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United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES MULTIPLE PROPERTY DOCUMENTATION FORM

This form is used for documenting multiple property groups relating to one or several historic contexts. See instructions in *How to Complete the Multiple Property Documentation form* (National Register Bulletin 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items.

_x_ New Submission _____ Amended

64500824

A. Name of Multiple Property Listing

Florida's Historic Lighthouses

B. Associated Historic Contexts

(Name each associated historic context identifying theme, geographical area, and chronological period for each.)

Antebellum Period, 1823-1860
Civil War, Reconstruction, and Late Nineteenth Century, 1861-1895
Progressive Era through World War I, 1896-1919
Florida Land Boom, Great Depression, and World War II and its Aftermath, 1920-1952

C. Form Prepared by

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organization Bureau of Historic Preservation **date** December 2002

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city or town Tallahassee **state** Florida **zip code** 32399-0250

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in **36 CFR Part 60** and the **Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.** (☐ See continuation sheet for additional comments.

Barbara E. Mattick / DSHPO for S+R — 12-26-02

Signature and title of certifying official — Date

Florida

State Historic Preservation Officer, Division of Historical Resources

State or Federal agency and bureau

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

for Daniel J. Vivian — 12/18/03

Signature of the Keeper — Date of Action

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and the title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Fill in page numbers for each section in the space below

Summary

This section provides contexts outlining the development of Florida's historic lighthouses. Documenting the significant activities associated with the state's principal aids-to-navigation, the narrative first discusses the administrative history of the Lighthouse Service and then the construction of Florida's lighthouses within the state's historic periods of development. A shelf list enumerates lighthouses listed in the National Register of Historic Places (NRHP), previously inventoried in the Florida Master Site File (FMSF), determined eligible for the NRHP, and those undocumented or unrecorded. Also a research tool and predictive model to identify potential resources, the document provides the necessary historical contexts for the listing of Florida's historic lighthouses as individual properties in the NRHP.

Introduction

Keeper John Thompson climbed higher in the lighthouse and fired his musket at the Seminoles from the upper windows and then from the lantern itself. Wounded and finding his assistant keeper dead, Thompson threw a keg of gunpowder down the lantern scuttle. A tremendous blast shook the tower, and dislodged the burning spiral staircase from its mount. Still, the Seminoles persisted in their attack, scaling the tower, but gave up within twenty feet of the top. Thwarted in their attempt to scalp the men, the Seminoles plundered the keeper's house and made off with the booty in the keeper's boat. The following day, a naval patrol rescued Thompson from his perch.

So ends one of the most dramatic events in America's lighthouse history, which occurred at the Cape Florida Lighthouse in Dade County during the Second Seminole War. A formidable challenge for the federal government, lighting Florida's coastline includes stories of Indian attacks, treacherous shifting inlets and shoals, congressional hearings, Civil War intrigues, and the use of modern technology. In 1821, when the United States annexed Florida as a territory, the Federal government acquired approximately thirteen hundred miles of largely unlighted and unmarked coastline. By then, fifty-five lighthouses sprinkled America's eastern seaboard between Georgia and Maine. Within three decades, an active program of construction resulted in fifteen lighthouses illuminating Florida's shipping lanes and harbors. Florida's system of lighthouses represents one of the most diverse groups of structures along America's Atlantic coast. Engineering types included on-shore conical brick, cast iron, cast iron brick-lined, iron and steel skeletal, and off-shore exposed screwpile. Some lighthouses, such as those at Carysfort Reef and Fowey Rocks, occupied isolated offshore outposts with only a small skiff to provide access to land and civilization; others, such as Key West, stood within the municipal limits of a city. Lighthouse historian Wayne Wheeler ranks Florida, Maine, and Michigan as the nation's premier lighthouse states.

The beauty of Florida's lighthouses has inspired authors, poets, residents, and tourists for over a century. In the nineteenth century, George Barbour and Sidney Lanier included references to lighthouses, and other popular guidebooks, such as James Henshall's *Camping and Cruising in Florida,* were illustrated with picturesque line drawings of the structures, a technique used by author and diplomat S. G. W. Benjamin in *Harper's New*

Monthly Magazine. Based on a shipwreck experience in the Atlantic Ocean, the renowned author Stephen Crane included descriptions of the nation's second tallest lighthouse at Ponce DeLeon Inlet in his short story, "The Open Boat." But, beyond poetry, politics, and statistics, Florida's lighthouses tell the stories of keepers who lived isolated existences to daily negotiate spiral staircases and maintain, light, and extinguish the lamps. The challenging work of dedicated men and women who lighted Florida's coastline helped to protect the nation's merchant and military vessels. Some keepers found the work distasteful and moved on; others were removed for insubordination. But, for most it became a satisfying life-long career, which in some cases extended from one generation into the next. Some Florida lighthouses are associated with a family lineage of keepers spanning the nineteenth and twentieth centuries. One of the state's oldest internal improvements and now a relatively scarce, fragile resource, lighthouses are reminders of the pivotal role of Florida's navigation and maritime history. Inherently valuable and worthy of preservation, the historic lighthouses of Florida represent an increasingly endangered resource, a vanishing image of the state's transportation heritage.

Administrative History of the Lighthouse Service, 1791-1952

Lighthouse Development in the Colonial and Early Federal Periods, 1565-1820

Prior to the formal organization of the United States of America in 1789, each colonial government assessed its needs for lighthouses, and financed and supervised their construction and operation. Assembled in 1716, a beacon at Little Brewster Island in Boston Harbor was the first lighthouse built in the American colonies. By 1760, lighthouses stood along the shores of Connecticut, Delaware, New York, Maine, North Carolina, Rhode Island, and South Carolina. By 1789, twelve lighthouses stood along the coast of the newly organized United States of America.[1]

In Florida, however, the British and Spanish Crown did not build any lighthouses, as defined today. Instead, watchtowers were fabricated near Matanzas Inlet in 1569 and a similar structure at the north end of Anastasia Island was built in 1586. Another watchtower was built near present-day St. Augustine in the 1730s. In 1765, the British converted the St. Augustine watchtower, which William Bartram described as a daybeacon to guide ships into the town's harbor. Archaeological remains of this structure are recorded in the Florida Master Site File (SJ 3702). The royal cartographer William Gerard de Brahm referred to the tower as a lighthouse, as did visiting British and German tourists. Conceived in 1773, a British plan to build a lighthouse in the Dry Tortugas never materialized. In 1774, the British crown installed a daymark at Mosquito Inlet, and hired a keeper to maintain it. The British also installed daybeacons at Sand Key and at the entrance to Tampa Bay. Yet, despite Florida's long colonial heritage heavily dependent upon ocean voyages to remain in contact with ruling authorities in Europe (1565-1821) and treacherous shoals along the Florida Reefs and Atlantic coast, relatively few permanent aids-to navigation are known to have been built in Florida by the governing authorities. Indeed, to date, little evidence has been unearthed to document any lighthouse, much less a system of beacons,

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[1]**Senate, *The Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 13-14; George Putnam, *Lighthouses and Lightships of the United States* (Boston and New York: Houghton Mifflin Company, 1917), 1-30.**

developed in Florida during the colonial era.[2] Research may yield valuable information that could rectify this apparent gap in the historical record.

On 7 August 1789, President George Washington signed the ninth act of the first federal Congress, authorizing the states to place their lighthouses under the supervision of the Federal government. The first public works legislation in American history, the act created the United States Lighthouse Service and placed supervision of the service and the country's aids-to-navigation under the secretary of the Department of the Treasury. The provisions of the act permitted the various states to cede their lighthouses to the national government. Although management was transferred several times between the secretary and the commissioner of revenue, the Treasury Department retained supervision of lighthouse development, operations, and maintenance during those transitions. Notable officials who supervised the treasury included Alexander Hamilton, Albert Gallatin, and Levi Woodbury, who reviewed contracts and the appointments of keepers, and sent the documents to the Congress and for review and signature by the president.[3]

Most presidents paid close attention to the nation's lighthouses because of their effect on commerce, military ships, and the treacherous nature of the nation's coastline. In 1789, before signing the Lighthouse Service into law, George Washington wrote the keeper at Sandy Hook Lighthouse to keep the light burning until the Congress authorized its maintenance. Scrutinizing even the smallest of details, Washington later authorized the fabrication of a mooring chain for a floating beacon in Delaware Bay in the 1790s. Later, in 1806, President Thomas Jefferson confirmed the firing of a keeper at the Cape Henry Lighthouse in Virginia. The nation's presidents closely reviewed the development of lighthouses through the administration of James Monroe, after which responsibility was formally subsumed within an auditor's office of the Treasury Department.[4]

Between 1791 and 1819, the Congress appropriated approximately three million dollars for lighthouse construction, maintenance, and personnel salaries. In 1812, the treasury department maintained forty-nine lighthouses, and by 1820 sixty lighthouses costing approximately one-half million dollars had been constructed. But, deterioration, erosion, and faulty site location and construction had taken their toll, and several structures had collapsed or toppled into the ocean. Consequently, only fifty-five lighthouses actively guided shipping on the American coastline in 1820. More than a few lighthouses had to be rebuilt because of inferior materials and craftsmanship.[5]

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[2]Thomas Taylor, *Florida's Territorial Lighthouses, 1821-1845* (Allendale: Thomas Taylor, 1995), 15-17; Thomas Taylor, *Florida Lighthouse Trail* (Sarasota: Pineapple Press, 2001), 13, 17,92; Jean Parker Waterbury, *The Oldest City: St. Augustine's Saga of Survival* (St. Augustine: St. Augustine Historical Society, 1983), 104, 153; J. Carver Harris, "Sentinels of the Coast," *El Escribano* (April 1964), 10-11.

[3]George Weiss, *The Lighthouse Service* (Baltimore: John Hopkins Press, 1926), 2-4; Putnam, *Lighthouses and Lightships,* 34; George Putnam, "Beacons of the Sea: Lighting the Coasts of the United States," *National Geographic Magazine* 24 (January 1913), 9.

[4]Weiss, *The Lighthouse Service,* 2-4; Putnam, *Lighthouses and Lightships,* 34; Putnam, "Beacons of the Sea," 9.

[5]Senate, *American State Papers, Commerce and Navigation,* 16th Cong., 2d Sess., Doc. No. 235, p. 456-461; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 2, 20; sources give the number of lighthouses between fifty-five and

By 1816, civilian and military engineers had conducted hundreds of coastal surveys, especially along the Eastern Seaboard. They made various recommendations for the placement of lighthouses. Despite the professional assessments, many early lighthouses were constructed in response to petitions received in the Congress and political pressure, rather than as part as an overall plan for developing a system of aids-to-navigation. Beginning in 1816, the Treasury Department bid contracts for lighthouse construction, apparently simply assigning contracts to a reputable builder before that period. The average structure cost six thousand dollars to fabricate, but because of difficult locations and long distances to transport materials, some required nearly three times that amount. Consequently, lighthouse construction expenditures between 1791 and 1817 amounted to nearly two million dollars. In 1820, a lighthouse inventory included nineteen structures in Massachusetts and eight in Maine. Because of the relatively small number of major ports in the southern states, lighthouses along the south Atlantic coast were fewer in number and more widely scattered than those in New England. By 1820, there were four lighthouses along Georgia's coastline at St. Simon's Island, Sapelo Island, Tybee Island, and the south end of Cumberland Island.[6]

Initially, local custom's collectors served as superintendents of lighthouses within their respective districts. In 1792, the Treasury Department employed seventeen customs officials who supervised the country's lighthouse system. Boston's customs official then maintained twenty-one lighthouses in New England, but some officers at other posts supervised only one light. Collectors managed all lighthouse affairs, including recommendations for hiring and firing keepers, providing guidance in site location and construction of lighthouses, and disbursement of funds. In 1813 alone, the annual expenses for keeping, repairing, and supplying America's lighthouses amounted to over one hundred thousand dollars. The system of administration changed little at the local level over the subsequent three decades. Customs officials continued to supervise lighthouses in their respective districts, and reported directly to the Treasury Department. By 1820, the nation's fifty-five lighthouses often occupied sites adjacent to treacherous bars, inlets, and shoals, but all too often had been constructed in response to immediate needs and local political agitation. By 1820, despite extensive surveys and an administrative system nearly three decades old, little overall planning guided the expansion of the nation's aids-to-navigation.[7]

Lighthouse Administration by the Fifth Auditor of the Department of the Treasury, 1820-1852

In 1820, on the eve of Florida becoming a Territory of the United States, the Congress reorganized the Lighthouse Service, taking it out of the direct supervision of the secretary of the treasury and placing it in the fifth auditor's office of the Treasury Department. Despite the reorganization, the development and maintenance

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fifty-eight in 1820. See Senate, *The Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14 and Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 34.

[6]Senate, *American State Papers, Commerce and Navigation,* 16th Cong., 2d Sess., Document No. 235, 456-461; House, *Light-House Establishment,* 27th Cong., 2d Sess., Document No. 811, 2, 20.

[7]Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Document No. 138, p. 28; House, *Light-House Establishment,* 27th Cong., 2d Sess., Document No. 811, p. 2, 8; Putnam, *Lighthouses and Lightships,* 41; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14.

of lighthouses remained similar to the process employed over the past decades: the Congress received petitions that were processed by the fifth auditor's office, and the recommended projects and requests were returned by the secretary of the treasury to the Congress for approval and funding appropriations.[8]

A professional auditor and federal career service employee, Stephen Pleasonton headed the fifth auditor's office between 1817 and 1855. Created as part of a reorganization of the Department of the Treasury during the administration of President James Monroe, the fifth auditor's office was subsumed within the office of the first comptroller, which revised and countersigned the accounts before sending them to the secretary. In addition to the Lighthouse Service, the fifth auditor's office was assigned the responsibility of reviewing the financial affairs of the U. S. Post Office and the Department of State's diplomatic corps and foreign service. Despite his varied duties, Pleasonton became popularly regarded as the general superintendent of lights. Between 1820 and 1852, Pleasonton increased the nation's lighthouses from fifty-five to approximately three hundred fifty with sixty-three customs officials assisting in their development and operations. Coinciding closely with Florida's territorial period (1821-1845), in the interval of supervision by the fifth auditor's office twenty-three lighthouses were built in Florida. Many survived only a brief period, washed away by relentless wave action along the Atlantic coast and Gulf of Mexico. Others were rebuilt, extended to a greater height, or replaced decades later by a superior technology or even a taller tower. Only three Florida lighthouses remain from this early period.[9]

In the mid-1830s, Pleasonton supervised ten clerks, two of whom addressed lighthouse affairs. Plans to reorganize the auditor system during the presidency of Andrew Jackson included placing the Lighthouse Service under the management of the Commissioner of the Customs, which never came to fruition. Political turmoil within the Diplomatic Corps and Post Office, not to mention the Lighthouse Service, made Pleasonton's tasks and those of his clerks challenging. Pleasonton assigned one clerk, Joseph Thaw, with the responsibility of preparing estimates, proposals, and contracts for lighthouses. In his 1836 report to Congress, Pleasonton noted that his duties and those of his staff assigned to "lighthouse business" had greatly increased. Pleasonton significantly expanded the Lighthouse Service during his three decades of supervision. By 1842, the government maintained two hundred fifty-six lighthouses, and the number reached three hundred fifteen in 1851.[10]

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[8]House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 105; 75; Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 38, 105; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14-16.

[9]Taylor, *Florida Lighthouse Trail,* 175-177; House, *Clerks in Fifth Auditor's Office, 1835,* 24th Cong., 1st Sess., Document No. 228, p. 1-3; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 105; 75; Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 38, 105; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14-16; House, *Letter from the Secretary of the Treasury,* 17th Cong., 2d Sess., Doc. No. 4, p. 11-12; House, *Reorganization of the Treasury Department,* 23d Cong., 2d Sess., Doc. No. 10, p. 1-13; House, *System of Public Accounts,* 24th Cong., 2d Sess., Doc. No. 71, p. 1-6.

[10]Taylor, *Florida Lighthouse Trail,* 175-177; House, *Clerks in Fifth Auditor's Office, 1835,* 24th Cong., 1st Sess., Doc. No. 228, p. 1-3; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 75, 105; Senate, *Report of the Officers*

Early in his administration as fifth auditor, Pleasonton adopted a plan to develop four classes of lighthouses. A system predicated on height, the largest, or first, class consisted of a tower that rose sixty-five feet in height. The second class stood fifty feet high, the third class forty feet high, and the fourth class thirty feet high. The vast majority of lighthouses built under the Pleasonton administration consisted of conical towers of brick, granite, rubble stone, or a combination of these and other masonry materials. Providing and protecting the illuminates, an iron-and-glass lantern containing a chandelier of lamps and reflectors was mounted to the top of the brick tower. In some cases, a lighthouse consisted of a wood frame tower attached to the roof of a keeper's dwelling.[11]

For illuminates, Pleasonton relied on a lamp-and-reflector system patented by Winslow Lewis in 1810. Lighting mechanisms prior to the 1790s had included pans of oil with four to ten wicks, named "spider lamps." The resulting fumes and an inadequate ventilation system created unhealthy conditions for keepers, required significant cleaning, and often failed to produce a sufficient amount of light. Invented in 1784 by Amie Argand of Switzerland, the Argand lamp produced a smokeless light from a coiled wick in a metal tube that was the equivalent of seven candles. An updraft clear-glass chimney placed over a wick directed smoke away from the wick, reducing lantern-room soot and producing a steady flame. The Argand design replaced spider lamp technology in America's lighthouses on the eve of the nineteenth century. To this design, an American inventor and later lighthouse builder, Winslow Lewis added a series of parabolic reflectors and a focusing lens to increase the intensity of each lamp. Lewis designed a large chandelier on which to suspend lights with their supporting magnifying lenses and reflectors in multiple patterns. In some lighthouse lantern rooms, a mechanism was added to rotate the chandelier. Known as a catoptric system, Lewis's patented design became outmoded in the 1820s, when a new lighthouse lens was invented by Augustin-Jean Fresnel of France. Still, most of America's lighthouses remained equipped with Lewis's patented lamps until the 1850s.[12]

Pleasonton relied on customs officials, in association with retired ship pilots and captains, to select the sites for lighthouses. Apparently, the fifth auditor's office seldom consulted navigation charts or engineers about lighthouse sites. In association with the fifth auditor's office, customs officials helped develop specifications for lighthouses, and put out construction bids in local newspapers. For lighthouse construction, the fifth auditor generally employed the low-bid process, and most contracts were awarded to New England builders, such as Lewis of Boston and Samuel Lincoln of Hingham, Massachusetts. Possessing decades of experience assembling New England's lighthouses, few contractors gave much consideration to environmental and soil conditions that

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Constituting the Light-House Board, **32d Cong., 1st Sess., Ex. Doc. No. 28, p. 38, 105; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14-16.**

[11]**House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 75, 105; Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 38, 105; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 25.**

[12]**Rhein, *Anatomy of the Lighthouse,* 148, 159; Taylor, *Florida's Territorial Lighthouses,* 8-9.**

distinguished their region from that of the south Atlantic coast. In effect, most of Florida's earliest lighthouses closely resembled in appearance, materials, and size those along the coasts of Maine and Massachusetts.[13]

An efficient accountant who worked with flush budgets during the nation's expansionist years of the 1820s, Pleasonton struggled to maintain the lighthouse system through the lean economic climate of the late-1830s. But, regardless of the economic conditions, Pleasonton seemed to resist both administrative changes and technological refinements. In 1836, during the administration of President Andrew Jackson, the Congress created the Office of the Supervising Architect to design federal projects. One of America's preeminent architects of the early nineteenth century, Robert Mills, was appointed to supervise the office which prepared plans for custom houses, federal courthouses, national monuments, marine hospitals, observatories, post offices, and the vast majority of the nation's federal building projects. In 1832, Mills had published *American Pharos, or Lighthouse Guide.* But, Pleasonton was unwilling to place the design work of lighthouses in the hands of the federal architect, or even request a review by Mills and his successors for the nation's lighthouse projects. Ironically, during the 1830s, the supervising architect drafted the plans for the nation's first Department of the Treasury Building, which housed the offices of the fifth auditor.[14]

The process of expansion wrought by Pleasonton became fraught with pitfalls, in part, because of the accountant's limited experience in architecture, engineering, and navigation, and, in part, because of his heavy reliance upon New England lighthouse builders. Although the number of lighthouses greatly expanded and a rudimentary system of standardization emerged, the fifth auditor's office neither encouraged up-to-date design techniques for new lighthouses, nor installed modern technology in older lighthouses, and failed to draft a comprehensive plan for a system of lighthouses. Soon, the Congress received complaints about lighthouses built too low, inadequately lighted, and poorly fabricated and located. Consequently, Pleasonton's methodology and products came increasingly under attack between the mid-1830s and the early-1850s. The process culminated by removing the Lighthouse Service from the office of the fifth auditor, and placing its supervision under the U. S. Light-House Board, which was comprised of civilian professionals and military officers. The reorganization left the board within the jurisdiction of the Department of the Treasury, but outside the purview of the fifth auditor. Characterized by a bitter and protracted political and administrative process, the reorganization represented a larger movement at efficiency and professionalization in government during the middle of the nineteenth century. Developments in Florida lay near the center of this controversy.[15]

During the presidency of Martin Van Buren (1837-1841), Levi Woodbury, then the secretary of the treasury, received numerous reports of lighthouses poorly constructed and inadequate supervision by the fifth auditor's

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[13]Taylor, *Florida's Territorial Lighthouses,* 9; *East Florida Herald,* 17 May, 7 June 1823.

[14]Henry Withey and Elsie Withey, *Biographical Dictionary of American Architects* (Los Angeles: Hennessey & Ingalls, Inc., 1970), 421-423; Taylor, *Florida's Territorial Lighthouses,* 9; Robert Mills, *American Pharos, or Lighthouse Guide* (Washington, D. C.: Thompson & Homans, 1832).

[15]House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 75, 105; Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 38, 105; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 14-16.

office. The critical reports eventually prompted an investigation by the Congress. The bulk of the criticism came from Edmund and George W. Blunt of *American Coast Pilot,* generally recognized as the sailor's bible to navigation hazards. A printer by trade, Edmund Blunt had established the *Pilot* in 1796. One son, George Blunt, made extensive surveys of the Bahama Banks and New York harbor in 1826, and expanded the publishing business with nautical charts. Another son, Edmund Blunt, became first assistant to the chief of the U. S. Coast Survey. In 1834, the Blunt brothers, styled as E. & G. W. Blunt, published their first treatise on the deficiencies of America's lighthouse system. They submitted the document to the Congress, and prepared a second publication in 1838. Disagreements erupted between the Blunts and the fifth auditor's office around poor site location, insufficient heights, alleged faulty construction by the Boston contractors who had assembled lighthouses over the decades, poor maintenance and inspection procedures, and the type of lighting infrastructure used in the lanterns. The Blunts claimed that lighthouses in England and France were far superior to those along America's coasts. Submitted to the Congress in the form of documents, memorials, and reports, these grievances and the responses prepared by Pleasonton and Lewis represented a lengthy congressional investigation, which essentially extended between 1838 and 1851. The Blunts expressed particular displeasure over Pleasonton's resistance to replace the antiquated Lewis system with the clearly superior Fresnel lens.[16]

A civil engineer employed by France's Lighthouse Authority, Augustin-Jean Fresnel began experimenting with lighthouse optics in 1813. He soon discovered that light refracting through a glass lens was dependent on contours rather than bulk. By 1824, Fresnel had perfected a compound glass lens for lighthouses that consisted of a bull's eye, or central lens, with concentric and prismatic components. Requiring a much smaller light source than Lewis's lamps, some of Fresnel's designs consisted of beehive and curved prisms, while others displayed concentric circular prisms surrounding a bull's eye lens. Fresnel's dioptric system solved the problem of the diffusion of light by concentrating diffused beams in horizontal bands. Providing a decrease in lens weight and a smaller light-source mass, Fresnel's products quickly made them a superior technology to the Lewis system with its heavy framework and multiple lenses, lights, and reflectors. Tests of the lens demonstrated that it captured seventy percent of the light produced by a single source and concentrated it into a thin beam. Other tests confirmed that one Fresnel lens could outshine sixteen Lewis lamps. Still, Pleasonton shunned the superior French technology of the Fresnel lens. Decades later, Pleasonton still insisted on the use of the lamp-and-reflector system developed by Winslow Lewis.[17]

By the mid-1830s, the Congress and Treasury Department had become overwhelmed with petitions for new lighthouses. In 1837 alone, the department received requests for thirty-one new lighthouses. Amounting to nearly one hundred seventy thousand dollars, the appeals compelled the Congress to appoint a board of naval commissioners to examine the need for these structures. The board reported to the Senate's committee on commerce that "hitherto Congress had before it, when proceeding to authorize the erection of new houses, little

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[16]**Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 15; *National Cyclopedia of American Biography,* 63 vols. (New York: James T. White & Company, 1897-1963), 21: 236; Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 2-23; *New York Times,* 20 April 1878.**

[17]**Rhein, *Anatomy of the Lighthouse,* 158-159; House, *Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 114, p. 4, 79-92, 206-261.**

information beyond the loose, irresponsible statements of petitioners, most of whom were in many instances unknown." In its recommendations, the board rejected at least one lighthouse in every state, except Florida. In its 1837 recommendations, the board approved proposed structures at Amelia Island, Apalachicola Bay, Carysfort Reef, and St. Joseph's Bay, and the rebuilding of lighthouses at Cape Florida and Mosquito Inlet. More than a cursory review of the nation's aids-to-navigation, the board made additional recommendations that precipitated continued debate between the fifth auditor, the Blunts, and additional congressional review.[18]

Much of the controversy about the Lighthouse Service swirled around the contracts and craftsmanship of Winslow Lewis. Born in Massachusetts in 1770, Lewis worked his way up in New England's maritime industry, eventually serving as captain of a merchant ship. After the embargo of 1807, he retired from sailing and became a lighthouse inspector, and experimented with lanterns. In 1808, he invented a binnacle light, and two years later perfected and patented a reflecting and magnifying system for use in lighthouses. In 1811, he installed the new system in the lighthouses supporting Boston harbor, where his patent used only one-half the amount of oil then consumed to provide illumination. He also installed several devices in lighthouses along the coasts of Denmark and Nova Scotia.[19]

In 1812, Congress authorized Albert Gallatin, secretary of the treasury, to contract with Lewis to install his system in all of the nation's lighthouses, then numbering forty-nine. Lewis's success bred more contracts, and in 1816 he began supplying the Lighthouse Service with sperm whale oil. He visited each lighthouse once a year, reporting its condition and delivering a year's supply of fuel. Published in 1817, his *Description of the Lighthouses on the Coast of the United States* became an early authoritative guide. Lewis's study of the condition and operation of lighthouses prompted him to open a lighthouse construction business about 1825. By the early-1840s, he had assembled or rebuilt approximately eighty lighthouses, and by 1850 he had built about one hundred lighthouses. New England contractors then dominated America's lighthouse construction industry, and Lewis claimed that all of Florida's earliest lighthouses had been assembled by Boston builders. Although some of these structures toppled into the sea or deteriorated, both Pleasonton and Thomas English of the Boston Maritime Society gave Lewis high marks for his consistent work. Equally comfortable in the construction trade and politics, Lewis served as an alderman on Boston's city council in the 1820s, and several terms in the Massachusetts Legislature. His maritime and political contracts cemented a long relationship with the Federal government and Stephen Pleasonton, which ended with Lewis's death in 1850.[20]

Notwithstanding Lewis's contacts and long association with the Lighthouse Service, the Blunts were unrelenting in their criticism of Lewis, Pleasonton, and the state of America's lighthouses. They compiled complaints from customs collectors, government surveyors, and ship captains. Considered by the Blunts as colossal blunders, the lighthouses at Brandywine Shoal and at the mouth of the Mississippi River, projects that

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[18]**Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 15, p. 13-15, 24.**

[19]**House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 96-98; *National Cyclopedia of American Biography,* 25: 211-212.**

[20]**Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 34-35, 41; House, *Light-House Establishment,* 27th Cong., 2d Sess., Document 811, p. 8-9, 97-99; *National Cyclopaedia of American Biography,* 25: 211-212.**

cost the government between thirty and eighty thousand dollars had been swept out to sea. Their complaints extended throughout the system, from Florida to Maine, ranging from lighthouses too short to be seen, ineffective lighting apparatus, poor maintenance, untimely shipments to keepers, and evidence that Pleasonton's office did not even maintain a comprehensive list of the nation's lighthouses and their individual characteristics.[21]

Much of the Blunts' criticism was justified, in part, because Pleasonton developed the system without benefit of an overall plan, and awarded contracts based on a low bid with little consideration or supervision over the design, materials, or location of lighthouses. Although the nation's system of lighthouses had increased nearly six-fold under Pleasonton's leadership, most were brick structures built without the benefit of either architects or engineers. Pleasonton and Lewis submitted voluminous rebuttals to the Blunts's accusations, which only fueled the wrath of the publishers and prolonged the congressional inquiries. Lewis claimed that inferior construction did not account for the collapse of his lighthouses; instead, he attributed the failure of his Florida lighthouses to poor site location, which had been established by the customs collector of each district. Nature, he said, also took a terrible toll. A hurricane that devastated the Florida Keys in 1846 was responsible for the loss of lighthouses at Key West and Sand Key, rather than inferior craftsmanship. Apparently, hollow-wall construction of towers was then a common construction technique, although Lewis did not address the matter. In an effort to deflect further criticisms, Lewis indicated that the Blunts had become associated with his nephew, civil engineer I. W. P. Lewis. He alleged that they were conspiring against Pleasonton to transfer the supervision of lighthouses from the Treasury Department to the Department of the Navy. Winslow Lewis seemed to hold his nephew in contempt, eagerly pointing out that the engineer's sole attempt at lighthouse design and construction at Stonington had ended in a dismal failure.[22]

Part of Winslow Lewis's documentation reveals the division then developing between long-established contractors and the emergent professionals in the fields of engineering and architecture. Lewis acknowledged that he had built a failed lighthouse at the mouth of the Mississippi River in 1820. But, he pointed out, the plans for the structure had been drafted by the renowned Benjamin Latrobe, the Philadelphia architect acknowledged as the father of Greek Revival architecture in America. Wary of its feasibility and the plans, Lewis had nevertheless accepted the eighty-thousand-dollar contract and built the lighthouse to specifications. Within days of its completion, the foundation collapsed, rendering the structure useless. In 1822, he built another tower in the Mississippi River using his own plans with five-foot thick walls, a tower that still stood in 1842.[23]

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[21]**Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 8, 10, 38-39; Senate, *Documents in Relation to the Light-House Establishment,* 25th Cong., 2d Sess., Doc. No. 258, p. 15; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 77, 80, 84, 93; Senate, *Documents in Relation to the Light-House Establishment,* 25th Cong., 2d Sess., Doc. No. 258, p. 15; Taylor, *Florida's Territorial Lighthouses,* 54-55, 176, 219-224.**

[22]**Rhein, *Anatomy of the Lighthouse,* 19-20; Putnam, *Lighthouses and Lightships,* 42; Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 8, 10, 38-39; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 1-85, 90, 98, 101, 106-107.**

[23]**House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 90, 101, 106-107, 110; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 25.**

Lewis's attack on professional architects then turned to a Latrobe protégé, William Strickland, who designed and built a lighthouse in Delaware Bay for nearly thirty thousand dollars. Soon after completion that structure also suffered a foundation failure. Noting Strickland's superior design of the Merchant's Exchange Building in Philadelphia, Lewis believed that the architect had "stepped out of the latitude of his experience" when he designed the massive lighthouse. Possessing no formal training in design or construction, Lewis believed practical know-how far superior to scientific knowledge, and that the services of an architect or engineer were not necessary to build a lighthouse. He seemed to despise some engineers, "for it seems that [they believe] no others can have any knowledge of science." He indicated that by the early-1840s only three American lighthouses had been built using professional design services, all ending in failure. He had personally supervised the construction of nearly one hundred lighthouses, and the vast majority of those still stood. With regard to the one hundred ten thousand dollar losses in lighthouses developed by "professionals" at Delaware Bay and on the Mississippi River, Lewis remarked "So much for engineering and architectural science in building light-houses." Lewis's death in 1850 left Pleasonton without one of his most vocal advocates supporting his administration of the Lighthouse Service.[24]

Congress responded in several ways to the complaints about America's lighthouses. In 1838, it gave the U. S. Army Corps of Engineers a role in site selection, construction, and lighting systems. In 1842, the Treasury Department directed I. W. P. Lewis to inspect New England's lighthouses, and his report to Congress became the first instance of a professional overview of the nation's lighthouse system. Lewis found few changes since 1789 in the nation's lighthouse law, reporting that "It omits, in short, every wholesome regulation calculated to confine the cupidity of contractors within the bounds of honesty; and the nation has thus been encumbered with a family of 250 lighthouses, all more or less defective, and all crying out for continual repairs."[25]

Part of the solution to improving lighthouse construction and administration included the Congress' division of dividing the country into eight districts, six of those along the Atlantic coast. A naval officer assigned to each district became responsible for evaluating the condition of each lighthouse and selecting sites for new structures. Naval reports continued to indicate faulty construction, poor locations, and inadequate lighting systems. Plague by national crises ranging from Indian removal, impending war with Mexico, and heated debates over the slavery issue, the Congress took few additional steps to remedy the circumstances, and lighthouse decisions remained under Pleasonton's jurisdiction. Captain Matthew Perry, son of the renowned naval commander Oliver Hazard Perry, studied the lighthouses along the English and French coasts, submitting another recommendation that America's lighthouses would benefit from Fresnel lenses and taller heights. Further investigation found that between 1791 and 1841 over nine million dollars had been expended on lighthouses with approximately seven million spent during the fifth auditor's administration alone. Still, a congressional investigation in 1842 concluded that the fifth auditor "merits no condemnation," and with "some

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[24]**House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 90, 101, 106-107, 110; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. No. 56, p. 25; *National Cyclopedia of American Biography,* 25: 211-212.**

[25]**House, *Examination--Light-House Establishment,* 27th Cong., 3d Sess., Doc. No. 183, p. 19-20.**

improvements, particularly in regard to inspection, it is believed that our establishment may compare with that of any nation." In 1847, still faced with a recalcitrant fifth auditor and the need for lighthouses in difficult locations, the Congress assigned the design and construction of six lighthouses to be built in particularly difficult locations to U. S. Army's engineers.[26]

By 1851, the crescendo of complaints regarding the country's system of aids-to-navigation had grown so intense that the Congress ordered a sweeping investigation of America's lighthouses. Distinguished military officers and civilian scientists comprised the investigating committee. The Congress appointed naval lieutenants Thornton Jenkins and Richard Bache to inspect and report on the lighthouses of Europe, and solicited reports from engineer I. W. P. Lewis. Broad and thorough, the investigation analyzed the existing system, and made numerous wide-ranging recommendations for its improvement. Adopted by the Congress, those findings resulted in a complete over haul of the administration of the nation's lighthouses.[27]

Lighthouse Administration by the U. S. Light-House Board, 1852-1910

Created by Congress, the U. S. Light-House Board essentially consisted of the members who conducted the congressional investigation of lighthouses in 1851: William Shubrick and S. F. DuPont of the U. S. Navy; Joseph Totten of the U. S. Army Corps of Engineers; James Kreamer of the U. S. Topographical Engineers; and A. D. Bache, superintendent of the U. S. Coast Survey. In addition, Joseph Henry of the Smithsonian Institution served on the board. President Millard Fillmore appointed the members, and the secretary of the treasury acted as *ex officio* president of the board, who also elected one of its members as chairman. For its first nineteen years, Shubrick served as chairman of the Light-House Board. In addition, Lieutenant Thornton Jenkins of the navy served as the board's secretary, and Edmund L. F. Hardcastle of the army was the engineering secretary. In 1852, still eager to exercise influence over the nation's lighthouse system, Pleasonton informed the Congress that "a single officer, under the Secretary of the Treasury, with full powers and responsibility, would insure the most efficient and economical administration," advice ignored by congressional leaders and the new board.[28]

Despite the presence of two civilian board members and supervision by the Department of the Treasury, the Light-House Board assumed a distinctly military flavor. Within the various lighthouse districts, military officers served as the engineers and inspectors who recommended and supervised construction and repair projects. The Light-House Board eventually eliminated the role of local customs collectors supervising lighthouse site location, development, maintenance, and operation. Early board members and many of their successors ranked among the leading military and scientific leaders of the nation. Through the 1890s, board members included several superintendents of the U. S. Coast and Geodetic Survey: professor A. D. Bache; physicist Thomas C. Mendenhall; educator Henry S. Pritchett; and Henry Morton of the Stevens Institute of Technology in New

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[26]**Weiss, *Lighthouse Service,* 9, 16-18; Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Doc. No. 138, p. 8, 10, 38-39; House, *Light-House Establishment,* 27th Cong., 2d Sess., Doc. No. 811, p. 1-85, 90, 98, 101, 106-107.**

[27]**Senate, *The Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. 56., p. 20-24.**

[28]**Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 1-5; Weiss, *Lighthouse Service,* 10-12, 14.**

Jersey. During the 1870s and 1880s, the board investigated the use of electricity in lighthouses, a development decades away from implementation, but promoted by scientists Mendenhall and Morton. Military officers who made important contributions to the Light-House Board included chief engineer of the Army Joseph Totten, who served between 1852 and his death in 1864. Past superintendent of public buildings, General Thomas Casey held the position of chief engineer of the Army in the 1880s, when he served on the Light-House Board.[29]

The legislation creating the Light-House Board directed it to appoint an engineer secretary or an army engineer to develop "all plans, drawings, specifications, and estimates of cost, or all illuminating and other apparatus, and of construction and repair of towers, buildings, etc., connected with the Lighthouse Establishment, and no bid or contract shall be accepted or entered into except upon the decision of the board...." The law also provided for public contracts of materials, using regulations adopted by the board.[30]

In practice, the army's engineers drafted the plans and supervised the construction of lighthouses, and kept the structures and buildings in a good state of repair. The navy was appointed the tasks of maintaining the lights and instilling proper discipline of the Lighthouse Service employees. The Light-House Board also maintained its own drafting room, where employees prepared the plans and specifications for some of its most difficult lighthouses. In addition, employees reviewed and revised plans submitted by army engineers.[31]

By 1861, the board had drafted standardized specifications for various types of lighthouses. First order brick towers were to display the shape of "a frustrum of a cone...with two shells of brickwork, the inner one being cylindrical, and connected to the outer one with six radial walls. The inner and outer walls will decrease in thickness as they approach the top, by offsets at intervals..." The specifications affirmed the use of "hollow cavities" in brick lighthouses, one of the pivotal issues used by the Blunts to discredit contractor Winslow Lewis and the subsequent creation of the Light-House Board by the Congress. Designating the focal plane at one hundred fifty feet above sea level, the board stipulated the excavation of a foundation pit ten feet deep, "if the ground on which the tower is to be built is good and solid." At sites with poor soils, the superintendent of construction was directed to use a "grillage of heavy timbers, say 12" x 12". The upper side of the grillage to come within eight feet of the surface of the ground." The board indicated the use of "good rubble masonry, in random courses, with level beds. The extreme diameter of the lowest course was to be forty feet. The largest stones obtainable must be used for this course." Spiral stairways consisted of iron "extending from the lower part of tower to the watch-room...and built in the brickwork of the tower. The brick used throughout must be of the best quality, firm in texture, hard burned, and laid in the most solid manner, with full beds of mortar." Plans called for the construction of "a small brick structure containing work and oil rooms."[32]

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[29] ***National Cyclopedia of American Biography,*** **10: 117-118, 24: 374-375.**

[30] **Weiss, *Lighthouse Service,* 13.**

[31] **Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. 56, p. 107-108.**

[32] **U. S. Light-House Board, *Specifications for a First Order Light-House (Brick Tower)* (Washington, D. C.: GPO, 1861), 3-4.**

Beginning in the 1850s, familiar names associated with the Second Seminole War, American Civil War, and other conflicts of the nineteenth century guided the development of America's lighthouses. Leading army engineers who helped develop the system included P. G. T. Beauregard, William B. Franklin, Andrew A. Humphreys, George Gordon Meade, Orlando M. Poe, and William S. Rosecrans. A veteran of Florida's Seminole wars, Humphreys built lighthouses with Richard Bache on Delaware Bay and served on the Light-House Board between 1855 and 1862. In association with other engineers, Meade designed novel exposed screwpile lighthouses along the Florida Reef and the Gulf of Mexico. In the mid-1850s, Meade served as construction and renovations engineer in the seventh lighthouse district, which then stretched between the St. Augustine and St. Marks lighthouses in Florida. Captain Danville Leadbetter, a West Point graduate and Army Corps engineer, supervised construction activities in the eighth lighthouse district that embraced the region west of St. Marks to Louisiana. The chief engineer commanding Sherman's "March-to-the-Sea," General Poe became secretary of the Light-House Board (1865-1874), and supervised the construction of towers astride the Great Lakes, including the notable Spectacle Reef Lighthouse. Beauregard and Rosecrans each served brief terms as engineers in lighthouse districts.[33]

Navy officers played an equally important role developing the nation's lighthouses. Commander Winfield Scott Schley who helped capture Port Hudson in 1863 became chairman of the Light-House Board in 1897. An officer in the North Atlantic Blockading Squadron during the Civil War and commander of the Battleship Iowa during the Spanish-American War, Robley Evans served on the Light-House Board in the 1880s and 1890s. Naval officer Rapheal Semmes served as a lighthouse inspector and as naval secretary of the board. A native of Alabama, Semmes resigned his naval commission in 1861, was briefly assigned chief of the Confederacy's lighthouse bureau, but later became feared as commander of the Confederate raider *C.S.S. Alabama.* George Dewey, famous for his attack on the Spanish fleet at Manila Harbor during the Spanish-American War, served as a lighthouse inspector in the 1870s and later served as the board's naval secretary.[34]

Notable civilians also contributed to the board. Arnold Johnson held one of the longest tenures of employment in the Lighthouse Service. Author, lawyer, and scientist, Johnson graduated from Columbia Law School in 1866, and became chief clerk of the Light-House Board in 1869. Although he opened a law office in Washington, D. C., he maintained the chief clerk's position until 1915. In association with Lucien I. Blake, Johnson conducted experiments with submarine signaling and fog signals, and their paper on sound signals was published in various reports and journals. In 1880, Johnson published *The History of the Lighthouse Establishment of the United States,* and a decade later he completed *The Modern Light-House Service.* Both volumes have become standard references about America's lighthouse history. A fellow of the American Association for the Advancement of Science, Johnson instituted the traveling lighthouse library system in 1876, which rotated books between lighthouse keepers.[35]

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[33]**Weiss, *Lighthouse Service,* 14-15; Senate, *Report of the Secretary of the Treasury,* 34th Cong., 1st Sess., Ex. Doc. No. 2, p. 261-264; Samuel Crompton, *The Lighthouse Book* (New York: Barnes and Noble, 1999), 81; *National Cyclopaedia of American Biography,* 6:542.**

[34]**Weiss, *Lighthouse Service,* 14-15; Putnam, *Lighthouses and Lightships,* 45.**

[35]***National Cyclopedia of American Biography,* 16: 180-181; Weiss, *Lighthouse Service,* 80.**

Comprised of a board rather than a single government official with decision-making authority, the Light-House Board embarked upon an ambitious plan to improve and expand the nation's system of navigation aids. Its priorities included operating the Lighthouse Service as a single system, "rather than as a mass of local and unrelated lights." Early goals included classification of lighthouses using the French method, which ranked lighthouses by the focal length of the lens, that is, the distance from the center of the light to the inner surface of the lens. It divided the country into twelve districts, seven of those on the Atlantic coast and two along the Gulf of Mexico. In addition, the board recommended the installation of Fresnel lenses in place of the existing Argand lamp-and-parabolic-reflectors then used in virtually all of America's lighthouses. By 1859, the board had replaced all but six of the older Lewis lamp systems. In addition, the board embraced the use of new technology and constructed new towers using exposed screwpile, iron caisson, and iron skeletal designs. The board's various activities also included annual reports and requests for appropriations, which were still submitted to the Department of the Treasury for review and submission to the Congress.[36]

Findings unearthed by the board included several deficiencies in Florida, which it sought to remedy in the 1850s and following the Civil War. It found that Florida contained the largest concentration of lighthouses requiring reconstruction in the nation. In a relatively brief period, seven of Florida's fifteen lighthouses had been rebuilt at a cost of seventy-four thousand dollars. Indeed, lighthouses in remote regions often seemed to have been built with less integrity and deteriorated faster than those near large urban centers, especially those in the Northeast. Despite relatively large expenditures in Florida, David D. Porter, a naval officer who gained fame for his exploits along the Mississippi River during the Civil War, found in 1851 that "no part of the coast of the United States is so badly lighted as the Florida reef."[37]

The board reported only three prominent revolving beams in a distance of thirteen hundred miles--between the Dry Tortugas and Navesink in New Jersey. Naval officers deemed insufficient the few fixed lights between Dry Tortugas and Cape Canaveral, and made a similar recommendation of the fixed beams in the primary lights between Cape Canaveral and Charleston. The Florida Reefs remained a significant detriment to shipping with an estimated seven million dollars worth of ships and cargoes lost on the reefs between 1843 and 1849. Most towers were too low, and one recommendation stated that any lighthouse with a focal plane less than one hundred fifty feet above sea level was insufficient to warn sailors of maritime hazards.[38]

The Light-House Board developed many new towers in its first decade. Between 1852 and 1858, the number of lighthouses increased from three hundred twenty-five to five hundred fifty-six. Reports indicated that the bays and harbors at Chesapeake, Delaware, and New York had been adequately lighted, and "the dangerous reefs of the Florida coast have been supplied with lights, beacons, and sea-marks." By 1858, Fresnel lenses were

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[36]**Weiss, *Lighthouse Service,* 10-11.**

[37]**Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 105-106, 212.**

[38]**Senate, *Report of the Officers Constituting the Light-House Board,* 32d Cong., 1st Sess., Ex. Doc. No. 28, p. 46, 105, 121; Taylor, *Florida's Territorial Lighthouses,* 243-249.**

installed in all but six of the nation's lighthouses. Twenty-six of those lights were classified as first-order, the largest and most powerful type. Second-order lights amounted to twenty-one, and forty lighthouses were equipped with third-order lights.[39]

Despite the increased number of lighthouses, the annual consumption of oil dropped from over one hundred thousand gallons nationwide to forty-eight thousand, primarily due to the efficiency of Fresnel lenses. The board also instituted the cost-efficient use of rape-seed, or wild-cabbage, oil, finding it less expensive than whale's oil. Animal lard oil became the illuminant of choice in 1865, but experiments with mineral oil, a derivative of kerosene, replaced the agricultural product in the mid-1870s. Much to the chagrin of New England's whaling culture, whale's oil substitutes benefitted new forms of industry at their expense.[40]

Contractors supervised by the board's engineers or secretaries greatly reduced the number of failed towers and necessary repairs. The U. S. Coast Survey's topographical engineers provided charts to help assess site locations for new lighthouses, and comprehensive examinations helped the board prepare an elaborate plan for a comprehensive system of aids-to-navigation. The board also began publishing notices in local newspapers and official documents regarding changes in light color and flash sequences, daymark colors, and other characteristics essential to navigators. An official document, the *Light-List* was annually compiled, published, and distributed to ship masters and owners of vessels to inform them of the nation's system of lights. The board's division of the Atlantic coastline into twelve districts carved Florida's shoreline into three of those: the sixth district stretched between New River Inlet in North Carolina and Cape Canaveral; the seventh district between Cape Canaveral and St. Marks Lighthouse; and the eighth district between St. Marks Lighthouse and Barrataria Bay in Louisiana. Subject to frequent adjustment, the board's district boundaries in Florida often changed in the nineteenth and twentieth centuries to streamline and expedite construction and repairs of lighthouses along the state's long, irregular coastline.[41]

During the Civil War, the Light-House Board became hampered by its loss of engineers and inspectors assigned to military duties. Construction came to a virtual standstill, and scarce resources increased the difficulties of routine maintenance and supply. Most keepers in the Lighthouse Service retained their posts, although some were enlisted into military service. During the war, an attempt was made to reorganize the Lighthouse Service into the Department of the Navy. In 1862, under the direction of Admiral William Shubrick, the board recommended that Congress leave the administration of lighthouses in the Treasury Department. The board reminded the Congress that aids-to-navigation were primarily of commercial benefit, and that the Department of the Treasury then administered the nation's commercial affairs. In addition, Shubrick, himself a naval commander, persuaded congressional leaders to retain the service within the Department of the Treasury

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[39]**Senate, *Letter of Wm. B. Shubrick, Chairman Light-House Board,* 37th Cong., 2d Sess., Misc. Doc. No. 61, p. 3-13.**

[40]**Senate, *Report of the Secretary of the Treasury,* 34th Cong., 1st Sess., Ex. Doc. No. 2, p. 261-264; Senate, *Letter of Wm. B. Shubrick, Chairman Light-House Board,* 37th Cong., 2d Sess., Misc. Doc. No. 61, p. 3-13; House, *Reports of the Secretary of the Treasury,* 44th Cong., 1st Sess., Ex. Doc. No. 2, p. 814-817.**

[41]**Senate, *Report of the Secretary of the Treasury,* 34th Cong., 1st Sess., Ex. Doc. No. 2, p. 261-264; Senate, *Letter of Wm. B. Shubrick, Chairman Light-House Board,* 37th Cong., 2d Sess., Misc. Doc. No. 61, p. 3-13.**

because the navy had insufficient resources to administer the nation's lighthouses. Surviving the political fray intact, the board in 1863 embarked on several small projects, such as organizing a general depot for the Lighthouse Service at Staten Island, and, to facilitate military shipping, the construction of several new lighthouses, light-ships, and buoys in the Northeast and along the Mississippi River. Still, relatively little new construction occurred.[42]

Early in the war, Stephen Mallory, secretary of the Confederate navy, ordered authorities to seize lighthouses in the Confederate States of America and keep the structures dark. In response to the seizure of Federal properties, President Abraham Lincoln proclaimed the government's intention to "recover and maintain possession of all forts, lighthouses, etc." Even before the outbreak of hostilities, the governor of South Carolina had ordered the keeper at Charleston to leave his post. By March 1862, southern sympathizers and Confederate forces had seized one hundred twenty-five Federal lighthouses. Generally without resorting to violence, Rebel forces and supporters removed the lighting apparatus, clock weights, and rotational mechanisms to render a lighthouse useless. General Danville Leadbetter, a former lighthouse engineer trained at West Point, supervised fortifications and lighthouses along the Gulf Coast for the Confederacy. At Mobile Bay, he directed Confederate troops in the destruction of the Sand Island Lighthouse, a prominent structure that he had designed in 1858.[43]

In some cases, Confederates scuttled light-ships to block navigation channels. Some artillery duels between opposing sea and land forces occasionally hit lighthouses, and some were destroyed. In a few cases, Federal troops restored lighthouses to active service after occupying a city or securing a harbor. In all, one hundred sixty-four lighthouses and light-ships along the coasts of the south Atlantic and Gulf of Mexico went dark at the hands of Confederates. Some of the few towers to remain lighted during the war stood on the Florida Reefs. After Federal forces captured southern ports, special aids-to-navigation were installed at the entrances of Charleston Harbor, Chesapeake Bay, James River, St. Johns River, and York River. By 1866, most lighthouses damaged or destroyed during the war had been repaired or rebuilt; still, nearly fifty southern lighthouses were reported unlit as late as 1869.[44]

Lighthouse construction resumed following the war. Large projects of the 1870s included an administration building for the Light-House Board in Washington, D. C., Stannard's Rock Lighthouse in Michigan, and Cherry

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[42]Weiss, *Lighthouse Service,* 15-16; Putnam, *Lighthouses and Lightships,* 48.

[43]Bruce Roberts and Ray Jones, *Gulf Coast Lighthouses: Florida Keys to the Rio Grande* (Philadelphia: Chelsea House Publishers, 1989), 32-34; Senate, *Letter of Wm. B. Shubrick, Chairman Light-House Board,* 37th Cong., 2d Sess., Misc. Doc. No. 61, p. 17; Weiss, *Lighthouse Service,* 15-16; Taylor, *Florida's Territorial Lighthouses,* 31, 179, 229, 249; Putnam, *Lighthouses and Lightships,* 100-101, 111; Charles Nordhoff, "The Light-Houses of the United States," *Harper's New Monthly Magazine* 48 (March 1874), 465; W. F. G. Shanks, "Policemen of the Sea," *Harper's New Monthly Magazine* 38 (March 1869), 434.

[44]Senate, *Letter of Wm. B. Shubrick, Chairman Light-House Board,* 37th Cong., 2d Sess., Misc. Doc. No. 61, p. 17; Weiss, *Lighthouse Service,* 15-16; Taylor, *Florida's Territorial Lighthouses,* 31, 179, 229, 249; Thomas Garner, *The Pensacola Lighthouse* (Pensacola: Pensacola Historical Society, 1994), 10-11; Putnam, *Lighthouses and Lightships,* 100-101, 111; Nordhoff, "The Light-Houses of the United States," 465; Shanks, "Policemen of the Sea," 434.

Island Flats Lighthouse in Delaware. Built in 1793, the Tybee Island Lighthouse in Georgia was rebuilt. Significant activity also occurred along the coastline of the Gulf of Mexico. The Light-House Board completed a tower at Southwest Pass in Louisiana in 1873, the same year it replaced the Sand Island Lighthouse. In 1882, the Horn Island Lighthouse at Mississippi Sound was rebuilt in a new location. A violent hurricane in 1906 swept the Horn Island and Sand Island structures into the Gulf of Mexico. Significant appropriations improved Florida's lighthouse system. Between 1873 and 1880, the Light-House Board completed three new exposed screwpile towers on the Florida Reefs. Based on the Carysfort Reef model, structures at Alligator Reef, American Shoals, and Fowey Rocks completed a significant system of aids-to-navigation first planned for southeast Florida in the 1820s. One leading lighthouse authority considered Alligator Reef Lighthouse, assembled at a cost of one hundred eighty-five thousand dollars, as "one of the finest iron sea-swept lighthouse structures in the world." By 1880, the Light-House Board maintained six hundred sixty-one lighthouses.[45]

In 1868, in addition to developing new structures and renewing its investigations of lighthouse illumination, the Light-House Board focused attention on sound-signals. Various experiments had been conducted on air whistles and reed horns in the 1850s. One application used a horse-operated treadmill to power a sound signal, but animal power soon yielded to steam engines. After the Civil War, new variations of ear signals emerged, including locomotive whistles attached to boilers, reed-trumpets, and siren-trumpets. Whistle fog signals replaced older bell buoys in 1876, and the first gaslight buoy was installed in 1882.[46]

In lighthouses, sperm whale oil yielded to rapeseed, lard oil, and then mineral oil, the latter a refined grade of kerosene. In 1877, the board introduced kerosene as an illuminant in lighthouses, initiated a program of substituting kerosene for lard in the nation's lighthouses in 1886, and completed the substitution policy in 1894. Later, the board would power its most significant lighthouses with oil-vapor lamps, an incandescent mantle lighted by kerosene introduced by the French in 1898 and first used in the United States in 1911. Completed in 1886, the Statue of Liberty was assigned to the Lighthouse Service, which installed in the statue's torch nine electric-arc lamps, still a modern invention, visible twenty-four miles at sea. Although electrification of lighthouses began in 1900, conversion occurred slowly because of the relative isolation of most structures. Indeed, many lighthouses operated without the benefit of electricity until the 1930s.[47]

In 1888, as a response to concerns regarding the volatility of kerosene, the Light-House Board embarked on an ambitious program to build brick oil houses throughout the nation. In 1895, the board reported "the substitution

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[45]Putnam, *Lighthouses and Lightships,* 110-113; Weiss, *Lighthouse Service,* 19; House, *Annual Report of the Secretary of the Treasury,* 44th Cong., 2d Sess., Ex. Doc. No. 2, p. 745-749.

[46]Weiss, *Lighthouse Service,* 15, 35; Putnam, "Beacons of the Sea," 31; Department of Commerce, *Annual Report of the Commissioner of Lighthouses* (Washington, D. C.: GPO, 1911), 15; Crompton, *Lighthouse Book,* 63; House, *Reports of the Department of Commerce and Labor,* 60th Cong., 2d Sess., Document No. 1048, p. 623.

[47]Department of the Treasury, *Annual Report of the Light-House Board to the Secretary of the Treasury for the Fiscal Year Ended June 30, 1895* (Washington, D. C.: GPO, 1895), p. 31; Weiss, *Lighthouse Service,* 15, 35; Putnam, "Beacons of the Sea," 31; *Annual Report of the Commissioner of Lighthouses, 1911,* 15; Crompton, *Lighthouse Book,* 63; House, *Reports of the Department of Commerce and Labor,* 60th Cong., 2d Sess., Document No. 1048, p. 623.

of mineral oil for lard oil in the Light-House Service, which has been in progress for several years, is finished. As the quantity of the oil now used is larger, and as its bulk is greater than was that of the oil formerly used, and as the mineral oil is much more likely to occasion fire, and indeed to take fire, then was the lard oil, the Board has come to the conclusion, in the interest of safety, to advise that the proper steps be taken to have a house erected at each of the larger stations, from a plan specifically devised after a careful study, for the purpose [of containing and protecting the oil.]" That year, the board requested fifteen thousand dollars to build "small inexpensive structures near to but separate from light-houses." By 1908, it had completed four hundred twenty-two of the small masonry structures. In 1913, mineral oil remained the most common lighthouse fuel, and only a few of the most powerful lights were operated with the incandescent oil-vapor system.[48]

A part of the American landscape since the eighteenth century, lighthouses appeared in leading journals of the nineteenth century. *Century Magazine* and *Harper's New Monthly Magazine* featured the writing and illustrating talents of authors M. Schele DeVere, Gustav Kobbe, Charles Nordhoff, and W. F. G. Shanks. In some articles, picturesque scenes of traditional lighthouses and keeper's houses in New England contrasted with modern screwpile structures in Florida and the Gulf of Mexico, and even steam-operated fog horns. Guidebooks of Florida often included illustrations and descriptions of the state's lighthouses.[49]

Political reforms increased the duties of the Light-House Board. In 1874, Congress extended the board's jurisdiction to include the Mississippi River, Missouri River, and Ohio River. In 1886, an expansion of the service compelled the Congress to increase the number of lighthouse districts to sixteen, and the Lighthouse Service became professionalized through the Civil Service Reform Acts of 1871 and 1883. Keepers became civil service employees in 1896. Although the Lighthouse Service was the oldest federal agency and despite the longevity of keepers, even through several generations of a family, the federal government provided no disability or retirement provisions for its keepers and other employees until the early twentieth century. Facing daily trudges up and down steep staircases and cleaning lanterns high above the ground, keepers risked injury daily and even death. Dramatic storms often took lives of keepers and their families. A hurricane that swept the Gulf Coast in 1906 destroyed twenty-three important navigational aids, including the lighthouses and their keepers at Horn Island and Sand Key.[50]

In the late nineteenth century, the Department of the Treasury assembled a Light-House Service Exhibit that showcased the nation's lighthouses and technology. In 1876, at the Philadelphia Centennial Exhibition, the board first exhibited a model of the plans for the Fowey Rocks Lighthouse. Soon the Light-House Board had

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[48]**Department of the Treasury, *Annual Report of the Light-House Board, 1895,* p. 31; Department of the Treasury, *Annual Report of the Light-House Board, 1897,* p. 35; Weiss, *Lighthouse Service,* 15, 35; Putnam, "Beacons of the Sea," 31; Department of Commerce, *Annual Report of the Commissioner of Lighthouses, 1911,* 15; Crompton, *Lighthouse Book,* 63; House, *Reports of the Department of Commerce and Labor,* 60th Cong., 2d Sess., Document No. 1048, p. 623.**

[49]**M. Schele DeVere, "Light-Houses," *Harper's New Monthly Magazine* 38 (February 1869), 405-414; Shanks, "Policemen of the Sea," 433-448; Nordhoff, "The Light-Houses of the United States," 465-477; Gustav Kobbe, "Life in a Lighthouse," *Century Magazine* 25 (January 1894), 364-373.**

[50]**Weiss, *Lighthouse Service,* 17-18; Putnam, "Beacons of the Sea," 4.**

prepared a traveling exhibit that appeared in many expositions and world's fairs. Paintings and photographs displayed the age and range of the nation's lighthouses. The exhibit also included the first Fresnel lens used in America, incandescent oil mantels, buoys, fog horns operated by steam boilers, and cannons used to warn mariners of shoals. Models of lighthouses included those at Coffin's Patches, St. Johns, and Sand Key. In 1893, the Light-House Board participated in the World's Columbian Exposition in Chicago. The exposition drew large crowds and the publicity helped spark a movement in urban planning and a renaissance of the Classical Revival style. To improve safety and showcase the capabilities of electricity, the Light-House Board installed a line of electric buoys along the waterfront and at midchannel between the Chicago Breakwater Lighthouse and the exposition's wharf to guide and separate channel traffic. Later, the exhibit appeared at the Tennessee Centennial Exposition (1897) in Nashville, Tennessee, the Trans-Mississippi & International Exposition at Omaha, Nebraska (1898), Pan-American Exposition in Buffalo, New York (1901), and the Louisiana Purchase Exposition (1904) in St. Louis, Missouri. As late as 1915, the exhibits were displayed at the Panama-Pacific International Exposition in San Diego, California.[51]

An invention of the 1890s set the stage for improvements in the early twentieth century. In 1893, Lieutenant-Colonel D. H. Heap, the Light-House Board's third district engineer, invented a revolving optical apparatus for Fresnel lenses. The invention came in response to concerns over long lapses between flashes. Various studies had shown that many of the nation's lighthouses then employed a ninety-second flash sequence, allowing too long of a dark interval between intermittent flashes. A bearing, collar, and shaft rotational device design by Heap permitted revolutions as often as once every ten seconds. By 1899, nearly seventy lighthouses still employed eighty-and ninety-second flash sequences, including Florida lighthouses at Amelia Island, Cape Canaveral, Cape Romain, Cedar Keys, Jupiter Inlet, Pensacola, Sand Key, and Sanibel Island. To help remedy the deficiency, the board embarked on a program installing new rotational devices in America's existing lighthouses, and in 1901-1902 allocated nearly seven hundred thousand dollars to the task, and eight hundred fifty thousand dollars in 1902-1903.[52]

During the early years of the Progressive era, various changes occurred within the Light-House Board. In 1903, the Congress organized the Department of Commerce and Labor, legislation that transferred commercial-related activities of the Federal government from the treasury to the new department. Oscar Strauss and Charles Nagel, early secretaries of the Commerce Department, perceived that the Light-House Board had become "cumbersome, uneconomical, and inefficient." In effect, the board began to show some of the administrative stresses that the fifth auditor's office had cautioned the Congress about in the 1850s. Some observers noted

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[51]**Department of the Treasury, *Annual Report of the Light-House Board, 1897,* p. 34; Department of the Treasury, *Annual Report of the Light-House Board, 1898,* p. 35; Department of the Treasury, *Annual Report of the Light-House Board, 1901,* p. 42-43; Department of the Commerce, *Reports of the Department of Commerce, 1915,* 581; Hans Christian Adamson, *Keepers of the Lights* (New York: Greenburg Publishing, 1955), 319; Taylor, *Florida's Lighthouse Trail,* 66.**

[52]**Department of the Treasury, *Annual Report of the Light-House Board, 1899,* p. 35-39; Department of the Treasury, *Annual Report of the Light-House Board, 1900,* p. 29; Department of the Treasury, *Annual Report of the Light-House Board, 1902,* p. 34-35, 141; Department of the Treasury, *Annual Report of the Light-House Board, 1903,* p. 646; Department of Commerce, *Annual Report of the Light-House Board, 1904,* p. 213.**

friction between army and navy officers. Consequently, through the influence of Straus and Nagel, in 1910 the Congress abolished the Light-House Board, and reorganized the Lighthouse Service into the Bureau of Lighthouses. By then, the nation had completed a comprehensive lighthouse system, and relatively few new lighthouses would be constructed over the following decades.[53]

Lighthouse Administration by the Bureau of Lighthouses, 1910-1939

Headed by civilian chief executive charged with the authority and responsibility of the managing the nation's aids-to-navigation, the Bureau of Lighthouses streamlined the operations of the Lighthouse Service and removed the dominant influence of the military from decision-making processes. President William Howard Taft appointed engineer George R. Putnam as commissioner of lighthouses, a position that later became head of the Lighthouse Service. In addition to the head post of commissioner, the Congress provided for a deputy commissioner, a position initially held by John S. Conway; an engineering construction division supervised by the chief constructing engineer, a position first held by H. B. Bowerman; and superintendent of naval construction, a post initially occupied by E. C. Gillette. The chief clerk supervised the general office employees.[54]

A professional engineer from Davenport, Iowa, George Putnam began his career driving stakes for a railroad survey crew. Later, he worked for the U. S. Coast Survey, and then graduated in 1895 with an engineering degree from Rose Polytechnic Institute in Indiana. He returned to the U. S. Coast Survey to survey parts of Alaska, Mexico, and the Philippine Islands. Between 1906 and 1910, he helped to prepare extensive revisions of nautical charts of the United States. He served as the Bureau of Lighthouse's commissioner between 1910 and 1935. During his tenure, the number of aids-to-navigation increased from eleven thousand seven hundred to over twenty-four thousand. Most of the increase consisted of relatively small beacons, buoys, range lights, and signaling equipment, rather than lighthouses. In 1913, he reported seven hundred sixty-two lighthouses with keepers, a number that only slightly increased during his tenure. Putnam initiated a campaign to emphasize the importance of lighthouses to the public. He published "Beacons of the Sea" in *National Geographic Magazine* and articles also appeared in *Scientific American.* More than popularized mariner tales, the journals unfolded the history of America's lighthouses and recent advances in technology.[55]

Putnam introduced various modern mechanical devices to improve the nation's lighthouses and navigation signals. The new technology included radio fog signals, radio-beacon transmitting equipment, automation of lighthouses, and the substitution of flashing lights with fixed lights in lighthouses. His publications included

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[53]Weiss, *Lighthouse Service,* 20-21; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. 56., p. 108.

[54]Weiss, *Lighthouse Service,* 20-21; Senate, *Modern Light-House Service,* 51st Cong., 1st Sess., Ex. Doc. 56., p. 108.

[55]*New York Times,* 3 July 1953; *National Cyclopaedia of American Biography,* 48: 38-39; Putnam, "Beacons of the Sea," 1-51; "The United States Lighthouse Service-1," *Scientific American Supplement* 82 (November 25, 1916), 344-345; "The United States Lighthouse Service-2," *Scientific American Supplement* 82 (December 2, 1916), 367-368.

Nautical Charts (1908), *Lighthouses and Lightships of the United States* (1917), *Radio Beacons and Radio Beacon Navigation* (1931), and *Sentinel of the Coasts* (1937). A trustee of the National Geographic Society, Putnam was a delegate to the International Lighthouse Congress in London in 1929.[56]

John Conway, Putnam's deputy chief, was typical of the professional non-military engineers who directed lighthouse operations. A native of Philadelphia, Conway graduated with a civil engineering degree from the University of Pennsylvania in 1900. He worked on various projects involving municipal water supply, reinforced concrete, and irrigation in Colorado, Montana, and Pennsylvania before being appointed to the bureau as chief constructing engineer in 1910. Two years later, Conway became deputy commissioner, a position he held until his retirement in 1930. In 1923, he published *The U.S. Lighthouse Service.* Among various responsibilities, the chief constructing engineer determined the necessity for additional navigation aids, and supervised the drafting of plans for buildings and structures.[57]

The responsibilities of the Bureau of Lighthouses remained essentially unchanged from the earlier Light-House Board. Between 1910 and 1925, only thirty new lighthouses were built and eight existing towers rebuilt. Instead, the bureau refined the existing system, installing automatic lights in approximately eight hundred lighthouses in its first fifteen years. In addition, the bureau established hundreds of gas-lighted buoys along rivers and harbors, implemented a program of radio fog signals, and initiated a uniform system of inspection in 1912.[58]

The bureau redivided the country into nineteen districts; Florida fell within the jurisdiction of two districts. The sixth district stretched between North Carolina and Cape Canaveral, and the seventh district from Cape Canaveral to Texas. A central office was assigned to each district with clerks and a technical crew to prepare reports, and inspect and maintain the lighthouses and related equipment. The bureau provided each district with a lighthouse tender to transport inspectors, monthly supplies, materials for construction and repairs, and tenders to place and maintain buoys. Comprised of civilians, the headquarters of each district was supported by an officer in the U. S. Army Corps of Engineers.[59]

Other changes helped streamline expenses and professionalize the Lighthouse Service. In 1912, the bureau encouraged American glass manufacturers to produce lighthouse lenses. In 1914, lighthouse inspectors held their first nationwide conference. Between 1908 and 1914, the bureau experimented with the use of reinforced concrete, constructing a new lighthouse at Brandywine Shoal in the latter year. In 1915, the Bureau of Lighthouses entered an era of Federal interagency cooperation with the U. S. Forest Service agreeing to manage forested property in lighthouse reservation lands.[60]

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[56] *New York Times,* 3 July 1953; *National Cyclopaedia of American Biography,* 48: 38-39.

[57] A. N. Marquis, comp., *Who's Who in America* (Chicago: A. N. Marquis, 1930), 566.

[58] Weiss, *The Lighthouse Service,* 23-24; Putnam, *Lighthouses and Lightships,* 52.

[59] Putnam, *Lighthouses and Lightships,* 47-48.

[60] U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1912), 13; Department of Commerce, *Annual Report of the Department of Commerce, 1914,* 106; Weiss, *Lighthouse Service,* 47; Putnam, *Lighthouses and Lightships,* 84-85.

In 1916, a naval mobilization act authorized the president to transfer the Lighthouse Service to the Department of the Navy. After the United States entered World War I, President Woodrow Wilson transferred twenty-one lighthouses with potential military significance, fifteen lighthouse tenders, and four lightships to the navy. Several lighthouse sites became repair facilities for patrol boats, and various depots became coaling stations and berthing quarters for the navy's vessels. Lighthouse Service personnel along the Atlantic coast performed watch duty from their towers. In 1918, a German submarine sunk a lightship at Diamond Shoals, and lighthouse personnel rescued one hundred fifty-eight people along the coasts. Reforms during World War I included improving the Lighthouse Service's retirement system and providing for the expenses of educators teaching keeper's children. Installation began in 1916 of a new technological device for lighthouses equipped with electricity. The device automatically rotated a new light bulb into position when a sensor detected a burned-out bulb. In those lighthouses still operated with kerosene, an alarm system was developed in 1917 to alert keepers of fluctuations in the efficiency of the oil-vapor lamps. Lighthouses and related equipment operating under the jurisdiction of the Department of the Navy during the war were returned to the Bureau of Lighthouses in July 1919.[61]

In the 1920s, the bureau maintained approximately six thousand employees. A decentralized organization, the bureau maintained forty employees at its headquarters in Washington, D.C. The president appointed the four top administrators; the remainder of the bureau's staff and employees were civil servants who fell within the purview of the Lighthouse Service. In 1925, lighthouse keepers constituted approximately twenty-five percent of the employees. A keeper's annual salary ranged between nine hundred dollars and fifteen hundred dollars. The Congress provided retirement benefits in 1918, and in 1925 enacted a disability act to help provide for injured keepers.[62]

In addition to its annual reports, the bureau published the *Light List* and *Buoy List,* which described and marked the nation's primary navigation aids. The first *Light List* had been issued by the Treasury Department in 1839, and the Light-House Board had issued its first volume in 1858, and began annual publications in 1869. Buoys lists became annual volumes in 1877. In 1891, in association with the U. S. Coast and Geodetic Survey, the bureau prepared monthly notices to mariners about significant changes in channels, lights, and shoals. In 1912, the bureau began issuing *Lighthouse Service Bulletin,* a monthly in-house publication for personnel. By the 1920s, the bureau published these publications and various other circulars and handbooks that provided information on operating instruction for equipment, laws, medical emergencies, and regulations.[63]

During the era of prohibition, lighthouse keepers were enlisted to watch and report activities associated with the smuggling of alcoholic beverages onto the nation's shores. Rum and whiskey were smuggled into the country

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[61] ***Reports of the Department of Commerce, 1919,*** **p. 692; Weiss, *Lighthouse Service,* 25-27, 68-69; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1916), 8; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1918), 8; Johnson, *Guardians of the Sea,* 203.**

[62] **Weiss, *Lighthouse Service,* 56, 67, 69, 86, 91-92, 239.**

[63] **Ibid., 56, 67, 69, 86, 91-92.**

from, among other areas, the Bahamas, Canada, Cuba, Miquelon, Newfoundland, and St. Pierre. New York had its "rum row," a line of vessels anchored three miles off the shore of New Jersey and New York, from which smaller boats would unload cargoes and transport them illegally to shore under the cover of darkness. Containing thirty-eight hundred miles of tidal shoreline, Florida became a major site for the illegal importation of alcoholic beverages. Its lighthouses became important watch posts for smugglers.[64]

Early examples of lighthouse historic preservation activity occurred in the Great Depression. In 1930, the Congress transferred the Cape Henry Lighthouse in Virginia to the Association for the Preservation of Virginia Antiquities (APVA). Founded in 1888, the APVA had formed various branches and established a proven tract record of preserving various historic sites on James Island and in Richmond and Williamsburg. Completed in 1792, the octagonal Old Cape Henry Lighthouse (NHL) was among America's early preservation success stories.[65]

By 1932, the bureau maintained approximately twenty-five hundred primary aids-to-navigation, about nineteen hundred of which were lighthouses. To streamline the Lighthouse Service as part of Depression-era reforms, the bureau reorganized the boundaries of various lighthouse districts. In 1933, the Mississippi River became its own district and a civilian engineer replaced the army engineer previously assigned to the waterway. Two years later, the bureau adjusted district boundaries, and adopted a method for marking channels along the Intracoastal Waterway south of Norfolk, Virginia. Increased use of pleasure craft for seasonal pilgrimages between the Northeast and Florida compelled improved markings of the waterway's channels. During the Great Depression, the Bureau of Lighthouses benefited from New Deal programs implemented by the administration of President Franklin D. Roosevelt. Between 1933 and 1935, the Bureau of Lighthouses received nearly six million dollars from the Public Works Administration (PWA) for ten lighthouses, four lightships, and five lighthouse depots. In 1938 alone, the Lighthouse Service received an additional appropriation of over two million dollars from the PWA to mark channels along the coasts and waterways of twenty-eight states. Later that year, the PWA allocated one million six hundred eighty thousand dollars for lighthouse tenders and lightships.[66]

In 1935, George Putnam retired, and President Roosevelt appointed Harold D. King as commissioner of lighthouses. A native of Maine, King graduated from Dartmouth College in 1905. An assistant in the U. S. Coast and Geodetic Survey between 1902 and 1911, King joined the Lighthouse Service in the latter year. For

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[64]**Johnson, *Guardians of the Sea,* 80-81; Michael Gannon, *A New History of Florida* (Gainesville: University Press of Florida, 1996), 289; James Carter, "Florida and Rumrunning during National Prohibition," *Florida Historical Quarterly* 48 (July 1969), 45-56; Taylor, *Florida Lighthouse Trail,* 15.**

[65]**Charles Hosmer, *Presence of the Past* (New York: G. P. Putnam, 1965), 65-69; Bureau of Lighthouses, *Annual Report of the Commissioner of Lighthouses* (Washington, D. C.: GPO, 1930), 8.**

[66]**U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1933), 99; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1935), 99, 117; Department of Commerce, *Twenty-third Annual Report of the Secretary of Commerce* (Washington, D. C.: GPO, 1935), 113-114; Department of Commerce, *Twenty-fifth Annual Report of the Secretary of Commerce* (Washington, D. C.: GPO, 1937), 113; Department of Commerce, *Twenty-sixth Annual Report of the Secretary of Commerce* (Washington, D. C.: GPO, 1938), 124.**

two years, he served as superintendent of the seventh district, headquartered in Key West, Florida, and then occupied offices in Charleston and Baltimore. In 1929, he was appointed deputy commissioner.[67]

Fond of paying tribute to science for advancing lighthouse technology, King considered the development of lighthouses of international interest. He explained that the exchange of ideas by engineers of the maritime nations could be attributed to three outstanding technological advancements to the improvement of lighthouse development: the Fresnel lens from France in the 1820s; acetylene gas from Sweden first used in an American lighthouse in 1902; and the radio beacon developed in the United States and first implemented by the Lighthouse Service in 1928. In the 1930s, he hailed the use of additional modern mechanical equipment: diesel-powered electric generators, rotary converters, and automatic code devices for radio beacons and fog signals.[68]

Lighthouse Administration by the U. S. Coast Guard, 1939-Present

A statement prepared by King in 1936 became the harbinger for yet another reorganization of the Lighthouse Service in 1939. That year, King indicated that the "Lighthouse Service is perhaps the most extensively decentralized agency of the Federal Government, less than 1 percent of its total personnel being located at the seat of government." The bureau then operated seventeen districts with headquarters ranging from Florida to Alaska with superintendents exercising a remarkable degree of autonomy. The decentralized command structure of the bureau, coupled with concerns over national defense and the aggressive nature of Germany, Italy, and Japan in the mid-1930s, prompted the president and the Congress to merge the nation's lighthouses with the U.S. Coast Guard in 1939.[69]

King was in his fourth year as lighthouse commissioner when President Roosevelt transferred the Bureau of Lighthouses to the Coast Guard. Approved by the Congress in June 1939, the reorganization plan provided for a "complete integration with the Coast Guard of personnel of the Lighthouse Service numbering about 5,200, together with the auxiliary organization of 64 buoy tenders, 30 depots, and 17 district offices." An appointed Federal official, King accepted the Coast Guard rank of captain with a position at Coast Guard headquarters in Washington, D. C., but retired in 1939. In his final annual report, King enumerated some of the accomplishments of the Bureau of Lighthouses. Between 1910 and 1939, the bureau increased the nation's aids-to-navigation from four thousand to ninety-eight hundred. In the bureau's first year, less than one-half of one percent of lighthouses operated with electricity, and over ninety-seven percent used kerosene. By 1939, forty percent of lighthouses were equipped with electricity, thirty-three percent used acetylene gas, and only twenty-seven percent still used kerosene as an illuminant. For its part, the Coast Guard between 1936 and 1940 experienced a period of expansion, part of which included the assimilation of the Lighthouse Service. In all, the legislation transferred thousands of civilian personnel and aids-to-navigation to a military service. The transfer

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[67]Putnam, *Lighthouses and Lightships,* 52; Weiss, *Lighthouse Service,* 32; Marquis, *Who's Who in America, 1936,* 1393.

[68]*New York Times,* 18 August 1930; Putnam, *Lighthouses and Lightships,* 189; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1928), 5.

[69]Department of Commerce, *Twenty-fourth Annual Report of the Department of Commerce, 1936,* 109; Johnson, *Guardians of the Sea,* 161-162.

eliminated the nation's oldest Federal agency, and removed the regulation of lighthouses from the Commerce Department and returned it to the Treasury Department, where the Congress had placed it in 1789. Recognizing the longevity of the Lighthouse Service to the nation, the Congress declared the week of 7 August 1939 as "Lighthouse Week," which coincided with the creation of the Lighthouse Establishment by Congress on 7 August 1789.[70]

The Coast Guard faced various challenges integrating the infrastructure and workforce of the Lighthouse Service. Over four hundred lighthouses, thirty lightships, and nearly thirty thousand smaller aids-to-navigation dotted the nation's coastline, bays, harbors, and rivers. Sixty-four lighthouse tenders ranged in size from seventy-two feet to two hundred feet. But the most challenging task consisted of assimilating nearly five thousand civilians into the Coast Guard's military framework, which then consisted of approximately ten thousand personnel. Although Coast Guard Commandant Russell Waesche orchestrated the administrative merger within a week, some bitter feelings by lighthouse keepers and other former Lighthouse Service personnel lingered for decades.[71]

Having developed its own customs and ethics, the Lighthouse Service had few keepers and lighthouse personnel who willingly embraced military culture. In respect of those traditions, the Coast Guard retained many keepers and other employees as civilian workers. Those keepers who chose to be inducted into the Coast Guard were generally assigned the rank of chief or first class petty officers. District superintendents became either commissioned commanders or lieutenants. A schedule of ranks and rates was developed for other former Lighthouse Service employees. In 1939, fifty-nine former lighthouse employees became officers, and in all, four hundred sixty-six employees accepted the rank of petty officer. But, in 1949, one retiring lighthouse keeper who had become a Coast Guardsman bemoaned "how the Commission had the heart to think we civilian personnel would ever blend with 15 & 16 year old Coast Guard men, 'is a huckleberry away above my persimmon' no good blood ever existed between or with either group. The Coast Guard & Rear Admirals [were] too brassy for we common Sailors, Fishermen, Oystermen & what have you."[72]

An important part of the merger consisted of eliminating lighthouse districts, which were blended into the operations into the Coast Guard's existing framework of thirteen districts. Maintenance and development of lighthouses and other navigation aids were integrated into the operations of lifesaving stations and cutter patrols. In 1940, the Coast Guard reported a savings of nearly one million dollars because of the merger, almost ten percent of the previous annual budget of the former Bureau of Lighthouses. Some lighthouse keepers who enlisted in the Coast Guard found the benefits included an increase in salary and better launches and small motorboats for use in maintaining small aids-to-navigation on rivers adjacent to lighthouses.[73]

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[70]**Department of the Treasury, *Annual Report* (Washington, D. C.: GPO, 1939), 107; Department of Commerce, *Twenty-seventh Annual Report of the Secretary of Commerce, 1939,* 116; Holland, *America's Lighthouses,* 38; Johnson, *Guardians of the Sea,* 164.**

[71]**Johnson, *Guardians of the Sea,* 162-163.**

[72]**Ibid., 164.**

[73]**Ibid., 164.**

On the eve of World War II, President Roosevelt issued on 1 November 1941 Executive Order 8929, which directed the Coast Guard to operate as part of the navy. Lighthouses gained importance as watchtowers for Coast Guard recruits who were assigned duty watches from the lantern galleries. In 1942, blackouts of lights showing seaward in coastal and beach communities were instituted to prevent silhouettes of ships at sea. A navigational necessity, lighthouses with relatively brief flashes continued to operate without interruption, although the intensity of some lights was reduced. To assist the army and navy and prevent U-boats from navigating into major harbors, the Coast Guard dimmed or darkened smaller navigational aids. In addition, markers were installed in new harbors, defensive coastal perimeters, and convoy areas. In 1942, the Coast Guard organized the Beach Patrol, an important step in the integration of the nation's system of coastal defenses. By 1944, the Coast Guard had completed its installation of markers along the Intracoastal Waterway along the Atlantic and Gulf coasts. Coast Guard personnel at some lighthouses rescued sailors from ships in distress and those sunk by German U-boats.[74]

Characterized as the "Battle of the Atlantic," the period between early-1942 and mid-1943 witnessed the destruction of hundreds of merchant vessels by U-boats along America's coastline. The Gulf Stream and especially Cape Hatteras and the Straits of Florida were productive hunting grounds for U-boats. Shipping lanes along the Gulf Stream and Florida's Atlantic coast provided one of the densest concentrations of Allied shipping in the world. In 1942, one out of every twelve ships sunk by Axis submarines throughout the world went down in Florida's waters. Some of the destruction occurred within several miles of the coast, presenting unsettling spectacles of war to those on shore. In March 1943 alone, U-boats sank nearly one hundred Allied ships in twenty days. But, soon the tide of war turned against the U-boats. Increased naval action and improved aircraft patrols from naval air stations and airfields helped drive the submarines from America's Atlantic coastline. In June 1942, General George C. Marshall observed the unfolding catastrophe by U-boats, which "off our Atlantic seaboard and in the Caribbean now threaten the entire war effort." Later, naval historian Samuel Eliot Morison observed that the battle against Germany's U-boats was "second to none in its influence on the outcome of the war," and historian Michael Gannon characterized the U-boat actions as America's "Atlantic Pearl Harbor." U-boats sunk nearly four hundred ships in North American waters protected by the U. S. Navy.[75]

Following the war, the Coast Guard and lighthouse personnel resumed their traditional duties. Reinforced concrete lighthouses, first introduced in 1908, were built in several coastal sites in the 1950s and 1960s. In most cases, the structures replaced aging towers, but some were built in new sites. Other post-war lighthouses included offshore structures, a technology refined by the oil industry for its drilling and pumping derricks. This so-called "Texas Tower," nicknamed because of its resemblance to oil rigs used along the Texas coast, appeared

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[74]**Julius Furer, *Administration of the Navy Department in World War II* (Washington, D. C.: Naval History Division, 1959), 598-611; Malcolm Willoughby, *The U. S. Coast Guard in World War II* (New York: Arno Press, 1980); Gannon, *The New History of Florida,* 326-327; Eliot Kleinberg, *War in Paradise: Stories of World War II in Florida* (Melbourne: Florida Historical Society Press, 1999), 34.**

[75]**Michael Gannon, *Operation Drumbeat: The Dramatic True Story of Germany's First U-Boat Attacks along the American Coast in World War II* (New York: Harper & Row Publishers, 1990), 388-389, 395-396.**

in locations from Massachusetts to Georgia. Aluminum was also introduced as a material for lantern rooms and even entire towers. One of those, the Charleston Tower completed in 1960 included an elevator, the first personnel vertical lift mechanism used in a lighthouse. Fiberglass also gained popularity for assembling structures beginning in the 1960s. Lighthouses gradually yielded to less costly structures, such as steel posts and buoys that supported automated beacons. Navigational buoys, LORAN, and GPS, modern equipment refined in the 1990s and now used by numerous mariners, ostensibly diminished the significance of lighthouses as navigation aids. The trend brought lighthouse construction to a virtual halt and resulted in the decommissioning and dismantling of some structures. Yet, many small-boat owners without modern navigation technology still depended upon these old beacons as familiar landmarks for safe passage.[76]

In the closing decades of the twentieth century, various national, regional, state, and local initiatives took steps to preserve the nation's remaining lighthouses. In 1992, the U. S. Department of the Interior issued National Register Bulletin 34, *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* By then, the Council of American Maritime Museums, Great Lakes Lighthouse Keeper's Association, Lighthouse Preservation Society, and U. S. Lighthouse Society had expressed concerns over the fate of the nation's remaining lighthouses and associated structures. In 1997, the Department of Defense Legacy Resource Management Program, National Park Service, and U. S. Lighthouse Society cooperated in the publication of the Historic Lighthouse Preservation Manual. In response to concerns from these various organizations regarding the potential loss of these significant cultural resources, the Congress enacted the National Historic Lighthouse Preservation Act in 2000. An amendment of the National Historic Preservation Act of 1966, the legislation authorized the disposal of lighthouses and established a lighthouse preservation program, which permits the acquisition of available lighthouses by federal, state, and local governments, non-profit corporations, and community development organizations for cultural, educational historical, park, and recreation functions. Websites maintained by the U. S. Coast Guard, National Park Service, and Florida Department of State include information regarding the history and current disposition of specific lighthouses.

Development of Florida's Lighthouses, 1823-1952

Antebellum Period, 1823-1860

In 1821, when Spain conveyed its Florida provinces to the United States, it left some watchtowers . Consequently, the Federal government acquired overnight the longest largely unlighted coastline in the country. Dotted with small, widely scattered inlets and harbors and dangerous shoals, Florida's coastline consisted of an area equivalent in length approximately from St. Simon's Island, Georgia to New York City, where a program of lighthouse construction had been implemented since the 1790s. To bring relief to the dark coastline, in the 1820s the Congress responded to urgent requests for lighthouses in the newly annexed territory. Petitions composed by citizens arrived in Tallahassee, and legislators sent documents to the Congress and the

[76]**Robert Browning, "Lighthouse Evolution and Typology," U. S. Coast Guard website, http://www.uscg.mil/hq/, 2002; Taylor, *Florida Lighthouse Trail,* 15.**

president. Characterized by long stretches along the Atlantic Ocean, Gulf of Mexico, and the Florida Keys, the territory represented one of the most challenging tasks for army engineers and lighthouse personnel to chart and mark in the nation.[77]

In 1821, D. Copp, foreman of a grand jury at St. Augustine, requested a lighthouse "with the belief that it may be the means of saving much property jeopardized for want of such an establishment." Secretary of the Treasury William Crawford undoubtedly misunderstood the navigational challenges of the Florida coastline in 1822 when he wrote Thomas Newton, chairman of the committee of commerce in the House of Representatives, "An appropriation for two light houses to be erected during the present year, at such points, upon the Florida reef, or upon cape Florida as the President shall designate, will perhaps, be as much as ought to be provided for at the present session." A subsequent petition from the Territorial Legislature and citizens of East Florida urged the Congress to build lighthouses at Key West, Mosquito Inlet, Pensacola, St. Augustine, and at the mouth of the St. Johns River. Initially, even some of the territory's political leaders failed to grasp the benefits, indeed the urgency, for a system of lighthouses. In 1823, Edmund Law, president of the Legislative Council, urged President Monroe only to consider "the necessity of erecting light-houses at Pensacola and St. Augustine." Early in his term, Joseph White, Florida's congressional delegate between 1825 and 1837, wrote the Secretary of the Navy about "the importance of a survey of the coast of Florida from St. Marks to Tampa Bay," lamenting that "Throughout this whole range there is no light-house or Beacon to guide the mariner." The Congress eventually responded to most petitions and official requests, although it required several decades before a system of lighthouses was installed. Florida's relatively small population and weak political voice at the national level accounted, in part, for the relatively slow initial pace of lighthouse construction in the territory. Increased trade around the waters of the peninsula and the loss of commerce on reefs and shoals soon brought the necessity into sharp relief.[78]

Despite early misunderstandings about the extent of navigational hazards along Florida's coastline, the Federal government included the territory in its early nineteenth century program of internal improvements. Between 1823 and 1829, an interval that coincides with the earliest period of the fifth auditor's office supervision of the nation's lighthouse development, the Congress disbursed over one hundred twenty-one thousand dollars for Florida's lighthouses. Few southern states enjoyed the level of allocations for aids-to-navigation received by the territory. In the same period, the Treasury Department paid out approximately eighty thousand dollars for Georgia's lighthouses, seventy thousand dollars for those in South Carolina, and about one hundred thirty-three thousand dollars in North Carolina. A reflection of its dominant political voice and willingness to accept internal improvements, the Northeast maintained significantly larger lighthouse appropriations than southern states and territories. Massachusetts received approximately one hundred eighty thousand dollars between 1823

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[77]House, *American State Papers, Miscellaneous,* 17th Cong., 2d Sess., Misc. Doc. 539, p. 1025-1027; House, *Disbursements for Certain Specific Purposes,* 21st Cong., 2d Sess., Document No. 11, p. 28; Taylor, *Florida's Territorial Lighthouses,* 7.

[78]Clarence Carter, comp., *The Territorial Papers of the United States* (Washington, D.C.: GPO, 1956), 22:295, 411, 523, 571, 650-651, 23:360-361; House, 17th Cong., 2d Sess., *American State Papers, Miscellaneous,* Misc. Doc. 539, p. 1025-1027; House, 21st Cong., 2d Sess., *Disbursements for Certain Specific Purposes,* Doc. No. 11, p. 28; Taylor, *Florida's Territorial Lighthouses,* 7.

and 1829, and New York garnered nearly one hundred eighty-five thousand dollars. Still, Florida received the largest single annual appropriation for lighthouses, more than any state during the 1823-1829 intervals--forty-seven thousand dollars in 1826.[79]

Territorial Florida's oldest ports--Pensacola and St. Augustine--gained lighthouses first. Completed in 1824 by Winslow Lewis of Boston, those structures later either collapsed or were replaced in the late nineteenth century. In 1822, navy reports from Lieutenant Commander Matthew Perry requested four lighthouses along the Florida Reefs between Cape Florida and Dry Tortugas. Following debate in the Congress, appropriations and contracts in 1825 specified "erecting light-houses at Cape Florida, Sambo Keys, and the Dry Tortugas." At the direction of David Porter, naval commandant at Key West, the proposed lighthouse for Sambo Keys was instead built at Key West, which had been occupied by United States forces in 1822. Completed in 1825 and rising sixty-five feet, the Cape Florida Lighthouse was the first of Florida's "ocean-coastal navigational" beacons. Its height and location were particularly significant because of an adjacent treacherous reef and narrow channel through the Straits of Florida. The same year, a lightship, essentially a stationary vessel equipped with a pair of lights, was built for the Carysfort Reef in the Florida Keys. Designated in 1770, the reef was named to honor a British frigate that foundered in the treacherous waters.[80]

The Florida coastline presented numerous hazards and challenges to contractors. Fabricated in New York for nearly nineteen thousand dollars, the Carysfort Reef Lightship was blown off course and foundered on the Florida coast. Abandoned by its crew, the vessel was carried to Key West by wreckers, rebuilt, and stationed on the reef until dry-rot compelled its replacement five years later. Samuel Lincoln, a Massachusetts contractor awarded the bid for assembling lighthouses at Cape Florida, Dry Tortugas, and Key West, was lost at sea on route to St. Augustine to consult with the customs official about the location for the structures. Appointed to complete the project, Noah Humphries left New England in a second ship laden with a construction crew and building materials. Although he met with delays from customs officers at Key West and Washington, D. C., he completed the three lighthouses in 1826. That year, contractors Hersey Stovall and James B. Gill assembled the Sand Key Lighthouse and keeper's dwelling. One of the more expensive of the Florida lighthouse projects of the mid-1820s, the Sand Key structure cost nearly fourteen thousand dollars to construct. Customs collectors at Apalachicola, Jacksonville, Key West, Pensacola, and St. Augustine supervised lighthouses in their respective regions.[81]

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[79]**House, 17th Cong., 2d Sess., *American State Papers, Miscellaneous,* Misc. Doc. 539, p. 1025-1027; House, 21st Cong., 2d Sess., *Disbursements for Certain Specific Purposes,* Doc. No. 11, p. 2-28.**

[80]**Senate, *Lighthouses and Buoys of the Coast of Florida and Gulf of Mexico,* 18th Cong., 2d Sess., Document 17, p. 4; House, *Lighthouses,* 19th Cong., 1st Sess., Document 19, 8-9; House, *Miscellaneous Claims,* 19th Cong., 2d Sess., Document 101, 10d; Taylor, *Florida's Territorial Lighthouses,* 15-26, 41, 46, 52, 54, 65, 68, 83-86.**

[81]**Senate, *Lighthouses and Buoys of the Coast of Florida and Gulf of Mexico,* 18th Cong., 2d Sess., Document 17, p. 4; House, *Lighthouses,* 19th Cong., 1st Sess., Document 19, 8-9; House, *Miscellaneous Claims,* 19th Cong., 2d Sess., Document 101, 10d; Taylor, *Florida's Territorial Lighthouses,* 15-26, 41, 46, 52, 54, 68, 257-260.**

Throughout Florida's territorial period, lighthouse construction often exceeded allocations for the structures elsewhere in the nation. The Treasury Department paid eleven thousand dollars for Florida's lighthouse projects in 1830, and the following year expenditures reached approximately thirty-six thousand dollars. In 1831, national lighthouse disbursements amounted to one hundred forty thousand dollars; New York and North Carolina each received less than one-half of Florida's appropriation. By 1837, the fifth auditor's office had developed eight lighthouses in the Territory of Florida: Cape Florida, Dry Tortugas, Key West, Pensacola, St. Augustine, St. Johns River, St. Marks, and Sand Key.[82]

Winslow Lewis fabricated many of Florida's earliest lighthouses. He completed Pensacola and St. Augustine's first lighthouse in 1824. John Rodman, the collector at St. Augustine, advertised the bid for the city's first lighthouse in the *East Florida Herald* in May 1823. An appropriation of five thousand dollars converted St. Augustine's colonial watchtower into a lighthouse rising thirty feet with a lantern containing Lewis's Argand lamp-and-reflector system. Perhaps the most distinctive of Florida's earliest lighthouses, the structure was a composite of seventeenth, eighteenth, and nineteenth century craftsmanship and materials, and displayed an unusual square stone tower. Installed at Pensacola, a thirty-foot whitewashed conical brick tower with a glass lantern earned Lewis fifty-seven hundred fifty dollars. Because of their relatively short stature, these early structures rated as harbor beacons rather than ocean lighthouses, and provided little guidance to ships at sea.[83]

Lewis also designed the St. Johns River Lighthouse in 1830 and the St. Marks structure in 1831. In 1834, the Treasury Department awarded him contracts to assemble a lighthouse at Mosquito Inlet, and to relocate to an adjacent site the tower he had built several years earlier at the mouth of the St. Johns River. He received ninety-four hundred dollars to construct a sixty-five foot lighthouse and an adjoining keeper's dwelling at St. George Island in Apalachicola Bay in 1833. Built with hard-fire clay bricks, most towers assembled in Florida by Lewis and other Boston builders consisted of hollow voids between the exterior and interior walls. This early design characteristic reduced the cost of materials and labor, and was later adopted by the Light-House Board. But, some critics claimed the construction technique sacrificed strength and constituted a fraud. The whitewash applied to the exterior walls generally yielded to the harsh climate, and stucco was generally applied to the exterior walls several years after a lighthouse was completed. Yet, whether finished in whitewash or stucco, the white character of the towers became important daymarks, and helped lighthouses stand out against the surrounding forests and against the night skies.[84]

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[82]House, *Appropriations and Disbursements for Fortifications, Light-Houses, Public Debt, &c.*, 22d Cong., 1st Sess., Document 200, 2; House, *Contracts, Payments, &c.--Treasury Department*, 23d Cong., 1st Sess., Document 124, 3; House, *Contracts--Payments--Treasury Department*, 23d Cong., 2d Sess., Document 161, 4; Taylor, *Florida's Territorial Lighthouses*, 201-212.

[83]*East Florida Herald*, 17 May, 7 June 1823; Senate, *Lighthouses and Buoys of the Coast of Florida and Gulf of Mexico*, 18th Cong., 2d Sess., Document 17, p. 4; House, *Lighthouses*, 19th Cong., 1st Sess., Document 19, p. 8-9; House, *Miscellaneous Claims*, 19th Cong., 2d Sess., Document 101, p. 10d; Taylor, *Florida's Territorial Lighthouses*, 15-26, 41, 46, 52, 54, 65.

[84]Taylor, *Florida's Territorial Lighthouses*, 10, 41, 143, 167, 185, 197; House, *Appropriations and Disbursements for Fortifications, Light-Houses, Public Debt, &c.*, 22d Cong., 1st Sess., Document 200, p. 2; House, *Contracts, Payments, &c.--Treasury Department*, 23d Cong., 1st Sess., Document 124, p. 3; House, *Contracts--Payments--Treasury Department*, 23d Cong., 2d Sess., Document 161, p. 4.

For their construction, the fifth auditor's office generally employed the low-bid process, most of which fell to New England builders. Possessing decades of experience assembling New England's lighthouses, few of the contractors gave much consideration to environmental and soil conditions that distinguished their region from that of the south Atlantic coast. In effect, most of Florida's earliest lighthouses closely resembled in appearance, materials, and size those sprinkling the coasts of Maine and Massachusetts.[85]

Lewis' contract for the Pensacola Lighthouse was representative of construction agreements between the Treasury Department and contractors. The contract called for "The Light House to be built of stone or hard brick, the form round. The foundation to be sunk three feet deep or as deep as may be necessary to make the fabric secure--To be laid in good lime mortar--The diameter of the base to be eighteen feet, and that of the top nine feet. The thickness of the walls at the base to be three feet, and uniformly graduated to twenty inches at the top."[86]

The hollow-wall design incorporated into many of Florida's early lighthouses surprised and alarmed some keepers. In 1830, William Livingston at the St. Johns Lighthouse reported to the fifth auditor's office and the *East Florida Herald* that "I have discovered that the wall of the light house is hollow, therefore is built up with two walls, leaving a space between the walls of twenty six inches." He explained that he had found the walls solid two feet above the ground, but then encountered a hollow cavity. In May 1830, he explained "Since my last communication to you relative to the Light house, I have opened the sill of the fourth window, which is more than half-way up, and have discovered the wall to continue hollow, from the second to the fourth window. The hollow space ranges from 26 to 14 inches. The inner and outer wall is connected together by cross walls from four to seven feet apart." The sixty-five foot structure had been completed in February 1830. Concerned about his safety whether inside the tower or the dwelling, Livingston expressed the desire for the government to "endeavor to ascertain whether there is strength enough in it to stand a September gale. It is only 42 feet from the dwelling house." Livingston's fears about the tower were well founded, but the danger emanated from poor site location rather than the alleged inferior construction. In late-1831, when John J. Audubon crossed the St. Johns River Bar, he reported a "star-like glimmer of the light in the great lantern at the entrance," a light amplified by a vast flock of snowy white pelicans flushed by the arrival of his ship. But, by 1833, soil erosion from a shifting inlet had caused the tower to lean noticeably, and later that year the sixty-five foot lighthouse collapsed into the encroaching ocean.[87]

The outbreak of hostilities with Seminoles in 1835 and the ensuing national Panic of 1837 slowed the development of Florida's lighthouses. A brutal, protracted conflict that lasted between 1835 and 1842, the Second Seminole War opened a new chapter in America's lighthouse heritage, and one involving armed conflict. Only recently completed, the Mosquito Inlet Lighthouse remained dark because the expected whale oil

[85]Taylor, *Florida's Territorial Lighthouses,* 9.

[86]Ibid., 46-49.

[87]*East Florida Herald,* 26 May 1830; Taylor, *Florida's Territorial Lighthouses,* 149-151; Bill Belleville, *River of Lakes: A Journey on Florida's St. Johns River* (Athens and London: University of Georgia Press, 2000), 191-192.

had burned in a schooner at Savannah, Georgia. The outbreak of hostilities deferred the shipment of additional supplies, and then a hurricane in September 1835 began eroding the foundation. In December, Seminoles attacked the tower, set fire to the structure and burned the wooden spiral stairs. Plundering the keeper's dwelling, the Seminoles seized reflectors placed there for safekeeping. Later, in a skirmish at nearby Dunlawton, Federal troops spotted Seminoles wearing the metal reflectors as head ornaments. In early 1836, further storms weakened the Mosquito tower, which soon toppled into the inlet. Persistent hostilities forestalled the selection of a new site and the arrival of a construction crew to replace the structure.[88]

Completed in 1825 but already badly deteriorated, the Cape Florida Lighthouse was scheduled for reconstruction ten years later. But, in July 1836, before repairs could begin, a band of Seminoles attacked keeper John Thompson and his assistant, Aaron Carter, an African-American, who sought refuge in the tower. Armed with a musket, Thompson returned fire, but failed to drive off the attackers. Pierced by bullets, an oil container inside the lighthouse spilled its contents, and, after Seminoles set fire to the wooden entrance door, a blaze spread within the tower. Finding the staircase destroyed, the Seminoles scaled the outside walls, but only reached forty feet up the sixty-five foot tower. They eventually retreated to ransack the nearby dwelling and escaped in the keeper's sloop. Assistant keeper Carter died in the attack, but Federal troops later rescued Thompson from the lantern gallery. News of the ferocity of the Seminole attack at Cape Florida and a subsequent massacre at Carysfort Reef Lightship sufficiently frightened Winslow Lewis's crew, who returned to New England with the equipment and materials to repair the Cape Florida Lighthouse.[89]

Despite the unsettled conditions, the Treasury Department and fifth auditor's office persisted in the development of a few Florida lighthouses. In 1837, an engineer was dispatched to conduct a preliminary investigation of the reefs, looking for a suitable location to build a permanent tower near the Carysfort Lightship. In 1838, an army detachment guarded masons assembling the Dog Island Lighthouse at the east pass into St. George Sound near Apalachicola. The same year, civil engineer I. W. P. Lewis conducted a survey, identifying the need for lighthouses along the Florida Reef at Alligator Reef, Carysfort Reef, Fowey Rocks, and Sombrero Reef, and drafted preliminary plans for a lighthouse at Carysfort Reef. In 1839, Winslow Lewis dismantled an 1820 lighthouse on Cumberland Island, Georgia, and rebuilt the structure on Amelia Island east of Fernandina. The prolific contractor also completed lighthouses at Dog Island and St. Joseph's Bay near the City of St. Joseph during the Seminole conflict. Still, as late as May 1842, Winslow Lewis reported that "Ever since the Seminole war commenced, the Indians have prevented the erecting of any light-house on that coast, or the repairing that which was burnt."[90]

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[88]**Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 15, p. 14-15; House, *Light-Houses, Buoys, &c.,* 25th Cong., 2d Sess., Document 27, p. 15; House, *Disbursements in 1834, '5, '6, '7, for Fortifications, &c.,"* 25th Cong., 2d Sess., Document 254, p. 8; Taylor, *Florida's Territorial Lighthouses,* 201-212; Taylor, *Florida Lighthouse Trail,* 51.**

[89]**Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 15, p. 14-15; House, *Light-Houses, Buoys, &c.,* 25th Cong., 2d Sess., Document 27, p. 15; House, *Disbursements in 1834, '5, '6, '7, for Fortifications, &c.,"* 25th Cong., 2d Sess., Document 254, p. 8; Taylor, *Florida's Territorial Lighthouses,* 201-212.**

[90]**Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 15, p. 14-15; House, *Light-Houses, Buoys, &c.,* 25th Cong., 2d Sess., Document 27, p. 15; House, *Disbursements in 1834, '5, '6, '7, for Fortifications, &c.,* 25th Cong., 2d**

Completed in 1839, the St. Joseph Point Lighthouse stood for less than a decade. A yellow fever epidemic devastated the population in 1841 and a series of storms buffeted the settlement. Founded in the 1820s, Apalachicola benefited from the disasters of its sister town farther west. In 1842, Apalachicola's community leaders sent a petition to the Congress, indicating that the lighthouse at St. Joseph's Bay was no longer necessary for "that port is entirely abandoned for commercial purposes." The following year, a plan unfolded to build a new tower at Cape San Blas. In 1846, contractors salvaged sections of the eight-year-old tower and completed the new lighthouse at Cape San Blas in April 1848. It stood only three years, destroyed by a hurricane in 1851.[91]

Treasury disbursements for Florida projects reflected the wartime conditions and economic recession. In 1834, the Congress appropriated nearly nineteen thousand dollars for Florida lighthouses, which increased to thirty thousand dollars in 1835. The following year, however, the department only disbursed eleven thousand dollars, and twenty-two thousand dollars in 1837. In contrast, significant sums were used for Florida's fortifications, amounting to nearly two hundred twenty thousand dollars in 1836, and approximately four hundred thousand dollars between 1834 and 1837. Despite the wartime interruption, Florida still maintained a respectable ranking among the states with lighthouse appropriations, falling behind only Massachusetts, New York, North Carolina, and Virginia. In the 1830s, the Treasury Department reported an average cost of six thousand dollars to build a lighthouse; by then, Florida's most expensive structure stood at Sand Key (fourteen thousand dollars) and the least expensive at St. Augustine (five thousand dollars).[92]

Florida stood close to the center of the congressional investigations and arguments that raged between the fifth auditor's office and the Blunt brothers through the late-1830s and early-1850s. The Blunts unearthed reports of Florida lighthouses built by Winslow Lewis at Mosquito Inlet and St. Johns River toppling into the sea shortly after their construction. Another Lewis-built structure, the Dog Island Lighthouse lost the upper portion of its tower in a storm. At Pensacola, custom's collector Robert Mitchell noted several deficiencies: the rotation device for Lewis' chandelier had become defective, the contractor had failed to install handrails in the tower, and water consistently migrated through the brick-and-mortar walls. For some it seemed that a poor location rather than faulty construction accounted for their rebuilding, such as in the case of St. Marks Lighthouse.[93]

Sess., Document 254, p. 8; House, *Building Light-Houses, Light-Boats, Beacons, &c.,* 25th Cong., 3d Sess., Document 158, p. 15-18; House, *Light-House Establishment,* 27th Cong., 2d Sess., Report 811, p. 104; Taylor, *Florida's Territorial Lighthouses,* 219, 223, 233, 235.

[91]Taylor, *Florida Lighthouse Trail,* 139-145; Taylor, *Florida's Territorial Lighthouses,* 233-239.

[92]Senate, *Report of the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 15, p. 14-15; House, *Light-Houses, Buoys, &c.,* 25th Cong., 2d Sess., Document 27, p. 15; House, *Disbursements in 1834, '5, '6, '7, for Fortifications, &c.,* 25th Cong., 2d Sess., Document 254, p. 8; House, *Building Light-Houses, Light-Boats, Beacons, &c.,* 25th Cong., 3d Sess., Document 158, p. 15-18.

[93]Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 138, p. 8, 10, 38-39; Senate, *Documents in Relation to the Light-House Establishment,* 25th Cong., 2d Sess., Document 258, p. 15; House, *Light-House Establishment,* 27th Cong., 2d Sess., Document 811, p. 77, 80, 84, 93; Taylor, *Florida's Territorial Lighthouses,* 176, 219-224; Taylor, *Florida's Territorial Lighthouses,* 54-55.

Beyond Lewis's alleged failed projects, the Blunts submitted testimonials about other dubious structures in Florida. They cited the hollow-wall technique used to assemble the St. Johns River and the Cape Florida lighthouses, a discovery made at the latter site only after Seminoles had burned the structure. They documented lighthouses at Key West and Sand Key being washed out to sea, and descried the decay and destruction of the Carysfort Reef Lightship within five years of its commissioning. Weak lights at Pensacola and St. George's Island confused some mariners about the location of their ships, and numerous captains, including Oliver Mumford of the *Hannibal,* testified that "the Tortugas light [is] a very bad one."[94]

The early congressional investigation of the nation's lighthouse system coincided with a new era of settlement in the Florida peninsula. The end of the Second Seminole War and the Armed Occupation Act of 1842 encouraged settlers to establish farmsteads, and a population increase became a compelling reason in Florida's bid for statehood in 1845. Settlement near inlets and harbors and uncertain shipping lanes and inlets unmarked for long distances between the lighthouses at St. Augustine and Cape Florida, and Key West and St. Marks drew the attention of settlers, as well as mariners and government officials. Soon petitions called for the installation of aids-to-navigation in additional locations, or at sites where earlier structures had collapsed. In 1847 and 1848, resolutions from the Florida Legislature were filed in Congress, seeking lighthouses at Indian River Bar near Fort Pierce, the mouth of the Suwannee River, and Egmont Key in Tampa Bay. One testimonial called for the construction of another lighthouse at Mosquito Inlet at New Smyrna. Some of the petitions motivated the Federal government to construct lighthouses at Cape Canaveral in 1847 and Egmont Key in 1848. But, both fell victim to erosion and were later rebuilt. A request for a structure at the mouth of the Suwannee River culminated in a lighthouse at Seahorse Key near Cedar Keys several years later. Other petitions, such as those for lighthouses at Indian River Bar and Mosquito Inlet, fell on deaf ears.[95]

Transporting military personnel by ships to Florida in the Second Seminole War and to Mexico during the Mexican War clearly illustrated the insufficiency of navigational aids along the coastlines of the south Atlantic and Gulf of Mexico. Plagued by dry-rot and Seminole attacks, the Carysfort Lightship in the Florida reef was replaced by a permanent lighthouse using a relatively new technology--the exposed iron screwpile structure. In the late-1830s, Alexander Mitchell, an Irish civil engineer, invented a screwpile mooring design. Patented in 1833, the broad-flanged screwpile technology had been employed to assemble English lighthouses since 1839. By the early 1840s, America's fleet of aging lightships required replacement. In 1842, finding the fifth auditor's

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[94]**Taylor, *Florida's Territorial Lighthouses,* 176, 219-224; Senate, *Report from the Secretary of the Treasury,* 25th Cong., 2d Sess., Document 138, p. 8, 10, 38-39; Senate, *Documents in Relation to the Light-House Establishment,* 25th Cong., 2d Sess., Document 258, p. 15; House, *Light-House Establishment,* 27th Cong., 2d Sess., Document 811, p. 77, 80, 84, 93.**

[95]**Senate, *Resolution of the Legislature of Florida Relative to the Erection of a Light-House at New Smyrna, Fla.,* 29th Cong., 2d Sess., Document 129; Senate, *Resolution of the Legislature of Florida Relative to the Erection of a Light-House at Egmont Key,* 29th Cong., 2d Sess., Document 130; Senate, *Resolution of the Legislature of Florida Relative to the Erection of a Light-House at Indian River Bar,* 29th Cong., 2d Sess., Document 131; Senate, *Resolution of the Legislature of Florida Relative to the Erection of a Light-House at Suwannee River,* 29th Cong., 2d Sess., Document 132; House, *Light-House at Indian River Bar,* 30th Cong., 1st Sess., Misc. Doc. 77, p. 1-2.**

office reluctant to experiment with new technology, the Congress directed engineers to survey the decaying fleet of lightships, and locate suitable sites for assembling iron screwpile lighthouses. It took nearly a decade to accomplish the task. In 1850, America's first use of the screwpile technology was completed with the construction of the Brandywine Shoal Lighthouse.[96]

At Carysfort Reef, construction began in 1848 on America's first exposed screwpile lighthouse. Civil engineers I. W. P. Lewis and George Meade of the U. S. Army Corps of Engineers collaborated on the project. A West Point graduate in civil engineering, Meade had fought in the Second Seminole War, and Fort Meade in Florida was named for the lieutenant. But, failing health caused by the semi-tropical conditions compelled his transfer to Arkansas and then Massachusetts. Meade returned to Florida between 1847 and 1856, when he directed the design and construction of lighthouses for the seventh lighthouse district, which then extended between St. Augustine and St. Marks. In the late-1850s, Meade conducted surveys in the North. During the Civil War, he commanded the Federal troops at Gettysburg, and was eventually promoted to major-general. Following the war, he returned to Florida one last time as the military district commander of the South, which included Alabama, Florida, Georgia, and South Carolina.[97]

For the Carysfort Reef project, Lewis and Meade adapted Mitchell's screwpile design to the site, developed cross-braced iron pillars, and designed a central iron cylinder that terminated at the lantern. An early example of pre-fabricated technology, the lighthouse sections were cast and assembled at a Philadelphia foundry, dismantled, and then shipped and reassembled on its permanent site. Captain Howard Stansbury and Major Thomas Linnard of the U. S. Army Corps of Engineers supervised its construction, which was completed by the I. P. Morris Company of Philadelphia in 1852 at the cost of one hundred five thousand dollars. Rising one hundred twelve feet and standing in four feet of water, the iron-pile wave-swept structure represented a new era in American lighthouse design. It became a model for the construction of additional lighthouses along the Florida Reef, Chesapeake Bay, and Gulf Coast in the nineteenth century.[98]

Not all residents of the Keys appreciated the development of lighthouses. The wreckers of Key West had profited from decades of rescuing cargoes from foundered ships, and collecting on the merchandise and salvaged ships through the courts, or sometimes, outright sale. A benefit for some wreckers, the destruction of the Cape Florida Lighthouse in 1836 and the Key West and Sand Key structures in 1846 made for an

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[96]Rhein, *Anatomy of the Lighthouse,* 116-122; U. S. Congress, House of Representatives, 27th Congress, 2d Session, "Surveys of Sites for Light-Houses and Light-Boats," Document 838, p. 1; U. S. Congress, Senate, 32d Congress, 1st Session, "Report of the Officers Constituting the Light-House Board," Executive Document 28, p. 438, 638; Johnson, *Modern Light-House Service,* 26-27.

[97]Rhein, *Anatomy of the Lighthouse,* 116-122; U. S. Congress, Senate, 32d Congress, 1st Session, "Report of the Officers Constituting the Light-House Board," Executive Document 28, p. 438, 638; Johnson, *Modern Light-House Service,* 26-27; *National Cyclopaedia of American Biography,* 4: 66-67.

[98]Rhein, *Anatomy of the Lighthouse,* 116-122; Taylor, *Florida Lighthouse Trail,* 69; Senate, 32d Cong., 1st Sess., "Report of the Officers Constituting the Light-House Board," Executive Document 28, p. 438, 638; Johnson, *Modern Light-House Service,* 26-27; *National Cyclopaedia of American Biography,* 4: 66-67; Crompton, *Lighthouse Book,* 80.

unpredictable passage along the Florida Reef. Between 1844 and 1859, wreckers collected approximately three million dollars from their wrecking business along the reef. With the development of lighthouses at Cape Florida, Garden Key, and Key West in the 1820s and 1830s, the *Pensacola Gazette* had mused "Employment for the wreckers diminishes daily, and some of them have left the wrecking ground." By 1858, when the Loggerhead Key and Sombrero Key Lighthouses were completed, most wreckers registered significant losses in business. With the installation of the Alligator Reef structure in 1873 and plans for additional lights at American Shoal, Fowey Rocks, Rebecca Shoal, and Tortugas Harbor, one wrecker cursed the new lighthouses, wishing "them damned lights was sunk below the sea."[99]

The Carysfort Reef project (1848-1852) spanned an era that witnessed the deaths of Winslow Lewis and Stephen Pleasonton, and the reorganization of the Lighthouse Service into the U. S. Light-House Board. During the fifth auditor's office supervision of America's lighthouses (1820-1852), Florida had experienced a significant amount of lighthouse construction, amounting to twenty-three significant aids-to-navigation. By decade, lighthouse construction amounted to seven (1824-1829); eight (1830-1839); eight (1840-1849); and fourteen (1850-1859). Categorization within traditional periods of Florida history reveals a relatively even process of building lighthouses: in the Territorial Period (1821-1844), the Congress funded the construction of seventeen lighthouses, and during the early Statehood Period (1845-1860) twenty-one additional lighthouses were built. Florida's expanding plantation system, the appearance of steamboats along the state's major rivers, and the introduction of a few railroads accounted, in part, for the expansion of the lighthouse system during the period of statehood.[100]

In its 1852 evaluation of America's aids-to-navigation, the Light-House Board emphasized the need to improve Florida's lighthouse system. Captain N. Hubbard of the brig *Charles A. Coe* considered Carysfort Reef, Hatteras, Highlands of Navesink, and Key West the best lighthouses in the country, but expressed concern over long stretches of unlit coastline. The board prioritized its recommendation for improvements. In an inventory of thirty-eight structures to be elevated and equipped with first-order Fresnel lenses, the board recommended that the Congress quickly improve eight Florida lighthouses; three of those--Cape Canaveral, Cape Florida, and Dry Tortugas--ranked in the top five. In addition, recommendations for thirty-three new lighthouses included eleven Florida sites. At the top of the national list stood Jupiter Inlet, one of five Florida sites in the top ten. Still containing a relatively dark coastline, Florida clearly remained far behind other regions of the country in its system of navigational aids. In its report, the board reminded the Congress that Florida had a higher percentage of rebuilt or replaced lighthouses in the country, in part, because of poor site locations, inferior construction, and devastating hurricanes.[101]

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[99]**Dorothy Dodd, "The Wrecking Business on the Florida Reef, 1822-1860," *Florida Historical Quarterly* 22 (April 1944), 171-199; Taylor, *Florida Lighthouse Trail,* 176.**

[100]**Taylor, *Florida Lighthouse Trail,* 175-177.**

[101]**Senate, 32d Cong., 1st Sess., *Report of the Officers Constituting the Light-House Board,* Executive Document 28, p. 46, 105, 121, 127-128; House, 32d Cong., 1st Sess., *Light-House Board,* Executive Document 114, p. 41; Taylor, *Florida's Territorial Lighthouses,* 243-249.**

Motivated by reports of increased shipping and settlement, the Light-House Board developed twelve Florida lighthouses in the decade preceding the Civil War. The Lewis-Meade design used at Carysfort Reef was adapted by Meade for use at Coffin's Patches (1854), Sand Key (1853), and Sombrero Key (1858). Built in 1827, the first Sand Key Lighthouse, an expensive fourteen-thousand-dollar project, had been destroyed by a hurricane in 1846. A wood house supported by iron screwpiles and surmounted by a lantern room was completed at Northwest Passage in 1854. The Lighthouse Board built conventional brick towers at Cape San Blas (1856), Loggerhead Key at Dry Tortugas (1858), Egmont Key (1858), Pensacola (1858), and St. Johns River (1859). Rising one hundred fifty-seven feet, the Loggerhead Key Lighthouse was the first of the modern tall brick structures built in Florida. Organized in 1853, the Florida Railroad initiated a cross-state route between Fernandina and Cedar Key, an event that encouraged the completion of a lighthouse at the Gulf port town in 1854, even though the railroad did not reach Cedar Keys until 1861. George Meade designed a modest keeper's dwelling and storage facility with the tower piercing the roofline of the house and projecting upwards thirty-three feet. Built on Seahorse Key southeast of the village of Cedar Key, the lighthouse consisted of a granite pile foundation, brick tower, and a fourth-order Fresnel lens.[102]

A naval station since 1825, Pensacola required improved navigational lights in the 1850s. By then, the 1824 thirty-foot tower had become insufficient to direct increased numbers of merchant and military ships. In 1859, the Light-House Board sponsored a dramatic expansion of Pensacola's system of navigational aids, building a one-hundred-fifty-foot lighthouse adjacent to the naval station, and installing range lights at Fort Barrancas and Fort McCree on Perdido Key at the mouth of Pensacola Bay. Equipped with a first-order Fresnel lens, the tower was painted in 1869 with a black-and-white scheme. Displaying white paint, the lower one-third contrasted with the surrounding dark landscape and the upper two-thirds finished with a black paint stood out against blue and overcast skies. Wood skeletal towers mounted on brick pilings, supporting range lights displayed a focal range of approximately fifty feet and were assembled to help mariners cross the bar and make safe anchorage at night. Built in pairs at different heights, range lights were used as navigational aids for sailing through channels. When the lights aligned, or visually became stacked one on top of the other, navigators were reassured their ship stood in mid-channel. Range lights arrayed to the right or left of a linear alignment indicated a vessel drifting out of the channel into shoals or shallows.[103]

Although the rate of failed structures diminished under the administration of the Light-House Board, some of Florida's lighthouses still yielded to the elements. Of the twelve major structures built between 1853 and 1860, eight still stand. George Meade designed most of these. Referred to as the "Hatteras of the Gulf," Cape San Blas supported three lighthouses between 1847 and 1859. The first two structures yielded to violent hurricanes and a third, completed in 1859, finally toppled into the Gulf in 1882. One of Meade's failed projects, the foundation for a structure at Rebecca Shoals washed away in storms between 1854 and 1858, and the Light-House Board finally abandoned the project in the latter year. In 1853, in its first annual report to the Senate, the Light-House Board had placed at the top of its list for Florida projects a "first-class lighthouse" at Jupiter Inlet. Designed by

[102]**Taylor, *Florida Lighthouse Trail,* 19, 99, 120-122, 139, 176; Johnson, *Modern Lighthouse Service,* 27.**
[103]**Taylor, *Florida Lighthouse Trail,* 149-162.**

Meade and completed in 1860, the Jupiter Inlet Lighthouse was the last significant structure built in the decade preceding the Civil War. Occupying a site on a forty-foot knoll, the Jupiter Inlet tower was Meade's final design and construction work in Florida. Hostilities during the Third Seminole War (1855-1858) delayed its completion. Three years later, Meade gained fame for defeating Robert E. Lee at Gettysburg.[104]

Civil War, Reconstruction, and Late Nineteenth Century, 1861-1895

Early in the Civil War, Stephen Mallory, secretary of the Confederate navy, ordered that lighthouses should be kept unlighted. In St. Augustine, the mayor organized a band of men to remove the lens and rotation machinery. In 1862, Union forces occupied the city, but having recovered the equipment, chose to keep the lighthouse dark for the remainder of the war. In contrast, Confederates seized none of the reef lighthouses, which remained lit during the war. The Key West Lighthouse also remained in operation during the conflict.[105]

Confederate keepers, sympathizers, and troops seized the apparatus from the Amelia Island, Cedar Keys, Jupiter Inlet, Pensacola, and St. Marks lighthouses. At the last site, southern gunners blew a hole in the exterior wall to prevent Union forces from using it as a lookout. Confiscated apparatus from the Amelia Island Lighthouse was shipped to Madison, Florida, for safekeeping, and the Egmont Key keeper took his lenses to Tampa. The Confederate lighthouse superintendent removed essential equipment at Cape San Blas before approaching Federal troops could reclaim the property. Confederate troops later burned the keeper's dwelling. Rebels burned the top of the Dog Island Lighthouse to render it useless for navigation and lookout purposes. Although artillery duels between Confederate and Union force damaged the Pensacola tower, Federal troops restored the light to active service after occupying the city in May 1862. Union troops attacked Seahorse Key from its Confederate defenders, and briefly used the lighthouse and attached buildings as a prison to hold captured rebels.[106]

The Light-House Board returned most of Florida's lighthouses to service by 1866. Repairs to the St. Marks structure delayed its return to service until early 1867, and repairs to Pensacola's tower were completed in 1869. During Reconstruction, the resumption of steamboat travel along the state's rivers and to coastal sites, and the expansion of existing ports prompted the development of new lighthouses. Population growth at various port cities, including Apalachicola, Cedar Keys, Jacksonville, Key West, Pensacola, St. Augustine, and Tampa resulted in increased shipping and commercial growth. Faster, heavier, larger, and more numerous ships demanded improved navigational aids. A new era of lighthouse development opened in 1868 with the completion of Cape Canaveral Lighthouse, and construction remained relatively steady until 1895. During the

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[104]Taylor, *Florida Lighthouse Trail,* 139, 176; Senate, *Report of the Secretary of the Treasury,* 32d Cong., 2d Sess., Ex. Doc. No. 22, p. 82.

[105]Taylor, *Florida Lighthouse Trail,* 87.

[106]Taylor, *Florida's Territorial Lighthouses,* 31, 179, 229, 249; Taylor, *Florida Lighthouse Trail,* 115, 139-140; Thomas Garner, *The Pensacola Lighthouse* (Pensacola: Pensacola Historical Society, 1994), 10-11; De Wire, *Guide to Florida Lighthouses,* 91.

interval, seventeen lighthouses--brick, cast iron, cast iron brick-lined, screwpile, and skeletal--were built, of which twelve remain.[107]

Representing new trends in lighthouse construction, the Cape Canaveral structure was assembled with cast-iron plates lined with brick. With the design completed and a contract let in 1860, the onset of war delayed its construction. Following the conflict, the West Point Foundry of New York began construction and completed the lighthouse in 1868. But, poor location and shoreline erosion, by now a recurrent theme in Florida lighthouse history, compelled the relocation of the one hundred forty-five foot conical structure. In the 1890s, contractors dismantled the lighthouse and completed its reassembly four years later about one mile farther inland of the original site.[108]

Creative solutions were used to design and build some new towers. Completed in 1826, the brick lighthouse at Garden Key, around which Fort Jefferson was built, became damaged by a hurricane in 1873. A plan to replace the lighthouse integrated the new structure into a bastion of the fort. Completed in 1876 and renamed Tortugas Harbor Lighthouse, the hexagonal structure was assembled with boilerplate iron on top of the fort's walls. Rising only twenty-five feet but standing nearly seventy feet above sea level, this was among the shortest lighthouses built by the Federal government in Florida.[109]

Between 1873 and 1886, the Light-House Board made a concerted effort to complete its lighting of the Florida Keys. During the era, the board built five lighthouses, three of those distinctive off-shore screwpile towers: Fowey Rocks (1878) at Biscayne Bay, Alligator Reef (1873) near Islamorada, and American Shoal (1880) near Sugarloaf Key. The Paulding Kemble Company of Cold Spring, New York, assembled the Alligator Reef structure, and collaborated with the Pusey, Jones Company of Wilmington, Delaware, to build the Fowey Rocks Lighthouse. The latter was a centerpiece of the Light-House Board's exhibit at Philadelphia's Centennial Exposition of 1876, where the board showcased a model of the structure and the first-order Fresnel lens later installed at Fowey Rocks. To distinguish the collection of Keys lighthouses, and, indeed, its lighthouses throughout the nation, the board used various flashes and colors: the light patterns in 1895 consisted of a fixed white for Fowey Rocks, flashing white for Carysfort, flashing red and white for Alligator Reef, fixed white for Sombrero Key, flashing white for American Shoal, fixed white with white flashes for Sand Key, and fixed white for Key West.[110]

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[107]Taylor, *Florida Lighthouse Trail,* 176-177; Roberts and Jones, *Gulf Coast Lighthouses,* 43.

[108]Johnson, *Modern Lighthouse Service,* 28; Taylor, *Florida Lighthouse Trail,* 54; House, *Cape Canaveral, Florida, Light Station,* 50th Cong., 2d Sess., Ex. Doc. No. 98., p. 1-2.

[109]Taylor, *Florida Lighthouse Trail,* 96; Neil Hurley, *Lighthouses of the Dry Tortugas: An Illustrated History* (Aiea: Historic Lighthouse Publishers, 1994), 40-41; House, *Annual Report of the Secretary of the Treasury,* 44th Cong., 2d Sess., Ex. Doc. No. 2, p. 781.

[110]*Annual Report of the Light-House Board to the Secretary of the Treasury for the Fiscal Year ended June 30, 1895,* 115-116; Taylor, *Florida Lighthouse Trail,* 65-67, 71-73, 77-79.

Not all lighthouse projects were new construction. The height of some towers were increased to help make their lights more prominent from the surrounding landscape. The only Florida lighthouse built within a current city boundary, the Key West structure was improved in 1873 with a new lantern and a new keeper's dwelling in 1887. By the mid 1890s, the encroachment and height of new buildings and vegetation had made the structure less identifiable at sea, prompting the board to increase its height twenty feet in 1895. Another new lantern accompanied the modification. Other labor-intensive activities of the board improved the state's existing lighthouse infrastructure. Damage from cannon fire during the Civil War manifested cracks in Pensacola's lighthouse tower in the 1870s. In 1879, the board authorized the arduous task of repointing the brick tower, and made repairs to the lantern and keeper's dwelling. Annual reports prepared by the Light-House Board for the Treasury Department during the late-nineteenth century were filled with statements by keepers and engineers about Florida lighthouses "thoroughly cleaned, scraped, and painted," dwellings assembled or repaired, cisterns dug, oil houses constructed, and fences installed.[111]

Notable architects and engineers designed two conventional tall brick lighthouses in Florida during the late nineteenth century. Faced with an aging structure steadily undermined by tidal erosion, the Board made plans to replace Florida's oldest lighthouse at St. Augustine. In 1871, the Congress authorized a new structure to be placed six hundred yards southwest of the existing beacon. German born and educated Paul Pelz designed the structure while working as a draftsman and engineer for the Board. Immigrating from Breslau to the United States in the 1850s, Pelz apprenticed in the studio of Detlef Lienau, a leading New York architect until 1866, and then briefly worked for architect Henry Fernbach. But, in 1867, Pelz left New York to work as an architect and engineer for the Light-House Board in Washington, D. C. In 1873, Pelz's design of a new American lighthouse won first place at the World's Fair in Vienna. That year, he toured Europe, studying lighthouses and public libraries. Later that year, he left government employment and formed a partnership with John Smithmeyer, construction superintendent of the Supervising Architect's Office in the nation's capital. Smithmeyer & Pelz won the design competition for the Library of Congress, their most significant commission. Pelz later designed several large public buildings and residences in Arkansas, New York, Pennsylvania, South Carolina, Virginia, and Washington, D. C. Spanning a brief period of 1867 to 1873, Pelz served as a chief engineer and draftsman for the Light-House Board.[112]

Pelz's plans for the one hundred sixty-seven-foot St. Augustine structure included a coquina and brick foundation, brick conical tower, first-order Fresnel lens, and a black-and-white spiral paint pattern with a red lantern. The board included a new two-story brick keeper's dwelling in the project. The distinctive lighthouse was lit on 15 October 1874, and the aging structure to the northeast collapsed into the sea in June 1880. Ruby

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[111]**Taylor, *Florida Lighthouse Trail,* 81; McCarthy, *Florida Lighthouses,* 71; Thomas Garner, *The Pensacola Lighthouse* (Pensacola: Pensacola Historical Society, 1994), 11-13.**

[112]**Taylor, *Florida Lighthouse Trail,* 40; Withey, *American Architects,* 466, 562; John Wells and Robert Dalton, *The South Carolina Architects, 1885-1935* (Richmond: New South Architectural Press, 1992), 137; *The National Cyclopaedia of American Biography,* 25: 424-425.**

Harn, the keeper's daughter, had just left the ancient structure; having written her name on the decaying walls and was walking away when she heard the old tower crash into the surf.[113]

Occupying a prominent site on Florida's east coast, the second tallest lighthouse on the Atlantic coast was completed at Mosquito Inlet in 1887. The first lighthouse built at the inlet had unceremoniously toppled into the sea in 1836 without the keeper ever lighting the lamps. The Second Seminole War, Civil War, an unstable inlet channel, and more urgent needs elsewhere delayed the construction of a replacement structure until 1887, when the tower, keeper's residence, and outbuildings were constructed. A self-taught artist and engineer, Francis Hopkinson Smith drafted the plans. Smith had worked in his family's iron business following the Civil War, and opened a contracting business in the 1870s. In addition to breakwater and jetty projects in New York, Smith prepared a novel design for the Race Rock Lighthouse at Fishers Island, New York. Smith's distinctive design for the Mosquito Inlet Lighthouse preceded his plans and supervision of the foundation for the Statue of Liberty in New York Harbor in 1886.[114]

At Mosquito Inlet, a first-order Fresnel lens mounted at the top of the one hundred fifty-one-foot structure, which stood one hundred sixty-eight feet above sea level, made it one of the brightest and tallest structures on the nation's east coast. In November 1887, the *Halifax Journal* in nearby Daytona announced "the lighthouse at the Inlet threw its light over the ocean and river for the first time. It is visible from our front gate." The Light-House Board instructed mariners of its fixed white light with a two hundred twenty-five degree sweep across the horizon, and a focal plane of one hundred sixty feet above mean low water. Several tragedies occurred during its construction: Orville E. Babcock, chief engineer for the fifth and sixth lighthouse districts, drowned in the inlet; and five schooners delivering supplies and workers foundered with six men drowned.[115]

Possessing a distinctive name and lighting the environs of a treacherous inlet, the Mosquito Inlet Lighthouse (renamed Ponce DeLeon Inlet in 1927) became immortalized in a short story by the renowned author Stephen Crane, who had already experienced literary success with his *Red Badge of Courage.* In January 1897, within sight of the inlet and lighthouse, Crane narrowly survived the wreck of the *Commodore* during a filibustering trip to Cuba. In his "The Open Boat," Crane described coming ashore against a backdrop of the Mosquito Inlet Lighthouse "a giant, standing with its back to the plight of the ants. It represented in a degree the serenity of nature amid the struggles of the individual--nature in the wind, and nature in the vision of men." A master of irony, Crane characterized the light as "a pale star, just lifting from the sea. The streaked saffron in the west passed before the all-merging darkness...." Despite the guidance and hope that the lighthouse held for Crane and his three shipmates, one of the crew drowned sailing through the churning surf. His travail in Florida's Atlantic

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[113]**Taylor, *Florida Lighthouse Trail,* 40-41; Taylor, *Florida's Territorial Lighthouses,* 34.**

[114]**Taylor, *Beacon of Mosquito Inlet,* 11-21; Crompton, *Lighthouse Book,* 81; *New York Times,* 8 April 1915; *National Cyclopaedia of American Biography,* 5:326.**

[115]**Taylor, *Beacon of Mosquito Inlet,* 11-21; Crompton, *Lighthouse Book,* 81; *New York Times,* 8 April 1915; *National Cyclopaedia of American Biography,* 5:326.**

waters and later fatigue while covering the Spanish-American War may have contributed to his early death in 1900.[116]

Picturesque vertical structures cast against the state's relatively flat terrain, Florida's lighthouses inspired other authors, travel writers, and visitors. Some lighthouses became tourist destinations, and even inspired publishers to produce picture postcards. In 1878, a line drawing in *Harper's New Monthly Magazine* depicted the Amelia Island Lighthouse projecting above the surrounding tree line with a plank walk and footbridge spanning a nearby creek and wetlands. Part of a larger study of the sea islands of Georgia and South Carolina by author and illustrator S. G. W. Benjamin, the article characterized the "light-house of Fernandina [as] exceptionally situated, a mile from the sea, on a steep eminence with a most picturesque grove of ancient oaks." Prepared with characteristic nineteenth-century flair and artistic license, Benjamin's illustration portrayed the keeper and a young assistant crossing the footbridge and beginning the long ascent up the plank walkway to the lighthouse. A seasoned writer and illustrator, Benjamin had launched his career preparing line drawings for the *London Illustrated News* during the Crimean War. After immigrating to America and graduating from Williams College in 1859, he published poetry and gained recognition for his "Ode on the Death of Abraham Lincoln." He opened an art studio in Boston, but then turned to travel writing and illustrating. Broadly published, his literary works soon brought him national acclaim, and in 1883 President Chester A. Arthur appointed Benjamin ambassador to Persia, after which he served as editor of the *Magazine of Art* and the *New York Mail.*[117]

One intriguing first-person narrative of the nineteenth-century Indian River that included Florida's lighthouses stemmed not from an author or travel writer, but a visitor gifted with a keen memory and assisted by a deft editor and artist. In his *Camping and Cruising in Florida* (1884), Cincinnati physician James Henshall opened his guide with an illustration of the Jupiter Inlet Lighthouse and the keeper's dwelling. In 1878, Henshall took in the view from the "balcony" of the lighthouse, which he described "at once grand and comprehensive." From the structure the Indian River stretched for miles "between the intervening hills and clumps of foliage like orient pearls at random strung." For Henshall, the Loxahatchee River appeared to be "like a huge serpent gliding from the setting sun toward the sea." That night the physician "camped at the foot of the bluff, and slept with the huge eye of the lantern flashing and gleaming on us, as it kept watch and ward over the vast expanse of the sea."[118]

In the Florida Keys, Henshall provided brief descriptions of the reef lighthouses, where "their keepers, being shut off from all communication with the keys except by boats, lead a very secluded and semi-hermit life, while exposed to the fury of fierce gales and the lashing of the angry seas." Alligator Reef Lighthouse he described as an "iron frame pyramid, showing a scintillating light flashing every five seconds, every sixth flash being red."

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[116]James Colvert, *Great Short Stories of Stephen Crane* (New York and Cambridge: Harper & Row, 1968), xi, 277-302, 357.

[117]A. N. Marquis, comp., *Who's Who in America* (Chicago: A. N. Marquis Company, 1912), 151; S. G. W. Benjamin, "The Sea Islands," *Harper's New Monthly Magazine* 57 (November 1878), 839-861; *New York Times,* 20 July 1914; the Florida Photographic Archives holds a copy of Benjamin's line drawing of the lighthouse.

[118]James Henshall, *Camping and Cruising in Florida* (Cincinnati: Robert Clarke & Co., 1884), xviii, 79-81, 110.

Henshall's picturesque, if stylized line drawings depicted the Jupiter Inlet Lighthouse and one of the brick towers in the Florida Keys.[119]

George Barbour, Sidney Lanier, R. K. Sewall, and Constance Woolson visited and wrote about various lighthouses with St. Augustine being the most popular lighthouse site. In 1882, Chicago journalist George Barbour included brief descriptions of several lighthouses, and included a stylized line drawing of a "lighthouse on Florida Keys." Popular travel guides and glowing descriptions of inexpensive homesteads, fed by the promises of cheap and fertile agricultural acreage, encouraged thousands of settlers into the state, many of whom arrived by steamboat. Railroads extended across west Florida, and into the peninsula in the 1880s, reaching Miami in 1896. Farmers raised winter vegetables, such as tomatoes, beans, and peppers, as well as citrus fruits, to satisfy the demand of northern urban markets. Harbor and inlet improvements brought ever larger ships into the state's ports. Late in the century, a few wealthy northerners began embarking on annual pilgrimages to Florida in pleasure yachts. With an increasing population and additional demands upon shipping channels, both commercial and private, new and improved navigation aids became a necessity.[120]

The Mosquito Inlet and St. Augustine lighthouses on Florida's east coast were traditional, if not picturesque and ornate conical brick towers, but new lighthouses assembled along the Gulf of Mexico displayed iron skeletal and screwpile characteristics. The site of the collapse of three brick towers, Cape San Blas received its fourth lighthouse in 1885. This time the Light-House Board engineers selected an iron skeletal tower mounted on pilings that supported a central cylinder encasing a staircase. The skeletal design would permit the board to easily relocate the lighthouse in the event of erosion. In addition, the skeletal profile offered less resistance than a brick tower to hurricane-force winds. A third-order lens from the nearby collapsed tower was salvaged and installed in the new structure, which was assembled by the Phoenix Iron Works of Ocean City, New Jersey. Founded about 1814 and reorganized in 1855, the New Jersey Company also manufactured and assembled the Sanibel Island Lighthouse in 1884. Several years later, the lighthouse design employed at Cape San Blas and Sanibel Island was adapted for a lighthouse at Anclote Keys. The Light-House Board had recommended a structure there as early as 1851, and even secured a lighthouse reservation at the Gulf Coast site in 1856. Although petitions were received from settlers in the 1870s, a low-priority ranking delayed construction until the 1880s. After the Congress approved an initial appropriation in 1885, Colwell Iron Works of New York City delivered the materials in June 1887 and the keeper illuminated the third-order Fresnel lens in September 1887.[121]

The Light-House Board's reasoning for employing the skeletal design at Cape San Blas was affirmed in 1894, when a hurricane eroded the nearby shoreline. The storm destroyed the keeper's dwelling, but left the lighthouse undamaged and standing in the surf. Work began in 1896 dismantling the lighthouse to relocate it to

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[119]Henshall, *Camping and Cruising,* 110, 174-176.

[120]Taylor, *Florida Lighthouse Trail,* 41; George Barbour, *Florida for Tourists, Invalids, and Settlers* (New York: D. Appleton and Company, 1882), 18-19; Gannon, *New History of Florida,* 266-277.

[121]Geoffrey Mohlman, "Anclote Keys Lighthouse: Guiding Light to Safe Anchorage," *Florida Historical Quarterly* 78 (Fall 1999), 161-167; Taylor, *Florida Lighthouse Trail,* 117-119, 139-141; *National Cyclopaedia of American Biography,* 13: 281.

nearby Black's Island, but currents reformed the shoreline, prompting the board to curtail the project. Subsequent erosion during World War I reactivated the project, which relocated the lighthouse in 1918 approximately one-quarter of a mile from its original site.[122]

Screwpile lighthouses appeared at Charlotte Harbor, Rebecca Shoal, and Volusia Bar on Lake George. The discovery of phosphate along the Peace River valley and the need to better protect Gulf Coast shipping spurred the construction of two lighthouses in Charlotte Harbor. Devised as wood-frame houses with a light perched at the roof ridge and supported by iron pilings, the structures were completed in 1890. One stood in Charlotte Harbor at the primary turning point in the channel, and another occupied a prominent site at the south end of Gasparilla Island, lighting the passage through Boca Grande Pass. The Port Boca Grande Lighthouse originally supported a third-and-one-half-order revolving white Fresnel lens that scintillated white every four seconds, and the Charlotte Harbor Lighthouse employed a fifth-order fixed red Fresnel lens. Completed in 1886, the Rebecca Shoal structure in the Keys was similar in size and design to the Charlotte Harbor buildings with their hip roofs, gable dormers, and a central light projecting from the peak. Earlier, the Northwest Passage Lighthouse in the Keys had been completed in 1855, the first example of the wood-house-on-iron-pilings in Florida.[123]

On the St. Johns River, the Volusia Bar at the south end of Lake George had presented navigation hazard since the appearance of steamboats on the waterway. Some mariners considered the bar "being low, afford[s] no prominent marks, rendering it impossible in dark or foggy weather to make the entrance of the Saint Johns River with certainty of safety." In 1883, the Corps of Engineers had improved the shallow, narrow river channel. Still, steamboats routinely foundered on mud shoals. In March 1886, the Light-House Board approved the construction of a one-story wood-frame gable-roof dwelling mounted on iron pilings. Equipped with a fourth-order Fresnel lens displaying a fixed white light, a wood-and-iron lantern projected from the center roof ridge. Standing forty-nine feet above the level of the lake, this lighthouse was the farthest inland significant aid-to-navigation built by the board in Florida.[124]

Some projects never materialized. In 1888, the Light-House Board opened discussions to discontinue Amelia Island Lighthouse. Engineers from the U. S. Coast Survey initiated the discussion after locating a potential lighthouse site sixty-two feet above sea level at Mount Cornelia north of the mouth of the St. Johns River. Suitably located to sweep the lighthouse arcs of Little Cumberland Island Lighthouse to the north and St. Augustine to the south, the height and position of the proposed structure would eliminate the need for both the Amelia Island structure and the existing lighthouse at St. Johns River. Proposing to build the structure at a cost of one hundred five thousand dollars, the board stipulated the light would be "second only on the Atlantic coast to that at the Highlands of Navesink, New Jersey." Despite some recent improvements, the board characterized Amelia Island Lighthouse as "an old and unsightly structure...." Other reasons cited to consolidate the

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[122]Taylor, *Florida Lighthouse Trail,* 140.

[123]Ibid., 43-45, 86, 108-113.

[124]House, *Volusia Bar, Florida,* 47th Cong., 2d Sess., Ex. Doc. No. 103, p. 1-2; Taylor, *Florida Lighthouse Trail,* 43-45; Bill Belleville, *River of Lakes,* 105.

lighthouse system in northeast Florida included increased commercial shipping at Jacksonville, calls for a better regional lighthouse by the Clyde Steamship Company, and efforts to streamline the Lighthouse Service. But, budgetary constraints and, perhaps, outcries from citizens at Fernandina and Mayport forestalled the project, which faded away in 1894, only to resume briefly and then vanish completely in the opening decade of the twentieth century.[125]

Indicative of a relatively comprehensive system of primary aids-to-navigation, Florida's lighthouse construction activity tapered off in the 1890s. During the decade, two structures were built in Charlotte Harbor, and a third completed in 1895 lit the Crooked River region in Franklin County near Carrabelle. An important waterway into Apalachicola, the East Pass into St. George Sound had confounded lighthouse contractors and engineers for decades. Completed in 1839, the first of three masonry lighthouses built on Dog Island succumbed after a hurricane undermined its foundation, a fate suffered by the next two structures. After the 1873 hurricane destroyed the third tower, the Congress resisted constructing a fourth lighthouse for nearly a decade.[126]

Difficulties stemming from choosing a site on either Dog Island or the mainland and then securing clear title forestalled the development of a new structure until the 1890s. Still, in 1888, Vice-Admiral S. C. Rowan of the Light-House Board urged the Congress to expedite the lighthouse because "quite a lumber trade is being built up at and near Apalachicola, and wharves and a good harbor in behind Dog Island. I think a light-house would be beneficial, but should recommend a screwpile structure like Fort Point, Galveston." After gaining approval from the Congress, securing title at a mainland location, and drafting plans for neither a conical brick nor screwpile structure, construction of a steel skeletal lighthouse began in January 1895 and was completed with a fourth-order Fresnel lens in August 1895. To provide contrast to the surrounding landscape, in 1902 the Light-House Board finished the structure with a two-tone paint configuration: white on the lower half and red on the upper portion.[127]

Crooked River was the last lighthouse built in Florida during the nineteenth century. By then, fifty-five lighthouses had been constructed in Florida by the Federal government since 1824; by 1895, nearly one-third of those had been replaced or collapsed. Only twenty-six of those nineteenth-century structures still stand. In a period encompassing Reconstruction through the mid-1890s, which brought increased settlement, extensive planting of citrus groves, and the expansion of the steamboat and railroad industries (1868-1895), seventeen lighthouses had been built. Only twelve survive. The completion of the Crooked River Lighthouse coincides with the landmark freezes of December 1894 and February 1895 that mark the end of a period of agricultural development in Florida history. The cold blasts ruined many vegetable fields, defoliated and killed thousands of citrus trees near the height of the growing season. The resulting loss in shipments by steamboat and rail placed severe strains on transportation companies, and thousands of farmers abandoned homesteads, to return to the

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[125]**House, *Reports of the Department of Commerce and Labor, 1905,* 59th Cong., 1st Sess., Document No. 7, p. 185.**

[126]**Taylor, *Florida Lighthouse Trail,* 130; House, *Light-House on the Highland to the West of Crooked River, Florida.* 50th Cong., 1st Sess., Report No. 2542.**

[127]**Taylor, *Florida Lighthouse Trail,* 130; House, *Light-House on the Highland to the West of Crooked River, Florida.* 50th Cong., 1st Sess., Report No. 2542.**

North or Midwest, or pushed farther south into the peninsula to avoid future freezes.[128] Large-scale citrus cultivation in North Florida virtually ceased.

Progressive Era through World War I, 1896-1919

Relatively little new lighthouse construction occurred during the Progressive era. Built early in the era, two new lighthouses appeared in Florida, one on the Gulf coast and the other on the Atlantic seaboard. In 1902, the Light-House Board installed a tower at St. Joseph's Bay, which had lost its first lighthouse in 1846 following an outbreak of yellow fever and devastating hurricanes at the City of St. Joseph. Built on the mainland, the new structure consisted of a two-story wood-frame house with a forty-one foot brick tower piercing the center of the hip roof. Operating with a third-order Fresnel lens that displayed a fixed white light in February 1903, the lighthouse stood opposite the site of St. Joseph Spit where the St. Joseph's Bay Lighthouse had been constructed in 1839 and dismantled several years later.[129]

Another major lighthouse project in Florida during the Progressive era occurred in 1907 with the development of the Hillsboro Inlet structure. Petitions and recommendations for a lighthouse at the Broward County site had been submitted to the Congress as early as 1851 and renewed in 1886. Filibustering expeditions and increased military shipments through the Florida Straights during the Spanish-American War helped re-emphasize the need for a lighthouse at Hillsboro Inlet. Still, more pressing concerns deferred development until the early twentieth century. Subsequently, between 1901 and 1905 the Congress appropriated ninety thousand dollars for the lighthouse--an octagonal, pyramidal iron skeletal tower with a central stair cylinder. The Russell Wheel & Foundry of Detroit, Michigan, fabricated the steel structural members, and J. H. Gardiner of New Orleans served as general contractor. In 1904, after the foundry fabricated the lantern but before contractors began assembly, the Light-House Board displayed the lantern at the Louisiana Purchase Exposition of 1904 in St. Louis, Missouri. Later, in 1907, the contractor built the lantern and other pre-fabricated sections at the permanent site in Pompano Beach. Marking the northern limit of the Florida Reef, the tower initially was painted white on its lower third and finished on the upper two-thirds and lantern with black paint. Contractors installed a first-order "clam-shell style" Fresnel lens in the lantern in March 1907. Soon after its commissioning, distinctive diamond-shaped panes comprising the lantern prompted citizens to apply the moniker "Big Diamond" to the lighthouse. In addition to the primary structure, contractors built three one-and-one-half-story wood-frame dwellings, a boathouse, a red-brick oil house, storehouse, wharf, walks, and fencing.[130]

A similar project languished at Cape Romano, where the board anticipated marking the northern limit of the Ten Thousand Islands with a lighthouse. Based on coastal surveys, a lighthouse reservation at Cape Romano was formed by an executive order in 1878. Requests between 1901 and 1907 ranged between thirty-five

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[128]Taylor, *Florida Lighthouse Trail,* 175-177.

[129]Ibid., 143-148; Department of the Treasury, *Annual Report of the Lighthouse Board, 1903,* 72.

[130]Taylor, *Florida Lighthouse Trail,* 59-61; House, *Reports of the Department of Commerce and Labor, 1906,* 59th Cong., 2d Sess., Document No. 7, p. 167; House, *Reports of the Department of Commerce and Labor, 1907,* 60th Cong., 1st Sess., Document No. 7, p. 551; Crompton, *Lighthouse Book,* 92; Rhein, *Anatomy of the Lighthouse,* 99.

thousand and forty-five thousand dollars. Oddly, the Congress turned a deaf ear to the Light-House Board, even though the board based its request upon a "necessity for this light are that there is a stretch of coast over 100 miles in length between Sanibel Island and Key West, Fla., without a single light. There is quite a large commerce carried on between Florida ports above Sanibel and Key West and Cuba, using the route along the west coast of Florida."[131]

During the Spanish-American War, the Light-House Board ordered the "extinction and relighting of light-houses, beacons, and lighted buoys and making changes in the characteristics of lights on short notice." In practice, however, few substantial changes were made to the principal coastal lights. Instead, one of the few practical developments of the conflict consisted of the installation of telephone lines between some lighthouses and an adjacent town. The introduction of telephone lines permitted some keepers who lived in relative isolation to communicate with nearby towns and villages. In 1898, a telephone system was installed between the Amelia Island Lighthouse and the town of Fernandina, and between St. Augustine and the lighthouse on Anastasia Island. Not maintained following the war, the system at the former location was "abandoned as useless" by June 1899, but replaced several years later.[132]

Other projects consisted of expanding lighthouse depots at Key West and Pensacola, and establishing range lights and post lamps along river channels. In addition, the board built new keeper's dwellings and supporting structures. In 1907, the board received seventy-five thousand dollars to build sixteen keeper's dwellings throughout the country. Two of those were planned for Amelia Island and Dry Tortugas. Oil houses were also built. Amelia Island Lighthouse received its brick oil house in 1890, a metal structure was installed at Fowey Rocks in 1898, and a structure for oil storage was built at Northwest Passage Lighthouse in 1899. In 1903, thirty-four oil houses were built throughout the country, including four structures for beacons at St. Andrews Bay. Cape San Blas received a brick oil house in 1906, and in 1908 the board reported the construction of twenty-five new oil houses, including those at the Apalachicola Range Light, Fort McRee Cut-Off Range Lighthouse, Mangrove Point and Peace Creek in Charlotte Harbor, and Tortugas Harbor at Fort Jefferson. In 1909, a new keeper's dwelling was assembled at Cape San Blas, and brick oil houses were built at Fort Barrancas Rear Range Light and Sand Key. That year, only seven lighthouses throughout the nation were equipped with an electric-arc illuminant, and one structure received an incandescent lighting system. None was in Florida.[133]

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[131]Taylor, *Florida Lighthouse Trail,* 59-61; House, *Reports of the Department of Commerce and Labor, 1906,* 59th Cong., 2d Sess., Document No. 7, p. 168; House, *Reports of the Department of Commerce and Labor, 1907,* 60th Cong., 1st Sess., Document No. 7, p. 552.

[132]Department of the Treasury, *Annual Report of the Light-House Board, 1899,* p. 122.

[133]House, *Reports of the Department of Commerce and Labor, 1908,* 60th Cong., 2d Sess., Docnment No. 1048, p. 615-616, 623; House, *Reports of the Department of Commerce, 1914,* 63th Cong., 3d Sess., Document No. 1505, p. 554; Department of the Treasury, *Annual Report of the Light-House Board, 1898,* p. 37; Department of the Treasury, *Annual Report of the Light-House Board, 1899,* 34; Department of the Treasury, *Annual Report of the Light-House Board, 1906,* p. 169; Department of the Treasury, *Annual Report of the Light-House Board, 1909,* p. 32, 39.

Some of Florida's lighthouses were affected by intergovernmental agreements. In 1904, the Carnegie Marine Biological Laboratory initiated experiments in coral reefs and mangroves at Loggerhead Key. Scientists stationed at the isolated key recorded some of the world's first black-and-white and color underwater photographs near the lighthouse. In 1908, the Federal government established a bird reservation near the Mosquito Inlet Lighthouse.[134]

In 1910, the Light-House Board yielded to the Bureau of Lighthouses, an administrative shift that eliminated the dominant influence of the military in the operation of the Lighthouse Service. George Putnam, the lighthouse commissioner, published articles in *National Geographic Magazine* and *Scientific American,* and the monograph, *Lighthouses and Lightships* (1917). Replete with illustrations, the publications depicted various Florida lighthouses, including St. Johns River and Sombrero Key. Prior to Putnam's tenure with the Bureau of Lighthouses, Arnold Johnson, chief clerk of the Light-House Board, had prepared *The Modern Light-House Service* (1890), which described various Florida lighthouses in detail and depicted the structures at Fowey Rocks and St. Augustine.[135]

By 1910, the state's primary lighthouse system was largely in place, and over the subsequent decades the bureau focused its attention on maintaining and improving the existing aids-to-navigation, and installing new relatively small post lights, range lights, and day markers along the channels of the state's rivers. As early as 1875, the Light-House Board had installed fifty-four daybeacon pilings to mark the channel of the St. Johns River between Jacksonville and Palatka. In 1913, the bureau recommended the installation of thirty-six range lights, and a collection of buoys and post lights between Jacksonville and the river's mouth. Eventually, the bureau settled for a more modest assortment of post lights and day markers. A decline in shipping near Cedar Key resulted in the abandonment and sale of the Seahorse Key Lighthouse in 1915.[136]

After the United States entered World War I, President Wilson transferred twenty-one lighthouses with potential military significance to the navy. Several lighthouse sites became repair facilities for patrol boats, and various depots served as coaling stations and berths for military vessels. Lighthouse Service personnel along the Atlantic coast performed patrol and watch duties from their towers and along beaches for German submarines. Lighthouse personnel stationed in Florida rescued some civilians and military servicemen, but none of those duties was in response to ships torpedoed by U-boats. John and William Linquist at Mosquito Inlet Lighthouse used his launch to pull the *Mana,* a private yacht, off a nearby shoal. Marshall Jones of Philadelphia received assistance from keeper Clinton Honeywell at Cape Canaveral Lighthouse in the repair of his yacht *Viola II.*

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[134]**Taylor, *Florida Lighthouse Trail,* 99; Alice Strickland, "Pone De Leon Inlet," *Florida Historical Quarterly* 43 (January 1965), 259.**

[135]***National Cyclopaedia of American Biography,* 48: 38-39; Putnam, "Beacons of the Sea," 1-51; Senate, *Modern Light-House Service,* 51st. Cong., 1st Sess., Ex. Doc. No. 56, p. 26-31; "The United States Lighthouse Service-1," *Scientific American Supplement* 82 (November 25, 1916), 344-345; "The United States Lighthouse Service-2," *Scientific American Supplement* 82 (December 2, 1916), 367-368.**

[136]**House, *Annual Report of the Secretary of the Treasury, 1876,* 44th Cong., 2d Sess., Ex. Doc. No. 2, p. 778; Taylor, *Florida Lighthouse Trail,* 121.**

Thomas Knight at Hillsboro Inlet Lighthouse recorded several instances of using his launch to "tow and render assistance" to disabled "aeroplanes and hydroplanes." Keeper Charles Johnson at Dry Tortugas pulled the schooner *Curry* off a coral reef and towed it with his motorboat to Fort Jefferson.[137]

Florida Land Boom, Great Depression, and World War II & Aftermath, 1920-1952

During the periods of the Florida land boom and Great Depression the Bureau of Lighthouses improved its existing facilities and persisted in its program of marking river channels. Florida then fell within three lighthouse districts: the sixth extended between North Carolina and the Hillsboro Inlet in Broward County with headquarters in Charleston; the seventh between Hillsboro Inlet and the Suwannee River with headquarters in Key West; and the eighth from the Suwannee River to Texas with headquarters in New Orleans.[138]

One of the largest projects in Florida during the era occurred in Charlotte Harbor. In 1927, the Boca Grande Entrance Rear Range Lighthouse was assembled about one mile north of the earlier Port Boca Grande Lighthouse. Manufactured in 1881 and originally named Green Hill Lighthouse, the iron skeletal tower had initially served as a rear range on Delaware Bay near Lewes, Delaware. The structure was forged by the Phoenix Iron Company of New Jersey, the same foundry that fabricated lighthouses at American Shoals, Cape San Blas, and Sanibel Island in the 1880s. Discontinued in 1918, the Delaware lighthouse was dismantled several years later, shipped to Miami, Florida, and then to Boca Grande. In 1927, the one-hundred-six-foot-tower was equipped with a red light and third-order Fresnel lens, but in 1932 a smaller fourth-order lens with a white flash was installed in the tower.[139]

Improvements and abandonment of both lighthouses and property characterized some of the bureau's activities in Florida during the 1920s and 1930s. Upgraded to an electric lamp in 1920, the 1859 St. Johns River Lighthouse at Mayport was discontinued in 1929, replaced by a lightship to better mark the inlet's entrance. During the era, the first St. Johns Lighthouse, built in 1835 and abandoned since 1859, finally succumbed to the tides and toppled into the ocean. In 1926, the Congress authorized the secretary of commerce to "dispose of certain lighthouse reservations, and to increase the efficiency of the Lighthouse Service and for other purposes." One effect of the act was to set in motion the disposal of government lands throughout the nation. At Anclote Key Lighthouse, the bureau offered its excess lands in the mid-1920s, a transaction that did not close until 1938. Initially conceived as a sale to private interests, the land was eventually transferred to the U. S. Department of Agriculture. Some lighthouse reservations of the 1920s did not contain lighthouses, the result of abandonment or relocations, or, in some cases, another site later selected for a lighthouse with the original property still held by the government. The bureau offered lighthouse reservations for sale at Amelia Island, Captiva Island,

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[137]**Department of Commerce, *Reports of the Department of Commerce, 1916,* p. 708; Department of Commerce, *Reports of the Department of Commerce, 1919,* p. 749; Weiss, *Lighthouse Service,* 25-27, 68-69; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1916), 8; U. S. Lighthouse Service, *Annual Report* (Washington, D. C.: GPO, 1918), 8; Johnson, *Guardians of the Sea,* 203.**

[138]**Weiss, *Lighthouse Service,* 56, 67, 69, 86.**

[139]**Taylor, *Florida Lighthouse Trail,* 105-107.**

Mosquito Inlet, and St. Augustine. Bureaucratic and legal entanglements forestalled some conveyances, such as the Amelia Island transaction. The City of Fernandina proposed leasing cabins on the proposed site, but was prevented by congressional action, which mandated the use of the property only for public park purposes and completed the transaction with that understanding in 1934.[140]

Lighthouse personnel played a small role watching for smugglers during the era of prohibition. Florida's close proximity to the Bahamas, an English possession, made it a popular destination for rumrunners. Dade, Duval, Hillsborough, and Palm Beach counties represented the most challenging enforcement sites for federal, state, and local officials in Florida. Two additional U. S. Coast Guard stations were organized at Fernandina and St. Petersburg, supplementing stations at Fort Lauderdale, Key West, and Miami. New motorboats and cabin cruisers, augmented by navy torpedo boats and mine sweepers, increased the Federal presence along Florida's coastline. The Federal government also pressed lighthouse keepers into service watching and reporting clandestine and suspicious activities. Charles Lupton at St. Joseph Point Lighthouse encountered a rumrunner stranded near the lighthouse with a sea of liquor bottles floating around the small boat. By the time Lupton notified the authorities residents had collected the booty and the boat sailed away. Keeper Charles Sisson at Ponce DeLeon Inlet Lighthouse received a "commendation for meritorious service" for his cooperation with the Coast Guard. One of his exploits included assisting the crew of the Coast Guard Cutter *Yamacraw.* Yet, lighthouses along Florida's Atlantic coast also served as beacons to guide smugglers to safety among the state's numerous secluded bays and coves.[141]

A program of streamlining the bureau's operations was thwarted by significant hurricanes during the 1920s and 1930s. Storms battered Florida's coastline and lighthouses, destroying equipment and eroding the terrain. Striking Florida's southeast coast between Ft. Lauderdale and Miami, a September 1926 hurricane apparently left largely undamaged the Cape Florida Lighthouse. But farther north, high winds and roiling tides swept away nearly six hundred feet of land between the shoreline and the Hillsboro Inlet Lighthouse, prompting the construction of a stone breakwater in 1930. In September 1928, another powerful hurricane roared ashore immediately south of Jupiter, and traveled the length of the state, re-entering the Atlantic Ocean near the mouth of the St. Johns River. The second most deadly hurricane in twentieth-century history, the storm produced wind gusts of one hundred sixty miles per hour just before slamming into the coast. At the Jupiter Inlet Lighthouse, after the storm interrupted the electric power, the keeper's son was compelled to turn the lens by hand for several hours. In addition, the tower swayed approximately seventeen inches at the height of the storm, sustaining heavy damage to its glass lantern and one of the lenses.[142]

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[140]**Taylor, *Florida Lighthouse Trail,* 33, 175-176; Mohlman, "Anclote Keys Lighthouse," 178-182; Senate, *Disposal of Lighthouse Reservations,* 70th Cong., 1st Sess., Report No. 703, p. 1-2; Department of Commerce, *Twenty-second Annual Report of the Secretary of Commerce, 1934,* 106.**

[141]**Carter, "Florida and Rumrunning during National Prohibition," 47-56; Taylor, *Ponce DeLeon Inlet Lighthouse,* 38; McCarthy and Trotter, *Florida Lighthouses,* 27; Elinor DeWire, *Guide to Florida Lighthouses* (Sarasota: Pineapple Press, 2001), 93.**

[142]**Taylor, *Florida Lighthouse Trail,* 57, 60; John Attaway, *Hurricanes and Florida Agriculture* (Lake Alfred: Florida Science Source, Inc., 1999), 81-114.**

In terms of cost for lighthouse repairs, one of the most destructive hurricanes of the Great Depression was Florida's Labor Day Hurricane of 1935. H. D. King, then commissioner of lighthouses reported that "Extensive damage was done to navigational aids by the hurricane which struck the Florida coast on September 2, 1935. Practically the entire coast line of the seventh lighthouse district was within the area affected, an unusual occurrence despite the frequency with which hurricanes are experienced in this vicinity. Many minor lights and beacons were either entirely destroyed or seriously damaged. Alligator Reef Light Station, which received the full force of the storm, was out of commission for several hours and was considerably damaged. Immediately following the storm the entire district office, depot, and vessel personnel of the district were engaged in the restoration of the aids to navigation and in the relief of stricken persons and communities. Damage to the Lighthouse Service was estimated at $79,000." The keepers at Alligator Reef Lighthouse reported the structure was buffeted by two-hundred-mile-per-hour wind gusts, which shattered the lantern and lens. They also recorded a twenty-foot tidal surge bearing down on the lighthouse and on nearby Upper Matecumbe Key.[143]

Beyond repair work, much of the work conducted by the Bureau of Lighthouses in Florida during the 1930s consisted of upgrading various lighthouses with electric lights, constructing new support facilities, and installing relatively small beacons and upgrading various lighthouses. Electrification came to the Jupiter Island Lighthouse in 1928, the Amelia Island and Ponce DeLeon Inlet lighthouses in 1933, and to Pensacola Lighthouse in 1938. In 1933, two new iron Punta Rassa Range Lights were built in San Carlos Bay, and the iron-skeleton Tennessee Reef Light replaced a lighted buoy. An unattended light, the Pulaski Shoal Light was completed in 1936 at a cost of nearly fifteen thousand dollars, and two range lights were installed on Mullet Key Shoal in Tampa Bay. A seventy-thousand-dollar buoy depot was built at Fort Pierce in 1938, and Port Everglades was marked by small range lights and channel markers. Permanent wrought-iron beacons were installed in the Florida Reefs at Big Pine Shoal, Coffin Patches, Dixie Shoal, Elbow Reef, and Pelican Shoal.[144]

Public Works Administration (PWA) implemented by the Roosevelt administration, furnished some of the funding for these projects. In 1939, the PWA provided funding that improved fifty-one minor lights along the St. Johns River, and installed three iron structures with lights in Charlotte Harbor. At Key West, the PWA made available funds to renovate buildings and wharves acquired from the Department of the Navy for use as a lighthouse depot.[145]

One of Florida's oldest internal improvement projects, the Intracoastal Waterway required additional aids-to-navigation during the Great Depression. Well into the twentieth century, inland navigation along Florida's east coast existed in a broken series of lagoons, haulovers, and inlets. In 1883, the Florida Coast Line Canal &

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[143]**Department of Commerce, *Twenty-fourth Annual Report of the Secretary of Commerce, 1936,* 115; Taylor, *Florida Lighthouse Trail,* 72.**

[144]**Department of Commerce, *Twenty-first Annual Report of the Secretary of Commerce for the Fiscal Year Ended June 30, 1935,* 103; Department of Commerce, *Twenty-third Annual Report of the Secretary of Commerce for the Fiscal Year Ended June 30, 1935,* 113; Taylor, *Florida Lighthouse Trail,* 130, 157; McCarthy and Trotter, *Florida Lighthouses,* 35.**

[145]**Department of Commerce, *Twenty-seventh Annual Report of the Secretary of Commerce, 1939,* 130-131.**

Transportation Company had initiated dredging operations. The Light-House Board began marking those channels as early as 1904. Construction was completed in 1912 with a resulting inland waterway extending three hundred sixty miles from the mouth of the St. Johns River to Biscayne Bay. But, maintenance was irregular, and some channels were safe to navigate only at high tide. Periodic examinations and surveys by the Corps of Engineers revealed significant channel deficiencies. In 1910, the canal company and Federal government opened negotiations to transfer maintenance of the waterway to the national government. As part of the agreement, the Florida Inland Navigation District (FIND) was organized in 1927 with authorization to purchase the waterway for the Federal government. Composed of commissioners from the state's eleven east coast counties, FIND issued bonds and transferred the rights-of-way to the Federal government in 1929.[146]

Florida's lighthouses standing along the Atlantic coast became important to seasonal visitors guiding recreational yachts and motor boats, commercial fishermen and shrimpers, and pilots navigating barges and other large craft along the state's inland waterways. Increased numbers of watercraft appeared during the Florida land boom of the 1920s and Great Depression. During World War I, nearly twenty thousand dollars of commercial goods were transported along the North River section of the waterway in St. Johns County, and in 1922 over fifteen hundred vessels plied that section of the route. Nearly one-half were freight and passenger boats, but pleasure yachts and launches accounted for nearly five hundred additional craft.[147]

Improvements to the channels, harbors, and inlets at Daytona Beach, Fort Lauderdale, Fort Pierce, Jacksonville, Miami, Port Everglades, St. Augustine, Stuart, Vero Beach, West Palm Beach, and various other locations encouraged wealthy tourists to visit the state by yacht. In the 1930s, pleasure craft began to dominate the waterway. Indicative of new growth at Palm Valley in St. Johns County and the emergent pleasure craft culture, developers opened subdivisions along the Intracoastal Waterway, a process repeated in countless sites along the east coast. By 1936, approximately thirty-six hundred vessels with drafts between three and ten feet plied the waterway between Fernandina and Savannah. Small yachts, sailboats, and motorboats accounted for nearly seventeen hundred of those watercraft. Commercial activities included large exports of paper products and shrimp at Fernandina, importing petroleum products at Port Everglades, and transporting fish products from countless sites. Lighthouses served as important navigational beacons for the both seasonal visitors, who embarked on annual pilgrimages to Florida, and commercial interests who depended upon a well-marked inland waterway.[148]

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[146]Junius Dovell, *Florida: Dramatic, Historic, Contemporary,* 4 vols., (New York: Lewis Historical Publishing Company, 1952), 2: 786-788; House, *Florida East Coast Canal,* 65th Cong., 2d Sess., Doc. No. 1147, p. 1-21; House, *Intracoastal Waterway From Jacksonville, Fla. to Miami, Fla., 1926,* 69th Cong., 2d Sess., Doc. 586, p. 1-91.

[147]House, *Florida East Coast Canal,* 65th Cong., 2d Sess., Doc. No. 1147, p. 1-21; House, *Intracoastal Waterway From Jacksonville, Fla. to Miami, Fla., 1926,* 69th Cong., 2d Sess., Doc. 586, p. 1-91.

[148]House, *Cape Fear River, N. C., to St. Johns River, Fla., Intracoastal Waterway,* 75th Cong., 3d Sess., Document No. 618, p. 20; House, *Intracoastal Waterway between Charleston, S. C., and St. Johns River, Fla.,* 77th Cong., 1st Sess., Document No. 114, p. 3, 6; House, *Intracoastal Waterway from Jacksonville, Fla. to Miami, Fla., 1926,* 69th Cong., 2d Sess., Doc. 586, p. 17, 91.

Emptying into the Atlantic Ocean at Stuart, north of the Jupiter Inlet Lighthouse, and into the Gulf of Mexico near Sanibel Island Lighthouse, the Okeechobee Waterway became an important cross-state shipping channel, via the St. Lucie River, Lake Okeechobee, and the Caloosahatchee River. In 1937, the boundary between the sixth and seventh lighthouse districts was moved north to St. Lucie Inlet, Florida. The adjustment placed the Okeechobee Waterway, which extended between Stuart and Fort Myers, entirely within the seventh lighthouse district. Opened in 1915, the waterway was dramatically improved with channels and locks during the Great Depression. In the 1930s, as pleasure craft began to dominate the state's improved waterways, the Bureau of Lighthouses installed relatively minor, but important aids-to-navigation along the Okeechobee Waterway and its contributing rivers.[149]

A familiar theme played out throughout the nation, the Bureau of Lighthouses improved and installed navigational aids along most of the state's major waterways during the Great Depression. Most of the state's lighthouses were converted to electricity, and many smaller oil-burning harbor and river lights were converted to battery-powered electric lights. Most new minor channel lights and markers installed along waterways operated with electrical current or batteries. At Tampa Bay, the bureau changed its navigational aids between Hillsboro Bay and Tampa Bay in 1934, and then installed six iron structures with lights in 1939. The Crooked River Lighthouse increased in importance as the eastern terminus along the northern Gulf Coast's Intracoastal Waterway. After 1939, when the Lighthouse Service was reorganized, the U. S. Coast Guard persisted in the program of improving aids-to-navigation.[150]

During World War II, the Coast Guard converted some lighthouse grounds to quarter its military personnel, who patrolled beaches and watched for German submarines. Coast Guard personnel at Anclote Keys Lighthouse daily observed U. S. Army Air Corps' formations of B-17 Flying Fortresses, P-40, Warhawks, P-47 Thunderbolts, and P-51 Mustangs practicing their maneuvers, but saw little evidence of U-boats. Similarly, lighthouse keepers at Amelia Island, Boca Grande, Cape Canaveral, Egmont Key, Key West, Pensacola, Ponce DeLeon Inlet, St. Augustine, and Sanibel Island witnessed a substantial amount of military training exercises associated with air corps bases and naval air stations near those locations. Coast Guardsmen rescued hundreds of sailors who abandoned ships destroyed by German U-boats off Florida's coast. Most lighthouses were equipped with a launch to service supporting range and harbor lights. Not suited for search-and-rescue missions, launches were used by some keepers to assist sailors in distressed ships and those victimized by submarine attacks. Coast Guard recruits served as lookouts at Amelia Island, Dry Tortugas Lighthouse, and most of the state's other lighthouses, contributing to twenty-four-hour watches from the lantern gallery. The installation of

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[149]House, *Intracoastal Waterway From Jacksonville, Fla. to Miami, Fla., 1926,* 69th Cong., 2d Sess., Doc. 586, p. 17, 90-91; House, *Intracoastal Waterway, Jacksonville to Miami, Fla., 1957,* 85th Cong., 1st Sess., Doc. 222, p. 3; Dovell, *Florida,* 2: 786-788.

[150]Department of Commerce, *Twenty-first Annual Report of the Secretary of Commerce, 1933,* 103; Department of Commerce, *Twenty-second Annual Report of the Secretary of Commerce, 1934,* 112; Department of Commerce, *Twenty-third Annual Report of the Secretary of Commerce, 1935,* 113; Department of Commerce, *Twenty-seventh Annual Report of the Secretary of Commerce, 1939,* 127; Taylor, *Florida Lighthouse Trail,* 130.

short-wave radios at lighthouses made possible quick contact with area Coast Guard stations and military bases.[151]

In 1942, U-boats sank twenty-four merchant ships off Florida's Atlantic and Gulf coasts. Destruction of sixteen of those vessels occurred in Atlantic waters in the period of February and May 1942 between Cape Canaveral and Boca Raton. On 11 April 1942, Florida's Governor Spessard Holland signed legislation mandating black outs of all lights showing seaward in coastal and beach communities to help prevent silhouettes of ships at sea. A navigational necessity, lighthouses with their relatively brief flashes continued to operate without interruption during the war, although most operated with a reduced light intensity. To reduce the threat of U-boat attack, some Allied merchant ships in the Gulf of Mexico anchored in the deep harbors of Charlotte Harbor and St. Joseph's Bay at night. Despite the precautions, a U-boat sunk the *Empire Mica* near Cape San Blas in June 1942.[152]

Undoubtedly, the vistas afforded keepers and watch crews from Florida's lighthouses afforded them a view of some merchant vessels torpedoed by U-boats. In February 1942, commander Reinhard Hardegan of U-123 sailed past Fernandina, which he found as "brightly lit as a welcome station." Several days later, after skirting carefully around the St. Johns River Lightship, he destroyed the large tanker *Gulfamerican* off Jacksonville Beach, which Hardegan considered "A rare show for tourists." The watch crew at St. Johns River Lighthouse and perhaps at Amelia Island Lighthouse could see the grisly spectacle. After resting on the bottom near Ponce DeLeon Inlet, the U-boat skipper sailed the U-123 to Cape Canaveral, where he destroyed the *Leslie* and the *Empire Steel* within sight of Cape Canaveral Lighthouse. The U-504 torpedoed the *Pan Massachusetts* within sight of the Cape Canaveral Lighthouse, but the ship drifted southward, sinking in sight of Jupiter Inlet Lighthouse. Loaded with gasoline, ore, and wool, the *Lubroful* and *Ohioan* sank off Hillsboro Inlet in 1942. Later reports indicate the capture and sinking of U-boats within sight of Hillsboro Inlet Lighthouse. Anecdotal stories postulate that some U-boat crews rowed ashore to carouse and drink beer on the beach near Ft. Lauderdale. Several merchant ships sank near Hobe Sound and Jupiter Inlet. The keeper at Jupiter Inlet Lighthouse in Florida recovered the bodies of crewmembers from a torpedoed merchant vessel. The Coast Guard Cutter *Nike* reportedly sank a U-boat near the Jupiter Inlet Lighthouse in May 1942. The implementation of Beach Patrols and watches at lighthouses, Coast Guard patrol boats, and the mobilization of air fields, camps, and naval stations throughout Florida in 1942 went far to alleviate concerns of an invasion. In 1943, increased naval action and aircraft patrols from naval air stations and airfields helped drive the submarines from the Florida's coastline.[153]

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[151]Taylor, *Florida Lighthouse Trail,* 33, 109, 147; Mohlman, "Anclote Keys Lighthouse," 183.

[152]McCarthy and Trotter, *Florida Lighthouses,* 24, 31; Michael Gannon, *Operation Drumbeat: The Dramatic True Story of Germany's First U-Boat Attacks Along the American Coast in World War II* (New York: Harper & Row Publishers, 1990), 358-364; Taylor, *Florida Lighthouse Trail,* 33, 109, 147; Julius Furer, *Administration of the Navy Department in World War II* (Washington, D. C.: Naval History Division, 1959), 598-611; Malcolm Willoughby, *The U. S. Coast Guard in World War II* (New York: Arno Press, 1980); Gannon, *The New History of Florida,* 326-327; Eliot Kleinberg, *War in Paradise: Stories of World War II in Florida* (Melbourne: Florida Historical Society Press, 1999), 34.

[153]Gannon, *Operation Drumbeat,* 358-364; Kleinberg, *War in Paradise,* 27; Taylor, *Florida Lighthouse Trail,* 60.

One of Florida's early historic preservation success stories played out during the war. Discontinued since 1929, the St. Johns River Lighthouse at Mayport was integrated into Jacksonville Naval Station in 1941. The lighthouse was preserved from destruction, in part, by the quick and vocal action of residents who heard of its imminent destruction by the Navy. Still, the keeper's quarters, oil house, and other outbuildings were demolished before the preservation effort took hold.[154]

For a variety of reasons, the Federal government stopped common-carrier freight service on the Intracoastal Waterway during the war, a crippling blow to an industry in Florida that failed to resume following the conflict. Following the war, thousands of pleasure yachts annually sailed along the waterway. New projects to dredge the channel to twelve feet and widen it to one hundred twenty-five feet were unveiled. The Coast Guard responded to the increased traffic and improvements by installing larger, automated modern aids-to-navigation. Most were relatively small harbor and river lights and markers. But one significant new lighthouse was constructed near Jacksonville Beach. The fourth structure to stand near the mouth of the St. Johns River, the St. Johns Light Station was completed in 1954. A reinforced concrete structure with supporting flat-roof extensions, the lighthouse displayed a monolithic, octagonal profile rising sixty-four feet. The last manned lighthouse constructed in Florida, the lighthouse replace the St. Johns Lightship, which in turn had replaced the nineteenth-century St. Johns Lighthouse at Mayport.[155]

Increasingly, Florida's lighthouses became threatened as modern navigation systems and some ports experienced a decrease in commercial shipping. Some of Florida's lighthouses were discontinued, demolished, or sold, and automated lights on metal towers installed in their place; other lighthouses were automated with new lenses and infrastructure. Success stories have been recorded by several private organizations working in partnership with government and industry to save some of Florida's lighthouses. In 1967, the U. S. Coast Guard abandoned the Port Boca Grande Lighthouse, which the County of Lee acquired in 1972. The late-twentieth century history of the lighthouse provides a good model of a public-private partnership. Citizens of Gasparilla Island rallied to preserve the building, persuading Florida Power and Light Company to build rock berms around the foundations, listed it in the National Register (1980), secured grant funds for restoration from the Florida Department of State, and eventually made it a showpiece and museum in Gasparilla Island State Recreation Area. The fate of the rear range lighthouse about one mile to the north remains uncertain.[156]

Automated in 1957, the St. Marks Lighthouse had been afforded some protection in 1931 when it was included in the St. Marks National Wildlife Refuge, and then National Register listed in 1972. At Cape St. George, a local lighthouse society preserved the aging, tilting structure from toppling into the Gulf of Mexico. Concrete,

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[154]Taylor, *Florida Lighthouse Trail,* 33.

[155]Ibid., 36-37; DeWire, *Guide to Florida Lighthouses,* 21-22; McCarthy and Trotter, *Florida Lighthouses,* 17-19; House, *Reports of the Department of Commerce and Labor, 1904,* 58th Cong., 3d Sess., Document No. 412, p. 212-213; House, *Intracoastal Waterway From Jacksonville, Fla. to Miami, Fla., 1926,* 69th Cong., 2d Sess., Doc. 586, p. 17, 91; House, *Intracoastal Waterway, Jacksonville to Miami, Fla., 1957,* 85th Cong., 1st Sess., Doc. 222, p. 3, 7, 12; Dovell, *Florida,* 2: 786-788.

[156]Taylor, *Florida Lighthouse Trail,* 90, 106-109, 112, 147; Roberts and Jones, *Gulf Coast Lighthouses,* 36-37.

steel pilings, and vinyl sheets straightened and protected the lighthouse from future tidal erosion. At Pensacola, the Fort McCree Rear Range Light had washed away with the crumbling fort in the 1930s and the range light at Fort Barrancas soon disappeared. The Pensacola Lighthouse was automated in 1965, and plans began to demolish the keeper's dwelling. Historic preservationists rallied to save the building, which the navy presently occupies. The lighthouse remains a primary aid-to-navigation with the U. S. Coast Guard Auxiliary maintaining the structure. The Amelia Island Lighthouse shares a similar history with a historical society forming to preserve the structure. The present keeper traces her roots to the first keeper of the lighthouse, an extraordinary example of a Florida lighthouse with family lines extending between the nineteenth and twenty-first centuries.[157]

Museums supported by local historical and lighthouse associations have been built around lighthouses at Boca Grande, Cape Florida, Jupiter Inlet, Key West, and Ponce DeLeon Inlet. Those lighthouses have been National Register listed, in addition to the isolated reef lighthouses at Carysfort and Sand Key. But, others remain officially unrecognized, and are subject to deterioration and vandalism. With a few notable exceptions, such as the 1859 St. Johns River Lighthouse, most lighthouses that remain standing serve as important navigational aids. Dating between 1839 and 1927, these relatively scarce resources are reminders of the pivotal role of navigation and maritime history in the development of the state. Inherently valuable and worthy of preservation, the historic lighthouses of Florida represent increasingly endangered resources, picturesque images of the state's transportation heritage.

Concerns about the potential demise and lack of maintenance of the state's lighthouses prompted the formation of statewide and national organizations. Founded in 1996, the Florida Lighthouse Association was organized to promote the preservation of Florida's lighthouses, and encourage the research and publication of lighthouse histories. The Association and its members have published various books on lighthouses, established a website, and helped recognize, preserve, and develop museums at several lighthouse sites. Museums in various locations, including those at Boca Grande, Key West, Miami, Pensacola, Ponce Inlet, St. Augustine, and Sanibel, help showcase the state's lighthouses and maritime history. In 2001, the Florida Legislature authorized a study of the state's lighthouses, funded by the Florida Department of Community Affairs and the Florida Department of State. This Multiple Property Submission represents a partial fulfillment of the provisions of that legislation.

Florida's Lighthouse Keepers

In the same way that Florida lighthouses represent a broad range of ages and structural types, the keepers of Florida's lighthouses represented a cross-section of nationalities and longevity of service. Keepers operated Florida lighthouses at remote outposts and even suburban settings. Built in 1847 and one of few lighthouses standing within a municipal limit, the Key West Lighthouse permitted its keepers daily contact with the residents of Key West. Michael Mabrity, the first keeper, served on Key West's town council and also worked

[157]**Garner, *Pensacola Lighthouse,* 15; Taylor, *Florida Lighthouse Trail,* 156-159; John Grant and Ray Jones, *Legendary Lighthouses* (Old Saybrook: Globe Pequot Press, 1998), 161-169.**

as a harbor pilot. Standing approximately two miles from downtown Fernandina, the location of the Amelia Island Lighthouse also permitted its keeper frequent contact with other people, an activity also available to the keepers at the Pensacola, Ponce DeLeon Inlet, and St. Augustine lighthouses.[158]

In sharp contrast, the keepers at lighthouses along the Florida Reefs, the Dry Tortugas, and the state's barrier islands lived a relatively isolated existence with relatively few human contacts. The isolation often resulted in difficult familial and professional relationships. In 1859, at Dry Tortugas Lighthouse, keeper Benjamin Kerr's daughter fell in love with an assistant keeper. Kerr's wife approved of the relationship, but her husband strongly objected. A fight eventually ensued with Kerr battling his wife and the two assistant keepers with clubs, chairs, and knives. The brawl ended with Kerr fleeing with his daughter to Fort Jefferson. The Kerr's eventually separated with Mrs. Kerr moving to Key West, and the assistant keepers removed from their posts.[159]

Lighthouse work carried risks associated with the heights of the structures, flammable illuminants, and exposed positions to menacing storms. Joseph Andrew, the third keeper at St. Augustine Lighthouse, died in a fall from the tower in 1859. Assignments along the Florida Reefs and Keys were especially dangerous. Between 1897 and 1915, William Curry served as keeper at Alligator Reef, American Shoals, Sanibel Island, and Sombrero Key. In the latter year, Curry was transferred to Carysfort Reef Lighthouse, where he drowned in a hurricane in 1919. John Flaherty served as the first keeper of the Dry Tortugas Lighthouse (1826-1827), but was transferred to Sand Key Lighthouse, where he died in 1830. His widow, Rebecca Flaherty, was appointed keeper, a post she maintained until 1837, when she resigned. The Treasury Department replaced her with Captain Joshua Appleby, who remained at Sand Key Lighthouse until 1846, when he was killed by a hurricane that swept the lighthouse and accompanying buildings out to sea.[160]

Serving as keeper of the Key West Lighthouse between 1832 and 1862, Barbara Mabrity survived the hurricanes of 1835, 1841, 1842, and 1846. Her husband, Michael Mabrity, served as the first keeper between 1826 and 1832. Following his death, the Treasury Department assigned Barbara Mabrity as lighthouse's keeper. She narrowly escaped death during the 1846 hurricane by rushing out of the structure just before it collapsed inward showering down its bricks, glass, and debris. Mabrity kept the lights in the replacement lighthouse until 1862, when she was removed because of her Confederate sympathies. Key West Lighthouse was one of the few southern lighthouses to remain under Federal control during the Civil War.[161]

Unlike land-based lighthouses with their supporting keeper's dwellings and structures, the reef lighthouses seldom accommodated a keeper's family. At Sombrero Key Lighthouse, keepers struggled to adapt to living in close quarters with other men. James R. Walker began his career in 1895 as an assistant keeper at Carysfort Reef Lighthouse. In 1900, after several promotions, Walker was transferred to Rebecca Shoal Lighthouse. But,

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[158]Hurley, *Keepers of Florida Lighthouses,* 77.

[159]Taylor, *Florida Lighthouse Trail,* 98-99; Hurley, *Keepers of Florida Lighthouses,* 55, 74-75.

[160]Hurley, *Keepers of Florida Lighthouses,* 37, 51, 105, 117; Mary Clifford and J. Candace Clifford, *Women Who Kept the Lights: An Illustrated History of Female Lighthouse Keepers* Alexandria: Cypress Communications, 2000), 25-28.

[161]Clifford and Clifford, *Women Who Kept the Lights,* 29-31.

two years later, Walker fell into the Gulf of Mexico, an apparent suicide from his service at the remote stations.[162]

Most keepers were dedicated people who maintained a daily schedule of trimming wicks, cleaning and filling the Argand lamps with whale's oil, completing reports, lighting the lamps in the evening, ensuring their effectiveness in the early morning hours, extinguishing them at daybreak, and countless other tasks. The introduction of lard, kerosene, and then electricity as illuminants gradually decreased some of their tasks, especially trimming wicks and cleaning lenses and glass. But, keepers still had numerous tasks to complete using an assortment of implements, including brushes, chisels, drills, files, levels, hammers, scissors, scrapers, screw drivers, valve punches, and vises.[163]

One of the state's oldest lighthouses, the Amelia Island Lighthouse serves as a good example of turnover in keepers and the various backgrounds of Florida's lighthouse keepers. During the antebellum period, eight keepers maintained the lighthouse with lengths of service extending between one and seven years. Appointments were cut short, either by transfer to another lighthouse, death, discharge, or retirement. Amos Latham, the first keeper, had transferred from Cumberland Island, and maintained his watch at Amelia Island until his death in 1842. A native of Connecticut, Latham was a veteran of the Revolutionary War.[164]

Captain E. Richardson, who served between 1842 and 1849, replaced Latham. Richardson's replacement, George W. Walton, a native of North Carolina, was removed in 1854 for speaking out "in terms most intemperate and bitter" against President Franklin Pierce. Horace Vaughn, a native of Florida, served three years, resigning in 1857. His replacement James Woodland maintained the post until Florida seceded from the Union, and then became the C. S. A.'s keeper of the lighthouse until the lighting apparatus was confiscated by Confederate authorities and shipped to Madison, Florida, for safekeeping.[165]

During the 1870s, keepers continued to maintain relatively brief assignments. They included Henry Swain, a native of Norway who would also serve as keeper at the Cape San Blas (Florida) and Little Cumberland Island (Georgia) lighthouses. After six years of service, Mordecai Edward was removed for "insubordination and neglect of duty." A carpenter and farmer, Samuel Petty worked as keeper between 1878 and 1879, and was followed by William Adams and Joseph Howell, the latter a former teacher. Dewayne Suydam, a native of New York, served as assistant keeper between 1871 and 1873, and then keeper between 1880 and 1891, retiring because of failing health in the latter year.[166]

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[162]Hurley, *Keepers of Florida Lighthouses,* 36, 102.
[163]Ibid., ii-iv.
[164]Taylor, *Florida's Lighthouse Trail,* 23-24; *Fernandina Beach News-Leader,* 25 June 1999.
[165]Hurley, *Keepers of Florida Lighthouses,* 5; Taylor, *Florida's Territorial Lighthouses,* 249.
[166]Hurley, *Keepers of Florida Lighthouses,* 5-6.

The trend in longer tenures was sustained in the 1890s with Charles W. Grimm (1891-1906), who served as keeper during the Spanish-American War and the installation of a new Fresnel lens. A native of Germany, Grimm served in the U. S. Navy before entering the Lighthouse Service, but was transferred to Volusia Bar Lighthouse in 1906. His replacement, Thomas P. O'Hagan was born in Brooklyn, New York. The son of Irish immigrants, O'Hagan entered the service in 1880 as assistant keeper at the Fort Ripley Shoal Lighthouse in Charleston, South Carolina, and following several other assistant keeper positions, was promoted in 1887 to keeper of the Georgetown Lighthouse in South Carolina. Another transfer in 1893 placed him at Mosquito Inlet Lighthouse in Florida. He remained there until 1905, when he was transferred to Amelia Island, where he retired in 1925. Upon O'Hagan's retirement, the *Lighthouse Service Bulletin* noted his service as "meritorious and he was held in esteem by the officers in charge of the district." O'Hagan and his wife raised twelve children, three of whom became lighthouse keepers. One of those, Thomas J. O'Hagan, worked as assistant keeper at Amelia Island between 1912 and 1925, and then served as keeper between 1925 and 1954, the longest tenure of any of the Amelia Island keepers. By marriage, the O'Hagans were related to Amos Latham, the first keeper of the Amelia Island Lighthouse. In the period spanning 1839-1954, twenty-one keepers were assigned to the lighthouse, most with brief service terms, but one extending for twenty-nine years.[167]

[167]**Ibid., 6-7, 97; Bureau of Lighthouses, *Lighthouse Service Bulletin, 1924-1929* (Washington, D.C.: GPO, 1929), n.p.**

Florida's Historic Lighthouses[168]

NRHP Listed Lighthouses

Name	Type	Built/Rebuilt	NRHP Date	FMSF#
Amelia Island	Brick	1839	pending	NA134
Anclote Key	Skeletal	1887	1999	PI8566
Boca Grande	Screwpile	1890	1980	LL637a
Cape Florida	Brick	1825/1846	1970	DA153
Cape St. George	Brick	1852	1974	FR69
Carysfort	Screwpile	1852	1984	MO1980
Crooked River	Skeletal	1895	1978	FR72
Egmont Key	Brick	1848/1858	1978 in historic district	HI117a
Tortugas Harbor	Cast Iron	1876	1966 in Ft. Jefferson Ntl Mon	MO229
Hillsboro Inlet	Skeletal	1907	1979	BD179
Jupiter Inlet	Brick	1860	1973	PB65
Key West	Brick	1847	1971 in historic district	MO214a
Pensacola	Brick	1858	1974	ES104
Ponce DeLeon Inlet	Brick	1887	1972	VO186a
St. Augustine	Brick	1874	1981	SJ96
St. Johns River	Brick	1858	1976	DU296
St. Marks	Brick	1830/1842	1972	WA114
Sand Key	Screwpile	1853	1973	MO221
Sanibel	Skeletal	1884	1974	LL97a
Seahorse Key	Brick	1854	1988 in historic district	LV121

NRHP Eligible Lighthouses

Cape Canaveral	Cast-iron	1868		BR212
Alligator Reef	Screwpile	1873		MO1259
American Shoals	Screwpile	1880		MO1295

[168]The inventory is compiled from data obtained from the National Park Service's NRHP website and Taylor's *Florida Lighthouse Trail* (2001).

Recorded in FMSF Only

Cape San Blas	Skeletal	1885	GU25

Unrecorded Lighthouses

	Type	Built
Boca Grande Rear Entrance	Skeletal	c. 1888/1927 (relocated to Florida)
Dry Tortugas	Brick	1858
Fowey Rocks	Screwpile	1878
St. Johns Light Station	Reinforced concrete	1954[169]
St. Joseph's Point	undocumented	1902
Sombrero Key	Screwpile	1858

[169] **May become eligible in 2004.**

PROPERTY TYPE: F.1

1. Name of Property Type: Brick Lighthouses

2. Description: The historic brick lighthouses of Florida represent a small, but significant collection of historic resources. As defined by the Oxford English Dictionary, a lighthouse is "a tower or other structure, with a powerful light or lights at the top, erected at some important or dangerous point on or near the sea-coast for the guidance of mariners." Renowned author George Bernard Shaw could "think of no other edifice constructed by man as altruistic as a lighthouse. They were built only to serve. They weren't built for any other purpose..." According to lighthouse historian F. Ross Holland, Jr., "A lighthouse has one main function: to provide a platform for a light by which mariners can navigate." Broadly speaking, lighthouses can be divided into two categories: on-shore, or land-based structures, and off-shore, or wave-swept structures. All of Florida's brick lighthouses are on-shore structures.[1]

Typically having a round profile in an exposed location, brick lighthouse design generates relatively little wind resistance at sites where hurricanes and heavy storms often damage buildings with flat exterior walls. Height plays a critical role in lighthouse design. Most sites in Florida and along the Atlantic seaboard are relatively low, or flat settings, where a lighthouse requires sufficient elevation to warn mariners of their approach to land and shoals.[2]

According to data compiled from the Florida Master Site File (FMSF), approximately twenty-five lighthouses have been inventoried in Florida, and nineteen of those have been either listed in the National Register of Historic Places (NRHP) individually, or contribute to NRHP historic districts. Three additional structures have been determined eligible by the State Historic Preservation Office (SHPO), and one NRHP nomination was prepared in conjunction with this Multiple Property Submission (MPS) project. Various primary and secondary sources indicate that approximately thirty lighthouses remain standing in Florida. Thirteen brick lighthouses have been recorded in the FMSF, five of which are Florida's oldest lighthouses. Popular subtypes applied to brick lighthouses include short brick, tall brick, and tapered brick, but each of the subtypes falls within a broad classification of conical brick lighthouses. All of Florida's brick lighthouses fit within this classification.

Brick lighthouses are comprised of two discreet parts: a brick tower and a metal lantern. Materials used in the construction or embellishment of the towers included brick, concrete, granite, iron, limestone, soapstone, and

[1]**Diane Maddex, ed., *Built in the U. S. A.: American Buildings from Airports to Zoos* (Washington, D. C.: Preservation Press, 1985), 112-113; Rhein, *Anatomy of a Lighthouse,* 4.**

[2]**Maddex, *Built in the U. S. A.,* 112-113.**

stucco. At least one Florida lighthouse has coquina, a rock comprised of marine shell and coral fragments. Historically, the height of brick lighthouses ranged from thirty feet to one hundred sixty-seven feet. In some cases, embellishment in the form of brick corbels and decorative iron brackets supporting the gallery around the lantern were introduced at a later period when an addition increased the height of a structure, or a modern replacement lantern room augmented the power of the light. Most brick lighthouses were supported by various buildings and structures, including a cistern, docks, fences, a garage, keeper's dwellings, an oil house, privies, sheds, and a water tower and tank.

Brick lighthouses were typically designed and assembled by architects, engineers, and builders who drew upon traditional building techniques for their inspiration. Primary consideration was given to providing a functional masonry tower designed to support rotation and lantern rooms at the summit fabricated with iron and glass. Generally protected by a bronze or copper roof, the lantern room is enclosed with metal muntins and glass panels to protect the lens, the heart of a lighthouse. Mounted beneath the lantern, the rotation room contains the mechanical or electrical assembly required to turn the lens.

Most brick towers developed in America between 1820 and 1852 were designed and assembled by New England contractors who used traditional knowledge and skills acquired during apprenticeships. Developed in the eighteenth century, brick lighthouses in New England often served as models for those structures built elsewhere in the early nineteenth century. Simple conical structures with tapered exterior and interior walls, these lighthouses were devoid of ornamentation. According to Winslow Lewis, a prominent Boston lighthouse builder, all of Florida's early brick lighthouses were assembled by New England contractors.

Florida's first period in the construction of brick lighthouses, the era spanning the years between 1820 and 1852 coincides with the supervision of the nation's lighthouses by the fifth auditor's office of the Department of the Treasury. Headed by Stephen Pleasonton, the office adopted four classes of lighthouses, predicated upon height rather than materials. The largest, or first, class consisted of a tower that rose sixty-five feet in height; the second class stood fifty feet high; the third class forty feet high; and the fourth class thirty feet high. Regardless of their height, the vast majority of lighthouses built under the Pleasonton administration consisted of conical towers of brick, fieldstone, granite, or a combination of these and other masonry materials. In Florida, all of the extant and demolished brick lighthouses from this early era displayed a strikingly similar appearance with an iron lantern room mounted on a brick tower supported by a brick-and-stone foundation.

In the 1850s, the supervision of lighthouse development by the Light-House Board and the advent of screwpile technology for lighthouses began to eclipse the dominant use of brick for Florida's lighthouses. This trend incorporated professionally trained engineers and architects. Still, some notable brick structures were built in the closing decade of the Antebellum period, including those at Dry Tortugas, Egmont Key, Jupiter Inlet, St. Johns River, and Seahorse Key. But, only two brick towers--Mosquito Inlet and St. Augustine--were assembled in Florida during Reconstruction and the late-nineteenth century.

Many of Florida's brick lighthouses are assembled using hollow voids, or cavities, between the exterior and interior walls. These wall systems were often discovered by a curious keeper, during an extension of a tower, or as part of a program of improvements and renovations to the tower's infrastructure. As early as 1861, the Light-House Board compiled standardized specifications for brick lighthouses. It directed that the shape of the tower assume the "frustrum of a cone"with two shells of brickwork. The inner shell was to have a cylindrical form, connected to the outer with six radial walls. This use of separate walls continued a long tradition of lighthouse construction used as early as the 1820s, and became a point of contention between New England contractors, the Blunt brothers of New York, and the fifth auditor's office of the Department of the Treasury.

Architects and engineers responsible for the design and construction of some of Florida's brick lighthouses fabricated between 1852 and 1887, the date of Florida's most recent brick lighthouse, included George Meade, Paul Pelz, and Francis Hopkinson Smith. In most cases, architects and engineers serving in the U. S. Army Corps of Engineers prepared, or at least reviewed, the plans. As part of the reorganization of the Lighthouse Service from the fifth auditor's office to the Light-House Board, an engineer from the U. S. Army Corps of Engineers was assigned to each lighthouse district. Trained engineers, officers developed the plans for lighthouses, often adapting existing drawings of earlier structures for a proposed structure. In some cases, they reviewed and, if necessary, refined the plans from an architect or engineer in private practice for a specific site.

Even the tall brick lighthouses of the post-Civil War era generally have little ornamentation. Distinctive architectural elements are limited to restrained classical details embellishing entrance ways and window hoods, flared or corbeled cornices at the juncture of the brick tower and metal lantern room, and simple corbel relief lines midway up a tower.

Fenestration often consists of double-hung sash or casement windows with multiple light patterns. Distinctive round casement windows punctuate the walls of some towers. Most windows are set flush with the exterior walls, which creates a deep inset, or tunnel, on the interior wall. On other lighthouses, windows are deeply inset within projecting window casings, providing depth and relief along the walls of a tower. Fenestration patterns appear in vertical arrangements, ninety-degree offsets, and semi-random alignments, but always maintain a consistent relationship with the interior staircase. A distinctive feature, circular staircases were often fashioned with wood in the 1820s and 1830s, but at least one was assembled with granite treads-and-risers. By the 1850s, most staircases were cast wrought-iron. The circular or winding staircases have various characteristics, including being built directly into the interior walls, or secured to the interior walls with metal brackets and winding around a central metal column. Landings are a part of some staircases; others are continuous.

Most of the state's oldest brick towers were upgraded from Argand lights to Fresnel lenses in the 1850s; new lantern and rotation rooms were often installed as part of the improvement. In some cases, several generations of lantern rooms and Fresnel lenses were installed at the top of a brick lighthouse. Various manufacturers,

including Barbier & Fenestre; Barbier & Benard; Barbier, Benard & Turenne; Henry-LePaute; L. Sautter; and L. Sautter and Limonier, fabricated Fresnel lenses documented in Florida lighthouses.

The height of some brick towers was increased during the nineteenth century to help make them more visible at sea, or distinguish the light from electric street lamps and tall buildings dotting the surrounding landscape. Built in 1825, the Cape Florida Lighthouse was rebuilt in 1846, extending it from sixty-five feet to ninety-five feet in height. The Key West Lighthouse was extended in 1894 and a new lantern installed to make it more visible from the adjacent collection of new buildings and vegetation. Only a few towers retained their original brick exteriors after the 1890s. Soon after construction, most brick lighthouses required a layer of protective stucco due to their exposed location in a harsh ocean environment. Some structures have both stucco and brick exteriors, such as the Key West Lighthouse. These contrasting exterior fabrics often indicate the extent of the original height and a later extension. A few towers are painted white or red, or display their original red bricks. Distinctive paint schemes applied to the exterior walls generally consist of black-and-white patterns, such as bands, spirals, and divided fields, which became familiar daymarks for mariners.

Several books document the relocation of brick lighthouses. Still, most of Florida's remaining brick lighthouses stand at their original sites. Built in 1820 and moved in 1839, the state's oldest lighthouse, at Amelia Island, originally stood on Cumberland Island, Georgia. Other types of lighthouses, such as the cast iron, brick-lined Cape Canaveral Lighthouse, was relocated one mile west of its original site in the 1890s. Assembled first in Delaware Bay in the 1880s, the skeletal Boca Grande Entrance Rear Range Lighthouse was moved to Florida in the 1920s. In most cases, a relocated brick lighthouse incorporated much of the original fabric from the earlier location, supplemented with additional bricks to replace broken materials. Moved lighthouses may have incorporated a new rotation and/or lantern room. Important early studies of brick lighthouses include *Lighthouse Construction and Illumination* (1881) by Thomas Stevenson, a civil engineer, and *The Modern Light-House Service* (1890) by Arnold Johnson, chief clerk of the Light-House Board.

3. Significance: The historic brick lighthouses of Florida possess potential significance in the areas of architecture, commerce, engineering, exploration/settlement, invention, maritime history, military, politics/government, and transportation under NRHP Criteria A and C. Representing an important resource associated with exploration and early settlement patterns, lighthouses often rank among the oldest structures within a particular geographic region. They represent a distinctive type of architecture developed and maintained by the Federal government through its various agencies: fifth auditor's office, Light-House Board, Bureau of Lighthouses, and U. S. Coast Guard. Despite the administrative changes, Florida's brick lighthouses maintained a relatively standardized form of architecture that changed relatively little over time between the 1820s and the 1880s. Changes in appearance to brick lighthouses are attributed, in part, to a standardized form adopted by the fifth auditor's office between 1820 and 1852, and those designs produced by engineers with the U. S. Light-House Board between 1852 and 1887. The relatively simple masonry structures exhibit no formal architectural

influences. A distinctive type of architecture developed during a defined period of history, brick lighthouses employ an unusual method of construction intended for a specific purpose.

Contractors designed and assembled many of the earliest brick structures using standardized heights maintained by the fifth auditor's office. Officers in the U. S. Army's Corps of Engineers and assigned to the Light-House Board were responsible for later designs. Architects and engineers associated with these structures include George Meade and Paul Pelz, who served brief terms as lighthouse engineers, and Francis Hopkinson Smith, who had prepared the design of the pedestal for the Statue of Liberty, then maintained by the Light-House Board. Builders associated with the construction of Florida's brick lighthouses consisted of civilians and military officers, including Orville Babcock, Herbert Bamber, Benjamin Beal, George Benjamin, Elias Bourne, Edward Bowden, Duncan Cameron, James Gregory, Leonard Hammond, Noah Humphries, Calvin Knowlton, Timothy Knowlton, Winslow Lewis, Samuel Lincoln, J. C. Mallory, John Newton, Jared Smith, and Jairus Thayer.

Some brick lighthouses possess significance for their association with new inventions and technology, undergoing adaptation from the antiquated Lewis system to the more efficient Fresnel lens. Other inventions include modern lanterns replacing older infrastructure and rotational devices. Some of the state's oldest lighthouses use several illuminants over a span of many decades, including whale's oil, lard, mineral oil, and electricity.

Lighthouses also possess significance for their association with an interrelated system of structures developed throughout the nation to provide safe navigation for commercial, military, and recreational boats and shipping along the coastline and waterways of the United States. Some of Florida's oldest brick lighthouses stood near the center of political debate between the fifth auditor's office and the Blunt brothers of New York City regarding the nation's lighthouse system. The controversy, in part, involved the condition of Florida's brick lighthouses, and is documented in the published records of the United States Senate and House of Representatives. Important beacons during times of peace and war, many brick lighthouses were raided by Confederate authorities, who confiscated lenses to thwart Federal navigation along Florida's coastline. During World War II, Florida's lighthouses contributed to a system of watchposts established along the state's beaches.

4. Registration Requirements: For brick lighthouses to be eligible for nomination under the F.1 property type they must have been developed by the Federal government and served a historic lighthouse function in Florida. The majority of these resources will be eligible as individual resources, rather than contributing to a historic district. Nominations should be guided by NRHP Bulletin 34 *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Eligibility for individual lighthouses is restricted to (1) exceptional examples of a type of architecture; (2) structures that contribute to a specific historic program or mission to improve the nation's system of navigational aids; or (3) lighthouses associated with important historical events. Guidelines for gauging the eligibility of resources should include the Secretary of the Interior's *Standards for*

Rehabilitation, codified in 36 CFR 67; NRHP Bulletin 15, *How to Apply the National Register Criteria for Evaluation;* and NRHP Bulletin 34, *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Structures must retain their original appearance to a high degree. The removal of a Fresnel lens does not necessarily make a lighthouse ineligible, but the removal of an entire lantern outside the historic period may jeopardize its eligibility. Alterations sensitive to the original design and appearance of a lighthouse will not necessarily preclude its eligibility. Such additions generally include installation of replacement doors and new windows that do not alter the original glazing pattern and depth of reveal. A lighthouse that has been altered by significant additions that interrupt the walls of the structure, exhibit materials inconsistent with the historic period in which it was constructed, or the removal of significant architectural details is excluded from eligibility. Lighthouses that have been moved, in accordance with criterion consideration B, should retain a strong physical relationship at their new site with maritime history, sufficient historic features to convey their architectural presence, and retain integrity of design, materials, workmanship, feeling, and association to a high degree.

PROPERTY TYPE: F.2

1. Name of Property Type: Screwpile Lighthouses

2. Description: The historic screwpile lighthouses of Florida represent a small but meaningful property type. The term "screwpile" refers to helicoidal, or screw-like, flanges or blades of iron attached to an iron beam and driven into the soil or rock. Invented and patented by Irish engineer Alexander Mitchell in the 1830s, the screwpile foundation system made possible the construction of lighthouses at wave-swept sites and at locations with soft soils or prone to erosion at far less cost than conventional straight-pile construction, such as brick technology. Florida's screwpile lighthouses are represented by two subtypes: (1) a conventional wood-frame house surmounted by a light and mounted upon an iron screwpile foundation system; and (2) iron skeletal screwpile systems. A few screwpile lighthouses were installed at Florida sites in the decade preceding the Civil War, but most resources were developed by the Light-House Board following the conflict. During the era, the board adopted a policy of replacing lightships with screwpile lighthouses.

According to data compiled from the FMSF, approximately twenty-five lighthouses have been inventoried in Florida, and nineteen of those have been either listed in the NRHP individually, or contribute to NRHP historic districts. Three additional structures have been determined eligible by the SHPO, and one NRHP nomination was prepared in conjunction with this MPS project. Various primary and secondary sources indicate that approximately thirty lighthouses remain standing in Florida, seven of which are screwpile structures. Five screwpile lighthouses have been recorded in the FMSF.

The traditional screwpile lighthouse is built on a rectangular or octagonal plan with wrought-iron screwpiles driven into the soil or rock. From the foundation piles, vertical iron members supported by tension rods and

braces extend well above the water level. A wood-frame keeper's house is mounted upon the framework. Hip or gable roofs pierced by a central light tower and gallery are distinctive features of the structures. Other important characteristics include porches and verandas incised within the primary roof, clapboards or drop siding exterior wall fabric, and double-hung sash windows with multiple light patterns.

A specialized structure employed in the Florida Reefs and sites along the Gulf of Mexico, the wrought-iron or steel skeletal screwpile lighthouse is supported by large iron footplates diffused over large areas through which diskpiles are driven deep into the sand or coral. Some designs, such as Sombrero Key Lighthouse, employ cast-iron disks eight feet in diameter driven ten feet into the coral rock. Most are built with a wrought-iron framework of horizontal girders and diagonal tension rods assembled in an overall octagonal design. Keeper's quarters and storage facilities are integrated into the design midway up the skeletal framework. A series of ladders and straight stairs provide access from the water level. Above the keeper's quarters a cylindrical tower fabricated with iron protects a circular staircase that leads to a watch room, rotation room, gallery, and lantern. The Carysfort Lighthouse, completed between 1848 and 1852, served as a model for wave-swept screwpile lighthouses elsewhere along the Florida Reefs and the Gulf of Mexico. Later, in 1873, a leading authority on lighthouses considered the Alligator Reef Lighthouse "one of the finest iron sea-swept lighthouse structures in the world." As late as the 1930s, the Bureau of Lighthouses employed iron skeletal screwpile systems for relatively short (fifty feet) shoal lights in the Florida Keys.[3]

Engineers and fabricators associated with the design and construction of this sub-type of Florida's screwpile lighthouses consist of civilians and military officers, including I. W. P. Lewis; George Meade; I. P. Morris Company of Philadelphia; Paulding Kemble of Cold Spring, New York; Phoenix Iron Company of New Jersey; Pusey, Jones & Company of Wilmington, Delaware; and John F. Riley Iron Works of Charleston, South Carolina.

3. Significance: The historic screwpile lighthouses of Florida possess potential significance in the areas of architecture, commerce, engineering, exploration/settlement, invention, maritime history, military, politics/government, and transportation under NRHP Criteria A and C. Representing an important resource associated with exploration and early settlement patterns, lighthouses often rank among the oldest structures within a particular geographic region. They represent a distinctive type of architecture developed by the Federal government through the Light-House Board and the Bureau of Lighthouses. Screwpile lighthouses represent a standardized form of architecture that changed relatively little over time between the 1850s and the 1930s. The relatively simple wood-frame and metal structures exhibit no formal architectural influences. Distinctive types of architecture developed during a defined period of history, they employ an unusual method of construction intended for a specific purpose. Officers in the U. S. Army's Corps of Engineers assigned to the Light-House

[3]**Putnam, *Lighthouses and Lightships*, 110-113; Weiss, *Lighthouse Service*, 19.**

Board adapted designs developed in England for use in the United States. The resources also possess significance for their association to an interrelated system of lighthouses developed throughout the nation to provide safe navigation for commercial, military, and recreational boats and shipping along its coastline. Some of Florida's lighthouses played an important role in the use of new inventions and applications, such as screwpile technology and Fresnel lenses. In addition, Florida's lighthouses stood near the center of political debate between the fifth auditor's office and the Blunt brothers of New York City regarding the state of the nation's lighthouses. Some of the controversy involved the use of new technology, such as the Fresnel lens and screwpile construction, a creative method for installing permanent lighthouses in the Florida Reefs. Important beacons during times of peace and war, the screwpile lighthouses along the Florida Reefs remained lighted during the Civil War, an exception in the Confederate States of America, where the government extinguished most lighthouses. During World War II, Florida's lighthouses contributed to a system of watchposts established along the state's beaches.

4. Registration Requirements: For screwpile lighthouses to be eligible for nomination under the F.2 property type they must have served a historic lighthouse function in Florida. Nominations should be guided by NRHP Bulletin 34 *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Eligibility for individual lighthouses is restricted to (1) exceptional examples of a type, period, or method of construction; (2) structures that contribute to a specific historic program or mission to improve the nation's navigational aids; or (3) are associated with important historical events.

Guidelines for gauging the eligibility of lighthouses should include the Secretary of the Interior's *Standards for Rehabilitation,* codified in 36 CFR 67; NRHP Bulletin 15, *How to Apply the National Register Criteria for Evaluation;* and NRHP Bulletin 34, *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Structures must retain their original appearance to a high degree. The removal of a Fresnel lens does not necessarily make a lighthouse ineligible, but the removal of an entire lantern outside the historic period may jeopardize its eligibility. Alterations sensitive to the original design and appearance of a lighthouse will not necessarily preclude its eligibility. Such additions generally include installation of replacement doors and new windows that do not alter the original glazing pattern and depth of reveal. A lighthouse that has been altered by significant additions that interrupt the walls or structural system of the structure, exhibit materials inconsistent with the historic period in which it was constructed, or the removal of significant architectural details is excluded from eligibility. Lighthouses that have been moved, in accordance with criterion consideration B, should retain a strong physical relationship at their new site with maritime history, sufficient historic features to convey their architectural presence, and retain integrity of design, materials, workmanship, feeling, and association to a high degree.

PROPERTY TYPE: F.3

1. Name of Property Type: Iron and Steel Skeletal Lighthouses

2. Description: The historic iron and steel skeletal lighthouses, a discreet type of on-shore lighthouse structure, represent a small but meaningful property type. According to data compiled from the FMSF, approximately twenty-five lighthouses have been inventoried in Florida, and nineteen of those have been either listed in the NRHP individually, or contribute to NRHP historic districts. Three additional structures have been determined eligible by the SHPO, and one NRHP nomination was prepared in conjunction with this MPS project. Various primary and secondary sources indicate that approximately thirty lighthouses remain standing in Florida. Five skeletal lighthouses have been recorded in the FMSF.

Primarily cast and assembled in the latter half of the nineteenth century and the opening decade of the twentieth century, skeletal lighthouses are generally employed on land where soils are inadequate to support a masonry foundation. The skeletal design permitted engineers to relatively easily relocate the lighthouse in the event of tidal erosion. In addition, the skeletal profile offered less resistance than a brick tower to hurricane-force winds. Skeletal lighthouses consist of a lantern and rotation room mounted above a central vertical cylinder encasing a stairway. The lantern and cylinder are supported by four to eight tapered skeletal columns connected by diagonal tension braces. Several windows generally punctuate the central cylinder, often filled with double-hung sashes set in an arched casing with a classical hood molded in iron or steel. Skeletal lighthouses typically rest on a foundation system of concrete pads, or, in some cases, a large concrete caisson sunk deep into the ground.

The tapered-leg-and-diagonal-brace system used in the design of skeletal lighthouses was available in sectional heights ranging between ten and forty feet, facilitating the ordering of segments to assemble a tower to a specified overall height. The skeletal form gained popularity with the Light-House Board, in part, because of its relatively inexpensive cost, standardized components, and relatively short construction timetables. Most skeletal lighthouses were supported by various buildings and structures, including a cistern, docks, fences, a garage, keeper's dwellings, an oil house, privies, sheds, and a water tower and tank.

3. Significance: The historic iron and steel skeletal lighthouses of Florida possess potential significance in the areas of architecture, commerce, engineering, exploration/settlement, invention, maritime history, military, politics/government, and transportation under NRHP Criteria A and C. Representing an important resource associated with exploration and early settlement patterns, lighthouses often rank among the oldest structures within a particular geographic region. They represent a distinctive type of architecture developed by the Federal government through its Light-House Board and Bureau of Lighthouses. Skeletal lighthouses in Florida represent a standardized form of architecture that changed relatively little between the 1880s and the 1920s. The relatively simple metal structures exhibit no formal architectural influences. A distinctive type of architecture developed during a defined period of history, the lighthouses display an unusual method of construction intended for a

specific purpose. Officers in the U. S. Army's Corps of Engineers assigned to the Light-House Board were responsible for establishing the standardized plans. Fabricators and contractors associated with Florida's skeletal lighthouses include Colwell Iron Works of New York City; J. H. Gardiner of New Orleans; Phoenix Iron Works of New Jersey; and Russell Wheel & Foundry of Detroit.

A relatively new technology in the late-nineteenth century, skeletal lighthouses possess historical significance for their association with Florida's role contributing to an interrelated system of lighthouses developed throughout the nation to provide safe navigation for commercial, military, and recreational boats and shipping along its coastline. Most of Florida's skeletal lighthouses appear along the Gulf coast. Some were installed at exposed sites, such as Cape San Blas, where hurricanes and heavy storms had destroyed several generations of older brick lighthouses. During World War II, Florida's lighthouses contributed to a system of watchposts established along the state's beaches.

4. Registration Requirements: For iron and steel skeletal lighthouses to be eligible for nomination under the F.3 property type they must have served a historic lighthouse function in Florida. The majority of these resources will be eligible as individual resources, rather than contributing to a historic district. Nominations should be guided by NRHP Bulletin 34 *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Eligibility for individual lighthouses is restricted to (1) exceptional examples of a type, period, or method of construction; (2) structures that contribute to a specific historic program or mission to improve the nation's navigational aids; or (3) are associated with important historical events.

Because the Light-House Board developed these lighthouses, in part, because of their relative ease for dismantling and reassembly at another site, examples of moved skeletal lighthouses should be given careful consideration. The period of significance of a moved lighthouse should begin with the date of installation at the present location. An original date of construction should be used if the structure was moved to a site adjacent to the original location, or protects the same body of water or passageway at which it was installed and still serves its originally intended function.

Guidelines for gauging the eligibility of lighthouses should include the Secretary of the Interior's *Standards for Rehabilitation,* codified in 36 CFR 67; NRHP Bulletin 15, *How to Apply the National Register Criteria for Evaluation;* and NRHP Bulletin 34, *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Structures must retain their original appearance to a high degree. The removal of a Fresnel lens does not necessarily make a lighthouse ineligible, but the removal of an entire lantern outside the historic period may jeopardize its eligibility. Alterations sensitive to the original design and appearance of a lighthouse will not necessarily preclude its eligibility. Such additions generally include installation of replacement doors, and new windows that do not alter the original glazing pattern and depth of reveal. A lighthouse that has been altered by significant additions that interrupt the walls of the structure, exhibit materials inconsistent with the historic

period in which it was constructed, or the removal of significant architectural details is excluded from eligibility.

PROPERTY TYPE: F.4

1. Name of Property Type: Supporting Buildings, Sites, and Structures

2. Description: The historic supporting buildings, sites, and structures associated with Florida's lighthouses include boat houses, cemeteries, cisterns, docks and piers, fences, garages, keeper's dwellings, oil houses, privies, sheds, and water towers and tanks. The resources contributing to the Florida's historic lighthouses represent a small, but significant collection of historic resources.

Keeper's dwellings are typically one, one-and-one-half, or two-story masonry, or wood-frame vernacular in construction. Often derived from standardized plans maintained by the Light-House Board, Bureau of Lighthouses, and U. S. Coast Guard, these dwellings are relatively simple houses fabricated without formal architectural influences and typically devoid of ornamentation. They have gable or hip roofs pierced by dormers and brick chimneys, brick walls or wood-frame wall systems finished with board-and-batten, clapboards, or drop siding, and double-hung sash windows with multiple light patterns. Most have porches or verandas incised within the primary roof system, or protected by hip or shed roofs. Because of characteristic low-lying terrain, most foundations raise a dwelling three to five feet above the ground using masonry piers infilled with lattice or a continuous system of bricks. Historically, keeper's dwelling ranged in physical location between twenty-five feet and nearly one hundred feet from a lighthouse.

Both masonry and wood-frame oil houses supported lighthouses. Many were demolished or deteriorated decades ago. Although some oil houses were attached to brick lighthouses, most of those built in Florida were assembled between 1888 and 1910 as freestanding structures. Designed to store mineral oil, a derivative of kerosene used as fuel for the lighthouse, oil houses often stood in close proximity to the primary structure. They generally had a rectangular plan, gable roof finished with standing seam metal panels, brick walls sometimes finished with stucco, and a central entrance that faced the lighthouse. Generally devoid of ornamentation, most oil houses did not contain windows, but a ventilator pierced the roof ridge.

Because of the relative isolation and lack of municipal services at most lighthouses, cisterns, and privies were maintained at lighthouses into the 1920s and 1930s, when electricity and other services appear. The relative isolation and associated large lighthouse reservation on which many lighthouses were built made possible at some sites the creation of small cemeteries for deceased keepers and some family members. The necessity of water collection compelled the construction of cisterns and water towers and tanks. Wood picket or metal wire fences often defined the limits of the lighthouse reservation, or property, with a second fence protecting the

lighthouse and keeper's dwelling. Boathouses, docks, and piers were important resources at lighthouses adjacent to waterways.

3. Significance: The historic supporting buildings, sites, and structures associated with Florida's lighthouses possess potential significance in the areas of architecture, commerce, exploration/settlement, and maritime history under NRHP Criteria A and C. They represent distinctive resources developed by the Federal government in support of the nation's lighthouse system. Early examples of keeper's dwellings and oil houses were simple vernacular buildings and structures assembled by contractors using specifications outlined in contracts. Later, the Light-House Board developed standardized plans for oil houses, and a variety of plans for keeper's dwellings. Numerous examples of the establishment and installation of cisterns, boathouses, docks and piers, fencing, and water tanks appear in annual reports of the Light-House Board and Bureau of Lighthouses, indicative of the careful review and planning process by keeper's, superintendents, and the board regarding the buildings and structures necessary to support a lighthouse.

4. Registration Requirements: For the supporting buildings, sites, and structures to be considered contributing as part of a nomination of a under the F.4 property type they must have contributed to a historic lighthouse function in Florida. Nominations should be guided by NRHP Bulletin 34 *Guidelines for Evaluating and Documenting Historic Aids to Navigation.* Other guides suitable for gauging the eligibility of these resources should include the Secretary of the Interior's *Standards for Rehabilitation,* codified in 36 CFR 67, and NRHP Bulletin 15, *How to Apply the National Register Criteria for Evaluation.* Contributing resources should retain their historical features to a high degree. Other important considerations include the historic site plan and circulation patterns between these resources and a lighthouse. Alterations sensitive to the original design and appearance of buildings and structures will not preclude their inclusion as eligible resources. Such additions are relatively small and generally appear on the rear of a resource. But, the addition of small bays or oriels, porte cocheres, and dormers that contribute to the character of a dwelling and do not disrupt the original rhythm and styling are acceptable. Asbestos shingles installed over the original exterior siding during the historic period do not preclude a property from eligibility. Enclosing porches in a manner that results in a diminution or loss of historic character, such as using solid materials--wood, stucco, or masonry--will exclude a building from eligibility. Replacement windows should reflect the original fenestration and display original glazing patterns. A building or structure that has been altered by significant additions, exhibits materials inconsistent with the historic period in which it was constructed, or the removal of significant architectural details should be considered non-contributing.

GEOGRAPHICAL DATA

The geographical limits are lighthouses within the boundaries of the state line and coastal limits of the State of Florida.

SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

In 2001, Kenneth Smith Architects, Inc. of Jacksonville, Florida was awarded a contract with the Florida Department of State, Division of Historical Resources and the Department of Community of Affairs to conduct a study of the lighthouses of Florida to determine their potential uses, their conditions, the cost of their rehabilitation, and the preparation of nomination proposals necessary for the purposes of listing on the National Register of Historic Places (NRHP) all of those lighthouses which were unrecognized. As defined by the contract, the term "lighthouses" included all buildings associated with the lighthouse itself, such as keeper's quarters, oil storage buildings, and the like. Kenneth Smith Architects enlisted the services of historian Sidney Johnston of DeLand, Florida, to prepare the Multiple Property Submission (MPS) and a nomination proposal for the Amelia Island Lighthouse in Fernandina Beach, Florida.

The methodology used to prepare the MPS largely consisted of a literature search to determine the periods of development, emphasizing important activities, individuals, and significant themes in the construction of Florida's lighthouses and related facilities. The research and composing of property types and historical contexts for evaluating lighthouses constituted significant parts of the project. Various sources provided an important framework for the MPS document. NRHP nominations for lighthouses at Anclote Key, Boca Grande, Cape Florida, Cape St. George, Cape San Blas, Carysfort, Crooked River, Hillsboro Inlet, Jupiter Inlet, Pensacola, Ponce DeLeon Inlet, St. Augustine, St. Johns River, St. Marks, Sand Key, and Sanibel provided substantial contextual and site specific documentation. The Florida Master Site File (FMSF) maintains files on twenty-five lighthouses and several associated keeper's dwellings and shoal lights. Several lighthouses, including those at Cedar Keys, Egmont Key, and Key West, contribute to larger historic districts, and the Dry Tortugas Harbor Lighthouse is part of Fort Jefferson National Monument. Equally useful were congressional reports published in the U. S. House and Senate serial set, and annual reports prepared by Bureau of Lighthouses, the Department of Commerce, the Department of the Treasury, and the U. S. Light-House Board. In addition to these Federal documents, the National Archives and Records Administration (NARA) holds an extensive collection of architectural and textual resources for documenting Florida's lighthouses.

Several recently-published books about Florida lighthouses also supplied substantial research materials, including Taylor's *Florida Lighthouse Trail* (2001) and *Florida's Territorial Lighthouses* (1995), and McCarthy and Trotter's *Florida Lighthouses* (1990). Several articles in *Florida Historical Quarterly* describe Florida lighthouses. Websites maintained by the Florida Department of State, Division of Historical Resources, Florida Lighthouse Association, National Park Service, U. S. Coast Guard, and various lighthouse associations and museums contain useful information about specific resources. Research was also conducted at various repositories, including the Amelia Island Museum of History, Key West Lighthouse Museum, Ponce DeLeon Inlet Museum, Map & Imagery Library and P. K. Yonge Library of Florida History at the University of Florida in Gainesville, and the Florida State Archives and the State Library of Florida in Tallahassee. The research furnished sufficient information to prepare the narratives appearing in sections E and F of the MPS.

Following the collection of research, Florida's lighthouses were analyzed and evaluated for architectural themes and historic contexts. The methodology included determining the types of lighthouses and their associated outbuildings and structures, and assessing their particular significance. A period of development extending between 1823 and 1952 was selected to reflect the recorded history of Florida's lighthouse development and operations. The period allows for the inclusion of the various property types developed by the Federal government, important technological modifications made to lighthouses and changes in supporting buildings, and the role played by lighthouses in various eras of Florida's historical development. A MPS nomination was prepared using the necessary forms and text.

One nomination proposal for listing a lighthouse in the NRHP was prepared in partial fulfillment of the project. The necessary forms and text were drafted, and maps with associated photographs were prepared to provide reviewers with documentation and visual aids that convey a sense of the significance of the historic resource.

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