

LOG

THE KEEPER'S

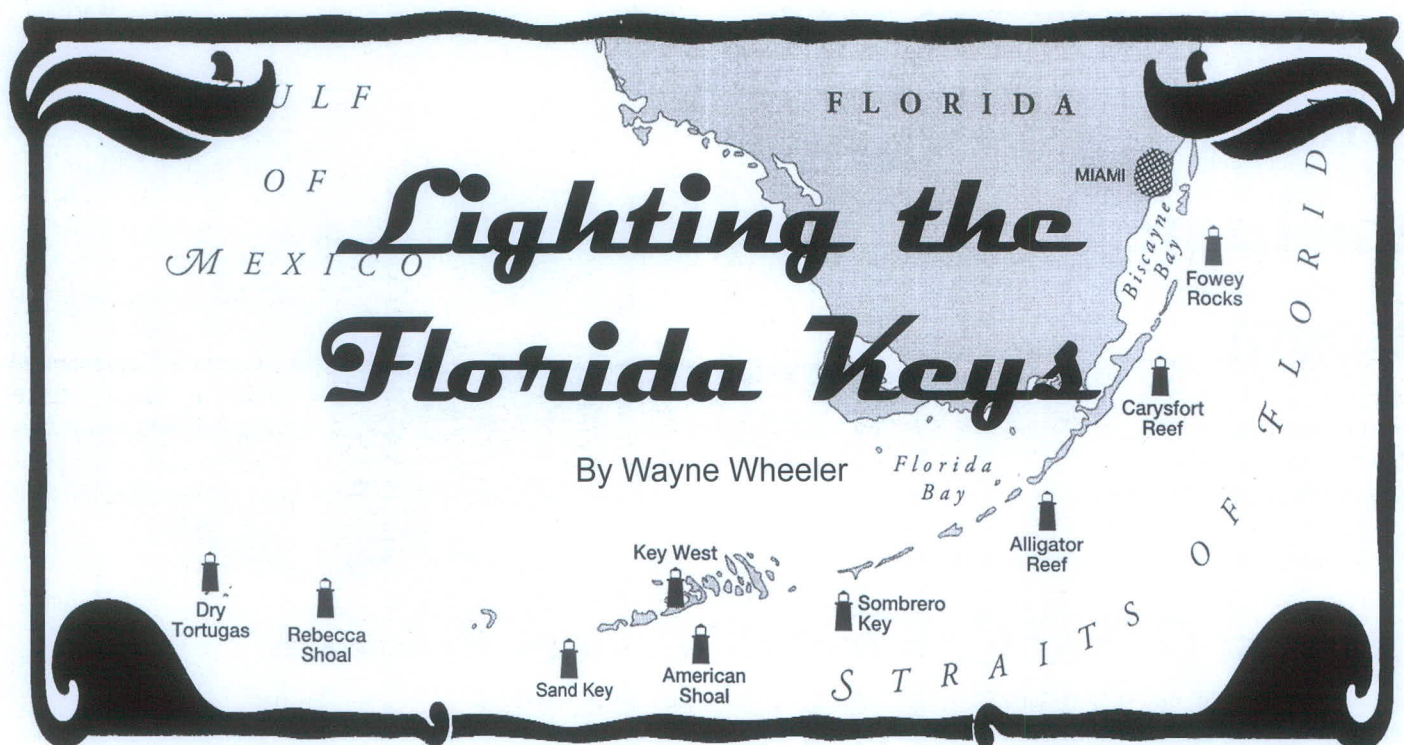
VOLUME XXVIII

NUMBER ONE, 2011



- Lighting the Florida Keys
- St. Marks Lighthouse
- Execution Rocks Lighthouse

- The Nose of the North
- Lighting Vessels at Night
- The Warden of Machias Seal Island



any of the Spanish vessels returning home with treasures looted from the people of Central and South America never made it back to Spain. Storms and hurricanes, uncharted reefs, poor or nonexistent charts, strong currents, and the low-lying keys and reefs of the southern Florida coast took their toll.

The frequency of ship wrecks along the Florida Keys was so often that "wrecking" (plundering valuables from wrecked ships) was big business for many years. Pirates also lurked among the Keys, often displaying false lights to entice the passing ships onto a lee shore. Even New England fishermen ventured to the area to partake of the wrecking business after the United States acquired the Florida Territory in 1819.

In 1821 a New Jersey merchant named Simonton purchased the farthest west isle of the Florida Keys, Key West, for \$2,000. He recognized the economic potential of Key West as a wrecking center. Early in 1822 President James Monroe declared Key West as a port of entry. It became a naval base and depot for wrecked property about a year later. Commander David Porter set up the West Indies Squadron to suppress piracy.

Key West was the deep, protected harbor south of Charleston and it was at a strategic location near the Gulf of Mexico, the Gulf Stream and Florida Straits. Simonton erected warehouses, shipyard repair facilities, stores,

and houses, all to engage in the wrecking business of receiving salvaged property and repairing damaged vessels.

Wrecking (the salvaging of wrecked ships and selling its cargo) was big business in the Keys. For years mariners from the Bahamas were the principal recipients of the spoils, even after America acquired the Florida Territory. By 1823 the American mariners were fed up with the foreign competition and pressured the Florida Legislature to take action. In 1823 the legislature pleaded with Congress to enact a law that would only authorize American mariners to be awarded salvage through arbitration. The law was passed that stated that any vessel would be "...forfeited if engaged in carrying any property, whatever, taken from a wreck on the coast of Florida to any foreign nation." Further, that all salvage property was to be taken to a U.S. port of entry. Key West was that port, and because of this lucrative business realized dramatic growth. In one year in the 1820s almost \$300,000 worth of salvaged property was sold at auction at Key West (\$8.8 million in today's money).

The West Indies Squadron at Key West (established in 1823) began to suppress piracy, leaving the third problem of lighting the Keys to be accomplished. Lighting the Keys (providing adequate aids to navigation) was a double-edged sword. While cargo, and lives, would be saved, the wrecking business would decline.

The Florida Keys extend from the Miami area 175 miles to Key West. Although the initial primary traffic was Spanish, vessels from many nations eventually began to ply the waters as the islands of the Caribbean developed. Trade with the United States between Jamaica, Cuba, Puerto Rico, and other islands grew as the need for sugar, rum, and slaves increased. However, there were no aids to navigation and the charts were inadequate.

After becoming a territory in 1819, the federal government was slow to act in establishing aids to navigation. Eventually the Army Corps of Engineers Coast Survey (funded by a \$6,000 appropriation from Congress) began to chart the newly acquired territory. The first lighthouse erected in Florida was at Cape Florida, close to Miami.

On April 2, 1824, Congress authorized funds for certain aids to navigation in the Florida territory: "For a light-house on Sambo keys, in the Territory of Florida, sixteen thousand dollars, for a light-vessel at Careysfort Reef, twenty thousand dollars; for the light-houses directed to be built, one on the Dry Tortugas and one on Cape Florida...a sum for each not exceeding sixteen thousand dollars."

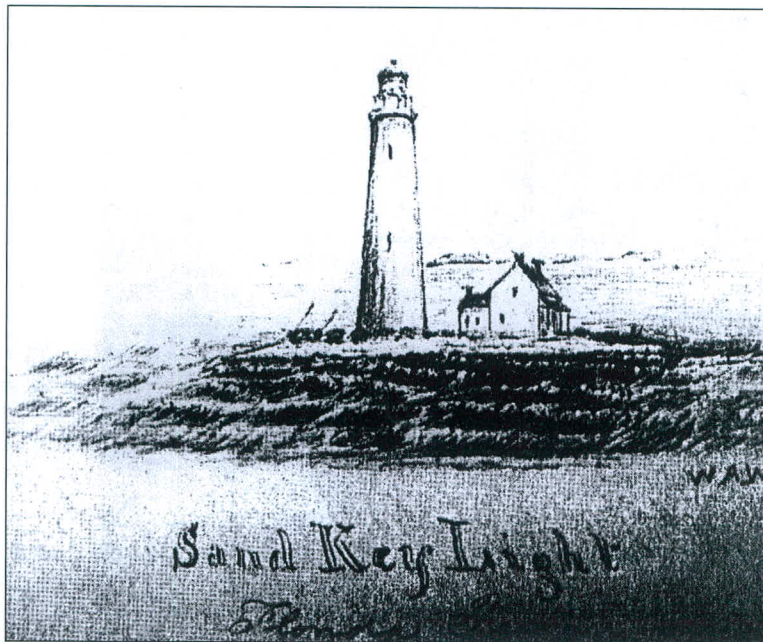
The first designated to be constructed was for Sambo Key, about seven miles east of Key West. Due to lack of contractors and materials in Florida, a Boston firm was selected. The ship of the company awarded

the contract sailed loaded with materials and personnel, but it never arrived in Florida, presumably lost at sea. The following year a second vessel departed Boston, arriving at Key West. The contractor requested that the government representative at Key West, Navy Commander Porter, designate the site for the lighthouse on Sambo Key. Knowing that the key was inundated at high tide and unstable, Porter selected a site on Key West.

Before the Key West Lighthouse was finished, construction began on the Cape Florida Lighthouse. That light station was completed in 1825, one year before the station on Key West. At about the same time, a light vessel was placed off Carysfort (later spelled Carysfort) Reef the same year. The lightship served until 1852 when the screw-pile lighthouse was constructed.

The next lighthouse erected in the Florida Keys was on Sand Key, a small islet nine miles southwest of Key West. Sand Key is a low-lying sand isle approximately 150 to 200 yards long and 50 yards wide. It is constantly changing size and shape due to currents and storms. The Lighthouse Service, possibly not realizing the danger of hurricanes, made the mistake of constructing a brick lighthouse on this low-lying islet of shifting sand. In 1826 Congress appropriated \$16,000 for the project. It was completed in 1827. It is amazing that it stood until 1846, when it was swept away by a hurricane with the loss of the keeper and his guests. Except for Key West, none of the isles that make up the Florida Keys have a sufficient foundation to support a masonry-style lighthouse. It was the skeleton screw-pile design of the Carysfort Reef Lighthouse, designed by I.W.P. Lewis, which paved the way for the six tall skeleton structures that have successfully lighted the Keys for more than 150 years.

The screw-pile design was invented by the Englishman Alexander Mitchell. The foundation of this style consists of (usually) eight iron piles forming an octagon with a center



Drawing of the original Sand Key Lighthouse. USLHS archives.

pile. Each pile is tipped with a broad flat disc (about two feet in diameter) shaped like a screw. As the piles are driven into the bottom (sand, mud or, in the case of the Florida Keys, coral) they literally screw themselves in. In some instances the piles (without the screw tip) are driven through an iron disc up to eight feet in diameter; the disc lies on the bottom and provides additional (lateral) support. The foundation piles are then tied together with cross braces. The first screw-pile lighthouse in the U.S. was the Brandywine Shoal Lighthouse in Delaware Bay, completed in 1850 (see *The Keeper's Log* Vol. 15, No.4). The first pile lighthouse was the original Minor's Ledge off Cohasset, Massachusetts. However, the piles, in this case, were set into holes that had been made in the Cohasset Rocks ledge.

Carysfort Reef was named for the British ship HMS *Carysford* (d later changed to a *t*), which grounded at that location. The original design for the Carysfort Reef Lighthouse was by Winslow Lewis, who had been furnishing the government with lighthouse apparatus since 1812. He also obtained most of the contracts to construct lighthouses as America expanded its aids to navigation system. Unfortunately, not being an engineer or architect, most of his structures were of poor quality and many failed. His idea for Carysfort was a large, heavy conical brick structure that would probably have collapsed

during the first hurricane to strike the area. Fortunately, the government selected the design of his engineer nephew, I.W. P. Lewis, who had inspected lighthouses for the government in the 1830s and 40s and was often critical of his uncle's designs and workmanship.

Congress appropriated funds for the lighthouse on March 31, 1847, "For a light-house at Carysfort Reef, the sum of thirty thousand dollars, heretofore appropriated and carried to the surplus fund, is hereby expropriated."

Major George Meade (later to command federal forces at Gettysburg) was assigned as construction engineer. He described the 112-foot high lighthouse as "... composed of a frame work of 9 iron piles. Occupying the center and angular points of an octagon of 50 feet diameter and tapering from 50 feet at the base to 19 feet at the top. The dwelling house...the sides having the same inclination as the piles...the floor 33 feet about the low water, and the house



The Carysfort Reef Lighthouse circa 2002. USLHS archive photo.

of two stories is 20 feet high. From the top of the house to the Lantern is a cylindrical Tower for a stairway 38 feet high. The whole structure is painted red—except for the piles which are black...”

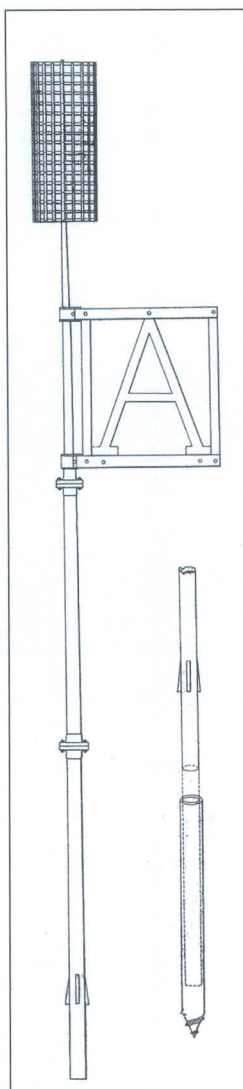
The unique aspect of this lighthouse was the use of screw piles, one of the first uses of a design invented by English engineer Mitchell. The ends of the piles were literally large screw shapes. As they were driven they screwed the ends of the piles into the coral reef providing solid support. This design was successfully used throughout the Chesapeake Bay and at some other locations. The lighthouse first went into operation on March 10, 1852, and the nearby lightship was retired.

A dangerous low-lying reef runs parallel to and south of the Florida Keys for their entire length. In light weather, especially after long easterly storms, the Gulf Stream crosses the dangerous reef. During the days of sail, should a mariner not pay attention to his course and venture too close to the low-lying reef, the vessel could be caught up in the current of the Gulf Stream and run aground.

In 1855 James Totten, assistant superintendent of the U.S. Coast Survey (who supervised the construction of the second Minot's Ledge Lighthouse in 1860), surveyed the length of the reef and established day beacons to assist mariners, at least during daylight hours.

He wrote to his superintendent, Professor A.D. Bache:

Dear Sir: I have the honor to report that [per] your instructions of January 20, 1854...I have caused a number of screw-pile signals or beacons to be constructed, and have had them erected along the Florida reef. [These were unlighted day beacons.] The complete signal...is made entirely of cast and wrought iron and is 36 feet in vertical height. Each signal consists of a screw-pile and a vertical shaft of 36 feet above the top of the pile. [The top section] or spindle carries a vane of wrought-iron, and a cylinder or barrel of strong hoop-iron...the vane represents one of the letters of the alphabet...the cylinder or barrel is six feet in length...The signals are located on the most projecting and dangerous points of the Florida reef. And stand, generally, from four to six miles outside shores of the Florida Keys...In daytime these signals cannot fail to attract the attention of careful navigators and warn of their proximity to danger. The depth of water where the signals stand does not exceed four feet in any case at low tide.



Drawing of Totten's day beacons. USLHS archives.

lighthouses.

In 1853 the Sand Key masonry lighthouse, destroyed in the 1846 hurricane, was replaced by a skeleton tower superintended by George Meade. The new tower was about 130 feet above the water. The dwelling within the skeleton structure contained nine rooms, each 12 feet square. The floor and ceilings were wood and the roof corrugated iron. One room was used to hold a cistern of 5,000 gallons of water and another room 1,000 gallons of oil. Rainwater from the roof was fed into the cistern. In later years the health of keepers was affected due to the roof being painted with red lead, although Meade wrote in his report, "There is no doubt the house will be constantly supplied with good water." A stairway was installed in the center room of the house that led to the watch room and lantern (112 steps).

The 14 beacons were lettered from *A* at Sambo Key (near Key West) to *P* at Fowey Rocks (off Miami). The letter *I* was skipped as it appears as a "one."

The construction of these beacons may have been an inexpensive effort to establish more aids to navigation in the area. But they clearly were of little use during periods of darkness or inclement weather. One has to wonder just how long they lasted during the heavy "blows" that frequent the region.

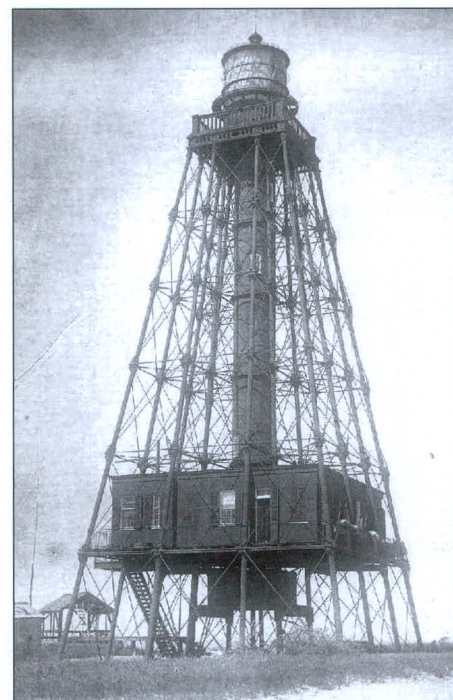
In any event, more lighthouses were clearly needed. Eventually, the beacons at American Shoal, Alligator Reef, and Fowey Rocks were replaced with

Meade's reports were detailed and accurate. His description of the Fresnel lens he installed so impressed the Lighthouse Board that he was invited to New York to assist in exhibiting the lens in the Crystal Palace Exhibition of 1853. He wrote to the board, "Many thanks for your complimentary notice of me...I will cheerfully attend...with two provisions - 1st that it is made a matter of duty (in lieu of leave from the Army). 2nd that it is not to cost me anything. This latter is an imperative condition with me, I don't ever ask to make money. I only compromise that I shall not sink any."

The keepers of the reef lighthouses were furnished with a pulling boat and a small sailboat to enable them to communicate with Key West for mail and supplies.

The newly organized (1852) Lighthouse Board made a decision to install Fresnel lenses in all new lighthouses and replace the antiquated system in all previously constructed lighthouses throughout the nation. Sand Key received a first-order revolving lens with a FVF (fixed varied with flash) characteristic: one minute of steady white light, followed by a flashing white light of ten seconds. The lighthouse was placed in operation on July 20, 1853.

The first hurricane that the new Sand Key station encountered was in 1856. The *Annual Report of the Light-House Board* noted that,



The second Sand Key Lighthouse. U.S. Coast Guard undated photo.

“...many lives were lost and much property destroyed and damaged...the sand island, upon which Sand Key Light-house was, with the wooden buildings, wharf and boats, destroyed, leaving, however, the light-house tower uninjured.” The small islet remained inundated for some time. In 1865 another hurricane again carried away everything on the island except the tower.

In 1870 the famous Twin Hurricanes swept through the area. The first one did only little damage. But the second blow swept the island away, again the tower remained.

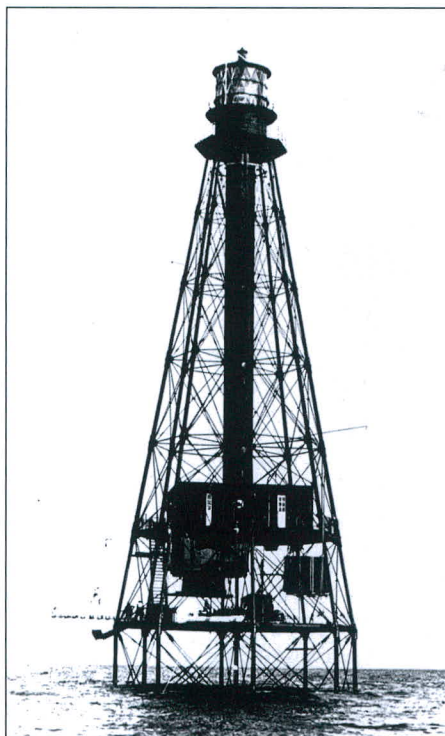
In 1910 another devastating hurricane hit. Keeper Doharty reported:

The station was visited by two severe hurricanes...the wind velocity steadily increased and much rain fell...Waves began to wash over the island and soon sand was carried from under the light-house, and the island shifted to a position further north...and outhouse was washed away...the wharf and wood pile were washed away and the lighthouse began to sway in the gusts...great trouble was experienced in keeping the doors closed on the windward side, the force of the wind pulling out nails repeatedly...the boat house was pulled to pieces and washed to sea. At 1:30 p.m. the brick oil house broke up...braces at the bottom of the lighthouse began to break, and the force of the waves kept striking them against the other iron like sledge hammers.

But in the end, the tower stood, once again testament to the outstanding design.

The next tall pile lighthouse constructed in the Florida Keys was at Sombbrero Key. Meade was again in charge of overseeing the project. From the beginning, West Point cadets like Meade were trained as engineers to enable them, in time of war, to erect fortifications, bridges, and the like. During peace time the Army officers were assigned to the Coast Survey, as topographical engineers and in the construction of federal projects. It was generally considered a “feather in their cap” to have an assignment like overseeing the construction of a fort, marine hospital, or lighthouse.

The need for more navigation aids along the Florida Keys was apparent when reports from underwriters listed the yearly losses. In 1856 one report noted that during that year 71 vessels were lost in the Keys, resulting in a loss of cargo valued at nearly \$4.5 million dollars (\$11.7 million in today's dollars).



Sombbrero Key Lighthouse. U.S. Coast Guard photo.

Initially Meade thought that a masonry structure was possible for Sombbrero Key. He worried about the corrosive action of the salt environment on a pile structure. But when he costed out a masonry structure of sufficient size to withstand the elements, the price was enormous and he concluded that a pile structure would suffice as long as the diameter was large enough and the Lighthouse Service provided proper maintenance.

From the onset difficulties were encountered, not in construction, but financing. While Congress authorized the project, it did not provide ample funds for the entire project. Meade provided a detailed cost estimate that included everything from the manufacture of the iron portions by a Philadelphia iron works to the cost of transporting the material to the site with a 10 percent contingency amount, something that most contractors include in today's projects. His estimate was \$118,405.60. He reasoned, “One disaster, such as the loss of a vessel freighted with materials required to sail over 1,400 miles, and through part of her voyage, the Florida Gulf [stream], as dangerous as any navigation in the world, might of itself swallow up the whole contingency, and such a catastrophe is by no means improbable.”

As it turned out, the contingency was

needed as a hurricane struck the Keys on August 29, 1856. The works were partially destroyed, and Meade almost had to start from scratch.

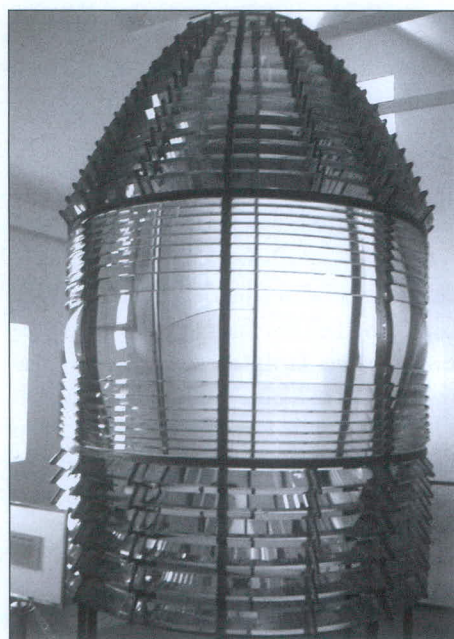
Similar to most other lighthouse pile structures, the base was in the shape of an octagon and 56 feet in diameter. The piles (without a screw base) were driven through an eight-foot-diameter disc 10 feet into the coral. The finished structure was the tallest to date along the reefs. An enclosed circular stairway of 133 steps led from the quarters to the lantern.

Because the lens at Carysfort Reef and Sand Key were revolving, Meade chose a fixed first-order Fresnel lens for Sombbrero Key. On March 17, 1858, the light was displayed for the first time. The final cost of \$153,158.81 was considerably more than Meade had originally estimated.

In addition to overseeing the construction of the lighthouse, Meade also outlined (and usually purchased) all the furnishings for the station. He recommended two boats for each lighthouse: a small rowboat and a sailboat to allow keepers to journey to Key West to obtain supplies and mail and to visit their families. Generally families did not reside at the lighthouses of the Florida Keys. For some reason only a sailboat was assigned to Sombbrero Key, and on one occasion this proved fatal.

In July 1873, Assistant Keeper Richard White took the station sailboat and headed to Key West to retrieve his pay, mail, and some supplies. The keeper recorded the following in the station log.

We saw nothing more of him or the boat until August 6 at 10 a.m... We discovered the boat was coming from Hogg Key. It was blowing fresh and begins to get squally. At 10:30 we saw the boat when it was struck by a squall and instantly capsized. After a few minutes the squall passed over. We saw the man floating on the capsized boom and sail of the boat. The boat was capsized still floating a few yards away from him. He was very visible for at the time of the accident he was not over 1 ½ miles from the lighthouse. The tide set in toward us, until we could distinctly see his features and could he have assisted the spar that bore him up by swimming in the least he would most assuredly reached the [light] house. The tide turned against him and swept him in a west southwest direction about four miles from us. This was about 3:30 p.m. at which time we lost sight of



The first-order lens from the Sombrero Key Lighthouse in 2006, on display at the Key West Lighthouse and Museum. Photo by Marie Vincent.

him altogether...as soon as the boat capsized we hoisted the ensign from the top of the tower to attract the attention of three little turtles or spongers that were cruising about outside of Knight's Key, but no one came on that day...At 4 p.m. the steamer *Clyde*, Captain Kennedy, finally hove to and sent his boat and crew to whom I imparted the news and also delivered the letters relative to the casualty to the official in Key West.

August 14, Mr. Babcock, chief engineer of the Lighthouse department of the district, having heard of the calamity and on his passing seeing that we were not as yet supplied with a boat to take either my assistant or myself on shore in case of any emergency...very kindly came and brought a good and sufficient boat and left a man, an old lighthouse keeper, Mr. William Bates, to assist me.

With the completion of Sombrero Key Lighthouse, Meade was finished with lighthouse construction along the Keys. There were still three major lighthouses to construct, but before Congress could act, the Civil War interrupted further development. In some cases the war caused the destruction of lighthouses. The South wanted to deny the Union from using them as navigation aids to assist the blockade, and the Union wanted to deny the South from using them as lookout towers.

In 1820 a 77-ton schooner named the *USS Alligator* was launched in the Boston Naval Yard. She was assigned to stop the illegal

slave trade off the African coast and to cruise the Florida reefs to hunt the very active pirate activities. In November of 1822, the *Alligator* went hard aground on a Florida reef. Lieutenant John Dale, captain, and his crew stayed with the vessel for three days attempting to refloat the vessel. He finally gave up when the American brig *Anna Maria*, seeing the situation, offered assistance. Lieutenant Dale transferred his 12 cannons and other valuable ship's equipment and stores, and then blew up the vessel rather than allowing the pirates to make use of her. Hence the name Alligator Reef.

In 1870 Congress finally appropriated funds to construct a lighthouse on Alligator Reef. The construction crew set up camp and work spaces on nearby Indian Key. The iron work was manufactured and shipped from Cold Spring, New York.

The site chosen from the lighthouse was on the northeast end of Alligator Reef and about 200 yards from the deep water of the Gulf Stream. Construction moved forward fairly smoothly except when heavy waves broke over the reef, denying the crew the ability to land. Once work was also postponed due to a lack of funds. An additional amount of \$25,000 was finally appropriated and the lighthouse was finished and in operation on November 25, 1873. A first-order Fresnel lens was installed that provided a characteristic of a flashing white light every five seconds, with every sixth second flashing red. This characteristic would differentiate the Alligator Reef Lighthouse from Sombrero Key.

Of course the presence of aids to navigation and the new lighthouses with their far reaching lights did not preclude an occasional wreck on the reefs. Mariners, even with good charts and ample aids to navigation, will occasionally make a fatal error or weather will take a toll.

In June of 1874, Keeper George Billberry, Jr. reported one of the first groundings after Alligator Reef became operational. An English vessel carrying lumber was blown aground by a storm near the lighthouse. In September his log reads: "Blowing a gale all night, heavy rain squalls, sea running very high and breaking heavy around the station...three masted schooner *Florence Rogers* from Jamaica for New York loaded with log wood on shore close by Indian Key, She lost top mast and nearly all sails during the gale."

In October of 1876, keeper Billberry reported, "Bethel [his first assistant] discovered a full brig on shore about 15 miles to

the eastward of this station in the neighborhood of Pickles Reef...hoisted flag [running the national flag upside down is an international signal of distress] to call attention and ask for assistance...about nine in the morning several wreckers got to the brig...Keeper ascertained...the wreck was a Spanish brig laden with logwood and mahogany...the cause of the wreck was that the captain mistook this light for Cary fort (lighthouse) and ran aground about 11:30 p.m..."

A week later he wrote, "Blowing a gale all night. Sea running very high, Barometer 29.03 and falling...blowing a hurricane from the east...revolving [of the lens] very uneven, sometimes 5 or 6 seconds fast, next 5 or 6 seconds slow...wharf washed away...after ring bolt of dingy gone, hanging now by lashings only. Could do nothing to secure her...blowing fearfully hard and seas running so high...9:30 Barometer 29.28."

Billberry tried to secure the boat when it was swept away. The boat was picked up by a vessel and returned undamaged three days later.

Hot days of routine chores and boredom were occasionally dashed with terrifying storms that violently shook the station. In January 1929 the keeper rescued a man and two women from a disabled boat. He brought them to the lighthouse, fed them, and made them comfortable until they could be transferred to Key West. He recorded the event in the station log book. Later the district inspector wrote opposite the entry in the log, "This is contrary to instructions and this practice must be abruptly stopped."



American Shoal Lighthouse. U.S. Coast Guard photo.

The most violent and dangerous hurricane that the keepers of the Alligator Reef Lighthouse experienced occurred on Labor Day of 1935. The barometric pressure fell to 26.35, the lowest ever recorded in the western hemisphere. The wind was recoded at 200 m.p.h. The waves jammed the exterior doors of the dwelling shut (50 feet above high water), and the interior doors were ripped off their hinges. All the windows of the dwelling, save one, were broken. The keeper wrote in the station log, "At 6:30 p.m., while lighting the lamp for the night the lantern glass began to break...the lens was completely wrecked...the rowboat washed away about 8 p.m....the platform landing was completely wrecked and launch #34 gone [motor boat assigned to the station]. This is the worst hurricane that I have experienced during the eleven years of service."

But the damage to nearby town of Islamorada on Matecumbe Key where workers on the Overseas Highway were camped out was far worse. Everything along the shore was wiped away save the wall of a grocery store. There were 423 people were killed by the hurricane and storm surge.

In 1875 it was determined that the Cape Florida Lighthouse (near Miami) was no longer an effective navigational aid. The Lighthouse Board requested and received a Congressional appropriation to erect another pile lighthouse, this one on Fowey Rocks at the beginning of the Keys and near the entrance to Miami.

Like many shoals and reefs nationwide, Fowey Rocks was named after a ship wreck. The HMS *Fowey*, a 20-gun British frigate sank in the area in 1748. The resulting design is the most pleasing of the reef lighthouses. A two-story structure with a Mansard roof surmounts the lower third of the skeleton-pile works. The struts taper up from the dwelling to 110 feet, ending in a watch and lantern room topped by a bell curve dome, similar to the dome on the Ponce Inlet, Ship John Shoal, and Stratford Shoal lighthouses.

Construction of the lighthouse did not go smoothly as weather often interfered with operations, both in construction and delivering supplies. At first the men were removed from the work platform (constructed alongside the lighthouse project)

at the end of the working day. But it was decided that installing tents on the platform as living quarters would eliminate some transportation of the crew and allow more time for working on the project. One night they were threatened by an unexpected event. They observed the running lights of a steamer coming straight at them. They feared that if it kept on its course it would demolish their platform, which was basically unlighted. Just before it reached the platform the *Arakanapka* grounded on Fowey Rocks. Before the lighthouse was finished, the workmen witnessed another vessel plow into the Fowey Rocks. This time the vessel, the *Carondelet*, managed to be refloated in a few days.

In the spring of 1878 the first-order Fresnel lens (manufactured by Henry-Lepaute of

is always dangerous, particularly to vessels bound southward and westward because of the strong and variable currents near the reef, causing many wrecks and loss of property." The request for \$100,000 was submitted along with the request for funds to construct Fowey Rocks Lighthouse. The portion for the lighthouse near Looe Key (American Shoal) was denied. Looe Key, like other shoals and keys, was named for a ship; in this case, the British frigate HMS *Looe* which sank there in 1744.

In 1850 the Coast Survey had established an iron pile on American Shoal. It was 38 feet high and topped with a barrel shaped day mark painted red with a white vane and the letter "B" in black (as mentioned earlier in this article).

The Lighthouse Board continued to request funds to construct a lighthouse. Finally in 1878 an appropriation of \$75,000 was approved. Key West, some 19 miles southwest of the site, was selected as a base of operations (storage of supplies and accommodations for the work crew). A special scow was constructed to transport crew and materials.

The Lighthouse Service used the same design of Fowey Rocks for American Shoal. The piles were driven in coral with only five feet of water over them. Work went smoothly thanks to a mild winter during 1879-80. An additional \$50,000 was requested and appropriated to finish the lighthouse. Another first-order Fresnel lens from the Henry-Lepaute factory in Paris was purchased and installed. The characteristic was a white flash every five seconds. The

station went into service on July 15, 1880.

Other small lighthouses and unmanned lights have been constructed on the Florida reefs (Pulaski Shoal, Rebecca Shoal, Cosgrove Shoal, Tennessee Reef, Smith Shoal, Pacific Reef, and Molasses Reef) but the engineering stars of the southern Florida reefs are the tall iron-pile structures at Fowey Rocks, Carysfort Reef, Sombrero Key, Alligator Reef, American Shoal, and Sand Key. These structures, today automated, still provide valuable lighted aids to navigation and are also serving other purposes for organizations such as the U. S. Fish and Wildlife Service, U.S. Weather Bureau, and marine biologists.



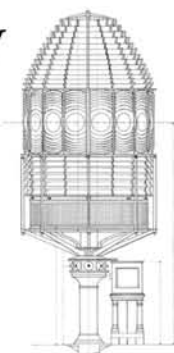
The amount of shipwrecks in the area led to the system of lighthouses along the Florida Keys. Drawing from USLHS archives.

Paris) was installed and operational on June 15, 1878. Prior to installation the lens had been on display in the Lighthouse Service's exhibition at the 1876 Philadelphia Centennial. The Lighthouse Service exhibit was such a big draw that the Lighthouse Board decided to enter the 1892-93 world's Columbian Exposition at Chicago. At the exposition one of the attractions was a painting and model of the Fowey Rocks Lighthouse. The final cost of the lighthouse was \$163,000.

The last of the major reef iron-pile lighthouses erected on the Florida Keys was at American Shoal. The Lighthouse Board wrote to Congress in its 1874 annual report: "The navigation of this portion of the gulf



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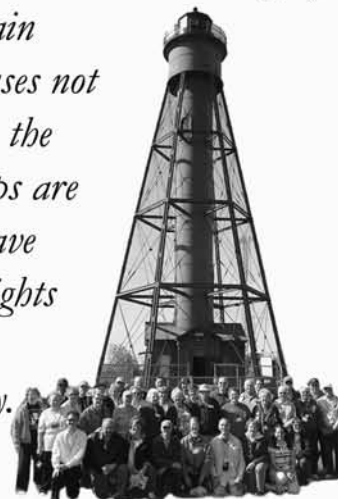
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