



# NOAA DIVING PROGRAM



## FY 2006 ANNUAL REPORT

### EXECUTIVE SUMMARY

The mission of the NOAA Diving Program is to train, certify, and equip scientists, engineers, and technicians to perform a variety of underwater tasks in support of NOAA's mission and to ensure that all diving operations are conducted safely, efficiently, and economically. Fiscal year 2006 was an especially active and successful year for the NOAA Diving Program. Statistically, the diving program registered increases in the following categories over last year: number of divers (+8%), number of dives performed (+28%), and hours of bottom time (+41%). There was a decrease in one category – incidents of decompression illness. One case was reported in the year. FY06 was the most productive year for NOAA diving since the formation of the agency in 1970.

NOAA divers conducted such activities as: studies of invasive species including snowflake coral in Hawaii and lionfish in North Carolina; archeological activities associated with numerous historic shipwrecks; restoration of the Truman Annex seawall adjacent to the new Nancy Foster Complex in Key West, Florida; installation of new mooring buoys in the marine sanctuaries; retrieval and subsequent redeployment of the Coral Reef Early Warning System/Integrated Coral Reef Observation Network in St. Croix, U.S. Virgin Islands; testing of new diver-held sonar systems for detecting underwater navigational hazards; installation of new water-level measuring stations associated with the Tsunami Early Warning System in Puerto Rico and the U.S. Virgin Islands; and marine debris removal in the Northwestern Hawaiian Islands Marine National Monument.

The NOAA Diving Center (NDC) had a very active year. The NDC conducted 111 days of diving and medical training for NOAA and other government employees. Concurrently, the diving center provided personnel and equipment to support more than 200 days of advanced (i.e., decompression diving) and remote (i.e., intensive diving operations >6 hours from a hyperbaric chamber) diving operations--primarily in the Northwestern Hawaiian Islands Marine National Monument--through continued use of the NDC's containerized chamber systems.

The center's noteworthy accomplishments during the year included an external review of the NOAA Working Diver Training Program, the hosting of a unit diving supervisor conference, the establishment and filling of a billet for an on-site diving medical officer to enhance diver safety, and the testing of multi-gas dive computers for potential use by NOAA divers.

This report highlights these and other significant activities and accomplishments of the NOAA Diving Program and the NOAA Diving Center for FY06.

### LINE OFFICE DIVING ACTIVITIES

#### NOAA FISHERIES SERVICE

The NOAA Fisheries Service (NFS) is dedicated to protecting and preserving the nation's living marine resources through scientific research, fisheries management, enforcement and habitat conservation.

During FY06, 203 NFS divers conducted 7,865 scientific dives (Table 1), in support of NFS operations. Divers conducted stock assessments, young-of-the-year recruitment studies, habitat surveys, and gear evaluations. Divers from the Santa Cruz unit detected a notable drop in rockfish recruitment while conducting the latest survey in their 24-year rockfish time series. A number of units conducted dives to study the behavioral ecology of fish and crustaceans. Divers monitored coral reefs in the tropical regions during research cruises to the Florida Keys, the Tortugas, the main Hawaiian Islands, Samoa, the northwestern Hawaiian Islands and the Line Islands. The surveys were often focused on the assessment and monitoring of marine protected areas. Diving scientists assessed environmental impacts by surveying ship grounding sites and studying invasive species such as snowflake coral in Hawaii and lionfish in North Carolina. Working divers installed acoustic tracking arrays, serviced seawater intakes, changed out oceanographic buoys, conducted hull inspections, removed marine debris, de-fouled sampling gear, and conducted inspections of dams and fish diversion screens. Collaboration between diving units was especially evident this year. For example, the Panama City, Florida, unit sent staff to support chamber operations in the Pacific Ocean, and the Pacific Islands unit sent staff to assist with marine debris training at Stellwagen Bank National Marine Sanctuary. Diving operations generated approximately 20 management reports and published peer reviewed science articles.

#### NOAA RESEARCH

The primary diving mission of NOAA Research is to support scientists and engineers in the development, testing, and deployment of advanced oceanographic monitoring and data collection instrumentation. Biological and physical oceanographic data are also acquired through direct diver measurement and observation. Normal diving operations include deployment and recovery of instrumentation.

Diving within NOAA Research is conducted by personnel from the Atlantic Oceanographic and Meteorological Laboratory (AOML) and Pacific Marine Environmental Laboratory (PMEL). During FY06, 13 divers from AOML and PMEL conducted 263 dives. (Table 1). AOML working and scientific



NMFS divers from Pascagoula, Mississippi, testing a Turtle Exclusion Device (TED) on a shrimp trawl net.

divers are the primary support for the installation and instrumentation development of the Coral Reef Early Warning System/Integrated Coral Reef Observation Network, with present sites at St. Croix, U.S. Virgin Islands; La Parguera, Puerto Rico; and Lee Stocking Island, Bahamas.

In FY06, the St. Croix station was retrieved after four years of continuous operation, completely refurbished, updated, and redeployed. Divers conducted site surveys for future installations at Little Cayman, Cayman Islands, for the Central Caribbean Marine Institute, and offshore Puerto Morales, Mexico, for the Marine Institute of the Universidad Nacional Autonoma de Mexico. AOML divers received the FY05 NOAA Bronze Medal Award in recognition of their efforts in implementing a unique oceanographic and meteorological monitoring network in coral reef areas under goals established by the U.S. Coral Reef Task Force and NOAA.

The AOML diving unit supported the Florida Area Coastal Environment (FACE) program by conducting initial site surveys for extensive future oceanographic monitoring systems and deploying the first set of acoustic Doppler current profilers offshore Boynton Beach, Florida. The FACE initiative will generate long-term, high-quality scientific data needed for science-based infrastructure and regulatory decision making by the State of Florida and Federal agencies.

Throughout FY06, PMEL operational dives supported the testing and evaluation of underwater sampling equipment of various types required by PMEL scientists and engineers. A number of these instruments are deployed for many months (up to a year or more). Diver-assisted testing is critical to the success of the following programs: VENTS, TAO, DART and FOCI, PICO, pCO2.

### NATIONAL OCEAN SERVICE

As the Nation's principal advocate for coastal and ocean stewardship, the National Ocean Service relies upon its divers to provide the science and data necessary to effectively manage the environmental and economic well being of the Nation's coastal resources and commu-

nities. From the conservation of historical cultural resources to the installation and maintenance of equipment vital to commercial shipping, NOS divers help to provide for a safe, healthy and sustainable marine and coastal environment. 182 NOS divers performed a total of 6,726 dives during FY06 (Table 1).

The National Centers for Coastal Ocean Science (NCCOS) conduct and support research, monitoring, and assessments to meet NOS coastal stewardship and management responsibilities. Divers play a critical role in providing ground truth for NCCOS's ongoing coral habitat characterization effort. Working with the National Coral Reef Monitoring Program, divers developed coral reef data collection standards to be utilized by marine managers globally. Divers also collected data sets to spatially characterize and monitor the distribution of reef fishes as well as macro invertebrates such as conch, lobster and sea urchins. Additionally, NCCOS divers participated in dives with the Magothy River Oyster Restoration Project in the Chesapeake Bay area and placed navigation grids to mark experimental oyster bars that are then seeded and monitored for survival rates. NCCOS divers conducted nearly 20% of all FY06 NOS dives.

Divers from the Center for Operational Oceanographic Products and Services (CO-OPS) install and maintain the underwater components of the National Water Level Observation Network (NWLON) and the Physical Oceanographic Real Time Systems (PORTS). The PORTS system supplies vital real-time tide, current and meteorological information to commercial shipping entering the Nation's major ports. The NWLON provides data necessary for publishing tide and current tables and for determining sea level datums. CO-OPS divers also install and maintain water level measurement stations that supply data to the National Weather Service Tsunami Early Warning System. New station installations around Puerto Rico and the Virgin Islands were mandated by Congress and their presence will potentially help to save thousands of lives in the event of a Tsunami disaster.

The Office of Coast Survey's Navigation Services Division deploys Navigation Response Teams (NRT) to locate and identify submerged wrecks, obstructions and other positioning features deemed to be hazardous to navigation. NRT Divers collect the data necessary to update NOAA nautical charts and Coast Pilot corrections, a critical service to mariners nationwide. They utilize cutting edge equipment including a diver worn sonar system (DIDSON) that creates near video quality images in zero visibility conditions.

NOS divers working in the National Marine Sanctuary (NMS) Program conduct diving operations in support of research, education, maritime heritage programs, damage assessment and restoration, resource protection, and mooring buoy installation and maintenance. Divers with the Florida Keys NMS have worked diligently to remove thousands of live corals from seawalls that are scheduled for demolition. The corals are moved to a temporary nursery and then re-located to a permanent site.

**Table 1 : FY06 NOAA DIVING ACTIVITY**

	<i>Divers</i>	<i>Dives</i>	<i>Bottom Time</i>
<i>NR</i>	<i>13</i>	<i>263</i>	<i>168</i>
<i>NF</i>	<i>203</i>	<i>7865</i>	<i>5092</i>
<i>NOS</i>	<i>182</i>	<i>6726</i>	<i>4089</i>
<i>OMAO</i>	<i>118</i>	<i>2056</i>	<i>1075</i>
<b>TOTALS</b>	<b>516</b>	<b>16910</b>	<b>10424</b>

Other projects in the FKNMS include collection of hours of video and still photos for the new Florida Keys Eco-Discovery Center, maintenance of hundreds of mooring and regulatory buoys, and a massive project to construct a seawall footer to prevent further erosion and deterioration of the Truman Annex seawall at the new Key West office. The seawall construction completed by NOS divers resulted in an estimated two million dollar savings to the Government. In the Monterey Bay and Channel Islands NMS's, most diving is in support of resource protection and long term monitoring. Channel Island divers work with National Park Service (NPS) divers for a Kelp Forest Monitoring Program. Divers also conduct visual surveys for population assessments of benthic communities and mid-water column species and conduct on-going fish surveys in support of the Reef Environmental Education Foundation. Divers at Monterey Bay have worked to remove invasive brown algae currently spreading into the Bay. They provide support to the NPS, NMF, USCG and Naval Post Graduate School. At Thunder Bay NMS divers have installed permanent moorings on several shipwrecks, which will lessen anchor damage to these submerged, historic sites. Divers collected data generated by archeological documentation of shipwrecks and other submerged sites to provide sanctuary staff with baseline information required for comprehensive resource management. Divers at Flower Garden Banks NMS have participated in Queen conch surveys, Manta Ray acoustic tagging and tracking, coral disease and bleaching surveys, and coral spawn collections. At Gray's Reef NMS divers conduct fish surveys and marine debris sweeps. Dive support is provided for researchers from Georgia Southern University who are developing an identification guide for invertebrates at Gray's Reef. In the Hawaiian Islands, diving operations are conducted in direct support of biological surveys, benthic mapping, and maritime archeology. Biological surveys, benthic mapping, and maritime archeology were conducted at Johnson Atoll and in the Northwestern Hawaiian Islands.

## OFFICE OF MARINE AND AVIATION OPERATIONS

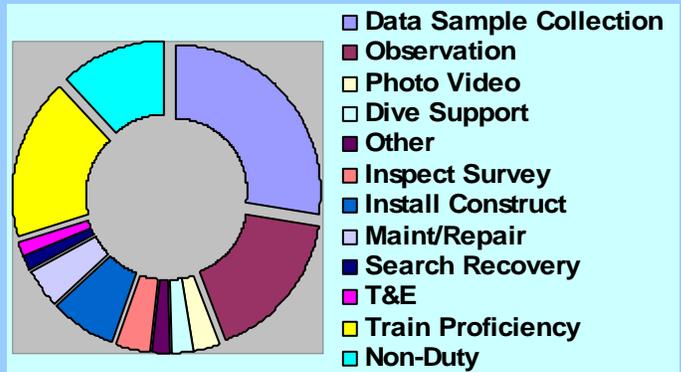
### NOAA FLEET

The mission of NOAA's Office of Marine and Aviation Operations (OMAO) is to safely and efficiently operate NOAA ships and aircraft, incorporate emerging data acquisition technologies, and provide a specialized professional team responsive to



NOS Divers from Stellwagen Bank NMS conducting a simulated Dive Accident Drill, part of all NOAA diver training.

### Breakdown of NDP Diving Activities During FY2006



NOAA programs. NOAA fleet divers perform a myriad of tasks, from ship husbandry tasks such as clearing screws and sea strainers, conducting hull surveys for damage, and installing transducers, to science-support activities including installing tide gauges, installing and replacing data gathering equipment, and investigating multi-beam contacts. These activities save the NOAA fleet significant time and cost by providing a readily available capability to accomplish underway repairs, maintenance, and tasks to keep operations continuous throughout the year.

During FY06, OMAO's complement of divers grew by 12% from 104 to 118 divers. These divers conducted a total of 2,056 dives (Table 1). OMAO divers perform operations in many locales from the South Pacific, Bering Sea, coastal Alaska waters, and Pacific Northwest, to the North and South Atlantic, and Gulf of Mexico. While all OMAO vessels have divers on-board conducting valuable tasks, below are some of the more noteworthy operations performed from some of NOAA's vessels in the past year:

NOAA Ship HI'IALAKAI divers obtained training in maritime archeology, which will allow them to document and identify wreck sites that may be encountered as part of the ship's operations. This platform had several thousand dives logged and its operations were multi-faceted and multi-disciplinary, bringing together various divisions within NOAA, outside agencies, and institutions.

NOAA Ship NANCY FOSTER divers were essential to many different operations, from surveying invasive lionfish off North Carolina to supporting advanced decompression diving. They also conducted surveys of coral and seagrass recovery sites at Naval Station Roosevelt Roads, Key West, Florida, and Vieques Island, Puerto Rico.

NOAA Ship MILLER FREEMAN divers worked in tandem with divers from the University of Washington, diving from the R/V THOMAS G. THOMPSON to study the ecosystems that exist beneath ice floes in the waters off Alaska.

### NOAA DIVING CENTER

The NOAA Diving Center (NDC), located at the NOAA Western Regional Center in Seattle, Washington, serves as the ad-

ministrative headquarters for the NOAA Diving Program and primary facility for all NOAA diver training activities and equipment maintenance and distribution. Located within the NDC complex are three operational hyperbaric chambers, offices, classrooms, workshops and gear lockers, air compressors and gas storage facilities, and a 30' high x 15' wide, 40,000 gallon water tower for equipment testing and diver training.

One of the primary missions of the NDC is training. Diver training is conducted at the NDC and in Key West, Florida. Dive training programs range from working diver to specialties including divemaster, Nitrox, and visual cylinder inspection. During the year, 150 individuals were outfitted, trained, and certified by the NDC in one or more of these specialties. An additional 32 scientific divers were certified at the unit level. Medical courses taught at the NDC include Hyperbaric Physicians Course, STCW Medical Person-in-Charge, and Diver Medical Technician. An additional 99 individuals completed these classes. In addition to training, the NDC also supported various technical dive projects through the year utilizing staff and chamber systems, from the large containerized systems on NOAA ships to the portable Hyperlite system in collaboration with the National Park Service in Lake Mead, Nevada.

To enhance diver safety, a Diving Medical Officer billet was established at the NDC and filled by Dr. Albert J. Exner, CAPT, USPHS.

Employees from other federal, state, and municipal agencies frequently enroll in NDC classes on a space available basis. Outside agencies that participated in training during FY06 included:

US Fish & Wildlife Dept.	Mercer Island Fire (WA)
Pierce County (WA) Sheriff	Seattle Harbor Patrol
Seattle Fire Dept.	Snohomish Co. (WA) Sheriff
University of Washington	Los Angeles Police Dept.
US Army 7th Engineering Dive Detachment (HI)	
Dept. of Interior-Minerals Management (FL)	

### EQUIPMENT

The NOAA Diving Center outfitted 75 new and returning divers, performed annual maintenance, and re-issued over 800 scuba regulators to NOAA divers worldwide.

Working with the Undersea Research Foundation, the NDC completed testing of two commercial, off-the-shelf multi-gas dive computers. The results were published in *Final report on the reliability of Delta P Technology, Ltd., VR3 and the Hydro-space Engineering, Inc. HS Explorer computers in producing acceptable mixed gas and air decompression schedules and providing accurate depth measurement*, dated 1 June 2006.

### NDC OUTREACH

Personnel from the NOAA Diving Center participated in a variety of outreach activities for NOAA Line Offices, state and local government agencies, educational institutions, and the general public. These outreach efforts consisted of technical guidance, operational support, and educational services. The

following activities were accomplished during FY06:

- Hosted training by the Washington Dept. of Natural Resources on derelict fishing gear removal. This training was held for the U.S. Navy and U.S. Army dive teams to develop a program for proper techniques to remove derelict gear from areas in the Puget Sound.
- Hosted training by the U.S. Coast Guard District Thirteen Maritime Safety and Security Team (MSST) 91101 in surface-supplied and dry suit training in the NDC diving tower.
- Presented lectures and tours of the center to local NOAA dependents during "Bring Your Child to Work" Day, students from Vashon High School, and science students during NOAA Science Camp. NDC also provided facilities and training for medical professionals attending a hyperbaric chamber technician course at Virginia Mason Medical Center, Seattle, Washington.
- Participated in an Earth Day open house for the public in Seattle to educate and familiarize visitors with tools and techniques used for NOAA diving, and the "Get to Know NOAA" day at the Western Area Science Center.

### ACKNOWLEDGEMENTS

NOAA divers helped make FY06 the most productive, and yet safe, year for diving to date. The activities highlighted in this report represent a small window into the multitude of operations conducted by NOAA divers on a daily basis. Diving will continue to play a vital role in helping NOAA accomplish its mission: to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs. It is due to the efforts and dedication of these individuals that NOAA is, and continues to be, the premiere Federal civilian diving organization in the country. Our program is only as successful as the individuals within it; their dedication and skill keep the NOAA Diving Program what it is, the premiere federal civilian diving organization in the United States. The NDP thanks all divers for their submitted photos, continuing safe practices, and hard work in the search to understand the marine world we all work in, on, and about.



VADM Lautenbacher, RADM De Bow and NDP Director Dave Dinsmore during a tour of the NDC facilities and familiarization of the services provided for NOAA divers.