NOAA Fleet Update

June 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.

Find us on Facebook for the latest news and activities.

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OMAO and the NOAA Corps – In the News

NOAA captures video of other-worldly jellyfish
-NBC4 (Columbus, OH)
When you see it, you might think its computer generated, but the other-worldly hydromedusa jellyfish is the real thing. Scientists with the NOAA Office of Ocean Exploration and Research found this mesmerizing creature bobbing along the seafloor near the Enigma Seamount at a depth of 3,700 meters. The dive team captured video of the jellyfish with a camera mounted on a remotely operated vehicle near the seafloor. NOAA ship *Okeanos Explorer* is conducting deep water exploration in and around the lesser known parts of the Marianas Trench...

Is El Niño Over? Not By a Long Shot
-Outside Magazine
Don't count it out yet," Klaus Wolter, a research scientist at CU Boulder and the National Oceanic Atmospheric Association's Earth System Research Laboratory, told me recently...This past winter, Wolter and other members of NOAA's El Niño Rapid Response team met here every day—and even some weekends—to assess Niño 3.4, the area of equatorial Pacific between 170 degrees West longitude and 120 degrees West longitude, where El Niño is born. The weather phenomenon shows up on Sea Surface Temperature models as a bloody gash that stretches to South America's northwest coast...The Rapid Response Field Campaign was an unprecedented coordinated effort, involving a hurricane hunter Gulfstream IV jet, a NASA Global Hawk drone, and a research ship that together covered 115,000 miles of Pacific Ocean, from Niño 3.4 to the California Coast. Along the way, they launched over 700 instruments into the atmosphere, amassing never-gathered-before, real-time data on El Niño weather events...

5 Cities In 5 Days: NOAA Hurricane Hunters Show How They Measure Storms
-Houston Public Media
Specially-outfitted aircraft used by the National Hurricane Center to track hurricanes were displayed in Galveston on Tuesday. The USAF C130 and NOAA G4 Hurricane Hunter aircraft are part of a fleet used to take measurements when hurricanes threaten. "It's primarily used to help them forecast the track of the hurricane, to improve on that track forecast,' said James McFadden, with NOAA's Aircraft Operations Center. "We do have a Doppler radar on-board the airplane, which we are using to measure wind speeds at altitude, to get maps of the wind-field around the hurricane, which is very useful in trying to improve the intensity forecasts." McFadden says the plans also have racks of electronic equipment and computer stations, and flies with a crew of nine. The planes were on display for media and school groups at Scholes International Airport for Hurricane Preparedness Week...

Hurricane hunters show methods behind tracking storms
-WINK
With the start of hurricane season less than two weeks away, hurricane experts stopped in Southwest Florida on Friday to show off the tools and technology they use to track the storms. While most people seek shelter from a hurricane, crews with the National Oceanic and Atmospheric Administration (NOAA) and the Air Force are flying above the storm collecting data. "We're basically a dot in the sky," said Lt. Dave Cowan, pilot for NOAA. "Flying over the top of the hurricane environment for the most part and around the outside to figure out where the storm is going to go and how it's being steered." The mission can take up to nine hours. Crews on board use two instruments to collect the temperature, dew point, wind speed and pressure...

Early use of 'hurricane hunter' data improves hurricane intensity predictions
-Science Daily
Data collected via airplane when a hurricane is developing can improve hurricane intensity predictions by up to 15 percent, according to Penn State researchers who have been working with the National Oceanic and Atmospheric Administration and the National Hurricane Center to put the new technique into practice...

Scientists Seeing More Whales Than Ever Before In Bay Area Waters

-KPIX-TV (CBS San Francisco Bay Area)

A group of scientists returned Sunday from their 13th annual research trip in the Farallones Marine Sanctuary, where they say they saw more whales than ever before. “All the rock stars were out. We had an orca and fin whales and humpback whales,” Marine Mammal Observer Dru Devlin said. Researchers even spotted a mother humpback whale and her calf...Crews from several marine sanctuaries tasked with managing the fragile ecosystem off the coast teamed up for this expedition. For nine days they lived on a NOAA ship known for quietly navigating the waters without disturbing the wildlife. “It’s a great ship for this particular research,” Nikita Norton, Navigation Officer on the *Bell M. Shimada* said...

Twelve Tons of Debris Removed from Papahānaumokuākea

-BigIslandNow.com

The National Ocean Atmospheric Administration marine debris expedition to Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands gathered a total of 12 tons of marine debris. Ten NOAA scientists from the Pacific Islands Fisheries Science Center Coral Reef Ecosystem spend nearly a month’s worth of time between April 12 and May 13 at five different islands and atolls, as well as onboard the NOAA ship *Hi’ialakai* in PMNM, conducting shoreline marine debris surveys and removing trash. This year’s mission had two layers, starting

Scientists discover largest sponge known during deep-sea exploration

-NOAA News Release

Today, Marine Biodiversity published a study describing the 12 foot by 7 foot sponge that was found at depth of 7,000 feet. The discovery was documented during an expedition aboard NOAA Ship *Okeanos Explorer* that used remotely-operated vehicles to explore deep-water habitats in the monument...

Hurricane technology presented as way to pinpoint storm, surge for early warning

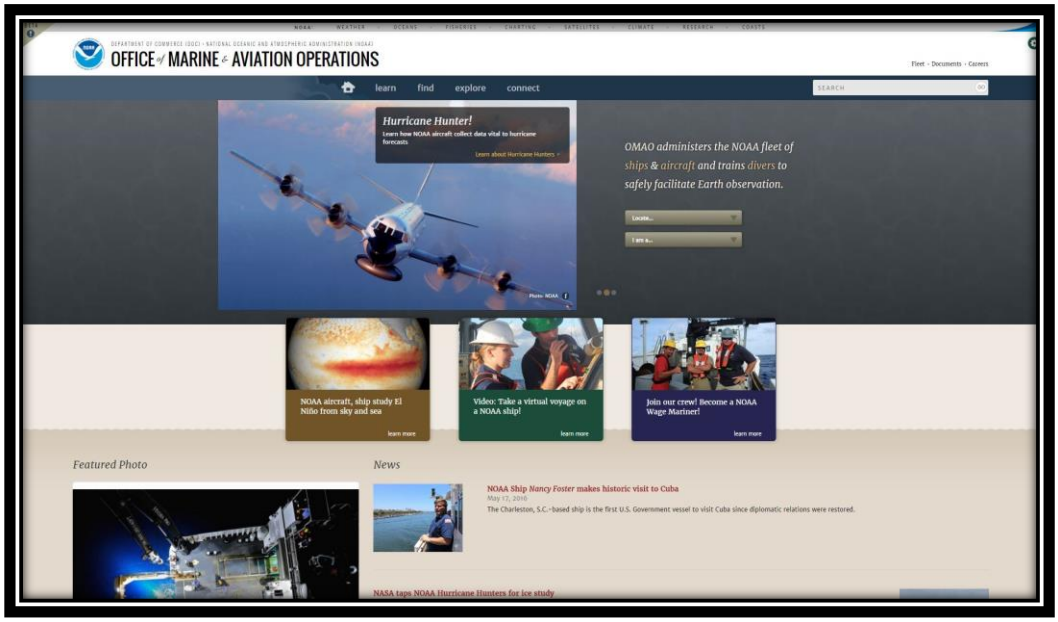
-Naples Daily News

Picture the possibility: a weather warning system so accurate it pinpoints the reach and intensity of a storm surge from an impending hurricane days before the flooding hits. After years of planning and testing, the National Oceanic and Atmospheric Administration is rolling out such a system for the upcoming hurricane season that officially begins Wednesday for the Gulf of Mexico and the Atlantic. A more detailed version is expected to come online next year that could predict storm surges even before a system forms. The other project is a disposable drone known as the Coyote. It was first dropped into the eye of Hurricane Edouard off the Atlantic Coast in 2014, providing scientists an unprecedented trove of data on the movement and intensity of the storm. That experiment was so successful that NOAA plans to use a small fleet of the Raytheon-made aircraft (weighing 13 pounds and sporting a 58-inch wingspan) for the 2016 hurricane season that officially kicks off June 1...

OMAO Website Redesign

OMAO's new website site will serve as a one-stop shop for Aircraft Operations, Marine Operations, the Diving Program, Small Boat Program, and NOAA Corps. This has been long overdue and would not have been possible without the vision and dedication of a long list of team members. Together, the team migrated thousands of pieces of content to the new site, which has a new look and feel and will serve as a useful tool for both OMAO and NOAA employees as well as external audiences. Some key new features of the website include:

- Lower bandwidth option makes it easier for shipboard access
- OMAO's first-ever centralized, searchable image gallery with photos and videos that are captioned and credited
- News articles highlighting OMAO activities that can be easily shared via social media
- Projects page that enables visitors to find out what project any given OMAO platform is currently supporting
- Maps showing where OMAO facilities and NOAA Diving units are located
- Audience pages with content specifically for wage mariners, divers, scientists, teachers, students, the press, OMAO, NOAA, and other government personnel
- Job listings
- Events calendar that can be used to list Diving Program training classes, NOAA Corps and wage mariner recruiting events, OMAO platform open houses, and more



OMAO's New Website Homepage
www.omao.noaa.gov

National Maritime Day

National Maritime Day was designated by Congress in 1933, and is proclaimed by the President each year on May 22, the date in 1819 that the American steamship *Savannah* set sail on the first transoceanic voyage under steam power. This day recognizes the service our Merchant Mariners carry out each day and their role in our nation's history. United States Merchant Mariners have supported the nation's maritime interests through every period of peace and war in our history by facilitating the transportation of American goods. In World War II, Merchant Mariners carried supplies and troops to the front lines, and were often the first to see battle and the last to return home.

OMAO's dedicated workforce of professional Wage Mariners carry on that legacy, serving on the front lines of scientific research and discovery across the globe as engineers, mates, deckhands, stewards, and technicians in NOAA's fleet. They spend hundreds of days at sea each year away from their loved ones to safely execute NOAA's missions at sea and are crucial to the work we do. In addition to their routine operations, OMAO's mariners have been among the first to respond to natural and man-made disasters to maintain safe waterways and protect life and property.

Please join OMAO in expressing my heartfelt appreciation for all our men and women at sea, joining the President's commitment to supporting them as they continue to uphold their proud tradition of service to our Nation.

The President's full proclamation on National Maritime Day can be found at https://www.whitehouse.gov/the-press-office/2016/05/20/presidential-proclamation-national-maritime-day-2016.

Chief Engineer Tim Olsen aboard NOAA Ship *Nancy Foster* looks toward Old Havana as the ship pulls into Cuba on May 8, 2016.
[Photo: David Hall/NOAA]

NOAA Corps - 99th Anniversary

On May 22, 1917, the United States Coast and Geodetic Survey (USC&GS) Corps was established and 2016 marks the 99th anniversary of its descendant service – the NOAA Commissioned Officer Corps.

The USC&GS Corps was born of a national necessity to provide technically skilled and scientifically trained officers to serve with and support our Nation's military might. These men (and women starting in 1972) provided their intellectual superiority and dutifully contributed their skills to defend freedom. They also made a very strong case for the benefits of a diverse military – diversity of education and experience.

As the descendants of the USC&GS Corps, today's men and women of the NOAA Corps, along with NOAA's Office of Marine and Aviation Operations civilian employees, continue to serve NOAA and the nation as a cadre of technically skilled and scientifically trained commissioned officers who conduct operations at sea, and in the air to support national requirements for environmental intelligence. The work we do has far reaching impact and continues to provide for the general welfare and security of our nation and the world. We have quietly and humbly proven the value of our Corps as a force multiplier during our nation's times of need - from aerial LIDAR mapping of the 9/11 attack sites; to responding to the Deepwater Horizon oil spill; to conducting the marine and aviation operations in the wake of Superstorm Sandy.

As the NOAA Corps looks forward to its centennial, the men and women of the NOAA corps will continue to serve the proud legacy of our ancestors and will continue to do so in the future.

Hurricane Technology Briefings

Sponsored by Senator Nelson and Representative Castor

On May 24, Senator Bill Nelson (D-FL) and Representative Kathy Castor (D FL-14) sponsored, and hosted, a hurricane technology viewing for fellow Members of Congress, and were joined by Senator Ed Markey (D-MA). Officials from NOAA's Office of Oceanic and Atmospheric Research, OMAO, and the NOAA Commissioned Officer Corps, as well as NOAA partner, Raytheon, briefed the Members on the platforms and technology NOAA uses to monitor and track hurricanes including the P3 "Hurricane Hunters" and the Coyote unmanned aircraft system. A Coyote unmanned system was on hand for the Members – and several press outlets – to view and ask questions about.

A briefing for all interested Senate and House staff followed this event and was attended by staff from over 30 Member offices, representing all areas of the country.

Senator Nelson holds the Coyote Unmanned System and discusses its use with Dr. Cione from NOAA's Office of Oceanic and Atmospheric Research.
[Photo: David Hall/NOAA]

NOAA Basic Officer Training Class 127

On May 4, 2016, NOAA gradated its 127th class of Basic Officer Training (BOTC). Congratulations to BOTC 127 for making the official transition from Officer Candidates to Junior Officers! These eight enthusiastic and hard-working Ensigns will be joining the fleet after the completion of their final two weeks of post-graduation training.

BOTC 127 and Officer Candidate School Class 2-16 render honors to the official party.
[Photo: ENS DeCastro/NOAA]

BOTC 127 with VADM (Three Star) Michael Devany and RADM (Two Star) David Score.
[Photo: Josephine Virginia Photography]

Independent Review Team

In January 2016, OMAO convened an Independent Review Team (IRT) to conduct a review of our ship fleet and:

- The IRT will assess the health of the NOAA Fleet of research vessels, requirements for recapitalization, and analysis of operational, maintenance practices and technology infusion, as well as:
    - Utilization of alternatives to the NOAA Fleet (commercial contracting, Academic Research Fleet, other public-funded vessels) to meet requirements;
    - Analysis of current operational systems (crewing, scheduling) and current maintenance practices; and
    - Technology readiness and infusion (instrumentation and mechanical).
- The IRT will deliver a final report in September 2016.
- The guidance from the IRT will inform modernization plans of the NOAA fleet in alignment with the Federal Oceanographic fleet, charter options, as well as operation and maintenance strategies of the current fleet.
- The IRT process & report is independent of any larger Administration planning efforts related to the federal fleet.
- The IRT consists of twelve persons from across Federal government, Academia, and private sector to include expertise in science, ship-based data collection requirements, vessel operation, vessel design and building, and ship-based technological advancements

Independent Review Team

Co-Chairs:

Dick West
RADM, US Navy (ret)

Robert Winokur
Senior Advisor
Michigan Tech Research Institute / Michigan Tech Univ.

Members:

Fred Byus
RDML, US Navy (ret)
Vice President & General Manager
Battelle Mission and Defense Technologies

Dr. John Hughes-Clarke
Professor
University of New Hampshire

John Crowley
RADM, US Coast Guard (ret)
Executive Director
National Association of Waterfront Employers

Bauke (Bob) Houtman
Head, Integrative Programs Section
National Science Foundation, Ocean Sciences Division

Dr. Steve Murawski
Professor
University of South Florida

Blake Powell
President
JMS Naval Architects

Nancy Rabalais, Ph.D.
Executive Director and Professor
Louisiana Universities Marine Consortium
National Defense University, Penn State University

Dr. Steve Ramberg
Distinguished Research Fellow
Center for Technology and National Security Policy,

Robert (Tim) Schnoor
Ocean Research Facilities Manager
Office of Naval Research

Dick Vortmann
President and CEO (retired)
National Steel and Shipbuilding Company (NASSCO)

NOAA Liaisons:

Nancy Hann, CDR/NOAA
Chief of Staff
NOAA Office of Marine and Aviation Operations

Richard J. Park, LT/NOAA
Flag Aide to Director, NOAA Corps and OMAO
NOAA Office of Marine and Aviation Operations

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 Briana Welton
Primary Mission Category: Hydrographic Surveys

Ship Status: Dry Dock Repair Period, ship will be alongside for scheduled maintenance, repairs, scientific data processing, crew rest, and training.

Newport, RI

NOAA Ship *Henry B. Bigelow*

Commanding Officer: CDR G. Mark Miller/LCDR Jeffery Taylor
Primary Mission Category: Fisheries Research
DEPART: Newport, Rhode Island **ARRIVE:** Boston, Massachusetts
DEPART: Boston, Massachusetts **ARRIVE:** Newport, Rhode Island
DEPART: Newport, Rhode Island **ARRIVE:** Newport, Rhode Island

Project 1: Spring Bottom Trawl Survey
Objectives: Determine the spring 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, and survey related equipment that may benefit the trawl survey and fish stock assessments. Collect oceanographic data including Conductivity, Temperature, Depth (CTD) casts and bongo tows at selected stations; and opportunistically collect acoustic data along cruise tracks with the EK-60 and ME-70 acoustic systems.

Project 2: AMAPPS Abundance Survey
Objectives: Determine the distribution and abundance of marine mammals, sea turtles and sea birds within the study area. Collect vocalizations of cetaceans using passive acoustic hydrophones. Determine the distribution and relative abundance of plankton using bongo nets with CTDs, midwater trawls, visual plankton recorder and EK-60. Collect hydrographic and meteorological data, and when possible, collect biopsy samples and photo-identification pictures of cetaceans.

Davisville, RI

NOAA Ship *Okeanos Explorer*

Commanding Officer: CDR Mark Wetzler
Primary Mission Category: Oceanographic Exploration and Research
Depart: Apra Harbor, Guam **Arrive:** Saipan, Northern Mariana Islands (NMI)
Depart: Saipan, NMI **Arrive:** Apra Harbor, Guam

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.

NOAA Ship *Okeanos Explorer,* "America's Ship for Ocean Exploration," is the only federally funded U.S. ship assigned to systematically explore our largely unknown ocean for the purpose of discovery and the advancement of knowledge. She is seen here from the camera of an "ROV," a remotely operated underwater vehicle, just as it breached the surface of the ocean.
[Photo: NOAA]

Norfolk, VA

NOAA Ship *Thomas Jefferson*

Commanding Officer: CAPT Shepard Smith
Primary Mission Category: Hydrographic Surveys

Ship Status: Alongside US Coast Guard Yard Curtis Bay - Baltimore, Maryland, for scheduled maintenance, winter 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:	LCDR Jeffrey Shoup
Primary Mission Category:	Oceanographic Research, Environmental Assessment
Depart: Cienfuegos, Cuba	**Arrive:** St. Thomas, US Virgin Islands
Depart: St. Thomas, US Virgin Islands	**Arrive:** St. Croix, US Virgin Islands
Depart: St. Croix, US Virgin Islands	**Arrive:** Miami, Florida
Depart: Miami, Florida	**Arrive:** Charleston, South Carolina

Project: Bluefin Tuna Ecology and Coral Reef Ecosystem Research
Objectives: Southeast Fisheries Science Center and the Atlantic Oceanographic and Meteorological Laboratory will be collaborating on two joint projects focused on Bluefin Tuna Ecology and Coral Reef Ecosystem research. This project will allow NOAA to gain a better understanding of the importance of alternative spawning sites and to improve management of the western Atlantic stock, as well as continue a multi-year, interdisciplinary research project to conduct biological and physical oceanographic surveys of the Virgin Islands bank ecosystems and surrounding regional waters.

NOAA Ship *Ronald H. Brown*

Commanding Officer:	CAPT Robert Kamphaus
Primary Mission Category:	Oceanographic Research, Environmental Assessment
DEPART: San Francisco, California	**ARRIVE:** Seattle, Washington
DEPART: Seattle, Washington	**ARRIVE:** Seattle, Washington

Project: West Coast Ocean Acidification
Objectives: Multiple deployments and recoveries of a CTD and 24-position Niskin bottle rosette in support of ocean acidification research, along transect lines and at moored sensor locations. There will be additional ancillary projects, including deployment of smaller sensor packages by hand and by winch, continuous underway pCO2 monitoring via the ship's scientific uncontaminated seawater line, deployment of Argo floats, collection of phytoplankton and zooplankton by net tows with winch, and onboard incubations of phytoplankton and zooplankton.

Pascagoula, MS

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: SEAMAP Summer Groundfish Survey
Objectives: Sample the northern Gulf of Mexico (GOM) with Southeast Area Monitoring and Assessment Program (SEAMAP) standard trawl sampling gear to determine the abundance and distribution of benthic fauna Commission for the Conservation of Atlantic Tuna). Now these data along with satellite imagery inform models describing the ABFT spawning habitat which is believed to be located exclusively to the Gulf of Mexico. Collect size measurements to determine population size structures, transmit real-time shrimp biological data weekly to Gulf States Marine Fisheries Commission, and record profiles of the water column for temperature, salinity, fluorescence, dissolved oxygen, and turbidity using a Conductivity/Temperature/Depth unit at SEAMAP stations.

NOAA Ship *Pisces*

Commanding Officer: CDR William Mowitt
Primary Mission Category: Fisheries Research
DEPART: Mayport, Florida **ARRIVE:** Mayport, Florida

Project: US South Atlantic Marine Protected Area (MPA) Survey
Objectives: Conduct ROV and multi-beam sonar surveys inside and outside six marine protected areas (MPAs) as well as inside the *Oculina* Experimental Closed Area (OECA) in the south Atlantic to assess the efficacy of this management tool to protect species of the snapper grouper complex and *Oculina* coral. The goal of the cruise is to gather additional data on habitat and fish assemblages in six of the South Atlantic MPAs and OECA as part of a long term sampling program to document changes in these areas before and after fishing restrictions are implemented. The southernmost boundary of our work areas will be Port Canaveral, FL while the northern-most boundary will be Cape Hatteras, NC. Efficacy testing of this management tool will aid fishery managers in future use of area restrictions for the protection of valuable habitat and fishery resources.

NOAA Ship *Pisces* "swinging" or calibrating her compass in the Singing River basin in Pascagoula, Mississippi.
[Photo: ENS Brian Yannutz/NOAA]

NOAA Ship *Gordon Gunter*

Commanding Officer: Master Donn Pratt
Primary Mission Category: Fisheries Research
DEPART: Davisville, Rhode Island **ARRIVE:** Norfolk, Virginia

Project: Spring Ecosystem Monitoring Survey
Objectives: Assess the hydrographic, planktonic and pelagic components of the Northeast U.S. Continental Shelf Ecosystem. Specifically we will quantify the spatial distribution of the following parameters: water currents, water properties, phytoplankton, microzooplankton, mesozooplankton, sea turtles and marine mammals. Traditional and novel techniques and instruments will be used, and a broad array of measurements of the pelagic ecosystem collected.

San Diego, CA

NOAA Ship *Reuben Lasker*

Commanding Officer: CDR John Crofts/CDR Kurt Dreflak
Primary Mission Category: Fisheries Research
DEPART: San Francisco, California **ARRIVE:** San Diego, California

Project: Rockfish Recruitment and Ecosystem Assessment
Objectives: This project will sample for pelagic juvenile rockfish (*Sebastes* spp.) and other epi-pelagic micronekton. Characterize prevailing ocean conditions and examine prominent hydrographic features as well as harmful algal blooms. Map the distribution and abundance of krill (Euphausiacea). Observe seabird and marine mammal distribution and abundance. Finally collect Humboldt squid (*Dosidicus gigas*), and sample for juvenile salmon (*Oncorhynchus* spp.).

Newport, OR

NOAA Ship *Rainier*

Commanding Officer: CDR E.J. Van Den Ameele
Primary Mission Category: Hydrographic Surveys
DEPART: Seattle, Washington **ARRIVE:** Kodiak, Alaska
DEPART: Kodiak, Alaska **ARRIVE:** Homer, Alaska
DEPART: Homer, Alaska **ARRIVE:** Kodiak, Alaska

Project: East Coast 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.

The NOAA Ship *Rainier* as seen in Dry-dock earlier this year.
[Photo: NOAA]

NOAA Ship *Bell M. Shimada*

Commanding Officer: CDR Paul Kunicki
Primary Mission Category: Fisheries Research
DEPART: Newport, Oregon **ARRIVE:** Newport, Oregon

Project: Rockfish Recruitment and Ecosystem Assessment
Objectives: Project will conduct a pre-recruit survey for juvenile fish and ecosystem survey of the northern California Current. Sample for pelagic juvenile rockfish (*Sebastes* spp.) and other epi-pelagic micronekton. Characterize prevailing ocean conditions and examine prominent hydrographic features. Collect acoustic data for mapping distribution of fish and krill. Finally, observe seabird and marine mammal distribution and abundance.

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 David Zezula/LCDR Mark Van Waes
Primary Mission Category: Hydrographic Surveys
Depart: Juneau, Alaska **Arrive:** Ketchikan, Alaska
Depart: Ketchikan, Alaska **Arrive:** Homer, Alaska

Project: Southeast Alaska Survey
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 Arthur "Jesse" Stark
Primary Mission Category: Fisheries Research
Depart: Dutch Harbor, Alaska **Arrive:** Dutch Harbor, Alaska
Depart: Dutch Harbor, Alaska **Arrive:** Dutch Harbor, Alaska

Project 1: FOCI/EMA Spring Ichthyoplankton
Objective: Conduct an assessment of eggs and larvae of walleye Pollock (*Gadus chalcogrammus*) over the eastern Bering shelf. Examine the interaction among climate, weather, and ichthyoplankton distribution and abundance. This work is intended to describe larval fish assemblages and determine how physical and biological factors affect the transport and survival of fish larvae.

Project 2: Summer Pollock-Bering Sea
Objective: Collect acoustic-trawl (AT) data necessary to determine the distribution, biomass, and biological composition of walleye Pollock, including regularly deploying a stereo-camera system (CamTrawl) in the midwater trawl to optically sample fish. Collect target strength data using hull- mounted transducers for use in converting acoustic data to estimates of absolute abundance. Calibrate the shipboard EK60 and a temporarily-installed broadband system using standard sphere calibration techniques. Collect physical oceanographic data (temperature, salinity, fluorescence and oxygen profiles with associated water samples) at selected sites, and continuously collect sea surface temperature, salinity, and fluorescence.

Honolulu, HI

NOAA Ship *Hi'ialakai*

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

Project 1: Biogeography Northwest Hawaiian Islands
Objective: Support for a Papahānaumokuākea Marine National Monument, National Ocean Service , NOAA project at Niʻihau, French Frigate Shoals, Laysan, Lisianski, Pearl and Hermes Atoll, Midway Atoll, and Kure Atoll. The project will support open-circuit SCUBA dives, closed-circuit re-breather dives, and snorkeler collections of reef fish, corals, other invertebrates, and algae for population genetics analysis; surveying and monitoring reefs and associated reef fish, as well as searching for invasive/alien species of coral and algae. These studies allow federal and state resource managers to better understand the resources under their jurisdictions.

Project 2: WHOI Hawaii Ocean Timeseries Station
Objective: Conduct mooring operations associated with the Woods Hole Oceanographic Institution (WHOI) Hawaii Ocean Timeseries Station (WHOTS) project. There are multiple specific objectives for the project, associated with recovery and re-deployment of the WHOTS mooring, CTD casts, and data collection from Project-provided and shipboard sensors while in near proximity to the WHOTS moorings.

NOAA Ship *Oscar Elton Sette*

Commanding Officer: LCDR Keith Golden/LCDR Donald Beaucage
Primary Mission Category: Fisheries Research
DEPART: Pearl Harbor, Hawaii **ARRIVE:** Pearl Harbor, Hawaii

Project: Oahu EK-60 Calibration and Shipboard Launch and Recovery Unmanned Aerial Systems (UAS) Testing
Objectives: Conduct successful drift or two point anchor calibration of Simrad EK-60 echo sounder (38 kHz, 70 kHz, 120 kHz, 200 kHz) off the west side of Oahu to set parameters for active acoustic data collected in 2016. Conduct successful ship based launch and recoveries of Latitude Engineering HQ-40 fixed wing hybrid quadrotor demonstrating its moving baseline differential GPS and ship landing logic system. Conduct successful Cobb trawl equipment tests to ensure the full capacity for future deep trawling operations and test the Marport net mensuration sensor system.

The NOAA Ship *Oscar Elton Sette* underway while launching one of its small boats.
[Photo: NOAA]

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"

Aircraft Commander: N/A
Temporary Base: Naval Air Station Jacksonville, FL
Current Mission: Scheduled Maintenance - Until August 2016

The aircraft is at the Naval Air Station Jacksonville, Florida 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.

WP-3D (N43RF) – "Hurricane Hunter"

Aircraft Commander: TBD
Current Mission: 2016 Hurricane Season - June through November 2016

June 1 marks the beginning of the 2016 Hurricane Season and the NOAA Hurricane Hunter aircraft are 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)

Aircraft Commander: LCDR Didier/LTJG Doremus
Temporary Base: Various locations
Current Mission: Soil Moisture Surveys

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of snowpack characteristics and soil moisture 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. A single snowmelt flood can cause billions of dollars in damage and in the western areas of the country spring snowmelt provides over 70% of the annual water supply. The benefits of accurate snow and soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

Gulfstream IV (N49RF)

Aircraft Commander: TBD
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)

Aircraft Commander: N/A
Current Mission: Maintenance Period

The aircraft will be in a scheduled maintenance period through the month of June.

King Air (N68RF)

Aircraft Commander: LCDR Waddington/LT Simms
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)

Aircraft Commander: ENS Blaauboer
Temporary base: Gulf of Mexico
Current Mission: BioLIDAR

BioLIDAR will investigate the prevalence of bio-aerosol in the atmosphere and its relation to air chemistry, microbial ecology, and climate. These particles can act as effective condensation nuclei with significant potential impacts on cloud formation and global climate. NOAA will employ two new sensors, a wide-band integrated bio-aerosol sensor and a micro-Doppler LIDAR, to increase understanding where few reported observations exist.

Twin Otter (N56RF)

Aircraft Commander: ENS Coker
Temporary base: Alaska
Current Mission: Arctic Heat and Steller Sea Lions Surveys

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 National Marine Fisheries Service is charged with will monitoring the abundance of Steller Sea Lion pups, juveniles, and adults in the North Pacific Ocean. Using a sophisticated motion-compensating camera system, imagery and data collected will be used to update multi-decadal population trends of the species. This year, the mission is to survey all terrestrial rookeries and haul out locations in the Aleutian Islands during the height of the summer breeding season.

Twin Otter (N57RF)

Aircraft Commander: LT Cowan/LTJG Norman
Temporary base: North Atlantic
Current Mission: Northeast Right Whale

North Atlantic right whales are critically endangered and listed under the Marine Mammal Protection Act. Aerial surveys serve multiple objectives with regard to conservation including providing locations and distribution of right whales to mariners to avoid collisions with ships, photo identification records on right whales, information on distribution and abundance of marine mammals and turtles, and provide sightings of dead whales for monitoring mortality.

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 G-IV Aircraft sits on the ramp at New Orleans Lakefront Airport during the 2016 Hurricane Preparedness Tour.
[Photo: NOAA]

Unmanned Systems Support

NASA Global Hawk

Location: Edwards Air Force Base (AFB), California/ NASA Wallops Flight facility
Mission: Maintenance
Project Manager: LCDR Neuhaus

The NASA Global Hawk project is conducting routine maintenance for the month of June 2016. For the 2016 Hurricane Season, NOAA will fund a hurricane surveillance campaign called SHOUT (Sensing Hazards Operationally using Unmanned Technology). SHOUT officially begins in early July with payload integration followed by a lengthy deployment to Virginia in August 2016. Flight operations for SHOUT will base out Wallops, VA to expand the Global Hawk's operational area in the Atlantic, Caribbean, and Gulf of Mexico.

APH-22 Hexacopter

Location: Strait of Juan de Fuca, Washington
Mission: Orca Whale Photogrammetry

The Southwest Fisheries Science Center (SWFSC) plans to survey Orca Whales from a small boat in the marine waters of Washington State. Aerial photographs will be used to assess the body condition and nutritional status of Southern Resident killer whales. Specifically, measurements of length will inform long-term growth trends and widths will be used to infer current nutritional status; both will be related to trends in returning Chinook salmon (their principal prey) in past decades. These metrics will be compared to those existing and planned for the Northern Resident killer whale population that aggregates in adjacent Canadian waters off Norther Vancouver Island, to provide a comparative assessment of nutritional status to guide management of these two protected populations.

Location: Sandy Point, Bahamas
Mission: Bahamas Beaked Whale

SWFSC in collaboration with the Bahamas Marine Mammal Research Organization seeks to utilize the APH-22 Hexacopter to survey Beaked Whales in the vicinity of Great Abaco Island in the Bahamas. Beaked whales are known to be particularly vulnerable to sonar exposure, and are difficult to reliably find and study at sea. However, these whales are known to naturally congregate in an area south of Abaco Island. Aerial images will assist in developing a baseline data set to determine the health of whales in a control population, not regularly disturbed by ship sonar. This project will assist in the future monitoring and understanding of the population levels affected by sonar within Navy operating areas.

Location: Aleutian Islands, Alaska
Mission: Aleutian Stellar Sea Lion

The National Marine Mammal Laboratory (NMML) plans to utilize the APH-22 Hexacopter to survey Steller Sea Lions throughout the Aleutian Island Chain. The primary objective is to capture images to obtain counts of sea lions (pup and non-pups) to be used in modeling abundance trends. The second objective is to sight for permanently marked animals from images for a long term life history study. The third objective is to capture images of known length animals for an ongoing photogrammetry study to assess demographics and body condition. Due to the extreme challenges of Aleutian weather in manned aircraft, unmanned systems such as the APH-22 have proven extremely productive in the western Steller Sea Lion sites that previously have had limited coverage.

Location: North East Atlantic Coastal Waters
Mission: Atlantic Blue Fin Tuna

The National Marine Fisheries Service (NMFS) seeks to utilize the APH-22 Hexacopter for direct assessment of juvenile Atlantic Bluefin Tuna, integrating aerial images from an unmanned aerial vehicle and underwater sonar measurements in support of a fishery independent survey. Direct assessment and fisheries independent estimation of fish abundance are the “gold standard” and are especially important in the management of valuable fish species. Atlantic Bluefin tuna stocks are currently assessed rather poorly, using a preponderance of fisheries dependent data. The goal is to improve the estimation of fish abundance data utilized in the management of valuable fish species.

Location: NOAA Ship *Oscar Elton Sette*, Hawaii
Mission: Hawaiian Cetaceans

The Pacific Islands Fisheries Science Center (PIFSC) Cetacean Research Program (CRP) conducts research on various cetacean species within the Hawaiian Archipelago, including both nearshore and offshore waters annually. As part of these efforts CRP collects data on species ID of sighted groups, group size, behavior, the occurrence of calves and when possible data on individual animal condition. The CRP plans to evaluate several users of the APH-22 Hexacopter from the NOAA ship *Oscar Elton Sette* for future ship based cetacean research. Specifically to test the capability and utility of the platform for obtaining photographs of cetacean groups that may be used for calibration of observer based group size estimates. This will be used to assess spatial arrangement of cetacean sub-groups and to assess health conditions of individual animals.

HQ-20 Hybrid Quadroter

Location: NOAA Ship *Oscar Elton Sette*, Hawaii
Mission: Field Demonstration of Hybrid Quadrotor Technology

The fixed wing hybrid quadrotor UAS technology will be tested aboard the NOAA Ship *Oscar Elton Sette* off the coast of Oahu. The field demonstration will be conducted with Latitude Engineering’s HQ-20, with the purpose of demonstrating the HQ technology from a ship with limited deck space and to validate the moving baseline differential GPS and ship landing logic. The UAS will take off from the ship, switch to fixed wing flight, and return and land on the ship. This series of events will be repeated multiple times to build up experience with ship board operations. The autopilot controls will be fine-tuned to improve tracking during the touchdown phase of the flight. The minimum landing foot-print will be tested along with the weather conditions needed to fly. Multiple flights will be done each day over 3 days. This demonstration is intended provide NOAA with insight into possible ship board platforms.

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: LTJG Rafael Klein, NOAA Commissioned Officer Corps

Members of the NOAA Commissioned Officer Corps carry out NOAA's mission in remote locations across the globe. LT Milton 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: CDR Christiaan van Westendorp, NOAA Commissioned Officer Corps

CDR van Westendorp 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, CDR van Westendorp 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.

Teacher at Sea Program

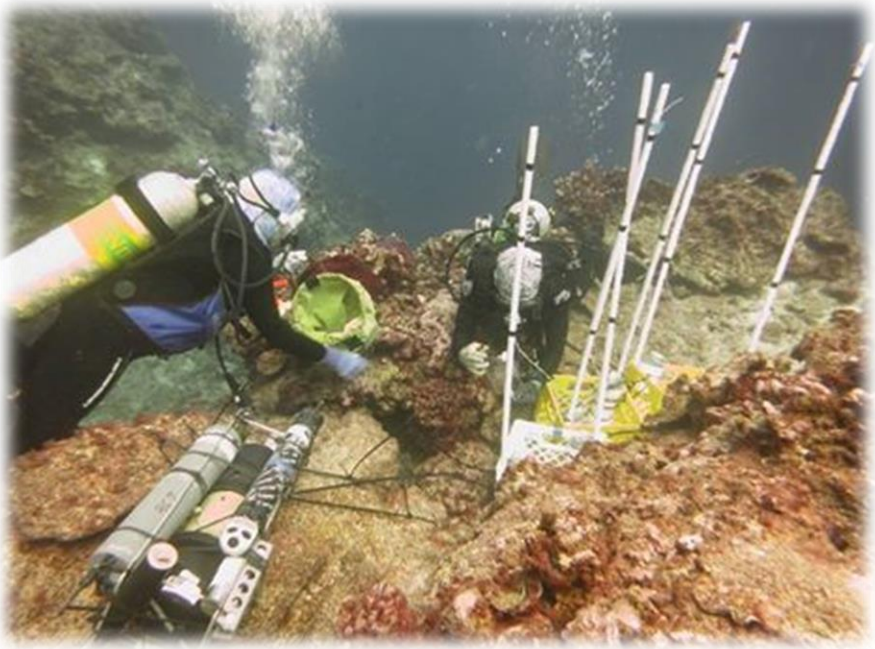
The mission of the Teacher at Sea (TAS) program is to give teachers a clearer insight into our ocean planet, a greater understanding of maritime work and studies, and to increase their level of environmental literacy by fostering an interdisciplinary research experience. The program provides a unique 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 Dana Chu from Florin High School, Sacramento, California sailing out of San Francisco, California on NOAA Ship *Bell M. Shimada* during the Cordell Bank National Marine Santuary Cruise .
- Teacher at Sea Spencer Cody from Hoven High School, Hoven, South Dakota sailing out of Juneau, Alaska on the NOAA Ship *Fairweather* on a hydrographic survey of south east Alaska.
    - https://teacheratsea.wordpress.com/author/spencercody2014/
- Teacher at Sea Donna Knutson from Century High School, Bismark, North Dakota sailing out of Woods Hole, Massachuetts on R/V *Hugh R. Sharp* on a scallop survey.

Teacher-At-Sea, Kathleen DeLussey underway aboard NOAA Ship *Henry B. Bigelow*.
[Photo: NOAA]

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 Divers diving from the NOAA Ship *Oscar Elton Sette* have been conducting reef fish surveys around Jarvis Island, monitoring ocean data, and recording the effects of the extensive coral bleaching event that was found there, likely triggered by the extreme 2015-2016 El Niño warming event. NOAA divers install ocean acidification sensors and use Portable Underwater Collectors (PUC) to collect water samples at Jarvis Island.
[Photo: 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 bathometric 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 nation's seven uniformed services and 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 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. NOAA Corps officers enable NOAA to fulfill mission requirements, meet changing environmental concerns, take advantage of emerging technologies, and serve as environmental first responders. 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 bathometric 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 re-open 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. 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.