Navesink Lighthouse and Robbins Reef Lighthouse: Lighting the Way Through New York Bay

(U.S. Coast Guard)

(Courtesy Twin Lights Historical Society)

By 1800 New York was America's busiest harbor, but navigating it was difficult and dangerous. Among other hazards, a series of shifting sandbars, some only 24 feet below the level of the water at low tide, extended across the entrance to the harbor. As maritime traffic and shipping increased during the 19th century, the number of shipwrecks also rose. In response to the losses of lives and cargo, the federal government began to build lighthouses, fog horns, and other structures to warn mariners of obstacles and hazards and to help them find safe harbors. Lighthouses are probably the best known of these "aids to navigation." Some of these towers, with lights

that could be seen for miles, were located on land. Others were built out in the open water.

Navesink is an excellent example of an onshore lighthouse. Robbins Reef is a good example of an offshore tower. Navesink is in Highlands, New Jersey; Robbins Reef is officially in New Jersey, but physically closer to the northern tip of Staten Island in New York. These two historic lighthouses illustrate the impact of building materials, construction techniques, and technological advancements. They also testify to the importance of maritime safety, especially during the period when water transportation of both cargo and passengers was at its height.

Many people still refer to Robbins Reef as "Kate's Light" because of its connection to Kate Walker, principal keeper at the isolated lighthouse from 1894 to 1919. She served as principal keeper in spite of the fact that government regulations did not allow women to be in charge of an offshore lighthouse. When she retired after 19 years of service, she was asked about her difficult, isolated, and dangerous life. Her modest reply was "It isn't much of a story. Just keep the light burning and the fog-bell wound up and the siren ready all the time. That's all."[1]

[1]William Hemmingway, "The Woman of the Light," *Harper's Weekly*, 14 August 1909, 11

Document Contents

References and Endnotes

Additional Resources

Where this lesson fits into the curriculum

Time Period: 1820s to early twentieth century

Topics: The lesson could be used in U.S. history, social studies, and geography courses in units on nineteenth century and early twentieth century commerce or transportation, and to help students understand the role that maritime industries played in American history. The lesson could also be used to enhance studies related to the industrial revolution and women's history.

Relevant United States History Standards for Grades 5-12

This lesson relates to the following National Standards for History from the UCLA National Center for History in the Schools:

US History Era 4:

- **Standard 2A:** The student understands how the factory system and the transportation and market revolutions shaped regional patterns of economic development.

US History Era 6:

- **Standard 3A:** The student understands how the "second industrial revolution" changed the nature and conditions of work.
- **Standard 3C:** The student understands how Americans grappled with social, economic, and political issues.

Relevant Curriculum Standards for Social Studies

This lesson relates to the following Curriculum Standards for Social Studies from the National Council for the Social Studies:

Theme II: Time, Continuity and Change

- **Standard C:** The student identifies and describes selected historical periods and patterns of change within and across cultures, such as the rise of civilizations,

the development of transportation systems, the growth and breakdown of colonial systems and others.

Theme III: People, Places and Environments

- **Standard A:** The student elaborates mental maps of locales, regions, and the world that demonstrate understanding of relative location, direction, size, and shape.
- **Standard E:** The student locates and describes varying landforms and geographic features, such as mountains, plateaus, islands, rain forests, deserts, and oceans, and explains their relationships within the ecosystem.
- **Standard J:** The student observes and speculates about social and economic effects of environmental changes and crises resulting from phenomena such as floods, storms, and drought.

Theme V Individuals, Groups and Institutions

- **Standard F:** The student describes the role of institutions in furthering both continuity and change.
- **Standard G:** The student applies knowledge of how groups and institutions work to meet individual needs and promote the common good.

Theme VI Power, Authority and Governance

- **Standard G:** The student describes and analyzes the role of technology in communications, transportation, information-processing, weapons development, or other areas as it contributes to or helps resolve conflicts.

Relevant Common Core Standards

This lesson relates to the following Common Core English and Language Arts Standards for History and Social Studies for middle and high school students:

Key Ideas and Details
- CCSS.ELA-Literacy.RH.6-12.1
- CCSS.ELA-Literacy.RH.6-12.2

Craft and Structure
- CCSS.ELA-Literacy.RH.6-12.6

Integration of Knowledge and Ideas
- CCSS.ELA-Literacy.RH.6-12.7

Range of Reading and Level of Text Complexity
- CCSS.ELA-Literacy.RH.6-12.10

About This Lesson

This lesson is based on the National Historic Landmark file, "Navesink Light Station" [https://npgallery.nps.gov/pdfhost/docs/NHLS/Text/06000237.pdf] (with photographs [https://npgallery.nps.gov/pdfhost/docs/NHLS/Photos/06000237.pdf]), and the National Register of Historic Places nomination, "Robbins Reef Light Station," as well as other primary and secondary sources related to the two lighthouses. It was published in 2007. It was written by Karmen Bisher, former Maritime Historian, National Park Service; Shannon Davis, Historian/National Conference of State Historic Preservation Officers Contractor; and Jennifer Perunko, former Maritime Historian, National Park Service. The lesson was edited by the Teaching with Historic Places Staff. This lesson is one in a series that brings the important stories of historic places into classrooms across the country.

Objectives

1. To explain how and why the federal government took an active role in protecting mariners by establishing and improving lighthouses;
2. To describe how better building materials, improved construction methods, and technological advancements affected lighthouses;
3. To compare and contrast the purpose, location, design, and technology of Navesink Lighthouse and Robbins Reef Lighthouse;
4. To list the major lighthouse keepers' duties and explain how technological advancements affected these duties;
5. To analyze the development and impact of transportation systems of all kinds in their own community.

Materials for students

The materials listed below can either be used directly on the computer or can be printed out, photocopied, and distributed to students.

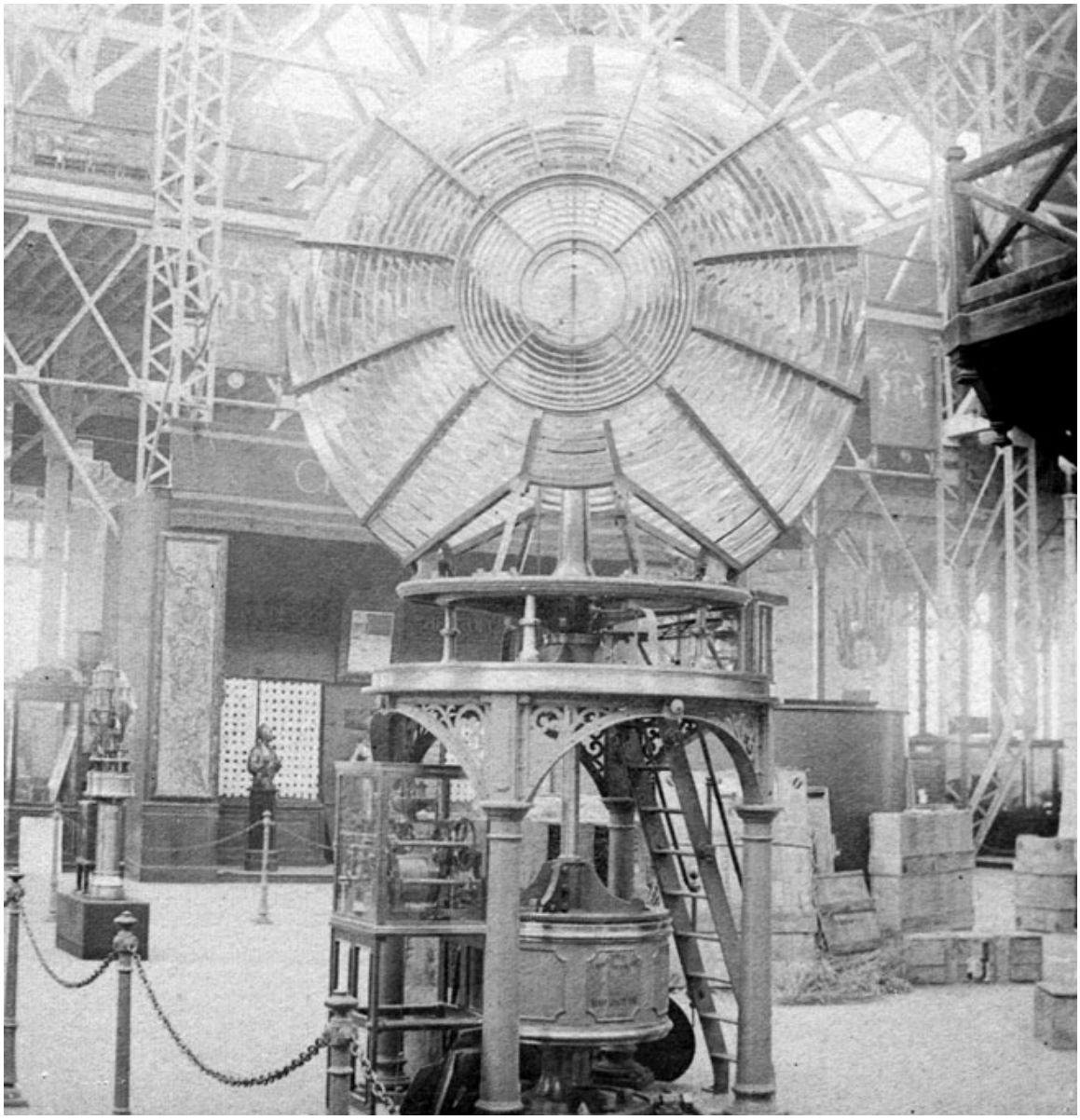
1. Two maps showing New York Bay and Third District light stations;
2. Three readings about Navesink Lighthouse and Robbins Reef Lighthouse;
3. Two illustrations of entries from Light Lists;
4. Four photographs of Navesink Lighthouse, Robbins Reef Lighthouse, a second-order bivalve Fresnel lens, and Lighthouse Keeper Kate Walker.

Visiting the site

The Navesink Light is located off Route 36 on Lighthouse Road, Highlands, New Jersey 07732. Today the north tower functions as a private aid to navigation and the building and grounds are open to the public. Visitors can climb the north tower and view a variety of museum exhibits in the north wing, including a Marconi Wireless Telegraph exhibit, in galleries that were once the living quarters for the keepers of the light. The second-order bivalve Fresnel lens, which was installed in the south tower in 1898, is on display in the Power House building. The Power House is located southwest of the lighthouse and originally housed generators that powered the carbon arc electric light. Other structures available for viewing on the grounds of the historic site focus on the United States Life Saving Service located in the Spermaceti Cove Life Boat Station, a building relocated from Sandy Hook in 1954. The building houses the submarine-like Francis Lifecar, which was used by the U.S. Life Saving Station to rescue shipwreck victims along the New Jersey coast. The museum, tower, and gift shop are open seasonally. The grounds are open year-round. For more information contact Twin Lights Historic Site at (732) 872-1814 or via email at twinlightshistoricalsociety@gmail.com. Visit http://www.twinlightslighthouse.com/.

The Robbins Reef Light is located in New Jersey waters on the west side of the Main Channel in Upper New York Bay, just off the northern tip of Staten Island, New York. The United States Coast Guard owns and operates the active light year-round and it is closed to the public. The lighthouse is visible from the Staten Island Ferry. The ferry departs from the Whitehall Terminal at Whitehall Street and South Street in Lower Manhattan and from the St. George Ferry Terminal at Richmond Terrace on Staten Island.

Getting Started



What is the object in this photo? What purpose do you think it served?

Photo Analysis Worksheet

Step 1:
Examine the photograph for 10 seconds. How would you describe the photograph?

Step 2:
Divide the photograph into quadrants and study each section individually. What details--such as people, objects, activities--do you notice?

Step 3:
What other information--such as time period, location, season, reason photo was taken--can you gather from the photo?

Step 4:
How would you revise your first description of the photo using the information noted in Steps 2 and 3?

Step 5:
What questions do you have about the photograph? How might you find answers to these questions?

Setting the Stage

The sea has played an important role in transportation and commerce throughout our nation's history. Unfortunately, dependence on water transportation inevitably resulted in shipwrecks, causing the death of sailors and passengers and the loss of cargo in the 18th and 19th centuries. New York Harbor provided a safe haven for vessels during bad weather. Its geographic location also was ideal for taking advantage of transatlantic, coastal, and inland trade. The colony of New York took action in 1764 to improve access to New York Harbor, already a busy and dangerous shipping area. It conducted a lottery and raised funds to build Sandy Hook Lighthouse. In 1789, the newly established federal government took over responsibility for constructing, operating, and maintaining lighthouses, buoys, markers, and other "aids to navigation" nationwide.

Traffic through the port of New York continued to increase, with hundreds of vessels entering and departing daily. By 1797, New York Harbor was the nation's leading port, surpassing both Boston and Philadelphia in both cargo and passenger traffic. After the Erie Canal opened in 1824, the volume of goods and the number of people passing through New York on the way to and from the nation's interior grew rapidly. New York also served as the distribution point for goods arriving from European and southern markets. More than a third of the world's foreign trade passed through the Narrows, the tidal strait connecting Upper New York Bay and Lower New York Bay.

By the mid-1820s, the federal government decided that Sandy Hook Lighthouse was not entirely meeting the needs of regional mariners. During the following years it constructed many additional lighthouses to guide ships safely through the dangerous waters of New York Bay. Navesink Light was established in 1828 and Robbins Reef Light in 1839.

Locating the Site

Map 1: New York Bay

(National Park Service)

"New York Bay" is a collective term for the waters leading from the Atlantic Ocean to the port of New York. It consists of the Lower Bay and Upper Bay, connected by the Narrows—a tidal strait separating Staten Island from Long Island. "New York Harbor" refers both to Upper New York Bay and to the waterfronts at the southern end of Manhattan Island and in nearby cities in New Jersey, such as those on the Hudson River.

Questions for Map 1

1) Look carefully at the map to find the trading routes available for ships using the harbor, marked by arrows. How many are there? Use a classroom map to identify the areas that each route leads to. How do you think these contacts would have affected the development of the port of New York?

2) Identify Sandy Hook, NJ, and Coney Island, NY. A series of shifting sand bars—in some areas only 24 feet below the water surface at low tide—is located under the water between these two points of land. What problems would this create for vessels?

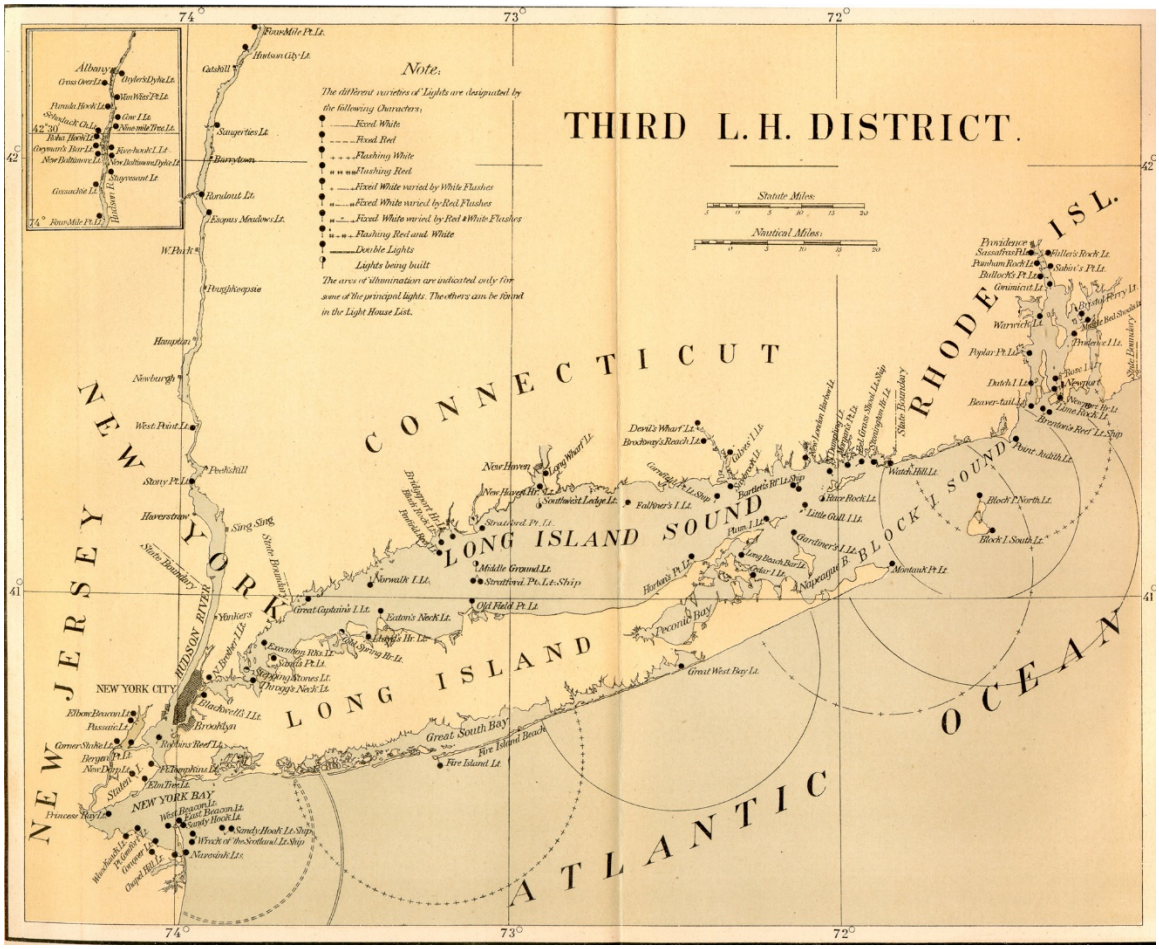
3) Identify the Navesink (Twin) Lights and the Robbins Reef Light on the map. Which one is on land? Which one is in the water?

4) Locate the Sandy Hook Light. Why do you think this was the first lighthouse to be built in New York Bay?

5) Find the Main/Gedney Channel. This channel was the primary approach to the Lower Bay from the Atlantic Ocean in the 19th Century. Now locate the Ambrose Channel. This route was created in 1903 by dredging, or digging out, the bottom of the harbor to a depth of nearly 40 feet. Why do you think this became the preferred way to get to New York Harbor?

Locating the Site

Map 2: Third Lighthouse District in 1876



(Annual Report of the Light-House Board, 1876)

In 1838, the U.S. Congress divided the country into eight lighthouse districts and gave a naval officer in each district the job of examining each lighthouse and making recommendations for new ones. The Third Lighthouse District consisted of parts of New Jersey, New York, Connecticut and Rhode Island. Each year the Lighthouse Service reported to Congress on its accomplishments for the year. By the late 19th century these reports included maps like this one, showing each lighthouse and lightship in a district. One of the densest concentrations of lights along the East Coast was where the Atlantic Ocean joined New York Bay.

Questions for Map 2

1) Find New York Bay on this map. How many lights can you find in the Bay? Why do you think there were so many lights around the approaches to New York City?

2) Look at the Note at the top of the map. How many different kinds of "Lights" (light houses and lightships) are listed? How do they differ? Why do you think there were so many varieties?

3) Lightships are ships with bright lights mounted on tall masts. They are anchored in water too deep for lighthouse construction. How many lightships can you find in New York Bay? Why do you think they are located where they are?

Determining the Facts

Reading 1: Navesink and Robbins Reef Lighthouses

Navesink Light Station was established by the federal government in 1828 on a coastal bluff about 200 feet above sea level in Highlands, New Jersey. This is the highest point of land on the Atlantic Coast from New Jersey to Florida. The light station originally consisted of two rubblestone towers and a separate keeper's house.[1] Navesink's two lights helped ships tell it apart from the Sandy Hook Lighthouse about five miles to the north and the Sandy Hook Lightship located offshore in the Atlantic Ocean. Robbins Reef Lighthouse is located about one mile north of Staten Island on a dangerous rocky underwater ledge. Established by the federal government in 1838, it was the first lighthouse built offshore in the water of New York Bay. It consisted of an octagonal stone tower resting on a granite-block pier. It. Navesink and Robbins Reef worked in conjunction with Sandy Hook and other aids to navigation to safely guide mariners through the Main Channel, into Lower New York Bay, through the Narrows and into Upper New York Bay.

By 1851, the federal government had received numerous complaints about the lighthouse system, including faulty construction, inadequate visibility and poor placement. In response, a group of distinguished military officers and civilian scientists gathered to conduct a large-scale investigation of existing lighthouses. The investigation determined that many lighthouses were in poor condition and therefore unable to meet mariners' needs. In 1852, the federal government formed the Lighthouse Board, made up of the individuals who conducted the earlier investigation. The Board was responsible for all duties related to lighthouses and to improve upon them by using better building materials, new construction methods, and advancements in lighting technology.

The newly formed Lighthouse Board presented a report to Congress based on the recent investigations of the quality of America's lighthouses. After visiting Navesink Light Station, the Board concluded, "The two towers are very badly constructed of rubble stone, and their present condition is very bad, owing to leaks and cracks. There is no cellar for oil, no storerooms in the tower for wicks, chimneys, cleaning cloths, &c. The oil is kept on the ground-floor of the towers, where the temperature is necessarily very variable." The report added, "The dwellings and out buildings are all out of order, and require repairs." On the other hand, the Board considered the Robbins Reef tower "well-built, dry, and in good preservation." The biggest problem was the light itself, which the Lighthouse Board described as uneconomical and "wasteful," "badly placed," "in very bad order" and "dirty." Since the tower was in good condition at the time of the 1851 inspection, it would be several years before it was finally replaced with a new one.[2]

The Lighthouse Board replaced the deteriorating Navesink towers and associated buildings in 1862 with a sturdy, fortress-like structure consisting of "twin" towers connected by keepers' quarters and work rooms. The entire structure was made of cut sandstone blocks and brick. Although the U.S. Lighthouse Board began standardizing designs in the 1850s, no other United States lighthouse repeats the design used at Navesink or even resembles its unique appearance. Built during a period when massive architecture was popular for government buildings, the design looks much like a military fort. The architect, Joseph Lederle, might have been influenced by European lighthouses that incorporated many elements of castles in their designs. The castle-like appearance of Navesink is unusual, but the two towers make it quite

distinctive. Early on, the lighthouse service experimented with “twin” or “double” lights in locations where lighthouses were close together, but advancements in lighting technology related to the development of the Fresnel lens eliminated the need for two towers. Navesink is the only surviving set of twin lights where the towers are part of a single building.

In 1883, the granite Robbins Reef light tower was replaced by a four-story, conical, iron-plate tower containing living space for two keepers. It was built upon the original pier. After 1840, cast iron was increasingly used for construction purposes in the United States because it was a readily available, sturdy, and economical building material. The first iron light towers designed and constructed by engineers and architects employed by the Lighthouse Board resembled early stone and brick towers. The iron towers were often lined in brick for added stability and increased insulation. For offshore sites, like Robbins Reef, a standard design was developed for the superstructures and used frequently in the Northeast and Mid-Atlantic regions. The specifications and plans for the cast-iron lighthouses were printed in large quantities and distributed to companies interested in competing for the federal construction jobs. Much of the tower was cast at foundries and fitted together off-site for preliminary approval by lighthouse engineers. This included the tower and floor plates, and architectural details such as the window surrounds, the brackets supporting the galleries, and the railing posts. The parts were numbered, the structure was taken apart, and then the parts were shipped to the location of the lighthouse. Once the foundation was in place, the light tower would be erected in just a few days’ time although finishing work such as putting in windows, hanging doors, and laying floor boards extended the completion time.

In order for mariners to distinguish lighthouses like Robbins Reef from other nearby lighthouses during daylight hours, the towers were painted in different colors or painted with strips or other distinguishable markings. When the cast-iron tower was erected at Robbins Reef, it was painted brown. However, by 1890 the color scheme or “day-mark” had changed slightly. The tower was painted brown from the base to the top of the second level and white above that to the lantern, which was painted black.

Questions for Reading 1

1) How were the locations for the Navesink and Robbins Reef lights chosen?

2) Why was each lighthouse rebuilt during the second half of the 19th century?

3) Why did the architects, engineers, and builders decide to use the designs they did at these two lighthouses? Why might cast iron be more practical than stone or brick for an offshore lighthouse like Robbins Reef?

4) How could mariners tell the difference between lighthouses of same or similar design during the day?

Determining the Facts

Reading 2: Technological Advancements and Experimentation at Navesink and Robbins Reef Lighthouses

Because Navesink and Robbins Reef Lighthouses aided in marking the nation's busiest port, the federal government used both for several successful technological experiments that significantly improved maritime safety. Throughout history, the purpose of a lighthouse's light has been to provide mariners with a fixed point of reference to guide them through waters at night or during bad weather when the shore or an offshore hazard cannot be seen clearly. Thus, the most important advancements in lighthouse technology over the years often have focused on the light itself.

The Fresnel lens, invented by a French scientist named Augustin Fresnel in 1822, quickly revolutionized lighthouses in Europe. The Fresnel lens looked like a glass beehive. A circular glass lens surrounded a light source at the center and prisms added to the top and bottom of the lens helped concentrate the light into a horizontal beam. A prism is a piece of glass cut with precise angles and plane faces, which reflects or refracts (bends) light waves. Fresnel lenses came in seven different sizes or "orders"—first, second, third, third-and-one-half, fourth, fifth and sixth—depending on the intensity of the light desired. Each lens was further classified as revolving or fixed. A revolving lens produced a flashing light as the lens rotated around the light source. A fixed lens produced a constant beam of light. Different flashes or "characteristics" helped mariners distinguish one lighthouse from another. The largest or first-order lens was almost 8 feet tall and more than 6 feet in diameter. It was intended for use in coastal lighthouses that needed to be visible from great distances. The smaller lenses (fourth, fifth, and sixth-orders) were used in lighthouses marking harbors or bays. A fourth-order lens was approximately 2 ½ feet tall and 1 ½ feet in diameter.

The United States was slower to adopt this new technology. At the time the Fresnel lens was invented all U.S. lighthouses were equipped with oil lamps in front of silver-plated pieces of copper that reflected the light. This system used vast quantities of oil and provided only a weak light. The Fresnel lens, on the other hand, captured and focused a much larger portion of the light emitted by lamps than did reflectors, and required less oil. In 1841, the first Fresnel lenses in the United States were placed in service in the original Navesink light towers. The federal government installed a fixed, first-order lens atop the south tower and a revolving, second-order lens atop the north tower. When the towers were rebuilt in 1862, the south tower's first-order lens was moved to the new tower, while the north-tower's lens was upgraded to a first-order.

By 1851, the industrial revolution had begun to transform America. Yet only two additional lighthouses had received Fresnel lenses. These were Sankaty Head in Massachusetts and Brandywine Shoal, an offshore lighthouse in the Delaware Bay. In 1852, the newly formed Lighthouse Board affirmed that "the lights at Navesink (two lenses) and the second order lens at Sankaty Head, Nantucket, are the best lights on the coast of the United States" and that they "are to be considered, as a general rule, equal to European lights of the same classes." When comparing the lights at Navesink with the light at nearby Sandy Hook the report concluded that "the relative useful effect of the Navesink and Sandy Hook lights is in the proportion of 5.2 to 1; or, the Navesink lights are 5.2 times more powerful and effective than the Sandy Hook Light."[1] The success of the new lenses at Navesink convinced the Lighthouse Board to convert

all outdated lighting equipment at existing lighthouses to Fresnel lenses but it would take more than a decade to do so. A fourth-order Fresnel lens was installed at Robbins Reef in 1855.

In 1875, Robbins Reef was selected as a location to conduct additional lighting experiments. It was chosen in part because it was located close to the federal Lighthouse Depot on Staten Island, Here the Lighthouse Board experimented with the use of kerosene in the lamps rather than the colza oil or lard oil being used at the time. Kerosene produced a more brilliant light than lard oil, which gave off a lot of smoke when burned. Successful tests convinced the Lighthouse Board to begin converting lamps over to kerosene in 1878 for lighthouses that contained fourth-order or smaller lenses. In 1883, a new revolving fourth-order lens was installed at the top of the new Robbins Reef lighthouse. The lens was illuminated by a kerosene lamp and kerosene was also tested in conjunction with the larger lens of Navesink. A kerosene lamp was first placed in Navesink's north tower, where it was also successful, and the fuel soon replaced lard oil as the standard for the larger lenses found in coastal lighthouses. The following year, a kerosene lamp was placed in the south tower at Navesink.

The next significant technological event at Navesink occurred in 1898, when the Lighthouse Board purchased a new type of lens from the French government called a "bivalve" Fresnel lens. It consisted of 386 separate lenses around a central bull's eye lens. The bivalve lens was 9 feet in diameter and 5 feet high and resembled a giant clam shell. At the center of the lens was an electric lamp, which produced a superior light. After some indecision on the part of the Lighthouse Board about which lighthouse would receive the lens, the south Navesink tower became its destination. Upon installation, Navesink became the first coastal lighthouse in America to be powered by electricity. The Board thought that the importance of marking the entrance to New York Harbor warranted placing the lens here and the high elevation of the lighthouse contributed to the light's visibility. Flashing once every five seconds for the duration of 1/10 of a second, it was visible for 22 miles at sea. The powerful lens made Navesink the brightest lighthouse in the United States and there was little danger of it being mistaken for another coastal light. Thus, the north tower light was no longer necessary and was reduced to backup status.

Other significant experiments conducted at Navesink were related to communication technology. In 1899, an Italian scientist and inventor named Guglielmo Marconi placed an antenna and receiving station at the Navesink Lighthouse to demonstrate his wireless telegraph. Marconi's wireless telegraph sent a message in Morse code, which was transmitted via electromagnetic waves. The *New York Herald* newspaper had hired Marconi to bring his wireless telegraph to the United States and report on the 1899 America's World Cup yacht races being held off the tip of Sandy Hook, New Jersey. The demonstration worked so well that Marconi expanded his American operation. He established the nation's first commercial wireless telegraph station at Navesink capable of sending and receiving messages on a regular basis. Eventually Marconi's ship-to-shore communications equipment would become standard on ocean-going vessels, improving the safety of maritime transportation. Marconi's experiments led to the development of commercial wireless telegraph equipment, which became the forerunner of modern radio communications.

The United States Army also used Navesink as a test site for experimental electronics and detection devices. From July 30 to August 9, 1935, heat-seeking equipment known as thermopiles were used to track ships approaching New York Harbor. The Army Signal Corp was in the process of experimenting with various methods of doing this and needed a high vantage point to test their equipment. The unparalleled view from the hill of the Navesink Lighthouse

provided that vantage point. The tests required the use of a powerful searchlight, so mariners were warned of its use. Four years later, in 1939, the Army Signal Corp was again at the lighthouse. This time they tested the effects of higher altitude on long-range radar sets. Once testing was completed all evidence of the top-secret radar equipment was removed.

Questions for Reading 2

1) What year was the Fresnel lens invented? By whom

2) Describe the appearance of Fresnel lenses. How did they work?

3) Using the classroom floor or wall, measure the height of a first-order and a fourth-order Fresnel lens. Why do you think Navesink Lighthouse received first- and second-order Fresnel lenses, while Robbins Reef received a fourth-order lens?

4) What were some of the "firsts" at Navesink Lighthouse? What were some of the reasons Navesink and Robbins Reef were considered good places to conduct technological experiments?

Determining the Facts

Reading 3: Keeping the Light

Lighthouse keepers' lives were often isolated, lonely, routine, and sometimes dangerous. Some lighthouse keepers lived in stations located on land near small towns, like those who worked at Navesink Lighthouse located in Highlands, New Jersey. Others lived on offshore lighthouses, like Robbins Reef, many located miles from land. In some instances, the keeper and the keeper's family were stationed on a desolate island or coastal location. Keepers had many responsibilities. Everyday tasks included maintaining the light, cleaning the lens, and operating the fog signal. In addition, keepers frequently had to row to the mainland for supplies, to work in severe climates and through harsh storms, and often to conduct heroic rescue missions. A keeper's salary varied greatly from one lighthouse to the next, and could be quite small, considering the risks associated with the job. In 1867, an Act of Congress fixed the average annual salary of a lighthouse keeper at $600.[1]

By 1852, the newly formed Lighthouse Board began distributing written instructions to lighthouse keepers. These instructions described the duties, rules, and regulations associated with the job. The Board's instructions stated, "The Keeper is responsible for the care and management of the light, and for the station in general. He must enforce careful attention to duty on the part of his assistants; and the assistants are strictly enjoined to render prompt obedience to his lawful orders." The manual also specified that "watches must be kept at all stations where there is an assistant. The keeper on watch must remain in the watch room and give continuous attention to the light while he is on duty. When there is no assistant, the keeper must visit the light at least twice during the night between 8 p.m. and sunrise; and on stormy nights the light must be constantly looked after." Keepers were instructed to keep the station tidy, carefully monitor supplies, and record the quantities of oil and other supplies used daily, as well as submit monthly reports on the condition of the station. Keepers were required to promptly report shipwrecks, and the manual reminded them that "it is the duty of light-keepers to aid wrecked persons as far as lies in their power."[2]

The Lighthouse Board employed one principal keeper and three assistant keepers at Navesink Light due to the size of the lighthouse and the difficulty of maintaining two lights. Eighteen rooms in the 228-foot long, castle-like, keepers' dwelling that connected the north and south towers housed the four keepers. In 1875, the three assistant keepers requested in writing to "divide the nights into three watches, owing to the extreme cold and dampness existing in the towers of the lighthouses, and certifying that no fires can be used in the towers as such would cause steam to arise and settle on the lantern panes and cause the light to be obscured from the sea… And also do desire the use of the Keeper's kitchen as a Watch Room." In response, the principal keeper of Navesink Light, Gersham Van Allen wrote "… that the lamps can be as well attended by the men on watch in the room below stairs as if they were in the 'towers' and knowing it to be injurious to the health to remain in the towers during the watches and believing this to be the better way for the good of health and as well for the light, I have granted the above request."[3]

A principal keeper and one assistant keeper were assigned to Robbins Reef Lighthouse in the late 1800s. Their living quarters consisted of a kitchen and dining room on the first level and bedrooms on the second and third levels. The fourth level served as the watch room. A boat sent by the Lighthouse Service twice a year delivered basic requirements for the light (such as

coal and oil), but the keepers at Robbins Reef had to row approximately one mile to shore to get personal supplies.

Lighthouse keeper positions were not entirely reserved for men. Women also served as assistant keepers and principal keepers under the direction of the Lighthouse Board. However, the practice of appointing women as keepers at offshore lighthouses was rare. More commonly women served as unofficial lighthouse keepers at land-based lighthouses while their husbands, the actual government-appointed lighthouse keepers, were engaged in other paid work.

One woman who did receive a government appointment was Katherine ("Kate") Walker—Robbins Reef's most famous lighthouse keeper. After emigrating from Germany to America, she met John Walker, then assistant keeper at Sandy Hook Lighthouse. He taught her English and also showed her how to tend the light at Sandy Hook. The couple married, and John Walker soon received a keeper's appointment at Robbins Reef Light with Kate as his assistant keeper. Kate recalled her initial impression of the isolated lighthouse in an interview stating, "When I first came to Robbins Reef, the sight of water, which ever way I looked, made me lonesome. I refused to unpack my trunks at first, but gradually, a little at a time, I unpacked. After a while they were all unpacked and I stayed on."[6] Her husband died of pneumonia in 1890 just a little more than four years after the Walkers' initial appointment. Upper New York Bay was covered in a thick layer of ice at the time, so Keeper Walker could not receive medical attention immediately. Kate believed that he might have lived if access to the mainland had been available sooner. With the help of her young son, Kate continued serving as an unofficial keeper. The Lighthouse Board tried to hire several men for the position, who all refused due to the lighthouse's isolated location. Government regulations strongly discouraged hiring women as principal keepers on offshore lighthouses at this time. Although she was a woman and an unlikely candidate for a light keeper, Kate proved she could perform the job. The Lighthouse Board finally appointed her as acting keeper in 1894. She received a permanent position the following year.

During her time at Robbins Reef, Kate Walker was the subject of many articles in local newspapers and magazines. In an article that appeared in the *New York Times* in 1905, Mrs. Walker described her life at the lighthouse.

> I have no time to get lonesome … I have meals to get regularly, although there is often nobody but myself here to eat them. Then there are the beds to make, the floors to scrub, the windows to clean … This lamp in the tower—it is more difficult to care for than a family of children. It need not be wound more than once in five hours, but I wind it every three hours so as to take no chances. In 19 years that light has never disappointed sailors who have depended upon it. Every night I watch until 12 o'clock. Then, if all is well, I go to bed leaving my assistant in charge. I am always up to put the light out at sunrise. Then I post my log from which monthly reports to the Government are made out. We have to put everything down, from the amount of oil consumed to the state of the weather. Every day I clean the brasswork of the lamp, and every month I polish the lenses. The latter is a two days' job.[4]

When fog rolled in, Mrs. Walker would descend to the basement to start the engine, which sent out signals from a foghorn at intervals of three seconds. The foghorn could be heard for miles and made sleep at the lighthouse nearly impossible. If the machinery broke, Kate or her son would climb to the top of the tower and ring a bell by hand until someone from the Lighthouse Depot could be summoned to fix the equipment. During the winter months ice would often

accumulate on the lantern room glass and would need to be constantly scraped in order that the light signal not be diminished.

In a *Harper's Weekly* article printed four years later, a reporter asked Kate if she was afraid of the storms to which she replied:

> Oh no, never. The storms don't amount to much. Once we were worried—about ten years ago when the bay was jammed solid with ice from here to the Jersey shore, and the ice was piled high as the railing of the platform here. We were cut off from the shore for a week and we thought maybe the lighthouse would be swept away, but it came out all right.[5]

Kate Walker remained at the light until retiring in 1919 at the age of 73. By her own count, she rescued as many as 50 persons during her time at Robbins Reef.

Questions for Reading 3

1) What personal characteristics or qualities might have been useful to someone aspiring to be a lighthouse keeper?

2) What were some of the duties a lighthouse keeper was expected to perform? What were some of the hardships they had to endure?

3) Why might the Lighthouse Board not have considered hiring women to tend lighthouses? Why might they have changed their minds about hiring women?

4) How do you think life differed for keepers of offshore lights versus keepers on the mainland?

5) Would you rather be a keeper at Navesink Lighthouse or Robbins Reef Lighthouse? Why?

Visual Evidence

Illustration 1: Entry for Robbins Reef in Light List of 1883

LIGHTS OF THE UNITED STATES.
NEW YORK AND NEW JERSEY.

THIRD DISTRICT.

Number.	Name.	Location.	Latitude, north. Longitude, west	Characteristic of light.	Order of Light.	Height of light above mean high water, in feet.	Distance visible in nautical miles.
			° ′ ″				
211	Robbin's Reef	Off Tompkinsville, lower part of New York harbor. (Soil belongs to State of New York, jurisdiction to State of New Jersey.	40 39 27 74 03 57	Fixed white.	4	58	13 3/4

Number.	Color and peculiarity of light-house or vessel.	Height in feet from base of structure to center of lantern.	When Established.	Fog Signal.	Remarks.
211	White tower	46	1839	Bell struck by machine every 15 sec.	To guide clear of the reef, on which it is built, to Hudson river and into Newark bay, through Kill Van Kull.

(United States Lighthouse Service, List of Light-houses, Lighted Beacons, & Floating Lights on the Atlantic, Gulf, & Pacific Coasts of the United States. Washington: Government Printing Office, 1883)

In 1852, the newly created federal Lighthouse Board began publishing an annual inventory of lighthouses usually referred to as the "Light List." The List was indispensable to mariners and is still being published by the U.S. Coast Guard, the successor to the Lighthouse Board.

Illustration 2: Entry for Robbins Reef in Light List of 1901

LIGHTS AND FOG SIGNALS OF THE UNITED STATES.
NEW YORK AND NEW JERSEY.

THIRD DISTRICT.

Number.	Name.	Location.	Latitude, north. Longitude, west	Characteristic of light.	Order of Light.	Height of light above mean high water, in feet.	Distance visible in nautical miles.
397	NEW YORK BAY: Robbins Reef	On Robbins Reef, off Tompkinsville, and on the westerly side of the main channel in the lower part of New York Upper Bay and the northerly side of the easterly entrance to Kill van Kull. (Soil belongs to New Jersey, jurisdiction to State of New York.	° ′ ″ 40 39 (27) 74 03 (57)	Flashing white every 6 sec.	4	56	13

Number	Description of Station.	Height in feet from base of structure to center of lantern.	When Established.	When last rebuilt.	Fog Signal.	Remarks.
397	Conical tower: stone base, white; lower half of tower brown, upper half white; lantern, black.	46	1839	1883	Blower siren; blasts 3 sec., silent intervals 3 sec. If siren be disabled a bell will be struck by machinery every 15 sec.	Guide to clear the reef on which it is built, to Hudson River, and into Newark Bay through Kill van Kull. Siren sounds thus: Blast 3 sec, Silent Interval 3 sec, Blast 3 sec, Silent Interval 3 sec

(United States Lighthouse Service, List of Light-houses, Lighted Beacons, & Floating Lights on the Atlantic, Gulf, & Pacific Coasts of the United States. Washington: Government Printing Office, 1901)

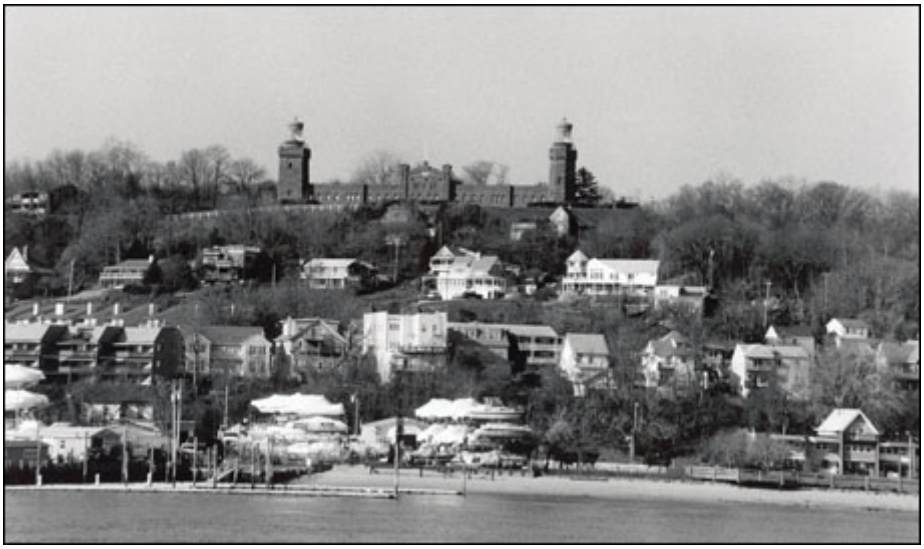
Questions for Illustrations 1 and 2:

1) What categories of information are included in the Light Lists? How do think this information would help mariners? Why do you think the Light Lists were updated every year?

2) Compare Illustrations 1 and 2. What changes were made to the lighthouse between 1883 and 1901?

Visual Evidence

Photo 1: Navesink Lighthouse c. 2000



(National Historic Landmark Survey)

In the 1930s, Navesink's importance diminished because of the improved lightships marking the approaches to the New York Harbor. New technology, such as radar and improved floating buoys, eventually made this powerful coastal light unnecessary. The U.S. Coast Guard turned off the lights at Navesink in 1949 and closed up the station. Five years later, the town of Highlands, New Jersey, acquired the lighthouse to use as a museum and public park. The Twin Lights Historical Society was formed to establish a museum at the light station and to train volunteers to staff it. When the town could no longer take care of the lighthouse, the State of New Jersey stepped in. The New Jersey State Park Service, working with the Twin Lights Historical Society, and other organizations, collected close to a million dollars to restore the buildings at the light station in the late 1970s. Later, the museum exhibits were improved to focus on the history of the lighthouse and its contribution to lighting technology and navigation. Today the structure's fortress-like architecture provides an interesting contrast to other historic lighthouses and modern navigational aids. Each year 100,000 people visit this New Jersey State Park and Historic Site.

Photo 2: Robbins Reef Lighthouse c. 1950

(Courtesy of U.S. Coast Guard Historian's Office)

The Robbins Reef Lighthouse is still an active aid to navigation today, but there are no resident keepers. In November of 1964, the *New York Times* newspaper printed an article stating that the Robbins Reef Lighthouse, along with another nearby lighthouse, were to be automated. The U.S. Coast Guard, which began maintaining aids to navigation in 1939, planned to lay electric cables under the water from the mainland to the lighthouses. After the cables were put in place and tested a year later, the lighthouse no longer needed to be manned 24 hours a day, seven days a week. At the time of the automation, Robbins Reef was home to a team of four men. Three men were always at the station and the other was on leave. The men worked eight hour shifts with 16 hours off and at least one man was awake at all times. They served for a few weeks to a month before receiving four to five days off to go ashore. The Robbins Reef Lighthouse is currently owned by the U.S. Coast Guard, and a modern, plastic light in the lantern functions year-round. The Coast Guard goes out to the light every couple of months for maintenance or when they detect a problem with the light. Although the lighthouse is closed to the public, it can be seen from the Staten Island Ferry.

Questions for Photos 1 & 2

1) How are Navesink Lighthouse and Robbins Reef Lighthouse similar? How are they different?

2) Look carefully at Photo 2. Can you see the rocky outcropping that the lighthouse is built on? Where is the foundation of the first lighthouse? Where is the lantern where the lens was located? Can you find the fog bell and the fog horn?

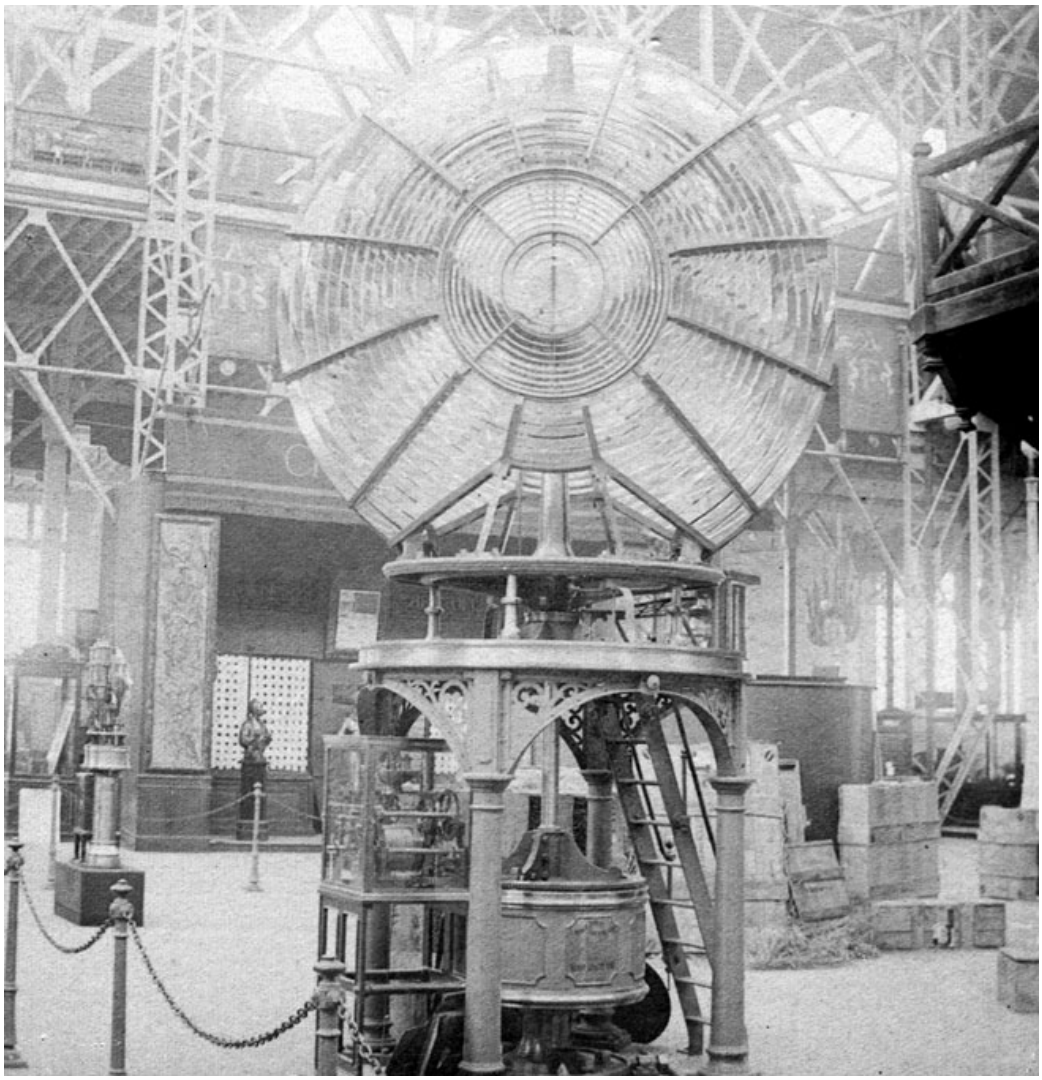
3) The small white boat suspended above the water was used by the keepers when they went to the mainland. How difficult do you think it would have been for one person to row a boat like this when the weather was bad?

4) Why was Navesink deactivated? Why do you think Robbins Reef is still operating?

5) Why do you think people wanted to save Navesink Lighthouse after it was deactivated?

Visual Evidence

Photo 3: Fresnel Lens on Display at the World's Columbian Exposition in Chicago in 1893



(From the collection of the Twin Lights Historical Society, used by permission)

In 1893, the French government displayed this second-order bivalve Fresnel lens at the World's Fair in Chicago. The Fair was a place where many countries showcased their recent scientific advancements and inventions. The lens is sitting on a cast-iron pedestal. Within the pedestal are the drum, gears, and mechanisms that turned the lens. A plaque below the lens stated "This apparatus, the greatest ever made according to the new principals of lighting lights, has been drawn and executed with the agreement of the French Lighthouse Board … Paris 1893." Because the lens weighed close to seven tons, the French government decided to sell it rather than ship it back to France. In 1898, the U.S. Lighthouse Board purchased the lens and installed it in the south tower at Navesink Lighthouse. A power house was built behind the lighthouses to generate electricity for the light.

In 1917, the lighthouse service replaced the electric light with an incandescent oil vapor lamp. The new lamp was similar to lanterns used today by campers and was less expensive for the lighthouse service to maintain and operate. Less than 10 years later commercial electric power became available in the area surrounding the lighthouse. The oil vapor lamp was removed and three light bulbs were installed inside the lens. Through all these changes, the 1893 lens shown in the photo stayed in use at the top of the tower. By 1949 the lighthouse was no longer needed. A few years later the lens was removed and put on display at the Boston Museum of Science. Later, funds were raised in Highlands to bring the lens back to Navesink. Today, it is displayed in the same building that originally generated the electricity to light the lens.

Questions for Photo 2

1) Why do you think the French government displayed the Fresnel lens at the Chicago World's Fair?

2) What was different about this Fresnel lens? How did it improve upon earlier lenses? (Refer to Reading 2, if necessary.)

3) Look carefully at the photo. How many circular facets are there in the central bull's-eye? How many panels surround the bull's-eye?

4) Look at the pedestal. Can you identify the drum and gears that turned the lens?

Visual Evidence

Photo 4: Kate Walker, Keeper at Robbins Reef Lighthouse c. 1909

(U.S. Coast Guard Historian's Office)

Robbins Reef Lighthouse is often referred to as "Kate's Light." The photo above shows Kate Walker, principal keeper from 1894 to 1919. Kate was about five feet tall and weighed less than 100 pounds. During her time at Robbins Reef, she maintained the light and fog signal, raised two children, and rescued about 50 people. Kate never received a lifesaving medal, which the federal government awarded to exceptionally brave keepers for rescues. Nonetheless, the U.S. Coast Guard named one of its boats the Katherine Walker in her honor. This photograph was published in Harper's Weekly in 1909 as part of a feature on Mrs. Walker.

Questions for Photo 4

1) Why was Kate Walker not officially appointed principal keeper at Robbins Reef Lighthouse until 1894? (Refer to Reading 3, if necessary.)

2) Why do you think Robbins Reef Lighthouse is commonly called “Kate’s Light” and why would the U.S. Coast Guard name a boat after her?

3) What qualities do you think Kate possessed that allowed her to perform the necessary work at the lighthouse?

4) Compare this photo with Photo 2. Can you tell where Kate might have been standing?

Putting it all Together

Navesink and Robbins Reef Lighthouses had a significant impact on improving access to and thus on the growth of New York Harbor and the nation's maritime trade as a whole. The following activities will help students apply what they have learned.

Activity 1: Advancements in Lighting

Have the students work individually or in groups to conduct further research on the history of lighting technology in American lighthouses using the library and the Internet. After gathering information about lamps, illuminants, lenses, lighting experiments, and inventors from colonial times to the present, ask the students to create a timeline showing how lighting technology has changed. Have them consider how lighting technology corresponds with other technological innovations discussed in their textbooks. Allow the students to present their timelines and findings to the class.

Activity 2: Living in a Lighthouse

Using the information provided in the lesson, have students imagine that they are lighthouse keepers or lighthouse keepers' spouses or children. Have them write diary or journal entries about what life might have been like for such a person living at Navesink Lighthouse or Robbins Reef Lighthouse in the late 19th or early 20th century. Have students compare accounts and summarize the different aspects of life described.

Activity 3: Transportation in the Local Community

Divide the class into small groups and have each group research one transportation system (maritime, railroad, roads, airplanes, or subways) that was historically important in the community. Have them investigate to the following questions: What impact did changes in technology have? How dangerous was their type of transportation? What kind of technology was used, if any, to ensure the safety of people and goods using or working on the system they are studying? How did their system affect the local economy? What types of workers were needed? How did technological changes affect their duties? Did technology eventually replace the workers? Are there any surviving resources associated with the various types of transportation that have been used over the course of the community's history?

To gather information on how their regional transportation systems evolved, students might contact a local transportation office, use newspaper archives, research collections at local historical societies, or conduct interviews with area residents.

Ask each group to report to the class after they have completed their research. Hold a general classroom discussion to compare the information they have found with what they have learned about the role of lighthouses and other aids to navigation in maritime travel and commerce.

References and Endnotes

Reading 1

Reading 1 was compiled from "Navesink Light Station" (Monmouth County, New Jersey) National Historic Landmark Nomination Form, Washington, DC: U.S. Department of the Interior, National Park Service, 2005 and "Robbins Reef Light Station" (Hudson County, New Jersey) National Register of Historic Places Nomination Form, Washington, DC: U.S. Department of the Interior, National Park Service, 2004.

[1] Groups of buildings were often called "light stations." "Light station" is also the general term that includes both lighthouses and lightships.
[2] U. S. Lighthouse Board, "Report of Light-House Board, dated Washington City, January 30, 1852," Record Group 26, Clippings File, National Archives and Records Administration.

Reading 2

Reading 2 was based on U.S. Light-House Establishment, *Public Documents and Extracts from Reports and Papers Relating to Light-Houses, Light-Vessels, and Illuminating Apparatus, and to Beacons, Buoys, and Fog Signals, 1789-1871* (Washington, D.C.: GPO, 1871); U.S. Lighthouse Establishment, *1852 Lighthouse Board Report* (Washington, D.C.: GPO, 1852); and "Navesink Light Station" (Monmouth County, New Jersey) National Historic Landmark Nomination Form.

[1]U.S. Lighthouse Establishment, *1852 Lighthouse Board Report* (Washington, D.C.: GPO, 1852), 10 & 23; and U.S. Light-House Establishment, *Public Documents and Extracts from Reports and Papers Relating to Light-Houses, Light-Vessels, and Illuminating Apparatus, and to Beacons, Buoys, and Fog Signals*, 1789-1871 (Washington, D.C.: Government Printing Office, 1871), 600.

Reading 3

Reading 3 was compiled from materials in the collections of the National Archives and Records Administration, Washington, D.C.; U.S. Coast Guard Historian's Office; the National Park Service's Maritime Heritage Program; the Library of Congress; and Mary Louise Clifford and J. Candace Clifford, *Women who Kept the Lights: An Illustrated History of Female Lighthouse Keepers* (Alexandria: Cypress Communications, 2000) .

[1] George R. Putnam, *Lighthouses and Lightships of the United States* (Boston: Houghton Mifflin Co., 1933), 238; and Francis Ross Holland, Jr., *America's Lighthouses: An Illustrated History* (New York: Dover Publications, Inc., 1988), 43.
[2]The Lighthouse Board, *Instructions to the Employees of the Lighthouse Service*, 1881 quoted in J. Candace Clifford and Mary Louise Clifford, *Nineteenth-Century Lights: Historic Images of American Lighthouses* (Alexandria: Cyprus Communications, 2000), 185.
[3]H.C. Van Allen, George Lewis, and Charles Murphy quoted in "Keeper Gersham Van Allen," *The Keeper's Log 8,* no. 1 (Fall 1991): 25.
[4]Kate Walker quoted in Cliff Gallant, "Mind the Light, Katie," *The Keeper's Log 3*, no. 3 (Spring 1987): 16.
[5]"Kept House Nineteen Years on Robbin's Reef," *New York Times*, 5 March 1905, SM7.
[6] *Hemmingway, "The Woman of the Light," 12.*

Additional Resources

By looking at *Navesink Lighthouse and Robbins Reef Lighthouse: Lighting the Way through New York Bay*, students learn about two historic lighthouses that illustrate how technological advancements contributed to maritime safety and commerce in the 19th and early 20th centuries and about the isolated, often routine, but sometimes heroic lives led by their keepers. Those interested in learning more will find that the Internet offers a variety of materials.

Maritime Heritage Program
This National Park Service program is devoted to interpreting and preserving America's maritime heritage. Included on the website is detailed information about lighthouses, lighthouse keepers, the lighthouse establishment, and much more.

Maritime History
The National Register of Historic Places travel itinerary on the Maritime History of Massachusetts includes detailed information about lighthouses and other historic places that tell the story of the state's complex relationship with the sea. There are also additional Teaching with Historic Places lessons that consider important aspects of maritime history.

U.S. Coast Guard Historian's Office
This website provides information about lighthouses and lighthouse keepers, as well as a variety of other topics. It also links to historical bibliographies, photographs, and images.

U.S. Coast Guard Light List
The Light List continues to be published by the U.S. Coast Guard to keep mariners informed about all aids to navigation in U.S. waters.

U.S. Library of Congress: Historic American Buildings Survey/ Historic American Engineering Record Collection
Search under the keyword "lighthouses" in the HABS/HAER collection for photographs and other documentation for 167 lighthouses nationwide. HABS/HAER is a division of the National Park Service.

National Archives and Records Administration
The historical records of the Bureau of Lighthouses and its predecessor agencies, beginning in 1785 and ending in 1951, are included in the Records of the United States Coast Guard (Record Group 26). A finding aid is available online.

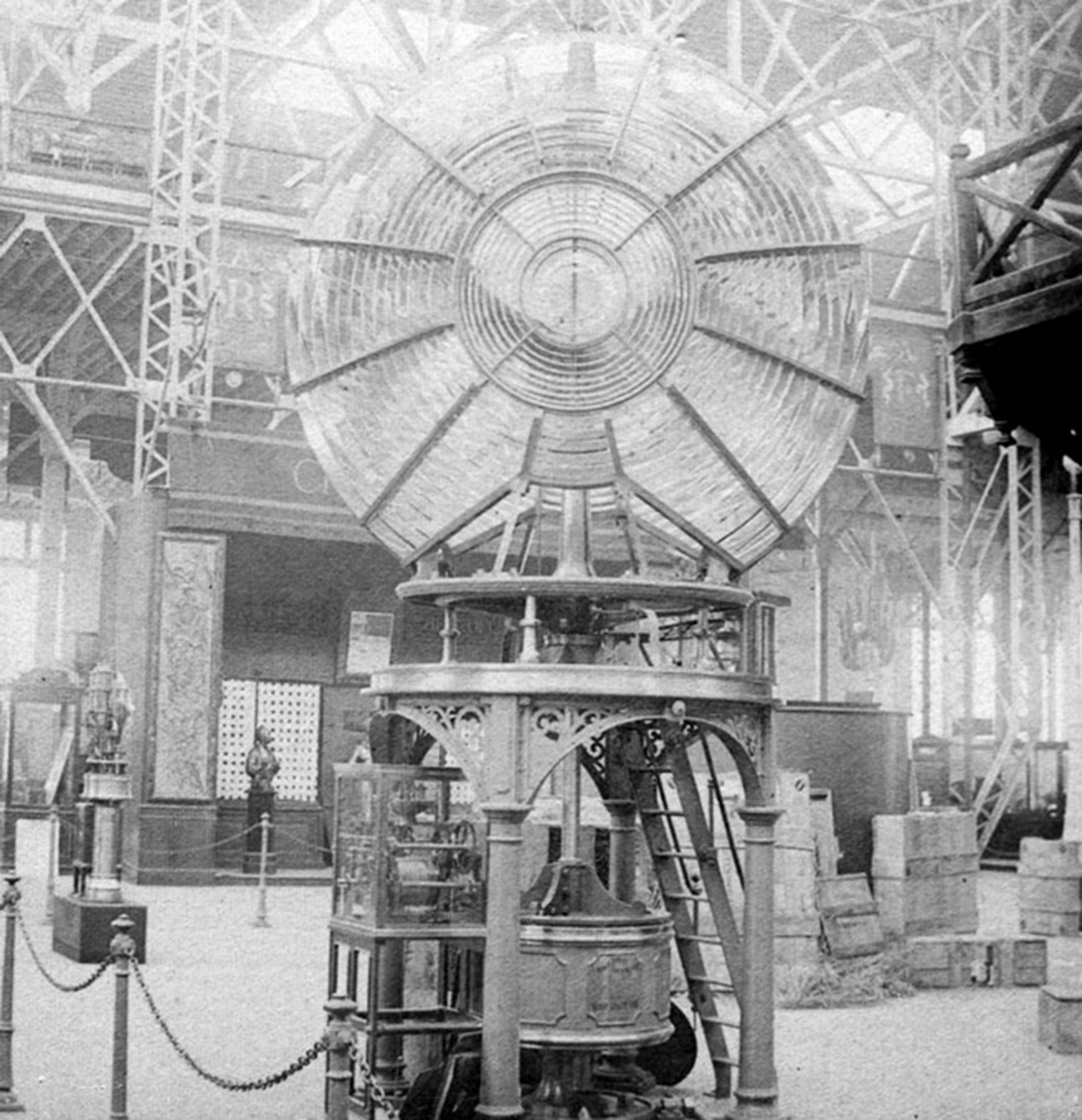
Navesink Lighthouse
Visit this website to learn more about the history of Navesink Lighthouse, see historical photos and images, and find out about visiting the Twin Lights Historic Site. You can view a visual tour of the lighthouse on the New Jersey Division of Parks and Forestry website.

New Jersey Lighthouse Society
This website is maintained by the New Jersey Lighthouse Society (NJLHS), a non-profit, educational corporation dedicated to the history and preservation of lighthouses everywhere, but particularly in the New Jersey, Delaware Bay, and New York Harbor areas.

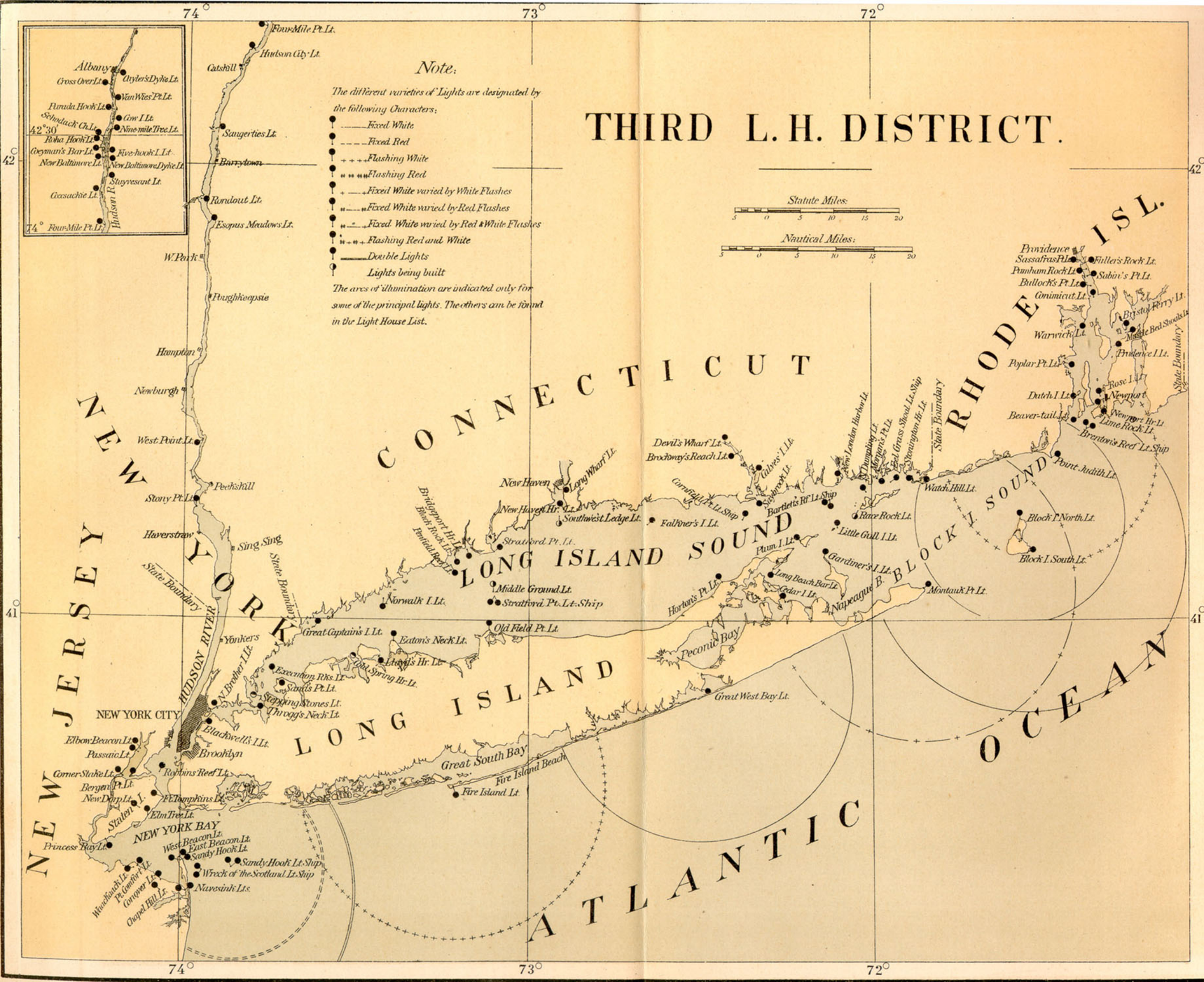
Seeing the Light—Lighthouse Illumination Technology through the Years
This website provides information, photos, and diagrams related to lighthouse illumination technology from the earliest Argand lamps to the most modern equipment.

For Further Reading

Those wishing to learn more about The Lighthouse Board, lighthouses, lighting technology, and lighthouse keepers may want to read: Francis Ross Holland, Jr. *America's Lighthouses: An Illustrated History* (New York: Dover Publications, Inc., 1988); David Veasey, *Guarding New Jersey's Shore: Lighthouses and Life-Saving Stations* (Charleston, SC: Arcadia Publishing, 2000); J. Candace Clifford and Mary Louise Clifford, *Nineteenth-Century Lights: Historic Images of American Lighthouses* (Alexandria: Cypress Communications, 2000); Mary Louise Clifford and J. Candace Clifford, *Women who Kept the Lights: An Illustrated History of Female Lighthouse Keepers* (Alexandria: Cypress Communications, 2000) and Mary Louise Clifford and J. Candace Clifford and, *Mind the Light Katie: The History of Thirty-Three Female Lighthouse Keepers* (Alexandria: Cypress Communications, 2006).




NEW YORK
Long Island Sound
To New England
NEW JERSEY
To the Erie Canal & the West
Hudson River
Manhattan
East River
Long Island
Upper Bay
Robbins Reef Light
Jamaica Bay
The Narrows
Coney Island Light
Staten Island
West Bank Light
Ambrose Channel
To Europe
Romer Shoal Light
Gedney Channel
Lower Bay
Old Orchard Light
Main Ship Channel
ATLANTIC OCEAN
Sandy HookLight
Raritan Bay
Great Beds Light
Navesink (Twin) Lights
NEW JERSEY
To the South and the Caribbean


THIRD L. H. DISTRICT.
Note:
The different varieties of Lights are designated by the following Characters:
Fixed White
Fixed Red
Flashing White
Flashing Red
Fixed White varied by White Flashes
Fixed White varied by Red Flashes
Fixed White varied by Red & White Flashes
Flashing Red and White
Double Lights
Lights being built
The arcs of illumination are indicated only for some of the principal lights. The others can be found in the Light House List.
Statute Miles:
Nautical Miles:
NEW YORK
NEW JERSEY
CONNECTICUT
RHODE ISL.
LONG ISLAND SOUND
LONG ISLAND
ATLANTIC OCEAN
NEW YORK BAY
NEW YORK CITY
HUDSON RIVER
Great South Bay
Peconic Bay
Napeague B.
Block I. Sound
State Boundary
Albany
Gross Over Lt.
Dyder's Dyke Lt.
Van Wies Pt. Lt.
Furnace Hook Lt.
Schodack Ch. Lt.
Cow I. Lt.
Nine mile Tree Lt.
Roha Hook Lt.
Coeyman's Bar Lt.
Five hook L. Lt.
New Baltimore Lt.
New Baltimore Dyke Lt.
Stuyvesant Lt.
Coxsackie Lt.
Four Mile Pt. Lt.
Hudson R.
42° 30'
74°
Four Mile Pt. Lt.
Hudson City Lt.
Catskill
Sangerties Lt.
Barrytown
Rondout Lt.
Esopus Meadows Lt.
W. Park
Poughkeepsie
Hampton
Newburgh
West Point Lt.
Peekskill
Stony Pt. Lt.
Haverstraw
Sing Sing
Yonkers
N. Brother Lt.
Execution Rks. Lt.
Sands Pt.
Stepping Stones Lt.
Throg's Neck Lt.
Great Captain's I. Lt.
Eaton's Neck Lt.
Lloyd's Hr. Lt.
Old Spring Hr. Lt.
Old Field Pt. Lt.
Norwalk I. Lt.
Middle Ground Lt.
Stratford Pt. Lt. Ship
Stratford Pt. Lt.
Bridgeport Hr. Lt.
Black Rock Lt.
Penfield Reef Lt.
New Haven
Long Wharf Lt.
New Haven Hr. Lt.
Southwest Ledge Lt.
Falkner's I. Lt.
Devil's Wharf Lt.
Brockway's Reach Lt.
Calves I. Lt.
Saybrook Lt.
Cornfield Pt. Lt. Ship
Bartlett's Rf. Lt. Ship
New London Harbor Lt.
Dumpling Lt.
Morgan's Pt. Lt.
Bel. Gross Shoal Lt. Ship
Stonington Hr. Lt.
State Boundary
Watch Hill Lt.
Race Rock Lt.
Little Gull I. Lt.
Plum I. Lt.
Gardiner's I. Lt.
Long Beach Bar Lt.
Cedar I. Lt.
Horton's Pt. Lt.
Montauk Pt. Lt.
Block I. North Lt.
Block I. South Lt.
Point Judith Lt.
Providence
Sassafras Pt. Lt.
Pamham Rock Lt.
Bullock's Pt. Lt.
Conimicut Lt.
Fuller's Rock Lt.
Sabin's Pt. Lt.
Bristol Ferry Lt.
Middle Bed Shoals Lt.
Warwick Lt.
Prudence I. Lt.
Poplar Pt. Lt.
Rose I. Lt.
Dutch I. Lt.
Newport
Newport Hr. Lt.
Beaver-tail Lt.
Lime Rock Lt.
Brenton's Reef Lt. Ship
State Boundary
Great West Bay Lt.
Fire Island Beach
Fire Island Lt.
Great South Bay
Elbow Beacon Lt.
Passaic Lt.
Corner Stake Lt.
Robbins Reef Lt.
Bergen Pt. Lt.
New Dorp Lt.
Ft. Tompkins Lt.
Elm Tree Lt.
Staten I.
Princess Bay Lt.
West Beacon Lt.
East Beacon Lt.
Sandy Hook Lt.
Sandy Hook Lt. Ship
Wreck of the Scotland Lt. Ship
Navesink Lts.
Chapel Hill Lt.
Conover Lt.
Ft. Comfort Lt.
Wreck Rock Lt.
Blackwell's I. Lt.
Brooklyn

LIGHTS OF THE UNITED STATES.

NEW YORK AND NEW JERSEY.

THIRD DISTRICT.

Number.	Name.	Location.	Latitude, north. Longitude, west	Characteristic of light.	Order of Light.	Height of light above mean high water, in feet.	Distance visible in nautical miles.
211	Robbin's Reef	Off Tompkinsville, lower part of New York harbor. (Soil belongs to State of New York, jurisdiction to State of New Jersey.	° ′ ″ 40 39 27 74 03 57	Fixed white.	4	58	13 3/4

Number.	Color and peculiarity of light-house or vessel.	Height in feet from base of structure to center of lantern.	When Established.	Fog Signal.	Remarks.
211	White tower	46	1839	Bell struck by machine every 15 sec.	To guide clear of the reef, on which it is built, to Hudson river and into Newark bay, through Kill Van Kull.

LIGHTS AND FOG SIGNALS OF THE UNITED STATES.

NEW YORK AND NEW JERSEY.

THIRD DISTRICT.

Number.	Name.	Location.	Latitude, north. Longitude, west	Characteristic of light.	Order of Light.	Height of light above mean high water, in feet.	Distance visible in nautical miles.
397	NEW YORK BAY: Robbins Reef	On Robbins Reef, off Tompkinsville, and on the westerly side of the main channel in the lower part of New York Upper Bay and the northerly side of the easterly entrance to Kill van Kull. (Soil belongs to New Jersey, jurisdiction to State of New York.	° ′ ″ 40 39 (27) 74 03 (57)	Flashing white every 6 sec.	4	56	13

Number	Description of Station.	Height in feet from base of structure to center of lantern.	When Established.	When last rebuilt.	Fog Signal.	Remarks.
397	Conical tower: stone base, white; lower half of tower brown, upper half white; lantern, black.	46	1839	1883	Blower siren; blasts 3 sec., silent intervals 3 sec. If siren be disabled a bell will be struck by machinery every 15 sec.	Guide to clear the reef on which it is built, to Hudson River, and into Newark Bay through Kill van Kull. Siren sounds thus: Blast 3 sec, Silent Interval 3 sec, Blast 3 sec, Silent Interval 3 sec