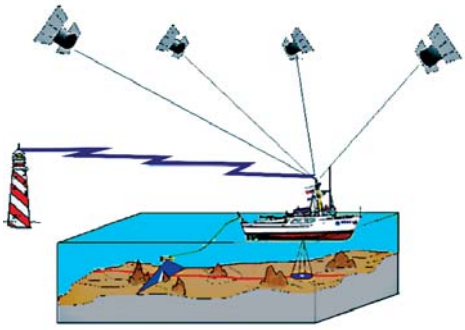
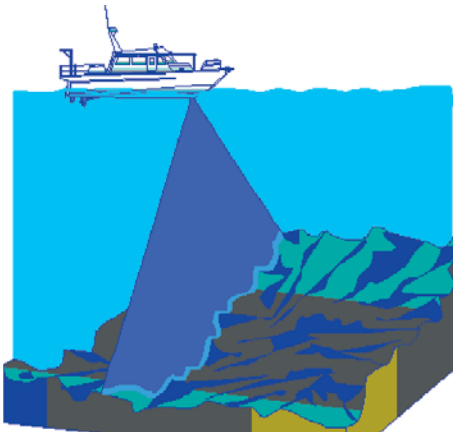
NOAA Ship *Thomas Jefferson*



Exact areas of coverage are determined using DGPS and side-scan sonar.



Launches are equipped with multibeam sonar.

NOAA Ship *Thomas Jefferson* is one of a fleet of research and survey vessels used by NOAA to improve our understanding of the marine environment. The ship is home ported in Norfolk, Virginia, and primarily operates along the Atlantic and Gulf coasts, including Puerto Rico and the U.S. Virgin Islands.

Thomas Jefferson's primary mission is to conduct hydrographic surveys for updating NOAA's nautical charts. Hydrographic surveys used for nautical charting include thousands of systematic depth measurements, as well as positions of wrecks or obstructions in navigable waters. These data are acquired by *Thomas Jefferson* and its two survey launches equipped with specialized echo sounders, multibeam sonars, and side-scan sonars. Data acquisition and processing relies heavily on state-of-the-art computers, specialized software, and highly skilled ship personnel. Commercial shipping relies on accurate nautical charts for the safe transportation of goods such as petroleum, coal, steel, automobiles, grain, and containerized cargo.

DGPS: Surveying with satellites:
Accurate positioning of the ship and launches is critical to the quality of the hydrographic survey. Since 1989, NOAA hydrographic vessels have used the Differential Global Positioning System (DGPS) for surveying. DGPS is based on the Department of Defense's network of Global Positioning System (GPS) satellites. Positions determined by the vessel GPS receivers are corrected using the United States Coast Guard's network of shore-based DGPS radio beacons. DGPS correctors provide the necessary positioning accuracy (3-5 meters) for modern hydrographic surveys, and enable 24-hour-per-day survey operations.

Side-scan and multibeam sonar - Imaging the sea floor with sound:
Side-scan sonar is used in hydrographic surveying to search the sea floor for wrecks and obstructions that could be navigation hazards to surface ships.

The side-scan sonar, resembling a small torpedo, is towed astern of the ship or fixed to the hull of the launches to collect high-resolution pictures or imagery of the sea floor. Sound waves are transmitted out from each side of the sonar in a wide fan. Reflected sound waves generate an image of the sea floor and objects such as wrecks, rocks, or other debris are clearly visible on a computer monitor. Positions of these objects can be accurately determined during processing of the sonar image data. Approximate heights can also be gauged, and are more accurately determined using divers or multibeam echo sounders during investigations subsequent to the initial side-scan survey. Multibeam echo sounders are mounted on the hull of the ship and launches and are used to collect very accurate depths over the entire sea floor.

Ship Specifications

Length:208 ft.
Breadth:45 ft.
Draft: 14 ft.
Displacement: 2054 tons
Cruising Speed: 12 knots
Range: 19,200 nm
Endurance: 80 days
Hull Number: S222
Call Letters: WTEA
Commissioned Officers: 8
Licensed Engineers: 4
Crew: 19
Launched: February 14, 1991
Delivered: January 10, 1992
Transferred to NOAA: March 3, 2003
Commissioned: July 8, 2003
Builder: Halter Marine, Inc.
Designer: Halter Marine, Inc., Moss Point, Miss.

Deck crew lowers side-scan sonar "fish"

One of the ship's survey launches conducts survey operations.

Office of Marine and Aviation Operations

Since NOAA's beginning, NOAA ships and aircraft have played a critical role in the collection of its oceanographic, atmospheric, hydrographic, fisheries and coastal data. This fleet of platforms is managed and operated by NOAA's Office of Marine and Aviation Operations (OMAO), an office composed of civilians and officers of the NOAA Commissioned Officer Corps, one of the Nation's seven uniformed services.

NOAA's fleet of research and survey ships is the largest fleet of federal research ships in the Nation. The fleet ranges from large oceanographic research vessels capable of exploring the world's deepest ocean, to smaller ships responsible for charting the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities, including fisheries research, nautical charting and mapping, and ocean and climate studies. Many of NOAA's research vessels are unique in their ability to conduct scientific research.

NOAA's fleet of aircraft operates throughout the world providing a wide range of capabilities including hurricane prediction research, marine mammal and fisheries assessment, and coastal mapping. NOAA aircraft are modified to carry scientists and specialized instrument packages to conduct research for NOAA's missions.

In addition to research and monitoring activities critical to NOAA's mission, NOAA ships and aircraft provide immediate response capabilities for unpredictable events. NOAA survey ships found the wreckage of EgyptAir Flight 990, TWA Flight 800 and John F. Kennedy Jr.'s aircraft. Our ships, aircraft and personnel have also conducted damage assessments after major oil spills, such as the Exxon Valdez and Persian Gulf War, and after land-falling hurricanes. Following Hurricanes Katrina and Rita, NOAA ships conducted emergency surveys for navigation hazards that helped Gulf ports reopen quickly, and tested the waters for contamination to ensure seafood safety. Aerial images of disaster-torn areas taken by a NOAA aircraft were posted on the Web with a Google interface, enabling residents and emergency workers to see if houses, bridges and roads were still standing.

NOAA Commissioned Officer Corps

The NOAA Corps is one of the seven uniformed services of the United States. It is composed of commissioned officers who provide NOAA with an important blend of operational, management, and technical skills that support the agency's science and surveying programs at sea, in the air, and ashore. NOAA Corps officers, in addition to managing and operating ships and aircraft, are also scientists and engineers. Corps officers serve in NOAA's research laboratories and program offices throughout the Nation and in remote locations around the world. For example, an officer serves as station chief at the South Pole, Antarctica.

About NOAA

NOAA conducts research and gathers data about the global oceans, atmosphere, space, and sun, and applies this knowledge to science and service that touch the lives of all Americans.

NOAA warns of dangerous weather, charts our seas and skies, guides our use and protection of ocean and coastal resources, and conducts research to improve our understanding and stewardship of the environment that sustains us all.

A Commerce Department agency, NOAA provides these services through five major divisions: the National Weather Service, the National Ocean Service, the National Marine Fisheries Service, the National Environmental Satellite, Data and Information Service, and Office of Oceanic and Atmospheric Research; and numerous special program offices. More information about NOAA can be found at http://www.noaa.gov.

Visit the ship's Web site at <www.moc.noaa.gov/tj/>
For more information, contact OMAO at 301-713-1045
or visit our Web site at <www.omao.noaa.gov>