

Recovered British Cannon on Display in Key Largo

Cheva Heck, Communications Manager

During a ceremony held on December 13, the Florida Keys National Marine Sanctuary and the Key Largo Chamber of Commerce unveiled an 18th century British cannon and a series of educational panels that will give visitors a deeper appreciation for the maritime history that lies beneath the waters of the Keys. NOAA manages the sanctuary in partnership with the state of Florida.

“We are delighted to have the cannon on display at the chamber’s visitor center,” said Jackie Harder, president of the Key Largo Chamber of Commerce. “We know our 71,000-plus annual visitors will enjoy it and, at the same time, learn more about the Keys’ fascinating maritime history.”

The cannon is one of 13 first documented near Carysfort Reef off North Key Largo in 1994 by volunteers from the sanctuary’s maritime heritage research inventory team. Little evidence of a shipwreck has been found, leading archaeologists to believe the cannons may have been heaved overboard in a successful attempt to free the vessel from the reef. The cast iron gun was manufactured between 1760 and 1780, weighs more than one thousand pounds, and was capable of firing a four-pound ball.

“Archaeological information and documentation indicates that the cannon has considerable historic significance,” said project archaeologist Duncan Mathewson. “The cannon may have been mounted for defense on a British privateer or naval ship at the time of the American revolution, when the colonies were at war with England and Florida was not yet a state.”

The sanctuary recovered the cannon in 2003. Working with sanctuary volunteers and staff from the National Undersea Research Center, sanctuary managers sought to learn more about the significance of the site through markings and construction details revealed as the conservation process removed centuries of limestone concretion from the gun.

Longtime volunteer Denis Trelewicz, whose research suggested the site dated to the 1700s, paid for the conservation of the cannon by Mel Fisher’s Motivation Inc. laboratory in Key West, and hired cannon expert Lawrence Campbell to construct a replica carriage mount. Trelewicz passed away just over a year ago.

“This Key Largo Chamber of Commerce display stands as a tribute to Denis Trelewicz and serves as an example of the many outstanding contributions made by our sanctuary volunteers,” commented Cmdr. Dave Score, sanctuary superintendent. “We are pleased that our partnership with the business community in the Upper Keys will allow us to reach so many visitors with the message of the importance of preserving our maritime heritage resources.”

The cannon display is located at the Key Largo Chamber of Commerce visitor center, mile marker 106, open daily from 9:00 a.m. until 6:00 p.m.



During a recent ceremony held at the Key Largo Chamber of Commerce visitor center, the 18th century British cannon recovered from Keys’ waters was unveiled. The following persons assisted with the unveiling (from left to right): U.S. Congresswoman Ros-Lehtinen’s representative Debbie Zimmerman, Sanctuary Superintendent Cmdr. Dave Score, Monroe County Commissioner Sylvia Murphy, Sanctuary Southeast Regional Director Billy Causey, former Chairman of the Board for the Key Largo Chamber of Commerce Jim Lupino. The current Chairman of the Board, Mike Shipley, also participated in the unveiling, but is hidden in this photograph.



New Photo Technique Used on Keys Shipwrecks

Tane Casserly, Maritime Archaeologist

Maritime Heritage Program archaeologists deployed a newly developed propulsion sled in April to create high-resolution, photo-mosaics of five shipwrecks on the Florida Keys National Marine Sanctuary's *Shipwreck Trail*. To create the photo-mosaics, the team used a propulsion sled to "fly" over the shipwrecks. At the same time, a camera mounted on the sled captured images of the wreck below. These images were later pieced together with computer software, much like a giant jigsaw puzzle, to create a highly detailed photo-mosaic of the site.



Maritime Archaeologist Tane Casserly operated the propulsion sled to create photo-mosaics of selected Keys' wrecks. Photo credit: Russ Green, Thunder Bay NMS

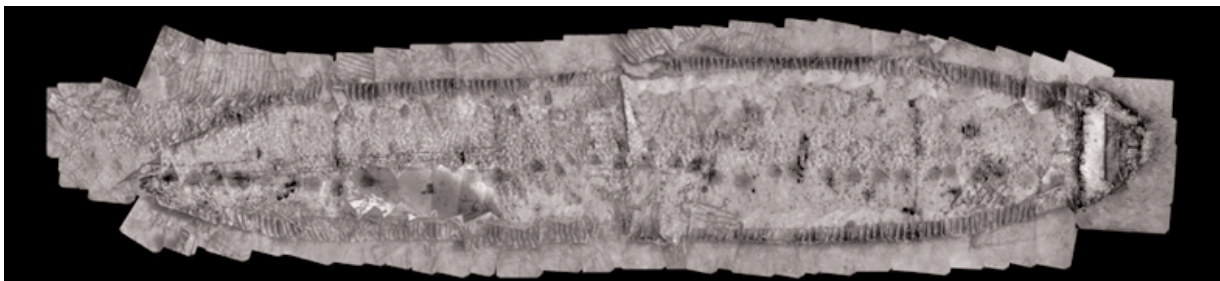
Right now, the *Shipwreck Trail* provides public information on nine different shipwrecks using sketch maps to portray the fascinating sites. Once completed, the new photo-mosaic images will allow the public to view these shipwrecks in their entirety on the seafloor for the first time in unprecedented detail. Five trail sites were photographed using this technique: the *City of Washington*, *Benwood*, *Adelaide Baker Cluster B*, *North America* and the *San Pedro*.

The mosaics also provide NOAA with supplemental archaeological data and serve as a baseline to gauge the effects of hurricanes as well as other natural and human impacts on these historic treasures. This photo-mosaic technique is continually evolving to create the most accurate product possible. It began in 2001 by towing a diver with a video camera behind a diver propulsion vehicle (DPV) using depth gauges to remain at a constant depth. This method proved problematic because shipwrecks with differing levels of relief produced images with differing focal lengths, which made it impossible to accurately piece the images together. Also, turbulence from the DPV's propeller wash caused the video camera to shake.

To alleviate these issues, a video camera and two handheld digital SONAR systems were attached to a Farallon Mk8-Twin DPV sled. The Farallon Mk8-Twin system consists of two Mk8 DPVs attached to a central platform or sled. This unit is designed to transport one or two divers and a significant neutral payload. Because of its wide rigid platform, or sled, the Mk8-Twin is an excellent camera platform for underwater filming. The SONAR aids in creating a more accurate photo-mosaic by bouncing sound waves off the bottom topography, i.e. the deck of a shipwreck, and the reflected sound waves are interpreted as a numeric readout in feet on the SONAR device. This insures that the camera remains at a consistent height over the shipwreck and produces an accurately scaled photo-mosaic of the site below.

Once safely back on the surface, video editing software is used to pull individual still frames from the video. The images are then overlaid one by one and pieced together using computer software creating a photo-mosaic of the entire shipwreck site.

By using this process, the Maritime Heritage Program has created accurate, scaled photo-mosaics of several deep-water shipwrecks in the Thunder Bay National Marine Sanctuary and the *Queen of Nassau* in the Florida Keys National Marine Sanctuary. Photo-mosaics provide unparalleled access to our nation's underwater cultural heritage and are just another way the national marine sanctuaries is proving its leadership as the steward of America's ocean treasures.



The wreck of the *Benwood* was one of the shipwrecks on the *Shipwreck Trail* photographed using the newly developed photo-mosaic technique, which allows one to see the entire 360 foot ship in one photograph.

Water Quality Answers for the Florida Keys



The coral reef ecosystem, with its teeming fish populations, thrives in clean water that is relatively low in nutrients.

Photo: Larry Benvenuti

1. What is meant by the term “water quality”?

The term “water quality” is used to describe the condition of the water. It can be used to describe the chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose (i.e., drinking, swimming, or fishing). Water quality can also indicate the concentrations of substances in quantities above their natural background levels that could negatively affect plant and animal life (pollution) and the presence of substances like pesticides that are not usually found in water (contamination).

2. What factors or parameters are used to describe water quality in the Florida Keys?

The following factors are often used to provide a measure of water quality: the concentration of dissolved oxygen (DO); the level of fecal coliform bacteria from human and animal wastes; the concentrations of plant nutrients nitrogen and phosphorus; the amount of particulate matter suspended in the water (turbidity); the concentration of salt (salinity); and the amount of chlorophyll pigment filtered from microscopic algae living in the water column. Pesticides, herbicides, heavy metals and other chemicals may also be measured to characterize the water quality.

3. Why is good nearshore water quality important to people?

Untreated or poorly treated stormwater and sewage can pose a health risk for humans and, at times, have resulted in beach closures. When present in high enough levels, fecal coliform bacteria, which are found in human intestines and are easily measured in the environment, are an indicator of untreated or minimally-treated sewage. These bacteria are not usually harmful, but can indicate the presence of other disease-causing organisms carried in the human intestine, such as cholera, diphtheria, and *Escherichia coli* and streptococcal

diseases. Because fecal coliform bacteria do not survive long in marine waters, their presence in marine systems is considered an indicator of *recent* fecal contamination.

4. Why is good water quality important to marine life?

Good water quality is essential to a healthy coral reef ecosystem in the Florida Keys. Tropical marine hard bottom, seagrass, and coral reef communities thrive in clean water that is relatively low in nutrients (nitrogen and phosphorus). Wastewater or stormwater high in nitrogen and phosphorus favors those plants and animals that thrive in nutrient-rich conditions, and over time this can change the nature of the coral reef or seagrass meadow. A coral reef that is exposed to too much nitrogen is usually covered with algal growth that competes with the living corals for space and sunlight. This visible change in ecosystems due to excessive nutrients is called eutrophication, which means “too much food.”

5. Why do our actions have such an immediate and direct impact on water quality?

In the Keys, the groundwater and nearshore surface waters are closely connected. Wastewater from septic systems and cesspits seeps into the surrounding porous limestone rock and pollutes the groundwater. The polluted groundwater seeps into nearshore marine waters where it introduces excessive nutrients and even harmful bacteria. The ebb and flow of the daily tidal cycle creates the force that drives this fairly rapid (hours to days) exchange between ground and surface waters.

Stormwater is a major source of pollutants in the Keys. Stormwater is washed from the land into nearshore waters, where it introduces organic debris, silt, nutrients, metals and oils, and sometimes pesticides, herbicides and fertilizers. *(continued on p. 12)*



Reef Restoration Takes Many Forms at M/V *Wellwood* Site

Cheva Heck, Communications Manager

For the past two decades, the Florida Keys National Marine Sanctuary has led the world in developing techniques to restore corals reefs damaged by vessel groundings. On Molasses Reef, the grounding site of the M/V *Wellwood* is one such reef restoration project. Now, a comprehensive effort to monitor the recovery of this major grounding site documents the structural stability of this project, as well as its success in attracting juvenile hard and soft corals and other marine life. The reef restoration modules have withstood not only winter storms, but the effects of four hurricanes passing by the Florida Keys in 2005 alone.

The most encouraging news is that juvenile hard and soft corals are settling on the reef restoration modules, both on natural limestone and concrete surfaces. If this continues and the corals survive, coral populations in the restored area should begin to match those of the natural reefs over time. Surveys of fish, as well as lobster and other invertebrates, demonstrate that the design of the reef restoration modules provides ample habitat for an array of species to survive and thrive. Other restored sites are also being monitored regularly by sanctuary biologists. Funds collected from responsible parties through legal settlements pay for the monitoring program.



Limestone rocks and concrete were used to build reef modules to fill in large excavations left behind at the site.



Staghorn coral “branches” were transplanted to one module on site in 2004 to promote recovery. The corals were originally cultivated in a nursery maintained by marine life collector and SAC Co-chair Ken Nedimyer. Photo: Jeff Anderson



During the monitoring surveys, new coral recruits growing on the reef modules like this young *Montastrea cavernosa* were recorded and measured. The scale shown is in centimeters. Photo: Jeff Anderson



Sanctuary Restoration Biologist Harold Hudson, designer of the reef restoration modules, measures the new coral growing on one of the 22 reef modules placed on the site. Photo: Jeff Anderson

Frequently Asked Questions about Water Quality

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Impervious surfaces like roads, bridges and most parking lots contribute to stormwater runoff; but significant runoff also occurs from yards and other landscaped areas.

Dead-end or poorly-flushed canals also contribute to poor nearshore water quality in the Keys. Stormwater runoff and wastewater from septic tanks find their way into canals. Tidal currents cause canal waters to flow into nearshore marine waters.

6. What activities/practices are negatively impacting water quality in the Florida Keys?

High nitrogen concentrations from untreated or poorly treated wastewater are entering canals and nearshore surface waters and causing eutrophication of seagrass meadows and coral reefs in some areas. At times, poorly treated sewage is introducing potentially harmful bacteria into Keys canals and beaches. Stormwater from land is washing pollutants and contaminants into nearshore waters where they may affect corals, seagrass and other biological communities.



Nutrients in marine waters promote the excessive growth of macroalgae that can compete with the corals for living space.

7. What can my family and I do to help protect and improve water quality?

You can support and participate in advanced wastewater treatment programs that remove unwanted nutrients and harmful bacteria. You can also use “pump-out” stations for your vessel’s sewage and always observe the “No-Discharge” Zone. Landscape your lawn or business to include native plants and reduce or eliminate the use of fertilizers. You can also slope or construct berms on your property to reduce the runoff of fertilizers or yard wastes into nearshore waters. Never dispose of fish carcasses or other organic waste into canals. Use as many “green” products as possible, such as phosphate-free soaps and detergents, and dispose of your household chemicals and hazardous wastes according to label instructions.

Find out more by reading EPA’s fact sheet *Coral Reefs and Coastal Watersheds* at: <http://www.epa.gov/owow/oceans/factsheets/fact4.html>.

Learn about green products by visiting: www.epa.gov/epp/pubs/about/about.htm.

8. What is the Water Quality Protection Program (WQPP), and what is its relationship to the Florida Keys National Marine Sanctuary (FKNMS)?

In the Act that created the Florida Keys National Marine Sanctuary, Congress directed the U.S. Environmental Protection Agency (EPA) and the State of Florida’s Department of Environmental Protection (FDEP) to develop a Water Quality Protection Program (WQPP) for the sanctuary. The purpose of the WQPP is to recommend corrective actions that restore and maintain the water quality conditions needed to maintain healthy native plant and animal populations in sanctuary waters.

9. What are some of the major accomplishments of the WQPP?

In 2002, state waters of the FKNMS were declared a “No-Discharge” zone for vessels. Since then, the new vessel pump-out facilities have processed thousands of gallons of wastewater that would have otherwise gone untreated into nearshore waters. Thousands of pounds of nitrogen and phosphorus are also being kept out of Key West waters each year now that Key West is using advanced wastewater treatment. However, many Keys residents and businesses still need to upgrade their wastewater treatment systems in order to meet the treatment standards set by the State of Florida by the 2010 deadline.

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