

Cast Iron, Salt Air, and 140 Years of Exposure: Cannon at Dry Tortugas



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Fort Jefferson, Dry Tortugas National Park (NPS Photo)

Project Location: Fort Jefferson is located on Garden Key, one of seven small islands within Dry Tortugas National Park. The 100-square mile park is located c. 68 miles west of Key West, Florida, and is accessible only by boat or seaplane. Surrounded by a moat, entrance through the fort is by a small sally port. Twelve National Park Service (NPS) employees live at Fort Jefferson year round. Electricity is provided by three diesel generators and drinking water is created through reverse-osmosis treatment of rainwater. All food, materials, supplies, and equipment must be brought to and from the park by NPS supply boat. In 2014, the park received 64,865 visitors.

Historical Background: Construction of Fort Jefferson began in 1846 and continued for 30 years. The location was chosen for its deep harbor and to protect key shipping lanes in the Straits of Florida and the Gulf of Mexico. The fort remained in Union hands during the Civil War and was used as a prison. In 1872-1873, one 15-inch smoothbore Rodman gun was mounted at each of the fort's six bastions and four 300-pounder rifled Parrott guns were mounted on three fronts.

The U.S. Army garrison left Fort Jefferson in 1874. In 1900 the War Department sold the ordnance stores, including the cannon, carriages, ammunition, and associated equipment, to Henry A. Hitner's Sons, an iron and steel scrap dealer from Philadelphia for \$14,054.20. By 1913, only the largest Rodman and Parrott guns remained. Removing these ten guns appeared to be more trouble than they were worth. The iron carriages were salvaged and the large guns were left behind.

Nationally Significant Collection: The park's museum collection includes six of the twenty-five 15-inch Rodman guns known to survive, and four of the thirteen surviving 300-pounder Parrott guns. With most guns going to World War II scrap metal drives, the Fort Jefferson guns represent c. 25% of the extant guns of each size. These Parrott guns were manufactured at the West Point Foundry in 1864-1865 and the Rodman guns were cast in Boston in 1871.



15-inch Rodman gun, before treatment (EVER 4579)



Guns mounted at Fort Jefferson, c. 1898 (DRTO 300573)



Carriages were sold for scrap and the guns lay in the sand for 100 years (EVER 7128)

Conservation Challenges: Logistical and professional challenges that had to be addressed in the proposed treatments included:

- Remote location of the national park.
- Design limitations of the historic fort.
- Working in a national park with its sensitive cultural and natural resources.
- Limited NPS infrastructure, utilities, and staffing on site.
- Heat, humidity, rain, storms, and hurricane season.
- Location of the guns on the terreplein of Fort Jefferson (c. 45 feet above parade ground).
- Size and weight of the objects (c. 25-ton Rodman and c. 11-ton rifled Parrott guns).
- Condition of the guns, which exhibited extensive corrosion.
- Ability to retreat in the future.
- Sustainability of the treatment in the harsh marine climate.

Treatment Methodology: The NPS requirement was for abrasive blasting over other approaches which were deemed impractical for this project. Conservation protocols were:

- Mechanically remove delaminating and heavy oxidation using ball peen hammers.
- Mechanically reduce the larger areas of oxidation with hand-operated pneumatic chisels worked along the surface of the cannon at 30-45 degrees at 100 psi.
- Further work the cleaved areas to reduce oxidation using hand-held needle scalers operated at 100 psi.
- Blast all exterior surfaces with 80 mesh garnet medium, using a Lindsay 25 with a 1/4" ceramic nozzle at approximately 100 psi.



Coating System: NPS requirements were for a long-term stable primer and paint system that would withstand the harsh environment for a minimum of five years. In consultation with Keith Lucas, director of the Center for Corrosion Science and Engineering at the Naval Research Laboratory, Amercoat 68HS was selected. This zinc-rich, epoxy-based primer is designed for outstanding resistance in a marine environment.

The paint used is PPG Amercoat PSX® 700, an engineered Siloxane coating designed for weather resistance and corrosion control in a marine environment. A glossy black paint was chosen based on historic photographs and military manuals, both of which suggest that "lacker" applied to the guns would have left a shiny appearance.

Bore Treatment: After removal of debris, the interior of the bore was flushed with compressed air and swabbed with Ship-2-Shore®, a semi-liquid dielectric barrier coating that prevents corrosion in aggressive environments.

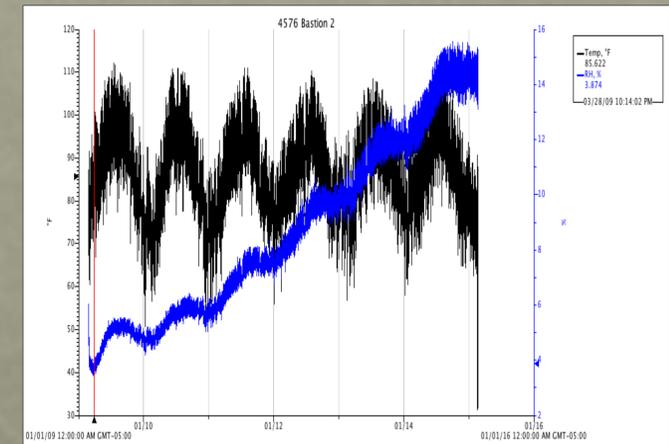


Uncovering History: Examples of some of the marks revealed during treatment.

Photographs, clockwise from top left: Weight of Rodman gun; Mis-struck stamp; U.S. stamp; Robert P. Parrott stamp; Number on right rimbase face; Ordnance officer and date; Graffiti from 1919; Muzzle face markings for Parrott.



15-inch Rodman gun, after treatment (EVER 4579)



Bore microclimate data, 2009-2015 (EVER 4576)

For More Information: Waterways TV show, episode 265 "Fort Jefferson Preservation" is available on YouTube at <https://www.youtube.com/watch?v=M5VqlcHxD90>