



NOAA DIVING PROGRAM



FY 2005 ANNUAL REPORT

EXECUTIVE SUMMARY

For over 30 years NOAA divers have been collecting data and performing tasks underwater in support of NOAA goals and objectives. Fiscal year 2005 was no exception. During this period 476 NOAA divers conducted dives in support of NOAA projects throughout the world. This figure represents a slight (+.01%) increase in the number of NOAA divers compared to the previous fiscal year. Despite this increase, overall the NOAA Diving Program experienced a slight decrease in both the number of dives performed (-1.4%) and hours of bottom time (-5.4%) during the year.

From a dive incidence standpoint, six divers reported symptoms of decompression sickness (aka "the bends") during the period - five during dive/medical training and one during field operations. All six divers were treated utilizing hyperbaric oxygen therapy with no residual symptoms. Based on a total of 13,232 dives, these six cases correlate to an incident rate of approximately one case per 2,200 dives or .045% (99.95% incident-free dives).

Historically the NOAA Diving Program has maintained an excellent overall safety record. From 1981 through 2005, a total of 220,666 dives were logged by NOAA divers, with 50 cases of DCS reported and treated using recompression therapy. This data correlates to an incident rate of 0.022%, or one case per 4,413 dives.

Some of the more noteworthy accomplishments by NOAA divers during the year included: the installation of a new Coral Reef Early Warning System/Integrated Coral Reef Observation Network monitoring system in La Parguera, Puerto Rico, by divers from the Atlantic Oceanographic and Meteorological Laboratory; the study of the invasive Indo-Pacific lionfish off the coast of North Carolina by divers from the Beaufort, NC, National Marine Fisheries Laboratory using advanced technical diving equipment and procedures; the installation of new monitoring stations in support of the National Weather Service Tsunami Early Warning System by divers from the NOS; and the installation of a replacement main transducer pod for NOAA Ship MILLER FREEMAN by her complement of ship divers.

Notable items from the NOAA Diving Center (NDC) included the continued investigation of various multi-gas dive computers for use with both open- and closed-circuit scuba equipment and the design and construction of a second containerized hyperbaric treatment system to support remote and/or advanced diving operations. This report highlights the various activities (Chart 1) and accomplishments of NOAA divers and the NOAA Diving Center for fiscal year 2005.

LINE OFFICE DIVING ACTIVITIES

NOAA RESEARCH

The primary diving mission of NOAA Research is to support scientists and engineers in the design, testing, deployment, maintenance, and retrieval of oceanographic monitoring and data collection instrumentation, which includes the field testing of various underwater mountings, moorings, sensors, sampling equipment, and profilers. In addition, biological and physical oceanographic data is collected through direct diver measurement and observation. In-situ deployment and recovery of instrumentation, often deployed for a year or more, is conducted as part of normal diving operations. Pacific Marine Environmental Laboratory (PMEL) and Atlantic Oceanographic and Meteorological Laboratory (AOML) divers (16 total) provide critical components in the scientific implementation of major oceanographic programs. During FY05, NOAA Research divers completed 305 dives for a total of 179 hours of bottom time (Table 1).

AOML divers provide support for the installation and instrumentation development of the Coral Reef Early Warning System/Integrated Coral Reef Observation Network (CREWS/ICON). CREWS/ICON stations provide real-time data to be used for prediction of coral bleaching as well as providing a data transmission link for add-on instrumentation particular to each remote site. CREWS/ICON is part of NOAA's Coral Health and Monitoring Program (CHAMP). Each station consists of a 40 ft., one ton instrumented mast assembly designed for multi-year deployment. In FY05, a station at the Caribbean Marine Research Station, Lee Stocking Island, Bahamas was instrumented and a site survey was performed at the Mesoamerican Barrier Reef, offshore in Belize. In St. Thomas, USVI, a bottom mounting was reconditioned for future deployment and a new station was installed in La Parguera, Puerto Rico, offshore of the new NOAA/Univ. of Puerto Rico Coral Reef Institute. Use of AOML divers and small boats allows non-intrusive installation of instrumentation on sensitive coral reef sites and cost-effective deployments without the use of large platform ships/barges in remote locations. The development of an in-house capability to deploy underwater drilling equipment and hard substrate moorings from small boats has permitted the establishment of rapid response working diver teams for CREWS/ICON site modifications and storm damage repairs. AOML divers also installed and maintained an underwater cable and innovative acoustic modem data transmission link covering 1.5nm for the project.

Another joint project between the EPA and NOAA in FY05 was the Southeast Florida Bio-Marker Coral Genetic Study in

which AOML and EPA divers collected specific coral samples for a genetic study of the stress of turbidity on corals near dredge material discharge areas during two separate cruises. AOML divers also assisted the Rosenstiel School of Marine and Atmospheric Science/University of Miami in a survey of the Aquarius underwater habitat site for the future installation of oceanographic instrumentation, and also participated in dive support for Florida Bay studies as part of the Florida State Circulation and Exchange Study.

PMEL divers assisted NMFS/Seattle and the Pacific Marine Operations Center on various projects through the year, as well as assisting the Washington State Department of Natural Resources (DNR) derelict fishing net removal program. Significant instrumentation evaluation conducted by PMEL divers included the evaluation and field testing of the Bottom Pressure Recorder (BPR) and buoyancy packages for the Platform for Continuous ocean Observation (PICO), in conjunction with the internationally important Deep-ocean Assessment and Reporting of Tsunamis (DART) program. Extensive testing of a new Tropical Ocean Atmosphere (TAO) Project/pCO₂ mooring system, as well as prototype current meters and temperature sensors were also completed. Diver assisted testing was critical to the success of underwater thermal imaging (VENTS) and the Fisheries Oceanography Coordinated Investigations (FOCI) programs. As part of an agreement between NOAA, EPA, U.S Army Corps of Engineers, and the State of Florida, a multimillion dollar dredging project of the Port of Miami was permitted with the condition that an offshore ADCP current monitoring system be operational and data available to all participants.

NOAA FISHERIES

NOAA Fisheries is responsible for conserving and promoting the health of the marine environment through science-based management. As steward of the nation's living marine resources, its goals are to rebuild and maintain sustainable fisheries, promote the recovery of protected species, and protect and maintain the health of coastal marine habitats. Accomplishing these goals often requires that Fisheries researchers dive to collect data, conduct surveys, install and recover instrumentation, and evaluate fishing gear performance. In FY05, 184 NMFS divers completed 4,822 dives for 2,724 hours of bottom time (Table 1).

Fisheries divers performed scientific dives to support stock assessment, young of the year recruitment studies, habitat surveys, and gear evaluations. Coral reef monitoring was conducted in a number of regions with diving research cruises to the Florida Keys, Caribbean, Gulf of Mexico, Hawaii, and Commonwealth of the Northern Marianas. Other dive operations were focused on marine mammals, turtles, and the monitoring of marine protected areas. This year more diving was focused on environmental impacts, such as surveys of ship grounding sites and studies focused on invasive species. Management reports and published peer reviewed science (~10 arti-

cles) were generated based on NMFS diving operations. Working dives were conducted to install acoustic tracking arrays and de-foul sampling gear. During one three month project in the Northwestern Hawaiian Islands, 40 tons of derelict fishing nets were recovered. In total, the Coral Reef Ecosystem Investigation Unit recovered 125 tons of derelict fishing gear during the year from this region of the world.

Notable items this year included the North Carolina unit employing advanced diving techniques to work beyond conventional depths to study an invasive species of lionfish. Also, a charter vessel for the Hawaii marine debris diving cruise went aground at night at the remote end of the archipelago and the divers were tasked with using their small craft to evacuate vessel personnel to a nearby sand spit until they were picked up by a NOAA vessel.

Table 1 : FY2005 NOAA DIVING ACTIVITY

	<i>Divers</i>	<i>Dives</i>	<i>Bottom Time</i>
<i>NR</i>	<i>16</i>	<i>305</i>	<i>179</i>
<i>NF</i>	<i>184</i>	<i>4822</i>	<i>2724</i>
<i>NOS</i>	<i>172</i>	<i>6107</i>	<i>3505</i>
<i>OMAO</i>	<i>104</i>	<i>1998</i>	<i>1011</i>
TOTALS	476	13232	7419

NOAA OCEAN SERVICE

The primary mission of the National Ocean Service is to be the Nation's principal advocate for coastal and ocean stewardship and to support and provide the science, information, management, and leadership necessary to balance the environmental and economic well-being of the Nation's coastal resources and communities. Diving operations conducted by NOS Units support this mission in multiple ways. During FY' 05, 172 NOS divers performed 6,107 dives for a total bottom time of 3,505 hours (Table 1).

NOS divers working in the National Marine Sanctuaries provide valuable data essential to resource management and sustainable use planning. Diving operations support research, damage assessment and restoration activities, educational outreach, natural resource protection, law enforcement activities, and Federally-mandated maritime heritage assets documentation and preservation. During FY05, NOS divers continued installation and maintenance on approximately 500 mooring, regulatory, and information buoys throughout the Florida Keys National Marine Sanctuary. Divers from Thunder Bay and Stell-



Figure 1: NOS diver filming on the wreck of the USS MA-CAW, Midway Atoll (Photo by Robert Schwemmer)

wagon Bank National Marine Sanctuaries supported ongoing projects documenting historic shipwrecks at their sites. Flower Garden Banks National Marine Sanctuary divers continued to establish and monitor deep reef stations in the Gulf of Mexico. NOS divers were also tasked with post-hurricane impact surveys in the wake of several major storms. In the Northwestern Hawaiian Islands, Coral Reef Ecosystem Reserve divers conducted ecosystem research and monitoring as established by Reserve Executive Order. This work included biological assessments of coral/invertebrate species, algae species, and fish surveys. Divers also assisted the National Park Service with archeological surveys on the USS Arizona and USS Utah. At Monterey Bay National Marine Sanctuary, divers worked to remove and reduce the spread of an invasive brown algae in the Bay. They also provided dive support to maintain scientific equipment and mooring buoys for the National Park Service, Coast Guard, and Naval Post Graduate School.

Divers from the Navigation Services Division conducted dives to determine the location and configuration of obstructions that may present a hazard to navigation. The data collected during these dives is used to update nautical charts and provide information for special notices to mariners concerning marine hazards. The team responded to the Gulf Coast following Hurricane Katrina to assist in re-opening ports and shipping lanes in the region. These divers also tested and evaluated a state-of-the-art, diver worn, acoustic lens sonar that creates a near video quality image in zero visibility waters.

The Center for Operational Oceanographic Products and Services, Field Operations Division, is responsible for maintaining the National Water Level Observation Network (NWLON) and the Physical Oceanographic Real Time Systems (PORTS). Divers participated in the installation and maintenance of remote tidal measurement sensing devices. The data provided by these stations is used to produce tide and current tables and real time navigational information to commercial shipping traffic. Field Operations divers also installed new monitoring stations in support of the National Weather Service Tsunami Early Warning System.

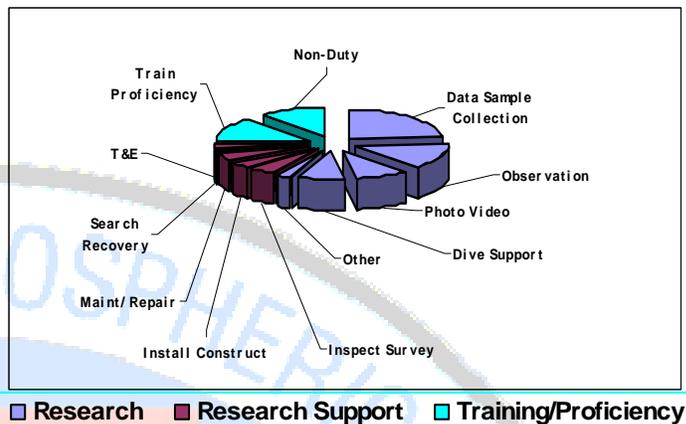
NOS divers working in conjunction with divers from the National Marine Fisheries Service at the Beaufort Laboratory conducted habitat studies and biological surveys of reef fish resources. Information gleaned from these surveys is disseminated to various Fishery Management Councils to assist in the management of Marine Protected Areas.

OFFICE OF MARINE AND AVIATION OPERATIONS

SHIPS

OMAO's complement of divers grew by almost 25% in FY05 from 79 to 104 divers. These divers performed 1,998 dives with a total bottom time of 1,011 hours (Table 1), a 13.5% increase in both categories. Dive locations ranged from the Gulf of Mexico and Atlantic to Alaska, the Pacific Northwest and South Pacific.

Chart 1: Breakdown of NDP Diving Activities During FY2005



NOAA fleet divers perform a myriad of tasks from clearing screws, installing tide gauges, and performing hull surveys, to supporting scientific operations, installing and replacing data gathering equipment, and investigating multi-beam contacts. These activities save the NOAA fleet significant time and cost by providing the ability to accomplish underway repairs, maintenance, and tasks to keep operations contiguous throughout the year.

NOAA Ship HI'IALAKAI divers assisted in many projects including monitoring of invasive algae, deployment of various scientific instruments, and support of photo assay of the USS MACAW (Figure 1). NOAA Ship KA'IMIMOANA utilized its divers to assist in recovery and maintenance of the TAO equa-

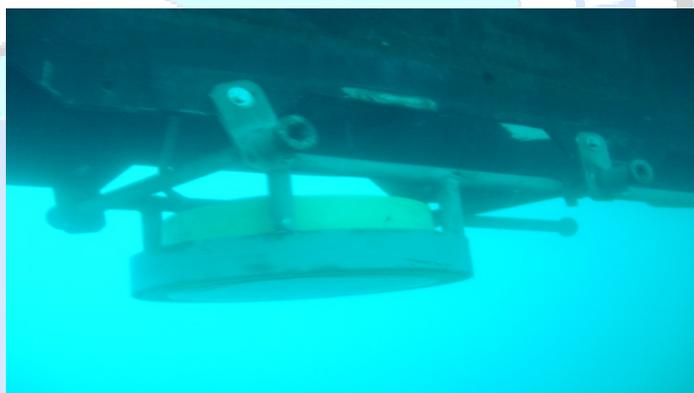


Figure 2: NOAA Ship MILLER FREEMAN's new main transducer pod installed by their working divers.

torial sensor array. Divers from NOAA Ship MILLER FREEMAN were called upon to install a replacement main transducer pod, lost while underway. The work was performed in moderate seas and current utilizing underwater skills and techniques learned in the NOAA Working Diver course. It took five divers and 10 dives to maneuver and install the 250 lb. pod. (Figure 2). This successful operation allowed the ship to continue on with a six-week cruise and saved tens of thousands of dollars.

NOAA DIVING CENTER (NDC)

NOAA dive-related training is conducted at the NDC training facility in Seattle, WA, and in Key West, FL. Dive training programs range from basic Working Diver to advanced specialties that include Divemaster, Nitrox, Visual Cylinder Inspection, and Diving Medical Officer. During FY05, 153 individuals were outfitted, trained, and certified by the NDC in one or more of these specialties. An additional 37 Scientific Divers were certified in the field. Medical courses taught at the NOAA Diving Center included DAN Oxygen Administration, STCW Medical Person-in-Charge, and Diver Medical Technician. An additional 105 individuals completed these classes during the year.

Employees from other federal, state, and municipal agencies frequently enroll in the aforementioned classes on a space-available basis. For the first time a civilian employee of the US Navy was officially authorized to attend the Working Diver training. Other outside agencies that participated in training during FY05, included:

Washington EPA	Washington DOT
King Co. (WA) Sheriff	Port of Seattle Police
Seattle Harbor Patrol	Snohomish Co. (WA) Sheriff
Seattle Fire Dept.	Mercer Island (WA) Fire & Police
University of WA	Alaska Dept. of Fish & Game
LAPD	

Equipment

The NOAA Diving Program's Standardized Equipment Program outfitted 77 new and returning divers, performed annual maintenance and re-issued 404 regulators, and serviced and re-issued an additional 413 Shadow alternate air source regulators.

The NDP was involved in the following equipment-related testing and evaluation efforts during FY05:



Figure 3: NDC's 2nd Containerized Hyperbaric Chamber

- Continued testing of commercial-off-the-shelf dive computers for use with Closed Circuit Rebreathers and open-circuit mixed gas diving operations.
- Constructed and deployed a second, fully self-sufficient, containerized hyperbaric chamber system (Figure 3) to support remote and advanced dive operations. During FY05, the chamber system was deployed to support dive operations off NOAA Ship OSCAR ELTON SETTE .

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 FY05:

- Supported training by the Washington DNR on derelict fishing gear removal. This training was held for the US Navy to develop a program for proper techniques to remove derelict gear from US Naval bases by Navy divers.
- Provided operational support for the US 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 (April), tours for students from Vashon High School (Apr & Sept), provided activities and tours for 58 ten and eleven year-old science students during NOAA Science Camp (June), and provided facilities and training for medical professionals attending a hyperbaric chamber technician course at Virginia Mason Medical Center, Seattle, WA (October).
- Participated in an Earth Day open house for the public on April 29th in Seattle, WA to educate and familiarize visitors with tools and techniques used for NOAA diving.

ACKNOWLEDGEMENTS

Throughout the year NOAA divers regularly "brave the elements" to perform tasks in an environment many would consider hostile or dangerous. Most of the work performed is conducted in cold, dark, murky water and is anything but glamorous. Still, each year NOAA personnel volunteer to participate in such activities, (since the monetary reward for diving is minimal, one can only surmise they do it for the enjoyment and knowledge that their skills also contribute to the overall goals of the agency.) Thanks to the dedication and hard work of the 450+ NOAA certified divers, the NOAA Diving Program is recognized as one of the premiere research diving programs in the nation.