



NOAA Fleet Update

September 2016

The following update provides the status of NOAA's fleet of ships and aircraft, which play a critical role in the collection of oceanographic, atmospheric, hydrographic, and fisheries data. NOAA's current fleet of 16 ships – the largest civilian research and survey fleet in the world – and nine aircraft, are operated, managed, and maintained by NOAA's Office of Marine and Aviation Operations ([OMAO](#)). OMAO includes civilians, mariners, and officers of the United States NOAA Commissioned Officer Corps ([NOAA Corps](#)), one of the nation's seven Uniformed Services.



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OMAO and the NOAA Corps – In the News

[How Soviet and American hurricane fliers set aside Cold War politics for science](#)

-Washington Post

On a September night in 1988, Hurricane Gilbert rampaged across Jamaica as a Category-5 storm headed toward Mexico and possibly the United States. Bob Sheets, director of the National Hurricane Center at the time, recalls in an email that he had gone home to catch a little sleep and returned early the next morning,...

[Researchers monitor reefs](#)

-The Garden Island

Most of the coral around Hawaii hasn't changed dramatically, according to initial reports from researchers aboard the National Oceanic and Atmospheric Administration's Ship, *Hi'ialakai*. "We haven't been to every single corner of all the islands, but at the sites we've been to, I haven't seen any evidence of widespread coral mortality," said Bernardo Vargas-Angel current Chief Scientist aboard the vessel. The last time the NOAA Ship conducted research in the area was in 2013. *Hi'ialakai* has already made it to most of Kauai, though Vargas-Angel said researchers missed the North Shore because of the presence and timing of Tropical Storm Darby.

[NOAA's Ark returns to Newport after extensive research voyage](#)

-Newport Daily News

NEWPORT — Research scientists recently had the first confirmed sighting of a True's beaked whale that was combined with a verified recording of the whale's sounds. "The whales are very far offshore and can spend one to three hours below the surface without coming up," said Debra Palka, a research biologist with the Northeast Fisheries Science Center in Woods Hole, Mass. "The whales are not seen very often...."

[NOAA surveyors in Dutch Harbor for chart updates](#)

-WorkBoat

A two-for-one National Oceanic and Atmospheric Administration survey mission in Alaskan waters has small boats surveying approaches to the port of Dutch Harbor to update new charts for shipping safety. The 231'x42'x15'6" NOAA Ship *Fairweather* departed Dutch Harbor Aug. 9 for its FISHPAC offshore acoustic survey mission, running sonar along some 4,000 nautical miles. In addition to mapping fish habitat, the sonar will contribute soundings data to NOAA's Institute of Coast Survey for new charts – a pressing need in the high latitudes where some areas have not been surveyed in many decades...

[NOAA updates Unalaska Bay charts](#)

-Bristol Bay Times

The seafloor of Unalaska Bay is being mapped for the first time since 1935, and the technology's more thorough now, using electronic devices instead of a couple of people in a rowboat dropping a weighted rope to the bottom a hundred feet apart. The National Oceanographic and Atmospheric Administration is conducting the hydrographic survey, using four 28-foot-long aluminum boats to map 38 square underwater miles, according to NOAA Lt. Bart Buesseler...

[Project to measure water depth will boost smoother sailing on the Hudson River](#)

-Times Herald-Record

[Capt. Scott] Ireland kicked off a campaign last year calling for some critical portions of the Hudson to be "sounded" and for the navigational charts to be changed to include more data. His campaign soon received support from a dozen industry, recreational and environmental organizations. In response to Ireland's request, NOAA surveyed a dozen critical areas outside the channel, including the Rondout Creek all the way north past the Kingston Rhinecliff Bridge. This summer, NOAA went further and set a course to survey the entire Hudson. The project began in Troy and will continue past the Tappan Zee Bridge through the end of 2017...

[NOAA's King Air 350CER Photographs Louisiana Flood Destruction](#)

-King Air Nation

The National Oceanic and Atmospheric Administration (NOAA) conducted the National Geodetic Survey (NGS) this month to collect damage assessment imagery in the aftermath of the severe storms that caused massive flooding in Louisiana. The imagery was collected in specific areas identified by FEMA and the National Weather Service including Abbeville, Port Vincent and Denham Springs, Louisiana. A team of NOAA aviators captured the images using specialized remote-sensing cameras aboard NOAA's King Air aircraft (350CER) flying above the area at an altitude between 2000-3000 feet...

[Progress for monk seal population, nesting green sea turtles down](#)

-KITV

One of the highlights on President Obama's agenda on his upcoming visit is stopping at Midway Atoll Thursday. The decision comes on the heels of his announcement to expand the Papahānaumokuākea National Monument. NOAA researchers just returned from a four month long mission to the region, monitoring Hawaiian monk seals and Green Sea Turtles. For decades, the math has been bad for young monk seals in the Northwestern Hawaiian Islands. For every five born, only one makes it to adulthood. That's no way to build a population. But now things are looking up....A big part of the mission is releasing seals that were previously rescued and nursed back to health at marine mammal center, Ke Kai Ola in Kona. This time around, researchers took four seals back with them aboard NOAA Ship *Oscar Elton Sette*...



Louisiana Flooding



NOAA King Air Responds to flooding in Louisiana

NOAA collected and delivered aerial imagery to assist federal, state, and coastal managers in assessing damage from flooding in Louisiana. NOAA King Air aircraft flew four flights for 19.3 hours on August 14, 15, 16, and 18 in response to the Louisiana flooding. The aircraft flying at 2,000-3,000 feet (lower than usual due to cloud cover) collected 5,855 images and surveyed more than 1,635 square miles. Aerial imagery is a crucial tool to determine the extent of the damage inflicted by flooding, and to compare baseline coastal areas to assess damages to ports and waterways, coastlines, infrastructure, and communities. These surveys identified over 100,000 homes as impacted to the flooding. The imagery was collected using a combination of nadir (straight down) and oblique (angled/side view) imagery, which gives the widest swath and allows the area to be covered as quickly as possible. Within four hours of collection, data was made available to the public through [NOAA's website](#). The King Air responded both to FEMA and National Weather Service tasking, and on the final day of work, imagery verified that water was receding.

NOAA's aerial imagery aids safe navigation and captures damage to coastal areas caused by a storm. Aerial imagery is a crucial tool to determine the extent of the damage inflicted by flooding, and to compare baseline coastal areas to assess the damage to major ports and waterways, coastlines, critical infrastructure, and coastal communities.



Imagery of Port Vincent, Louisiana after flooding as collected from NOAA's King Air and processed by the National Geodetic Survey.

[Photo: NOAA]



OMAO's Ships and Centers



OMAO's [Ship Tracker](#) (screen shot below) shows information about the location - present and past - of our fleet of research and survey ships. Please note: To access Ship Tracker you must create an account with a **.gov** or **.mil** email address. All other access is restricted.



OMAO's ships and related Marine Centers are listed below based on the geographical location of the vessels' homeports starting in the Northeast and ending in the Pacific.

New Castle, NH

NOAA Ship *Ferdinand R. Hassler*

Commanding Officer: LCDR Matthew Jaskoski
Primary Mission Category: Hydrographic Surveys
DEPART: Charleston, South Carolina **ARRIVE:** Charleston, South Carolina
DEPART: Charleston, South Carolina **ARRIVE:** Norfolk, VA

Project: Approaches to Wilmington

Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

Newport, RI

NOAA Ship *Henry B. Bigelow*

Commanding Officer: CDR Jeff Taylor
Primary Mission Category: Fisheries Research
DEPART: Newport, RI **ARRIVE:** Newport, Rhode Island
DEPART: Newport, RI **ARRIVE:** Newport, Rhode Island

Project: Autumn Bottom Trawl and Acoustic Survey

Objectives: Determine the autumn distribution and relative abundance of fish and invertebrate species found on the continental shelf and upper slope, including the collection of additional biological information following the pre-established sampling plan at the direction of the Chief Scientist. Opportunistically evaluate survey gear efficiency, methods, or survey related equipment that may benefit the trawl survey and fish stock assessments. Collect oceanographic data including conductivity, temperature, and depth casts and bongo tows at selected stations. Opportunistically collect acoustic data along cruise tracks with the EK-60 and ME-70 acoustic systems.



U.S. Senator Jack Reed (center) joins NOAA Ship *Henry B. Bigelow* Commanding Officer Lt. Cmdr. Jeffrey Taylor (right) and Naval Station Newport Commanding Officer Capt. Dennis Boyer on the *Bigelow's* bridge on Aug. 26, 2016.

Photo: [David Hall/NOAA]

Davisville, RI

NOAA Ship *Okeanos Explorer*

Commanding Officer: CAPT Mark Wetzler
Primary Mission Category: Oceanographic Exploration and Research
Depart: Kwajalein, Marshall Islands **Arrive:** Pearl Harbor, Hawaii

Project: CAPSTONE

Objectives: CAPSTONE is a three year initiative to collect critical baseline NOAA science and management needs in largely unknown areas of U.S. waters in the Pacific. Operations conducted during this campaign support NOAA missions to understand and predict changes in climate, weather, oceans and coasts, and share that knowledge and information with others. Much of this work associated with CAPSTONE will contribute to and complement Deep Sea Coral Research and Technology Program's three-year Pacific Islands Regional Initiative.

Norfolk, VA

NOAA Ship *Thomas Jefferson*

Commanding Officer: CDR Christiaan van Westendorp
Primary Mission Category: Hydrographic Surveys

Ship Status: Alongside U.S. Coast Guard Yard Curtis Bay - Baltimore, Maryland, for scheduled maintenance, repairs, scientific data processing, crew rest, and training.

OMAO'S MARINE OPERATIONS CENTER – ATLANTIC (MOC-A)

CAPT Scott Sirois, Commanding Officer MOC-A

MOC-A serves as a homeport for one NOAA ship, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Atlantic fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

Charleston, SC

NOAA Ship *Nancy Foster*

Commanding Officer:	Master Donn Pratt
Primary Mission Category:	Oceanographic Research, Environmental Assessment
Depart: Charleston, South Carolina	Arrive: Jacksonville, Florida
Depart: Jacksonville, Florida	Arrive: Charleston, South Carolina

Project: Habitat Mapping Southeast

Objectives: The National Centers for Coastal Ocean Sciences will continue its mission to conduct ecological characterizations of hardbottom and rocky reef essential fish habitats in the Southeast U.S. Atlantic waters to guide ecosystem management and ocean planning. The purpose of the cruise will be to collect multibeam and fishery echosounder data and diver visual observations to describe the distribution of benthic habitats and biological hotspots, particularly around ocean dredge material disposal sites and natural hardbottom/rocky reefs.



NOAA Ship *Nancy Foster* alongside, Charleston, South Carolina.

[Photo: ENS Hanson/NOAA]

NOAA Ship *Ronald H. Brown*

Commanding Officer:	CAPT Robert Kamphaus
Primary Mission Category:	Oceanographic Research, Environmental Assessment

Ship Status: At dry dock in Vallejo, California for scheduled maintenance, repairs, scientific data processing, crew rest, and training.

Pascagoula, MS

NOAA Ship Pisces

Commanding Officer: CDR William Mowitt
Primary Mission Category: Fisheries Research
DEPART: Newport, Rhode Island **ARRIVE:** Newport, Rhode Island
DEPART: Newport, Rhode Island **ARRIVE:** Newport, Rhode Island

Project 1: Deep Sea Corals

Objectives: Survey suspected deep-sea coral habitats associated with deepwater canyons off the coast of North Carolina, a team of scientists will conduct a program having the following objectives; survey canyon area and inter-canyon slope habitats using the AUV Sentry; with concurrent sampling of environmental factors (i.e. depth, salinity, turbidity and hydrography) to characterize benthic habitats and identify areas of coral presence; conduct multi-beam mapping in areas where data are missing or incomplete; and assess geological features and characterize canyon morphology

Project 2: Benthic Habitat

Objectives: Characterize offshore benthic habitats that fall within Bureau of Ocean Energy Management (BOEM) designated New Jersey Wind Energy Areas (WEA). Collect high-resolution multi-beam mapping data of areas of high priority, including areas of known or suspected value as habitats of managed species. Perform sampling at close spatial intervals for sediment characteristics (grabs) and epifauna, including demersal fishes at benthic stations within the WEA.

NOAA Ship Oregon II

Commanding Officer: Master Dave Nelson
Primary Mission Category: Fisheries Research
DEPART: Pascagoula, Mississippi **ARRIVE:** Galveston, Texas
DEPART: Galveston, Texas **ARRIVE:** Pascagoula, Mississippi

Project: Shark Redsnapper Longline

Objectives: Sample the U.S. Atlantic and northern Gulf of Mexico for data concerning the distribution and abundance of shark and red snapper populations to aid in stock assessments. Collect morphological measurements and biological samples to facilitate life history studies. Conduct conductivity, temperature and depth casts to profile water column temperature, salinity, transmissivity, dissolved oxygen concentrations and fluorometry.

NOAA Ship Gordon Gunter

Commanding Officer: LCDR Lindsay Kurelja
Primary Mission Category: Fisheries Research
DEPART: Pascagoula, Mississippi **ARRIVE:** Pascagoula, Mississippi

Project: Fall Plankton Survey

Objectives: Sample the northern Gulf of Mexico (GOM) with 90 ft high-opening fish trawl to determine the abundance and distribution of benthopelagic fauna species. Sampling will begin in the western GOM and will work eastward. Oceanographic data will also be collected at stations across the GOM.



NOAA Ship *Gordon Gunter* underway during the Southeast Marine Mammal Project.

[Photo: ENS Thompson/NOAA]

San Diego, CA

NOAA Ship *Reuben Lasker*

Commanding Officer:

CDR Kurt Dreflak

Primary Mission Category:

Fisheries Research

DEPART: San Diego, California

ARRIVE: San Diego, California

DEPART: San Diego, California

ARRIVE: San Diego, California

Project: Summer California Current Ecosystem Survey

Objectives: Assess the biomasses, distributions, and biological compositions of sardine, anchovy, hake, and other Coastal Pelagic Species (CPS) populations in U.S. and Canadian waters off the Pacific coast. The primary goal of the survey is to estimate the biomasses, distributions, and biological compositions of populations of CPS and hake using data from an integrated acoustic and trawl survey. Also, a small portion of the survey will be devoted to testing and evaluation of acoustic and optical instrumentation, and a remotely operated vehicle.

Newport, OR

NOAA Ship *Rainier*

Commanding Officer:

CAPT E.J. van den Ameele

Primary Mission Category:

Hydrographic Surveys

DEPART: Dutch Harbor, Alaska

ARRIVE: Kodiak, Alaska

Project: Arctic Alaska

Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

NOAA Ship *Bell M. Shimada*

Commanding Officer:

CDR Paul Kunicki

Primary Mission Category:

Fisheries Research

DEPART: San Diego, California

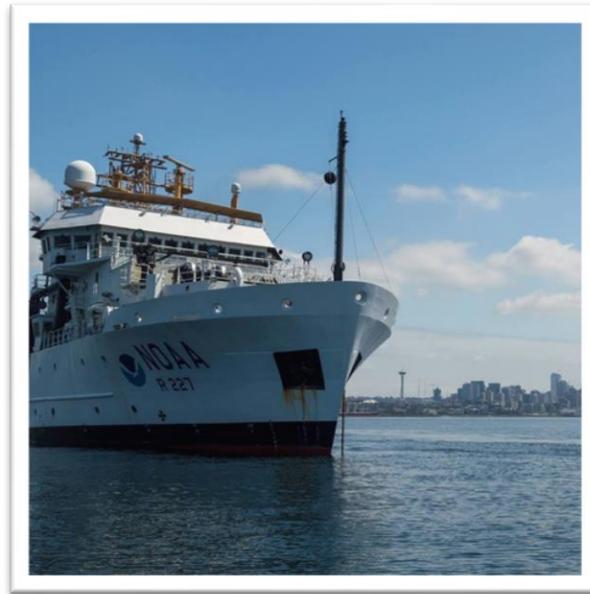
ARRIVE: San Diego, California

DEPART: San Diego, California

ARRIVE: San Diego, California

Project 1: ESA-listed Cetacean Survey: Passive Acoustic Survey of Cetacean Abundance Levels

Objectives: The primary objective of this project is to estimate density of beaked whales and other acoustically surveyable species (e.g., sperm whales *Physeter macrocephalus*, and pygmy and dwarf sperm whales (genus *Kogia*)) throughout the California Current ecosystem using new survey technology and increased acoustic sampling effort compared to past large-scale transect surveys (which have been more visually focused). PASCAL is expected to provide far more acoustic detections than during previous large-scale cetacean assessment surveys, thus providing improved estimates of density (and in turn, improving existing spatial models and trend estimates).



NOAA Ship *Bell M. Shimada* at anchor in Seattle, Washington.

[Photo: NOAA]

OMAO'S MARINE OPERATIONS

CAPT Todd Bridgeman, Director of Marine Operations

OMAO's Marine Operations over-sees operations of the three regional Centers, including the Marine Operations Center-Pacific, Marine Operations Center-Atlantic, and Marine Operations Center-Pacific Islands.

OMAO'S MARINE OPERATIONS CENTER – PACIFIC (MOC-P)

CDR Brian Parker, Commanding Officer MOC-P

MOC-P serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Pacific fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

Ketchikan, AK

NOAA Ship *Fairweather*

Commanding Officer:

CDR Mark Van Waes

Primary Mission Category:

Hydrographic Surveys

Depart: Kodiak, Alaska

Arrive: Kodiak, Alaska

Project: South Kodiak Island

Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

Kodiak, AK

NOAA Ship *Oscar Dyson*

Commanding Officer:

CDR Michael Levine

Primary Mission Category:

Fisheries Research

Depart: Dutch Harbor, Alaska

Arrive: Dutch Harbor, Alaska

Depart: Dutch Harbor, Alaska

Arrive: Dutch Harbor, Alaska

Project 1: FOCI Bearing Sea

Objective: This research area is focused on improving and reducing uncertainty in stock assessment models of important commercial fish species in the Bering Sea through the collection of acoustics information, fish and zooplankton samples, and fisheries oceanographic indices.



NOAA Ship *Oscar Dyson* underway with an autonomous Sailable Drone.

[Photo: LT Frydrych/NOAA]

Honolulu, HI

NOAA Ship *Hi'ialakai*

Commanding Officer: CAPT Elizabeth Kretovic
Primary Mission Category: Oceanographic Research, Environmental Assessment
Depart: Pearl Harbor, Hawaii **Arrive:** Pearl Harbor, Hawaii

Project: Hawaiian Archipelago RAMP

Objective: The Hawaiian Archipelago Reef Assessment and Monitoring Program (HARAMP) is a component of an integrated coral reef ecosystem assessment led by the Coral Reef Ecosystem Program (CREP) of the Pacific Island Fisheries Science Center in some 50 U.S.-affiliated Pacific Islands. This comprehensive, multi-agency research and education effort is sponsored by NOAA's Coral Reef Conservation Program (CRCP), a partnership between the National Marine Fisheries Service, National Ocean Service, and other NOAA agencies with the objective of improving understanding and management of coral reef ecosystems. Scientists will collect data to monitor nearshore physical and ecological factors associated with ocean acidification and general water quality, including data on water temperature, salinity, and other physical and biological characteristics of the coral reef environment using an assortment of oceanographic sampling and monitoring instruments, including systems deployed from the ship, underwater moored instruments, and sensors on the ship.

NOAA Ship *Oscar Elton Sette*

Commanding Officer: CDR Donald Beaucage
Primary Mission Category: Fisheries Research
DEPART: Pearl Harbor, Hawaii **ARRIVE:** Pearl Harbor, Hawaii

Project: West Hawaii Integrated Ecosystem Assessment

Objectives: The West Hawaii Integrated Ecosystem Assessment survey will gather data on the physical, biological and chemical oceanography of West Hawaii's Marine ecosystem, with a particular emphasis on understanding the deep-water micronekton community and the ecological importance of surface slicks.

OMAO'S MARINE OPERATIONS CENTER – PACIFIC ISLANDS (MOC-PI)

CDR Matthew Wingate, Commanding Officer MOC-PI

MOC-PI serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the ships in NOAA's Pacific Islands' fleet.



OMAO's Aircraft



Tampa, Florida

WP-3D (N42RF) – “Hurricane Hunter”

Temporary Base:

Naval Air Station Jacksonville, FL

Current Mission:

Scheduled Maintenance - Until September 2016

The aircraft is at the Naval Air Station Jacksonville undergoing an extensive refurbishment period which will include replacing the wings and upgrading various components. This effort will extend the useful life of the aircraft for another 15-20 years. Following completion, aircraft will be configured for survey operations.

WP-3D (N43RF) – “Hurricane Hunter”

Current Mission:

2016 Hurricane Season - June through November 2016

The NOAA WP-3D Hurricane Hunter aircraft is ready to respond. Radar reconnaissance missions on the NOAA WP-3D aircraft will be conducted to support tropical cyclone forecasting and the Hurricane Forecast Improvement Project. These flights will use the WP-3D's tail Doppler radar system to obtain high-density, three-dimensional measurements of the inner core wind structure of each tropical cyclone, potentially throughout its full life cycle. The hurricane research missions will also use the WP-3D to support the calibration/validation of satellite measurements and instrumentation development for the tropical cyclone environment and sampling of other aspects of the tropical cyclone inner core. These measurements will be used to enhance the accuracy of track and intensity guidance generated by NOAA's numerical weather prediction models. They will also be used directly by NOAA's National Weather Service hurricane specialists with the ultimate outcome being improved accuracy of intensity and track forecasts, extended forecast/warning lead-times and improved confidence levels by decision makers.

Jet Prop Commander (N45RF)

Temporary Base:

Various locations

Current Mission:

GRAV-D- through mid-September, followed by Soil Moisture Surveys

The aircraft will be supporting NOAA's National Geodetic Survey (NGS) on the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project. This project launched in 2007 and will conclude in 2022. When complete, the National Spatial Reference System will have a new, more accurate, gravity-based vertical datum. Vertical heights will be known throughout the US at a 2-cm accuracy, a vast improvement over the current vertical datum. Accurate height measurement is essential to accurate mapping and surveying, as well as floodplain mapping and management nationwide.

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

Gulfstream IV (N49RF)

Current Mission:

2016 Hurricane Season - June through November 2016

NOAA's Gulfstream IV aircraft will support operational tropical cyclone forecasting and the Hurricane Forecast Improvement Project. The G-IV will be the primary aircraft for surveillance missions with the Air Force's WC-130J and NOAA's WP-3D aircraft serving as backup platforms. The radar reconnaissance missions will use the G-IV's Tail Doppler Radar (TDR) system to obtain high-density, three-dimensional measurements of the inner core wind structure of tropical cyclones, potentially throughout its full life cycle. NOAA's National Weather Service is seeking to gather data on the performance of the TDR observation system and will work with the Hurricane Research Division to develop observing strategies for maximizing the utility of the TDR with the goal of improving hurricane track and intensity forecasts.

Twin Otter (N46RF)

Temporary Base: Northeast U.S. Coast

Current Mission: Northeast AMAPPS

The aircraft will be supporting the NMFS Atlantic Marine Assessment Program for Protected Species (AMAPPS) project in the Northeast U.S. This survey helps to develop models and tools to provide seasonal density estimates incorporating habitat characteristics of marine mammals, turtles, and seabirds in the western North Atlantic Ocean. The project will provide data essential to supporting conservation initiatives mandated under the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Migratory Bird Treaty Act (MBTA), and Endangered Species Act (ESA).

King Air (N68RF)

Temporary Base: Various locations

Current Mission: Continuous Coastal Mapping

Coastal Mapping is an on-going mission of NOAA's National Geodetic Survey (NGS) to survey approximately 95,000 miles of United States coastline providing the Nation with an accurate, up-to-date and seamless database of the national shoreline. This data is used as the baseline for defining America's marine territorial limits, including its Exclusive Economic Zone, and for the geographic reference needed to manage coastal resources and support marine navigation. Stereo photogrammetry and LiDAR are used to produce a digital database. In addition, the Coastal Mapping Program supports NOAA's homeland security and emergency response requirements by rapidly acquiring and disseminating a variety of datasets to federal, state, and local government agencies as well as the general public.

Twin Otter (N48RF)

Temporary base: Various locations

Current Mission: Soil Moisture Surveys

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

Twin Otter (N56RF)

Temporary base: Various locations

Current Mission: Arctic Heat followed by Florida Keys National Marine Sanctuary Survey

The complex interaction between the atmosphere, ice, and ocean drives the seasonal cycle of ice melting and freezing in the Arctic as well as the biological activity related to it. The goal of the Arctic Heat project is to collect data necessary to better understand these processes while also improving weather and sea-ice hazard forecasts. This project will also quantify and map the movement of heat through the Arctic surface environment on a variety of scales.

The Florida Keys National Marine Sanctuary (FKNMS) encompasses approximately 2,900 square nautical miles of coastal and oceanic waters. The purpose of this project is to acquire data providing a greater understanding of usage patterns within the FKNMS and surrounding waters. This information is essential to help sanctuary managers better manage sanctuary resources, inform modifications to or the creation of new marine zones, and for revision of the overall sanctuary management plan.

Twin Otter (N57RF)

Temporary base: Monterey, California

Current Mission: West Coast Sea Turtles.

The National Marine Fisheries Service west coast sea turtles survey will determine density and abundance of endangered Pacific leatherback and loggerhead in West Coast waters. Data on oceanographic conditions will be collected concurrently. The goal is to collect long-term data that can be used to build models to predict occurrence of protected species as a function of environmental variables. Capture and sampling of free-swimming leatherbacks will also be conducted by an in-water team, with assistance from the aerial survey observers.

OMAO'S AIRCRAFT OPERATIONS CENTER (AOC)

CAPT Michael Silah, Commanding Officer AOC

The AOC, located at MacDill Air Force Base in Tampa, Florida, serves as the main base for OMAO's fleet of nine aircraft and provides capable, mission-ready aircraft and professional crews to the scientific community. Whether studying global climate change or acid rain, assessing marine mammal populations, surveying coastal erosion, investigating oil spills, flight checking aeronautical charts, or improving hurricane prediction models, the AOC flight crews continue to operate in some of the world's most demanding flight regimes.



NOAA's P-3 N43RF flies over Havana, Cuba as part of the mission into Invest 99L as tasked by the Hurricane Center.

[Photo: Ian Sears/NOAA]



Unmanned Systems Support



NASA Global Hawk

Location: NASA Wallops Flight facility

Mission: SHOUT (Sensing Hazards Operationally using Unmanned Technology)

On August 1, this year's hurricane surveillance campaign began. This joint NASA and NOAA funded project is entering its third year. The Global Hawk will base out of Edwards Air Force Base until mid-August followed by a lengthy deployment to Wallops, VA. The NOAA partnership with NASA to utilize the Global Hawk will allow NOAA scientists and forecasters the capability to expand operational areas of interest in the Atlantic, Caribbean, and Gulf of Mexico as well as spend added time on station over hurricanes. Additionally, with the Global Hawk's high altitude capability, NOAA researchers will attain unique datasets to profile hurricanes from the upper levels of the atmosphere.

APH-22 Hexacopter

Location: Vancouver Island, British Columbia, Canada

Mission: Orca Whales

The Southwest Fisheries Science Center (SWFSC) is utilizing the APH-22 airframe to survey orca whales from a small boat in Queen Charlotte Strait, in the northern part of Vancouver Island, British Columbia, Canada. The objective of this study is to assess the body condition and nutritional status of the Northern Resident killer whales. Specifically, measurements of length and width from vertical aerial photographs to be used in estimating the long-term growth trends and current nutritional status which are related to trends in returning Chinook salmon (their principal prey) in past decades. In addition to the killer whale photogrammetry, humpback whales will also be opportunistically photographed during this study. This will allow for a health comparison between North East Pacific and Atlantic humpback whales.

Location: Atlantic Northeast, Cape Cod vicinity

Mission: Atlantic Menhaden

The North East Fisheries Science Center is collaborating with the South East Fisheries Science Center and University of New Hampshire to develop aerial and underwater acoustical methods that will improve fisheries-independent estimates of Atlantic Menhaden abundance and biomass on the East Coast. The project is being funded through NOAA Fisheries Office of Science and Technology. Operations will consist of launching and deploying an APH-22 from the small boat F/V Lily.

Location: Pribilof Islands, Alaska

Mission: Pribilof Fur Seals

The National Marine Fisheries Service (NMFS), Marine Mammal Laboratory (MML) is utilizing the APH-22 Hexacopter to photograph northern fur seal rookeries in the Pribilof Islands: St Paul, St. George, Otter, and Walrus Island. The Eastern Pacific northern fur seal stock is managed by NMFS and listed as depleted under the Marine Mammal Protection Act. Photographic survey flights will be flown above the targeted animals at a height of 100 feet. The captured images will be used to update historical photographs of rookery spaced used by northern fur seals. Additionally, opportunistic surveys of Steller sea lions will be collected to gather population data and catalog permanent markings of individuals.

Location: Hawaiian Islands

Mission: Hawaiian Surface Slicks

The Pacific Islands Fisheries Science Center seeks to utilize the APH-22 Hexacopter to categorize ocean debris surface slicks and their impacts on marine life. The work to be conducted on this project will focus on surface slicks: widespread oceanographic phenomena characterized by regions of the ocean that are noticeably slick and glassy in appearance, distinctly contrasting with the surrounding water. This research will investigate the ecological and physical oceanographic properties of surface slicks, their importance for fish (and other marine animals) recruitment and development, and overall relevance for local ecosystem dynamics in the region. NOAA's Pacific Islands Fisheries Science Center West Hawaii

Integrated Ecosystem Assessment was formed in 2010 to develop a comprehensive understanding of marine ecosystem dynamics in the region and aims to provide sound and relevant scientific information that addresses existing and future resource management concerns in west Hawaii.

Location: Descanso Ranch Jamul, California

Mission: Training/ Experimental Equipment Testing

The Southwest Fisheries Science Center plans to utilize the Descanso Ranch in Jamul, California as a testing and training facility for the APH-22 Hexacopter. Testing and training activities with the APH-22 platform will include flight maneuvers, take-off and landing drills, aerial mapping, photogrammetry and experimental equipment testing. The training and platform testing will increase the proficiency of the pilots and increase the capabilities of the APH-22 platform and evaluate new applications of platform enhancements.

MD4-1000/DJI S-1000

Location: Knoxville, Tennessee

Mission: MD4-1000 Evaluation

NOAA's Air Resources Laboratory, Atmospheric Turbulence and Diffusion Division seeks to utilize the NOAA National Marine Fisheries Center for Cooperative Unmanned Technologies MD4-1000 and DJI S-1000 airframes to perform instrument testing to verify its performance prior to the upcoming VORTEX-SE 2017 field study. Two iMet-XQ temperature/pressure/relative humidity sensors will be flown on the MD4-1000 for inter-comparison with the existing DJI S-1000 platform.

Location: Newport, Oregon

Mission: Coastal Seabird Surveys

NOAA's National Marine Sanctuaries Center for Collaborative Unmanned Technologies seeks to utilize the MD4-1000 quadcopter for coastal seabird surveys. The primary objective of this project is to utilize infrared imagery collected from unmanned aerial systems above the forest canopy to locate and identify Marbled Murrelet nesting sites. Operations will be conducted in remote forests, operating off of public lands outside of Newport, Oregon.

SenseFly eBee RTK

Location: Corbin, Virginia – Duck, North Carolina

Mission: Training and Operational Development

The Remote Sensing Division (RSD) and the Office of National Marine Sanctuaries (ONMS) have been funded to operate the SenseFly eBee RTK to further the development of UAS operational procedures specifically related to coastal and habitat mapping, living marine resource surveys, as well as a range of emergency preparation, response and recovery requirements. The project consists of the initial acquisition, flight training and system acceptance. Upon completion of the training/system acceptance segment several operational missions will take place during the fall to begin the development of procedures and protocols for integrating eBee operations and data collection into existing RSD and ONMS programs.



OMAO Partnerships



United States Senate Committee on Commerce, Science, and Transportation

Location: Washington, DC

Detail: LCDR Wendy Lewis, NOAA Commissioned Officer Corps

LCDR Lewis is currently on detail to the Committee with the staff of the Chair, Senator John Thune (R-SD), where she is assisting on activities pertaining to oceans, atmosphere, and fisheries policy, as well as other matters within the Committee's jurisdiction.

National Science Foundation

Location: Antarctica

Mission: LT Rafael Klein, NOAA Commissioned Officer Corps

Members of the NOAA Commissioned Officer Corps carry out NOAA's mission in remote locations across the globe. LTJG Klein is assigned to Antarctica where he serves as the Station Chief for NOAA's Atmospheric Research Observatory (ARO) at the Amundsen-Scott South Pole Station. The ARO at the Amundsen-Scott South Pole Station is a National Science Foundation facility used in support of scientific research related to atmospheric phenomena.

Department of Defense - U.S. Pacific Command (USPACOM)

Location: Honolulu, Hawaii

Embedded Liaison: CAPT Barry Choy, NOAA Commissioned Officer Corps

The U.S. Pacific Command (USPACOM) area of responsibility encompasses approximately half the earth's surface and more than half of its population. The 36 nations that comprise the Asia-Pacific include: two of the three largest economies and nine of the ten smallest; the most populous nation; the largest democracy; the largest Muslim-majority nation; and the smallest republic in the world. The region is a vital driver of the global economy and includes the world's busiest international sea lanes and nine of the ten largest ports. By any meaningful measure, the Asia-Pacific is also the most militarized region in the world, with seven of the world's ten largest standing militaries and five of the world's declared nuclear nations. Under these circumstances, the strategic complexity facing the region is unique. CAPT Choy is linked closely with the activities within the region allowing for identification of opportunities and cooperation between USPACOM and NOAA, and better overall government function situational awareness in the region.

Department of Defense - U.S. Navy

Location: Washington, DC

Embedded Liaison: LCDR Jason Mansour, NOAA Commissioned Officer Corps

LCDR Jason Mansour serves as NOAA liaison to the Oceanographer of the Navy and is an important interface between the U.S. Navy and other U.S. federal agencies, including NOAA. As NOAA Liaison, LCDR Jason Mansour serves as the Head of the Interagency Policy Branch of the International and Interagency Policy Division, Office of the Oceanographer of the Navy, located at the U.S. Naval Observatory. The mission of this Division is to coordinate and execute the Oceanographer of the Navy functions related to policy and programs involving international and/or interagency oceanography. Oceanography includes meteorology, oceanography, mapping, charting and geodesy, astronomy, and precise time and time interval.

Location: Stennis Space Center, Mississippi

Embedded Liaison: LTJG Laura Dwyer, NOAA Commissioned Officer Corps

Embedded in the Navy's Naval Oceanography Mine Warfare Center, LTJG Laura Dwyer works side by side with Navy officers operating Unmanned Underwater Vehicles worldwide and is currently stationed at Stennis Space Center. This collaboration will provide knowledge and experience that will keep NOAA on the cutting edge of this emerging technology as well as strengthen the partnership between NOAA and the Navy.

Department of Homeland Security - U.S. Coast Guard

Location: Washington, DC

Embedded Liaison: CDR G. Mark Miller, NOAA Commissioned Officer Corps

As the NOAA liaison to the United States Coast Guard (USCG), CDR Miller maintains a current and comprehensive knowledge of interagency activities and policies related to the USCG and NOAA. He identifies potential conflicts or benefits issues for analysis and evaluation, conducts appropriate assessments and studies, and serves as the interface between NOAA and the USCG. CDR Miller initiates, designs, and implements strategies through federal agency liaison and coordination that results in cooperative arrangements for maritime security, oceanographic research, hazardous materials spill response, and many other activities.

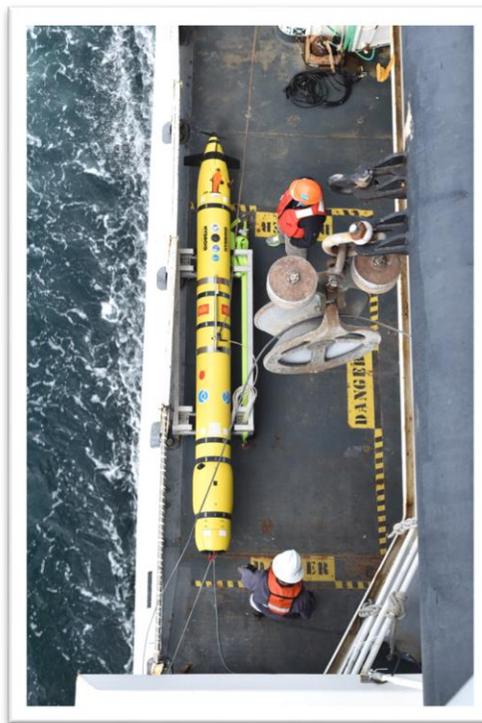


Teacher at Sea Program



The mission of the [Teacher at Sea](#) (TAS) program is to give teachers a clearer insight into our ocean planet, a greater understanding of maritime work and studies, and to increase their level of environmental literacy by fostering an interdisciplinary research experience. The program provides a unique environment for learning and teaching by sending kindergarten through college-level teachers to sea aboard NOAA research and survey ships to work under the tutelage of scientists and crew. Then, armed with new understanding and experience, teachers bring this knowledge back to their classrooms. Since its inception in 1990, the program has enabled more than 600 teachers to gain first-hand experience of science and life at sea. By participating in this program, teachers enrich their classroom curricula with knowledge that can only be gained by living and working side-by-side, day and night, with those who contribute to the world's body of oceanic and atmospheric scientific knowledge. Below is a list of the NOAA Teachers at Sea for the current monthly update for the 2016 Field Season. Once they have embarked on their cruise, you can gain access to their [blogs](#) which document their missions at sea and offer a wealth of information about the research being conducted as well as personal stories.

- Teacher at Sea Barney Peterson from James Monroe Elementary, Everett, Washington sailed on the Shark/Red Snapper Longline research cruise on the NOAA Ship *Oregon II* from Mayport, Florida to Pascagoula, Mississippi.
 - <https://teacheratsea.wordpress.com/author/barneypeterson2016/>
- Teacher at Sea Denise Harrington from South Paririe Elementary, Tillamook, Oregon will sail on the Shark/Red Snapper Longline research cruise on the NOAA Ship *Oregon II* from Galveston, Texas to Pascagoula, Mississippi.



Teacher-At-Sea, Nichia Huxtable observes an Automated Underwater Vehicle deployment aboard the NOAA Ship *Bell M. Shimada*.

[Photo: Nichia Huxtable]



OMAO - NOAA Dive Program



OMAO manages and implements [NOAA's Dive Program](#) (NDP), which trains and certifies scientists, engineers, and technicians from federal, state, tribal governments, and the private sector to perform the variety of tasks carried out underwater to support NOAA's mission. NDP also has cooperative diving agreements with over 100 government agencies and academic institutions. NOAA has more than 400 divers who perform over 14,000 dives per year. The NDP is headquartered at the NOAA Diving Center at the NOAA Western Regional Center in Seattle, Washington.

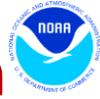


NOAA Diver Randy Kosaki collects Black Coral at Necker Island in the Northwestern Hawaiian Islands. He is wearing open-circuit technical scuba gear.

[Photo: Greg McFall /NOAA]



OMAO Small Boat Program



OMAO manages NOAA's [Small Boat Program](#) and sets policy and provides safety inspections for almost 400 small boats operated by the various Line and program offices throughout NOAA, which support fisheries laboratories, dive support, nautical charting, ocean and Great Lakes research, and more.



NOAA small boats support many diverse operations across the country.

[Photos: NOAA]



Office of Marine and Aviation Operations



Providing Environmental Intelligence for a Dynamic World

The personnel, ships, and aircraft of NOAA play a critical role in gathering environmental data vital to the nation's economic security, the safety of its citizens, and the understanding, protection, and management of our natural resources. The NOAA fleet of ships and aircraft is managed and operated by the Office of Marine and Aviation Operations (OMAO), an office comprising civilians, mariners, and officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States. NOAA's roots trace back to 1807, when President Thomas Jefferson ordered the first comprehensive coastal surveys. Those early surveys ensured safe passage of ship-borne cargo for a young nation. As the needs of the nation have grown, so too have OMAO's responsibilities. Today, OMAO civilians and NOAA Corps officers operate, manage, and maintain NOAA's active fleet of 16 research and survey ships and nine specialized aircraft. Together, OMAO and the NOAA Corps support nearly all of NOAA's missions.



NOAA has the largest fleet of federal research and survey ships in the nation. The fleet ranges from large oceanographic ships capable of exploring and charting the world's deepest ocean, to smaller vessels responsible for surveying the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries surveys, nautical charting, and ocean and climate studies. Based throughout the continental United States, Alaska, and Hawaii, the ships operate in all regions of the nation and around the world.

NOAA's aircraft provide a wide range of airborne capabilities. Our highly specialized Lockheed WP-3D "Hurricane Hunter" aircraft are equipped with an unprecedented variety of scientific instrumentation, radars, and recording systems for both in situ and remote sensing measurements of the atmosphere, the Earth, and its environment. Equipped with both C-band weather radar and X-band tail Doppler radar systems, the WP-3Ds have the unique ability to conduct tropical cyclone research in addition to storm reconnaissance. Together with NOAA's Gulfstream IV-SP hurricane surveillance jet, these aircraft greatly improve our physical understanding of hurricanes and enhance the accuracy of tropical cyclone forecasts. NOAA's light aircraft also play a vital role in monitoring our environment. Our King Air, Commander and Twin Otter aircraft support marine mammal population studies, shoreline change assessments, oil spill investigations, and water resource/snowpack surveys for spring flood forecasts.



The NOAA fleet provides immediate response capabilities for unpredictable events. For example, in November 2014, our aircraft flew missions over upstate New York after the record snow falls of up to seven feet and conducted airborne Snow Water Equivalent (SWE) and soil moisture measurements. Airborne SWE measurements are used by NOAA's National Weather Service when issuing river and flood forecasts, water supply forecasts, and spring flood outlooks.

After Hurricane Sandy in 2012, NOAA ships Thomas Jefferson and Ferdinand R. Hassler conducted emergency bathymetric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure. In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.

While manned aircraft and sea-going vessels have been, and will continue to be, a primary source of environmental data, new technology will have a significant role to play in the future NOAA fleet. OMAO, in coordination with other NOAA offices and federal agencies, is evaluating and deploying remotely piloted underwater and aircraft systems that could significantly contribute to environmental observations. OMAO's ongoing challenge is to meet the growing demand for in situ scientific data while providing the highest level of service. To better serve the needs of the nation, NOAA is examining the composition of the fleet through an exhaustive and critical review of at-sea science and observation requirements. Our objective is to develop a clear, cost-efficient path forward to ensure that the NOAA fleet can continue to conduct at-sea surveys and research vital to fisheries management, updating nautical charts, responding to natural and manmade disasters, and understanding coastal and marine systems more fully. Meeting these requirements is essential to developing sustainable, science-based management and conservation plans that protect the health and resiliency of these resources over the long-term.

We continue our efforts to build a civilian and NOAA Corps officer work force that is uniquely qualified to gather critical environmental intelligence and be adaptive and responsive to a changing world and work to expand our partnerships with other federal agencies. For example, NOAA Corps officers are currently assigned to work in the Department of Defense, National Science Foundation, and the U.S. Senate among others where they lend their expertise and service. We also continue to strengthen our partnership with the U.S. Coast Guard. Our basic NOAA Corps officer training class is held at the U.S. Coast Guard Academy, where newly commissioned officers train alongside Coast Guard officer candidates, developing skills and professional relationships that will benefit both services, especially during challenging times. Active collaboration among the Federal family is critical to ensuring the long-term capability and success of the federal ocean infrastructure. Our partners' success is our success. The men and women of OMAO and the NOAA Corps provide environmental intelligence for a dynamic world as they serve our nation every day from the farthest seas to the highest skies.

NOAA Commissioned Officer Corps

– Honor, Respect, Commitment –



The NOAA Commissioned Officer Corps (NOAA Corps) is one of the United States' seven Uniformed Services and as commissioned officers serve with the 'special trust and confidence' of the President. NOAA Corps officers are an integral part of the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce. With an authorized strength of 321 officers, the NOAA Corps serves throughout the agency's Line and Staff Offices to support nearly all of NOAA's programs and missions. The combination of commissioned service and scientific expertise makes these officers uniquely capable of leading some of NOAA's most important initiatives.

The NOAA Corps is part of NOAA's Office of Marine and Aviation Operations (OMAO) and traces its roots back to the former U.S. Coast and Geodetic Survey, which dates back to 1807 and President Thomas Jefferson. In 1970, NOAA was created to develop a coordinated approach to oceanographic and atmospheric research and subsequent legislation converted the commissioned officer corps to the NOAA Corps. The NOAA Corps today provides a cadre of professionals trained in engineering, earth sciences, oceanography, meteorology, fisheries science, and other related disciplines. Corps officers operate NOAA's ships, fly aircraft, manage research projects, conduct diving operations, and serve in staff positions throughout NOAA.

Benefits of the NOAA Corps to the Nation

The combination of commissioned service with scientific and operational expertise, allows the NOAA Corps to provide a unique and indispensable service to the nation. Discipline and flexibility are inherent in the NOAA Corps personnel system. Officers are trained for positions of leadership and command in the operation of ships and aircraft; in the conduct of field projects on land, at and under the sea, and in the air; in the management of NOAA observational and support facilities; as members or leaders of research efforts; and in the management of various organizational elements throughout NOAA. NOAA Corps officers must be technically competent to assume positions of leadership and command in NOAA and Department of Commerce programs and in the Armed Forces during times of war or national emergency. NOAA Corps officers enable NOAA to fulfill mission requirements, meet changing environmental concerns, take advantage of emerging technologies, and serve as environmental first responders.

- In 2015, NOAA aircraft conducted research and surveillance missions into some of the planet's most extreme weather, ranging from Hurricane Patricia, the strongest on record in the Western hemisphere, to severe storms over the U.S. Great Plains region. In addition, NOAA aircraft responded to unprecedented flooding in South Carolina using advanced sensors and imaging technology to provide emergency response managers with critical real-time information needed to respond to this disaster.
- In 2015, several ships conducted monitoring of an extensive harmful algal bloom (HAB) extending from California to the Gulf of Alaska. The 2015 HAB was the largest in more than a decade, affecting sea birds, sea lions, and triggered closures of commercial shellfish fisheries along the U.S. west coast. Observations help scientists understand HABs and help predictive modeling for the future.
- After Hurricane Sandy in 2012, NOAA Ships *Thomas Jefferson* and *Ferdinand R. Hassler* conducted emergency bathymetric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure.
- After Hurricane Irene in 2011, the NOAA Ship *Ferdinand Hassler* and team completed 300 lineal nautical miles of survey work in less than 48 hours providing a damage assessment that enabled the U.S. Coast Guard to reopen ports and restore more than \$5M per hour in maritime commerce less than three days after the storm.
- In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill in the Gulf of Mexico. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.