecological Reserve.

R2002, staged in Key Largo, is used for research, damage assessments, and field support for shoreline cleanups when using kayaks. By utilizing the Carolina Skiff the goal is Clean Seas Florida Keys, the marine debris cleanup program run by the Florida Keys National Marine Sanctuary. The program removed over 10,000 lbs of trash from sanctuary waters in its first year.

Personnel from R1606 educate recreational boaters on safe whale watching guidelines. Photo: NOAA

Marine Mammal Protection

As shown on the image to the left, R1606 from R/V *Auk* approached a recreational boat on Stellwagen Bank in Massachusetts that was watching humpback whales while a whale watch vessel was in the background. Two NOAA personnel explained safe whale watching guidelines, educated recreational boaters, and answered any of their questions. Pamphlets were passed out with informative flyers and information about the sanctuary.

Researchers aboard R/V *Auk* recovered one of three "sound trap" acoustic buoys on Stellwagen Bank. The buoys listened for marine mammals, cod spawning, ship traffic, and other acoustics underwater. This research helps us compare large and small ship traffic to marine life and understand the effect of large ship traffic in the sanctuary.

R/V Manta *conducts ROV operations in FGB. Photo: NOAA*

Bottom Monitoring

The Flower Gardens Banks (FGB) National Marine Sanctuary partnered with remotely operated vehicle (ROV) operators at the University of North Carolina Wilmington and scientists from Florida Atlantic University to explore and characterize benthic communities at the sanctuary. Sanctuary divers collected samples for genotyping and analysis while the ROV was used to identify locations for a reciprocal transplant experiment. Surveys included the spatial characterization of the distribution, abundance, and size of both reef fishes and macro invertebrates within and around the waters of the sanctuary.

NOS Office of National Marine Sanctuaries, Pacific Islands Region

R/Vs Hihimanu *and* Kaku *support technical rebreather dive operations. Photo: NOAA*

Technical Rebreather Diving Operations

Dives of this nature require two vessels to be on the scene. The 36-foot R/V *Hihimanu* can support up to six fully-equipped technical rebreather divers. These divers carry all the equipment needed to conduct research dives to depths of 330 feet. The 19-foot SAFE Boats *Kaku* and *Hihimanu* serve as the case boats, supporting the Science Support Dive Team. Having two vessels on scene allows one to evacuate an injured diver while the other remains until the other divers can surface safely.

Reef Assessment and Monitoring

All vessels in ONMS-PIR support research diving activities to assess and monitor coral reef ecosystems. The vessels serve as the primary dive platforms, transporting all the necessary science equipment, safety gear, and support personnel (divemaster, deckhands, etc.) to the dive sites. ONMS-PIR coxswains operate across a large variety of environments and conditions.

Vessel Support for Coast Survey's Mobile Integrated Survey Team

Team members from MIST support coral nurseries. Photo: NOAA

Mobile Integrated Survey Team

Hihimanu and the Office of Coast Survey's Mobile Integrated Survey Team (MIST) spent the days before Hurricane Lane prepositioning assets and ensuring the vessel's compatibility for the survey equipment. Following the storm, the team was asked to survey Honolulu Harbor to provide bathymetric information to the Captain of the Port, USCG Sector Honolulu, Department of Transportation, and U.S. Army Corps of Engineers.

Coral Nursery Support

Hihimanu and *Manuma* provided vessel and dive support to coral nurseries in their regions. NOAA's Restoration Center is developing a new type of coral nursery that could help restore damaged reefs using fully formed coral colonies rather than small fragments.

NOS Office of National Marine Sanctuaries West

A diver who deployed from R/V Fulmar *monitors Big Sur in California. Photo: NOAA*

Research Dive Operations

R/V Fulmar—Monterey Bay National Marine Sanctuary divers and partners continued the nearshore characterization and monitoring effort of the Big Sur coast aboard the R/V *Fulmar*. The work of sanctuary scientific divers in this area has established the sanctuary as a leader in ecosystem-based management of resources along the Big Sur coast. Surveys of fishes, invertebrates, and algae provided species richness data that complement those collected by the University of California Santa Cruz's Partnership for Interdisciplinary Studies of Coastal Oceans and allow comparisons among subtidal sites along the coast.

R/V Tatoosh *supports dive operations. Photo: NOAA*

R/V Tatoosh—On board R/V *Tatoosh*, divers take part in subtidal dives. Exceptional habitats and fish populations go hand-in-hand with the coast's extreme conditions. The coast has rocky reefs and kelp forests for diving among rockfish, sea urchins, and the giant Pacific octopus.

Acoustic Buoys & Gliders

With the growth in vessel traffic during the last 50 years, the level of ocean noise pollution has also increased. Commercial shipping traffic, fishing vessels, research ships, and military activities all contribute to degradation of the natural ocean soundscape. The Olympic Coast National Marine Sanctuary lies at the western entrance to the Strait of Juan de Fuca—a marine transit route for large vessels heading to and from busy commercial ports in Puget Sound and Vancouver, Canada.

Gliders are used for various reasons including detecting minute amounts of spilled oil and collecting meteorological and oceanographic data via the solar powered weather station.

R/V Shearwater *crew participate in whale entanglement response from an inflatable boat. Photo: NOAA*

Resource and Marine Mammal Protection

R/V Shearwater—R/V *Shearwater* partnered with participants from NOAA's Large Whale Entanglement Response Network, Channel Islands Marine Wildlife Institute, Island Packers, Condor Express, Vessel Assist, and K2 Uncrewed Drone Company for large whale entanglement response training conducted offshore of Santa Barbara, CA.

R4107 crew assists in the removal of derelict fishing gear. Photo: NOAA

R4107—Monterey Bay National Marine Sanctuary conducted patrols aboard the R4107 to inspect the shoreline for illegal construction below mean high tide in the sanctuary. In May 2012, the R4107 was deployed to Santa Cruz to monitor human activity around a humpback whale that was swimming unusually close to shore. The R4107 was also called upon to search for a whale that was reported to be entangled in fishing gear

The team successfully retrieved a 75- by 25-foot gillnet and a variety of crab pots and traps. They also located a 100-foot longline and a Navy cable dump area. Biologists collected and catalogued specimens from the recovered gear and a Cal State Monterey Bay graduate student determined the density of the monofilament fishing line for her thesis. This 3-year project reflects the importance partnerships with other agencies on completing sanctuary-led projects.

NOS National Centers for Coastal Ocean Science

55-foot R/V Chesapeake *operates on inland and near coastal waters of the Mid-Atlantic. Photo: Jay Lewis/NOAA*

Unique Aspects of Platforms

NOS National Centers for Coastal Ocean Science (NCCOS) serves as the focal point for NOAA's coastal ocean science efforts. It helps NOAA meet its coastal stewardship and management responsibilities and provide coastal managers with scientific information necessary to protect environmental resources and public health, preserve valued habitats, and improve the way communities interact with coastal ecosystems.

NCCOS' four laboratories (Beaufort, NC; Charleston, SC; Kasitsna Bay, AK; and Oxford, MD) operate vessels ranging in size from 15 to 55 feet. These platforms provide the capability to conduct general inshore and nearshore marine research, diving operations, buoy deployment and recovery, marine mammals work, scientific gear deployment, ecosystem assessments, ROV deployment, and fisheries acoustics on inland and near coastal waters of the United States.

R/V Chesapeake *deploys a CBIBS buoy. Photo by Gary Culver, MD DNR*

Contributions to NOAA Priorities

Chesapeake Bay Interpretive Buoy System—The NCCOS Cooperative Oxford Laboratory partners with NOAA's Chesapeake Bay Office to provide a vessel platform for deployment, recovery, and maintenance of some Chesapeake Bay Interpretive Buoy System (CBIBS) buoys. Real-time weather and environmental information (wind speed, air and water temperature, currents, wave height, and more) can be obtained from any buoy location at https://buoybay.noaa.gov/.

NOAA researchers conduct a photo-identification survey of bottlenose dolphins. Photo taken under NOAA scientific permit. Photo: NOAA

Marine Mammal Research—NCCOS Charleston partners with NMFS and the National Marine Mammal Foundation in support of marine mammal research. NCCOS and NMFS small boats are used as research platforms for population surveys and health assessments.

In addition, Charleston small boats are used to assess the status of ecological condition and potential stressor impacts. Sampling consists of multiple indicators of general habitat characteristics, potential stressors, and biological condition. NCCOS Charleston partners with Guana Tolomato Matanzas National Estuarine Research Reserve (NERR) to further these priorities. Charleston also partners with NOAA's Status and Trends Mussel Watch Program conducting regional pilot studies to assess the magnitude and distribution of contaminants of emerging concern in shellfish and sediment from different coastal zones.

NOAA personnel deploy a drop camera to collect imagery of near-bottom habitats. Photo by Kris Holderied/NOAA.

Drop Camera Imagery—Researchers from NCCOS Kasitsna Bay and Beaufort Laboratories use drop cameras to collect imagery of near-bottom habitats, which is combined with sonar mapping information to develop benthic habitat maps. Imagery and maps are provided online to resource managers and local community members through the NCCOS Kachemak Bay, AK BioMapper tool. The BioMapper portal contains a comprehensive collection of data that provides a contemporary evaluation on the abundance and distribution of marine benthic habitats in Kachemak Bay. The results of these efforts provide resource managers, scientists, and the public increased understanding and technical capacity for ocean exploration, management and stewardship. (https://maps.coastalscience.noaa.gov/biomapper/biomapper.html?id)

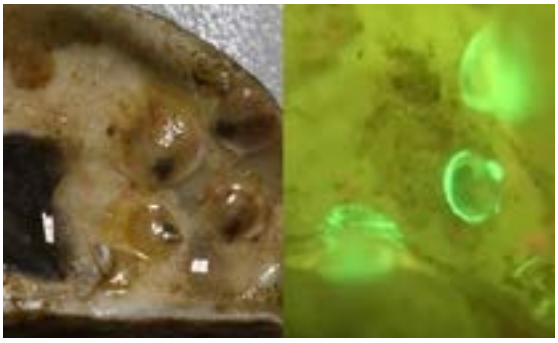
NOAA personnel deploy a CTD—an instrument that measures the water's conductivity, temperature, and depth—In Kachemak Bay, AK, as a humpback whale surfaces. Photo: Domonic Hondolero/NOAA

Highlight Local Impacts

NCCOS Beaufort uses small boats to evaluate the efficacy of island restoration and enhancement for coastal protection. Marsh islands are disappearing due to the cumulative effects of shoreline erosion, subsidence, inadequate sediment supply, and sea level rise. While providing critical habitat for estuarine organisms, many of these islands are valued for their role in shielding adjacent developed shorelines from waves; their loss leaves the developed shorelines more vulnerable to flooding and erosion. NCCOS scientists; partnering with researchers from the U.S. Fish and Wildlife Service, Maryland Department of Natural Resources, and the U.S. Army Corps of Engineers; are using dredged sediments to restore the islands to their native condition. The team is specifically assessing the impacts of restoration on nearshore benthic communities (oysters and seagrasses), intertidal marsh habitat, and long-term resilience of islands to erosion and sea level rise.

NCCOS Kasitsna Bay Lab conducts regular environmental monitoring as part of NCCOS's mission to understand how changing oceanographic conditions are affecting local communities and the marine resources that they rely on.

Maryland Department of Natural Resources scientists conduct an annual Winter Trawl Survey onboard the NCCOS R/V *Chesapeake* to gather population data for yellow perch, white perch and channel and white catfishes. Data gathered is used to determine recruitment, mortality, general status of individual species populations (such as age structure), and length/weight relations. Yellow perch data is also used in a statistical model to set an annual Maryland commercial harvest quota for the species.



Spat are attached to an oyster shell (left). Green calcein-labeled spat are attached to an oyster shell (right). Photo: Jason Spires/NOAA

Emerging Technologies

The NCCOS Cooperative Oxford Lab leads investigations to support coastal shellfish managers, planners, and the aquaculture industry with innovative science. Using the lab's vessels and divers, an oyster direct setting project is testing alternative methodology to the primary spat-on-shell oyster production currently used in oyster restoration and aquaculture. If deemed a viable alternative, direct setting (releasing oyster larvae directly onto substrate in-situ) could reduce substantial bottlenecks associated with the acquisition of shell material and the accompanying costs of spat-on-shell production.

To overcome the challenge of verifying spat (juvenile oysters) origins, NCCOS scientists are using novel oyster tagging tools recently developed at the Cooperative Oxford Lab to confirm recovered individuals are from project larval stock. Late stage oyster larvae are marked by placing them in a calcein bath (green fluorescent dye) prior to release. This calcein dye "tag" glows under special light, and can persist for several months as the larvae settle and grow into juvenile oysters.

OMAO

A lead fisherman is leading by example as coxswain of a 16-foot Northwind rigid-hull inflatable boat (RHIB) which was deployed from NOAA Ship Oscar Elton Sette. *At the time,* Oscar Elton Sette *was operating in the Pacific Islands. Photo: NOAA*

OMAO operates 60 small boats in the Atlantic, Pacific, Pacific Islands, and Gulf Coast regions. OMAO small boats predominately support the research fleet but some also support operations at training centers and marine centers. Every NOAA ship is required to carry a USCG-approved rescue boat that meets SOLAS requirements.

Many NOAA ships carry more small boats than just their rescue boat. These are to meet program or mission requirements beyond the standard operation of the ship. They are also used for personnel and equipment transfers instead of bringing the ship into port, although marine center small boats may also be tapped to meet this need. The three main mission areas that small boats support are hydrographic survey, logistics, and diving.

While underway, NOAA Ship Oregon II *launched their 17-foot rescue boat during a man overboard drill. Photo: Nick Jeremiah/NOAA*

Looking Ahead

The Small Boat Safety Board and Small Boat Program Office continue to strive for excellence and carry out our mission "To support NOAA's mission of science, service and stewardship through safe, efficient, effective, and professional small boat operations."

The SBP is working on the development and release of the next version of the Small Boat Standards and Procedures Manual. Version 4.2 of the manual will include a variety of updates that address new policies, modifications to existing policies, and new requirements which will improve safety across the NOAA small boat community. A few highlights include the NOAA Blood Borne Pathogen Exposure Control Plan, lithium battery safety procedures, and fixed fire system closures.

The Vessel Operations Program and Vessel Inventory Management program are undergoing continual improvement. A mobile version of VOP has been released that greatly streamlines the process of filing and managing float plans and allows access on the waterfront, greatly improving efficiency of operations and accuracy of small boat metrics. New modules to VIM are in development. The maintenance module, training module, and inspection module will further increase Vessel Operations Coordinators' ability to oversee and manage the safety and readiness of the small boat resources under their purview.

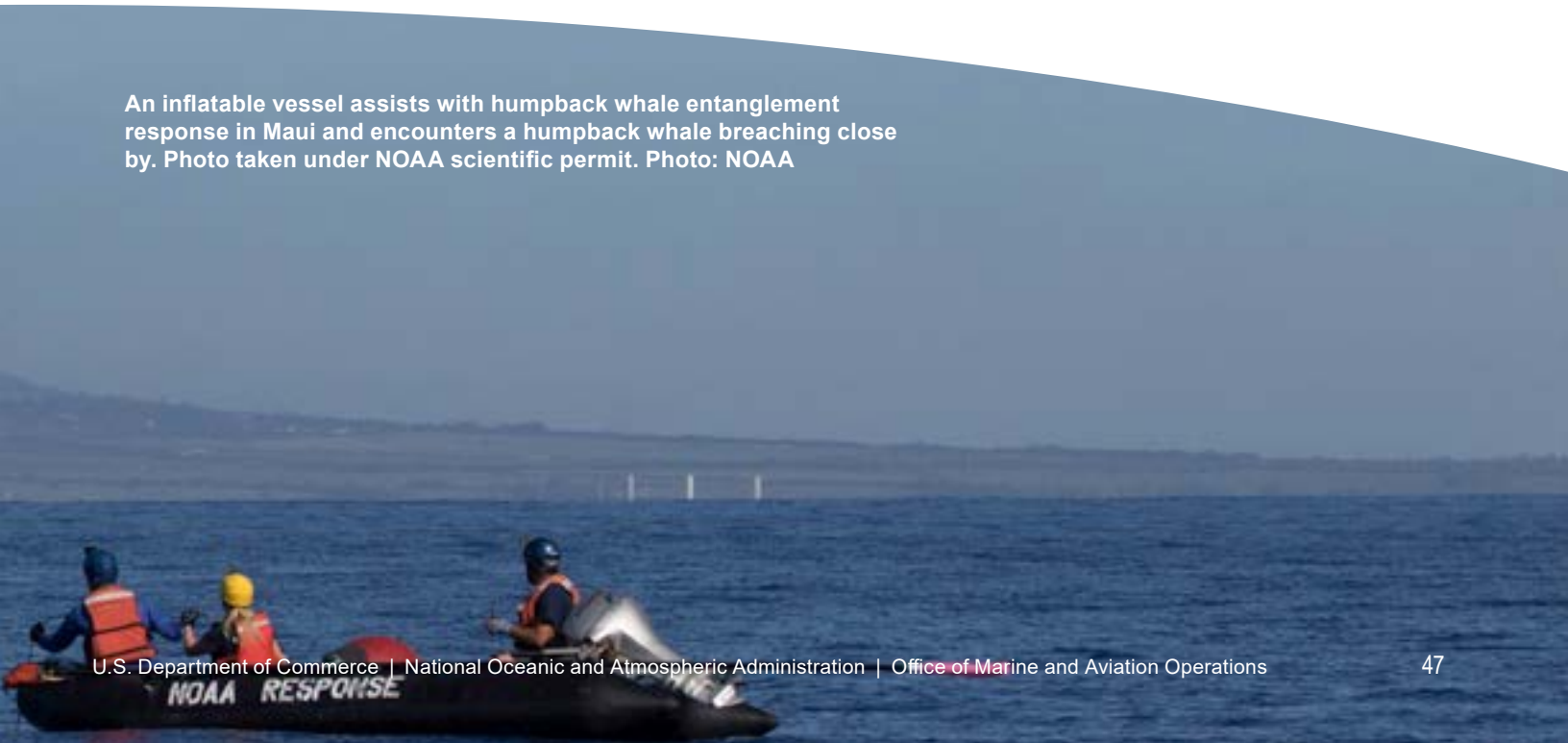
The SBP has worked closely with the development of the NOAASafe Incident Reporting Portal for incident and near miss reporting. This new system will allow personnel on the waterfront to more easily report incidents and near misses. The increase of reporting anticipated with this new system will help the SBP to further refine our procedures to best meet the needs of the small boat fleet and improve upon an already outstanding safety record.

Two OMAO small boats support NOAA dive operations in the Pacific. Photo: James Morioka/NOAA

Acronyms

AOML	Atlantic Oceanographic and Meteorological Laboratory
ASBE	Annual Small Boat Examination
ASV	Autonomous Surface Vehicles
ATON	Aid to Navigation
AUV	Autonomous Underwater Vehicles
BBP	Bloodborne Pathogens
CBIBS	Chesapeake Bay Interpretive Buoy System
CO-OPS	Center for Operational Oceanographic Products and Services
DOI	Department of Interior
ENC	Electronic Navigation Charts
FKNMS	Florida Keys National Marine Sanctuary
FWRI	Florida Fish and Wildlife Research Institute
FY	Fiscal Year
GAR	Green-Amber-Red
GLERL	Great Lakes Environmental Research Laboratory
LNG	Liquified Natural Gas
LOSBO	Line Office Small Boat Officer
MIST	Mobile Integrated Survey Team
MOCC	Motorboat Operator Certification Course
MOU	Memorandum of Understanding
NAO	NOAA Administrative Order
NCOP	National Current Observation Program
NDBC	National Data Buoy Center
NDC	NOAA Diving Center
NDCSB	NOAA Diving Control & Safety Board
NMC	Office of Air and Marine, National Marine Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
NOS	National Ocean Service
NRB	Navigation Response Branch
NRT	Navigation Response Team

NWS	National Weather Service
OAR	Oceanic and Atmospheric Research
OCS	Office of Coast Survey
OLE	Office of Law Enforcement
OMAO	Office of Marine and Aviation Operations
ONMS	Office of National Marine Sanctuaries
ORM	Operational Risk Assessment
OSTEP	Ocean System Test and Evaluation Program
PISCO	Partnership for Interdisciplinary Studies of Coastal Oceans
PMEL	Pacific Marine Environmental Laboratory
PORTS	Physical Oceanographic Real Time System
RHIB	Rigid Hull Inflatable Boat
ROV	Remotely Operated Vehicle
RV	Research Vessel
SBEX	Small Boat Examination
SBP	Small Boat Program
SBSB	Small Boat Safety Board
SBSPM	Small Boat Standards and Procedures Manual
SECO	Safety and Environmental Compliance Office
SOPEP	Shipboard Oil Pollution Emergency Plan
SRKW	Southern Resident Killer Whale Program
SRV	Small Research Vessel
TED	Turtle Excluder Device
USCG	United States Coast Guard
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey
VIM	Vessel Inventory Management
VOC	Vessel Operations Coordinator
VOP	Vessel Operations Program
VPC	Vessel Program Coordinator
WDFW	Washington State Dept. of Fish and Wildlife



An inflatable vessel assists with humpback whale entanglement response in Maui and encounters a humpback whale breaching close by. Photo taken under NOAA scientific permit. Photo: NOAA

Photos From the Field

Photos from top to bottom:

R/V *S.P. Hayes* supports OAR Pacific Marine Environmental Laboratory operations. Photo: NOAA

Tim Gallaudet, rear admiral, U.S. Navy (Ret.) Assistant Secretary of Commerce for Oceans and Atmosphere / Deputy NOAA Administrator, with R/V *Laurentian* crew in the Great Lakes. Photo: NOAA

R2801 scientists deploy sound traps in the Channel Islands of California NMS. Photo: Zac Montgomery/NOAA

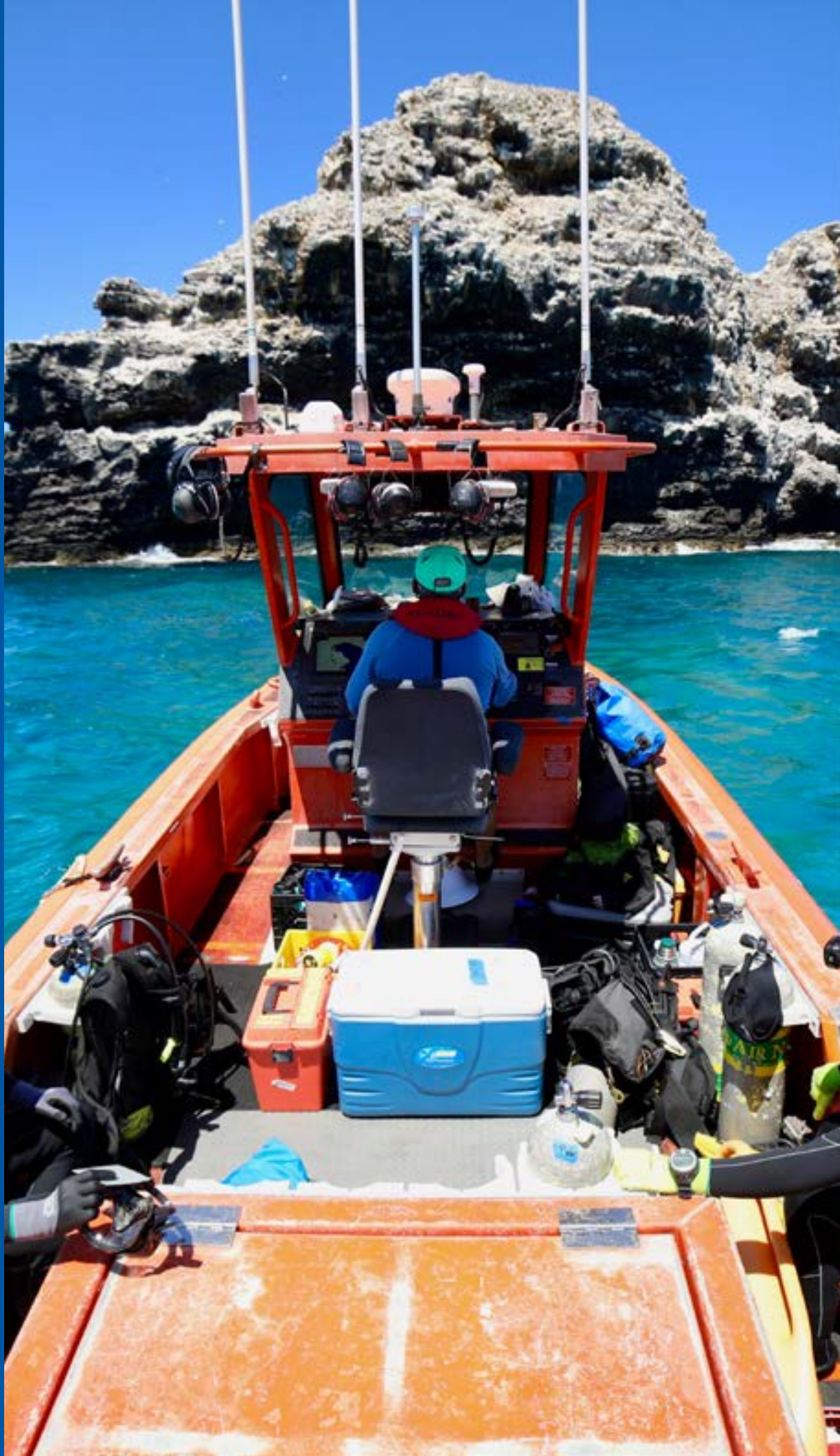
Trawling operation takes place in Columbia River. Photo: NOAA

Photos from top to bottom:

R/V *S.P. Hayes* prepares for equipment deployment in Hood Canal, WA. Photo: NOAA

R/V *Manta* is underway in the Flower Garden Banks National Marine Sanctuary. Photo: NOAA

Small boats operating off the coast of Kauai Island in Hawaii. Photo: Ari Halperin/NOAA



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OFFICIAL BUSINESS