

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form*. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

1. Name of Property

Historic name: LIGHT VESSEL 71 Shipwreck
Other names/site number: LV 71, Diamond Shoal Lightship
Name of related multiple property listing:
N/A
(Enter "N/A" if property is not part of a multiple property listing)

2. Location

Street & number: Approximately 15 miles southeast of Cape Hatteras
City or town: Offshore State: NC County: Dare
Not For Publication: Vicinity:

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,
I hereby certify that this X nomination ___ request for determination of eligibility meets
the documentation standards for registering properties in the National Register of Historic
Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.
In my opinion, the property X meets ___ does not meet the National Register Criteria. I
recommend that this property be considered significant at the following
level(s) of significance:

X national ___ statewide ___ local
Applicable National Register Criteria:
X A ___ B X C X D

Kelby Kelly USCG FPO 5/8/15
Signature of certifying official/Title: Date
United States Coast Guard
State or Federal agency/bureau or Tribal Government

In my opinion, the property X meets ___ does not meet the National Register criteria.
Kevin Cherry 6/2/2015
Signature of commenting official: Date
North Carolina SHPO
Title: State or Federal agency/bureau or Tribal Government

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4. National Park Service Certification

I hereby certify that this property is:

- entered in the National Register
- determined eligible for the National Register
- determined not eligible for the National Register
- removed from the National Register
- other (explain:) _____

Signature of the Keeper

Date of Action

5. Classification

Ownership of Property

(Check as many boxes as apply.)

- Private:
- Public – Local
- Public – State
- Public – Federal

Category of Property

(Check only **one** box.)

- Building(s)
- District
- Site
- Structure
- Object

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Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
_____	_____	buildings
<u> 1 </u>	_____	sites
_____	_____	structures
_____	_____	objects
<u> 1 </u>	<u> 0 </u>	Total

Number of contributing resources previously listed in the National Register 0

6. Function or Use

Historic Functions

(Enter categories from instructions.)

TRANSPORTATION / water-related

Current Functions

(Enter categories from instructions.)

VACANT/NOT IN USE

7. Description

Architectural Classification

(Enter categories from instructions.)

N/A

Materials: (enter categories from instructions.)

Principal exterior materials of the property: Metal, wood

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Narrative Description

Summary Paragraph

*****Certain information in the nomination should be redacted under NHPA Section 304. The information to be withheld includes Section 10: Geographic Data and Figure 1 (location map).***

SUMMARY

The LIGHT VESSEL 71 Shipwreck is a sunken composite-hull, steam-powered lightship. It is located in approximately 200 feet of water some 15 miles southeast of Cape Hatteras in Dare County, North Carolina. The LIGHT VESSEL 71 (LV 71) was built by the Bath Iron Works of Maine for the U.S. Lighthouse Board and launched in 1897. It displaced 590 tons and was operated by the U.S. Lighthouse Board and its successor, the U.S. Lighthouse Service, as a Federal aid to navigation from 1898 to 1918. The lightship LV 71 was in service and anchored at the Diamond Shoal Station when it was attacked and sunk by the German submarine U-140 on 6 August 1918. The LV 71 is the only United States lightship sunk during World War I and is the only U.S. light vessel lost during the twentieth century as a result of enemy action. The LIGHT VESSEL 71 Shipwreck site includes the vessel's upright, articulated composite hull which is largely preserved from the keel to the main deck level. Its steam engine and boilers are also present on the site, along with a number of other features and artifacts such as its windlass, masts, and anchor. The LV 71 Shipwreck represents the only known existing example of a late nineteenth century lightship type that is characterized by a metal and wood composite hull and steam-power propulsion. This shipwreck is Federal government personal property administered by the U.S. Coast Guard. No disturbance to this sunken vessel or its associated artifacts is allowed without Coast Guard authorization.

Narrative Description

LIGHT VESSEL 71 (1897 to 1918)

The Bath Iron Works of Bath, Maine, launched the LIGHT VESSEL 71 (LV 71) on 28 December 1897. It measured 122 feet, 10 inches in length with a beam of 28 feet, 6 inches and a depth of hold of 13 feet, 6 inches (Flint 1989). The LV 71 displaced 590 tons and had a composite hull made of steel and wood, a steam engine that powered the vessel's single propeller, and two masts for mounting signal lanterns (see Photographs 1 and 2). Its standard cruising speed was 8.5 knots.

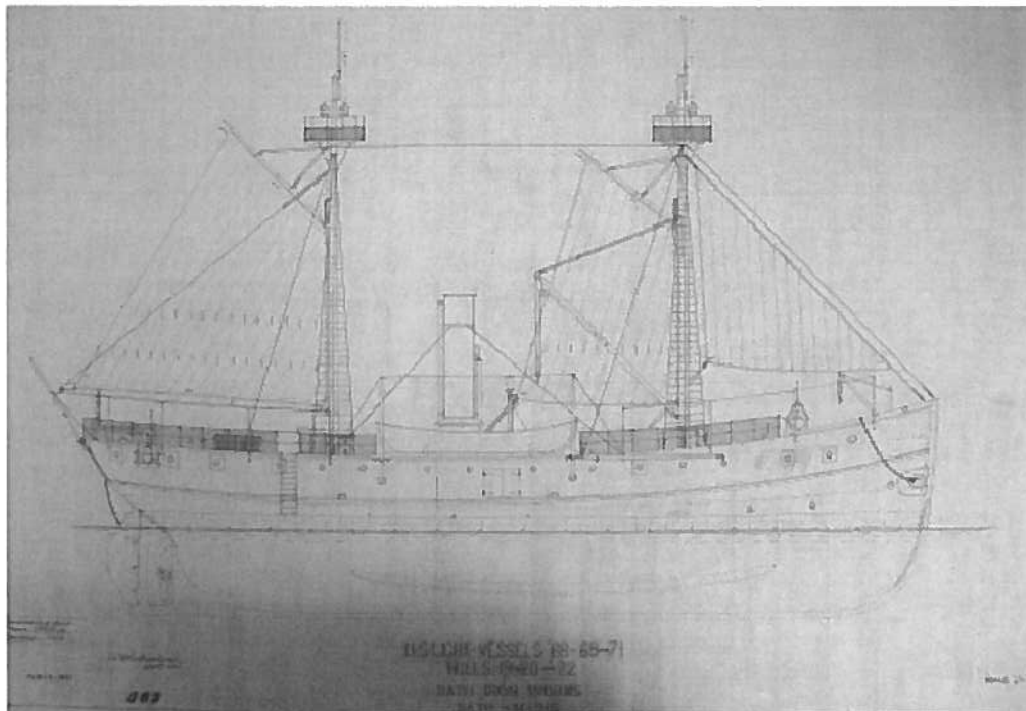
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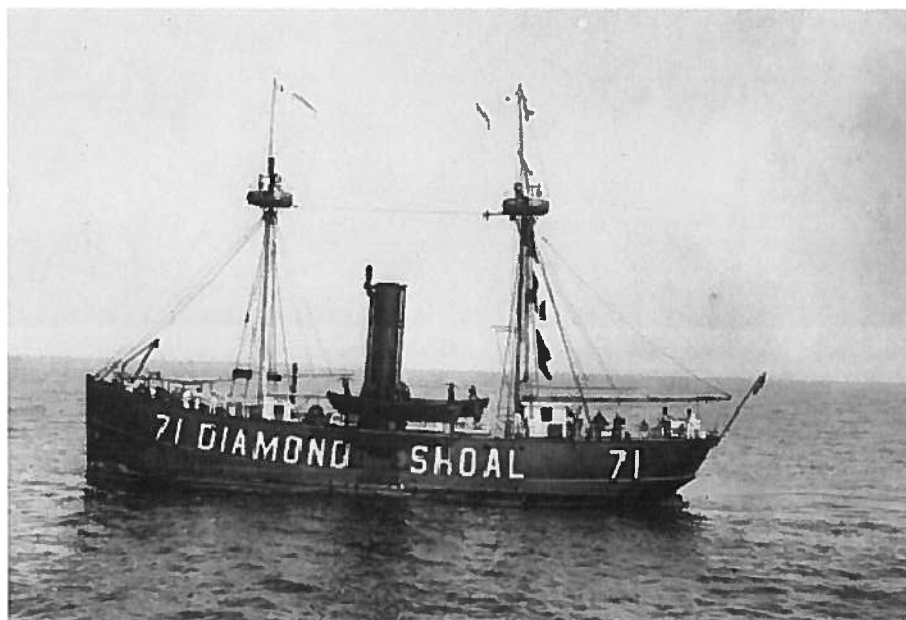
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Photograph 1. LIGHT VESSEL 71 profile design drawing by the Bath Iron Works, 1897



Photograph 2. LIGHT VESSEL 71
(NOAA Monitor National Marine Sanctuary collection, Newport News, VA)



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The LV 71 was built for the United States Lighthouse Board, predecessor to the U.S. Lighthouse Service. The Lighthouse Board entered into a contract with the Bath Iron Works on 18 September 1897 to build the LIGHT VESSEL 71, which the shipyard designated as Hull 22. The lightship was launched on 28 December 1897, 35 working days after its construction began. The LV 71 was delivered to the Lighthouse Board on 10 February 1898 (Snow 1987).

The LV 71 had two sister ships which had been built earlier by the Bath Iron Works. They were the LV 68 and LV 69. The Federal government's contract with the Bath Iron Works for building the LV 71 and a November 1897 *Marine Engineering* magazine article describing the LV 68 and LV 69 provide useful information regarding their characteristics. All three vessels had composite hull construction that was comprised of steel frames, steel topsides, and a bottom hull made of wood. This made them very strong structurally. The steel frames were made of 4.5-inch by 3-inch angle iron and were spaced at 18-inch intervals, measured from center to center. The floor plates were steel, and 3-inch by 3-inch steel bars extended up to the main deck and to the turn of the bilge. Additional stiffening support was provided by four 12-inch wide belt frames on each side with double 2.5-inch by 2.5-inch angles inside the hull. A flat steel keel plate 36 inches wide was connected to a 12-inch by 12-inch yellow pine keel with two white oak false keels (one being 3 inches by 12 inches and the other being 2 inches by 12 inches). All three vessels were planked with yellow pine from the keel to two feet above the main deck, with 5-inch thickness at the keel to 4-inch thickness on the sides. The pine planking was covered with 1.5-inch thick white oak sheathing boards from the keel to 14 feet above the water line. The oak sheathing was then covered with hair felt which was covered in turn with a final outer sheathing of copper from the keel to 13 feet, 6 inches above the water line (*Marine Engineering* 1897:8, 10).

The foregoing particulars are sufficient to show that the hull of the vessel is very heavy, and weight is judiciously located so that the structure is unusually strong. The steel in the hull weighs about 200 tons and the launching weights of these boats was about 275 tons, the draught being nearly 8 ft. mean (*Marine Engineering* 1897:10-11).

Above the waterline, the upper structure of the LV 71 and its sister ships was plated with steel from 3 feet below the main deck to the upper deck. The main deck beams were 7 inches wide by 3 inches thick and spaced 36 inches apart. There were secured to the frames with brackets or gusset plates, and strengthened fore and aft with additional beams above and below the deck. The upper (spar) deck beams were 6 inches wide by 3 inches thick. Both decks had a metal waterway 10 inches wide as well as steel stringers and tie plates. The main deck's planking was 3.5-inch wide white pine planks. The spar deck's planking was yellow pine 3 inches wide. The ship's lower deck was positioned forward and aft of the machinery spaces. It was supported by beams measuring 4 inches by 3 inches and decked with yellow pine. The vessel's internal bulkheads were made of steel and stiffened vertically and horizontally with angle bars. The LV 71's stem, sternpost, deadwood, and rudder were made of white oak and constructed extra heavy (*Marine Engineering* 1897:10).

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The LIGHT VESSEL 71's engine room and boiler casings occupied most of the ship's space amidships. The crew quarters were forward of it and the officer quarters were aft (*Marine Engineering* 1897:11, 14).

The LV 71 was powered with one surface condensing, vertical inverted, direct acting, single cylinder steam engine manufactured by the Bath Iron Works (Snow 1987). Its cylinder measured 20 inches wide and had a 22-inch stroke. This engine generated 350 horsepower at 150 rpm (revolutions per minute). It occupied a space 6 feet, 6 inches square in the engine room which measured 10 feet long by 12 feet wide. Steam for the engine, at 100 pounds per square inch, was provided by a single coal-fired, steel Scotch boiler that was 11 feet, 3 inches in diameter by 12 feet, 2 inches long. A shaft extending from the engine room to the vessel's stern turned the lightship's 4-bladed manganese bronze propeller which was 7 feet, 10 inches in diameter (Flint 1989). Coal to fuel the boiler was stored in bunkers. The crew loaded the coal bunkers using ten coal scuttles from either the main deck through the cargo side ports, or from the spar deck by canvas chutes. The LV 71 and its sister ships were also equipped with two vertical tubular donkey (auxiliary) boilers that supplied steam for the windlass, electrical plant, donkey pumps, fog signals, and heating.

One of the best features of these boats is the fact that they are fitted with propelling machinery and power sufficient to take them to and from their respective stations, and in the case the anchor breaks, they are not helpless (*Marine Engineering* 1897:14).

The LV 68, LV 69, and LV 71 were also equipped with other machinery components. These included a Hyde-improved Robinson steering gear with a 60-inch mahogany wheel. A steam winch capable of lifting 3,000 pounds was mounted on the spar deck, along with a 1,000 pound fog bell mounted in a belfry. The ships' ground tackle included one 5,100 pound mushroom anchor, one 2,000 pound bower anchor, one 335 pound kedge anchor, and two stud-link anchor chains that were each 120 fathoms (720 feet) long.

Anchor chain was controlled using a Hyde steam pump brake windlass with two Hyde double-spring riding stoppers (chain stoppers). The windlass was positioned at the deck's center. Its two chain wheels were directly in line with the ship's two 11-inch diameter hawse pipes (*Marine Engineering* 1897:14). This arrangement differed from some earlier 1890s light vessels that had a single hawse pipe at the stem (Saunders and Payne n.d.:3).

The LV 71's main deck included accommodations for its officers and crew. The crew's quarters were forward of the engine spaces and included five spacious staterooms with double pipe berths 6 feet, 3 inches long by 2 feet, 6 inches wide. The ship's galley and pantry were forward on the starboard side near the windlass, as was the lamp room. The crew's head (toilet room) was on the port side. The galley had a coal-burning range for cooking, and a wooden lead-lined sink with a brass pump connected to the ship's fresh water tanks. The crew's mess

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(dining room) was paneled with white pine trimmed with hardwood, and included an 8-foot long dining table with wooden chairs made of ash (*Marine Engineering* 1897:11).

The officers' quarters were on the main deck aft of the machinery spaces. They included four staterooms, two on each side of the light vessel. Each was paneled with white pine and contained one berth, a wardrobe, and a washstand. The Captain's room and a chart and signal room were located on the starboard side forward of the staterooms. Opposite these on the port side were the Engineer's room, a pantry, and the officers' head. The officer's mess was at the light vessel's stern. It was furnished with a 6-foot long table, four leather chairs, and a sideboard. The entire officer and crew areas had linoleum floors or rugs, making it well-appointed and comfortable (*Marine Engineering* 1897:11, 14, 15).

The light vessel's lower deck and cargo hold were used to hold stores. Paints, oils, and spare rigging were placed in storage spaces forward of the ship's engine room, near the ship carpenter's workroom and storage for the boatswain's gear. Coal storage for the galley's stove and twelve tanks for fresh water were also forward of the engine spaces. The lower deck area aft of the engine room contained the Engineer's workroom, the ship's sail room, a storeroom for bread, two additional storage rooms, and six more fresh water tanks. The capacity of each water tank was 16,000 gallons (*Marine Engineering* 1897:14). The LV 71 was also equipped with two small boats, a 24-foot centerboard whaleboat and a 27-foot steel self-righting and self-bailing lifeboat. Both were stowed topside on the spar deck.

The LV 71 had two 16-inch diameter steel masts that rose vertically to 64 feet above the waterline. Both had a gallery at the top used by crew members to service the mast-head signal lanterns and display visual day-signals. Each mast was topped with a flagpole which made their total height 73 feet above the water.

The LIGHT VESSEL 71 was well equipped to fulfill its role with both visual and audible signal devices. A three-lantern cluster was mounted above both mast galleries. Each of these lanterns was lighted with a 100-candlepower electric lamp. The lightship's electrical system was powered at 100 volts by two same-model General Electric marine generators. The lights' signal characteristic was adjusted by switching equipment that could be set for on and off intervals varying from five to 20 seconds (*Marine Engineering* 1897:15). The ship's sound signals included a 1,000 pound fog bell and a 12-inch diameter Crosby chime fog whistle. These were used while at anchor on the lightship's station. A smaller 6-inch diameter fog whistle was used while underway.

SETTING

The LIGHT VESSEL 71 Shipwreck rests on the seafloor of the U.S. continental shelf in approximately 200 feet of water some 15 miles southeast of Cape Hatteras in Dare County, North Carolina (see Additional Documentation, Figure 1.). The underwater terrain in the

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shipwreck vicinity is a plain with a level to gradually sloping grade. The bottom material is predominantly sand. This shipwreck site lies near the Gulf Stream's shifting western edge and is subject to changes in current velocity and direction. Currents appear to have scoured the sand bottom several feet deep near the LV 71's bow. The shipwreck has become an artificial reef and has a role in the local ecosystem. It provides a hard substrate for encrusting invertebrates as well as shelter for a variety of fish species including sharks.

The LV 71 Shipwreck is located within an area off the North Carolina coast that was an operating zone for German U-boat submarines in 1918 during World War I. A number of other shipwrecks in this area were also sunk in 1918 within what constitutes an American underwater battlefield from a significant maritime engagement of the twentieth century's first global conflict. These underwater archeological sites represent an episode of the overarching 1914 to 1918 "First Battle of the Atlantic" which pitted German U-boats and other armed vessels against ships of the Allied Nations. Vessels involved in that far-flung oceanic battle included foreign- and U.S.-flagged warships, non-military government-owned ships, and merchant vessels engaged in transporting materials. Ships such as the LIGHT VESSEL 71 that were sunk as a result of this World War I maritime combat are part of the First Battle of the Atlantic's material record.

ARCHEOLOGICAL REMAINS OF LIGHT VESSEL 71

The following description of the LIGHT VESSEL 71 Shipwreck archeological site is based on side-scan sonar surveys conducted in summer 2014 by NOAA's Office of National Marine Sanctuaries and the *Monitor* National Marine Sanctuary, as well as recreational diver reports. Recreational divers have visited the LV 71 Shipwreck for several years and their observations and research findings have been published in popular dive guides, shipwreck books, and on the internet. This information provides onsite details and supplements the side-scan sonar data.

This wreck site's location, condition, size, and characteristics serve to confirm that it is the LIGHT VESSEL 71 Shipwreck. Its position relative to the Diamond Shoals corresponds with historical accounts of where the LV 71 sank off Cape Hatteras. In addition, the wreck's integrity matches contemporary reports of its demise after its crew abandoned ship and began rowing towards shore while the German submarine U-140 shelled and eventually sank the vessel. The largely intact condition of its hull matches the sinking event's description that the German U-boat used its deck guns and not a torpedo to sink the vessel. A torpedo explosion would have caused substantially greater damage to the LV 71's hull than has been observed here.

The LV 71 Shipwreck measures approximately 115 feet long by 28.5 feet wide with at least 10 feet of vertical relief above the seafloor. This reflects its remaining articulated bow to stern hull length. The wreck's axis extends east-west with the bow at the west end. The site's main feature is the vessel's steel and wooden composite hull which is largely intact and sitting

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upright. Side-scan sonar images reveal that the hull retains substantial integrity from stem to stern.

Reports from recreational divers are consistent with the sonar images showing deck beams in place and supporting portions of deck. It has been reported that some deck areas are collapsed, which allows access into the lower hull and its associated contents including the steam engine. Diver observations also indicate that bollards and rope fairleads are intact, along with a large electrical switching panel just forward of the stern on the starboard side. The most prominent feature reported from the wreck's bow area is the ship's steam windlass. A large anchor and anchor chain stretches from the bow along the wreck's north side. The lightship's two masts lie off to one side and are largely buried in the sand (Association of Underwater Explorers 2014; Dive Hatteras 2011).

The shipwreck's size, machinery, and visual construction features correspond to the characteristics of the LIGHT VESSEL 71 as recorded in historical documentation. This site may be characterized as a small, composite hull, single steam engine ship outfitted as a light vessel.

SITE INVESTIGATIONS

While the general location of the LIGHT VESSEL 71's loss was known based on survivor accounts, the wreck was not salvaged. The U.S. Coast and Geodetic Survey conducted hydrographic surveys of the Diamond Shoals in 1955 with the ships *Parker*, *Bowen*, and *Stirni*, which located the shipwreck and marked it as an obstruction. Nautical charts from 1955 denote a wreck symbol near the LV 71 Shipwreck's actual location. The NOAA Office of Coast Survey Automated Wreck and Obstruction Information System (AWOIS) includes a record labeled "Diamond Shoal NO. 71" (# 640). It states the following information:

Latitude: 35.080177
Longitude: -75.332916
Positional Accuracy: Low
History: DESCRIPTION 24 NO.1590; SUNK 1918 BY SUBMARINE; POS. ACCURACY WITHIN 1 MILE; REPORTED THROUGH CGS SURVEY DATED 7/23/55 (REG. NO. NOT ASCERTAINED) 177 NO.1590; SUNK 8/16/18, REPORTED 4/1/23, POS.35-05N, 75-20W. SURVEY REQUIREMENTS NOT DETERMINED

North Carolina has a substantial number of active wreck divers who conduct expeditions to locate and identify offshore shipwrecks. Investigations prior to 2014 by divers from this group provide important information concerning the LV 71 Shipwreck.

Archeologists from NOAA's Office of National Marine Sanctuaries and the *Monitor* National Marine Sanctuary aboard the NOAA ship *Sand Tiger (SRVx)* conducted a close-order side-scan sonar survey of the LV 71 Shipwreck site in 2014. This fieldwork sought to answer research questions about the site's characteristics and to record its extant remains (see Photographs 3. and 4.). The data compiled provides information on the shipwreck's structural

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integrity and contributed to its assessment for nomination to the National Register of Historic Places (NRHP). Further investigation of the LV 71 Shipwreck is planned in order to perform additional site assessment and archeological analysis.

Photograph 3. Side-scan sonar image of the LIGHT VESSEL 71
(NOAA *Monitor* National Marine Sanctuary collection, Newport News, VA)



Photograph 4. Side-scan sonar image of the LIGHT VESSEL 71
(NOAA *Monitor* National Marine Sanctuary collection, Newport News, VA)



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Archeological work has been conducted on several sunken lightships located around the United States. Besides the LV 71 Shipwreck, ten other light vessel wrecks have been found (see Table 1.). The LV 71 fits into the middle time period of the 11 lightship wrecks located to date and is the only composite-hull light vessel of this group. Only four of these sunken light vessels have undergone professional archeological documentation and analysis. One of them, the LV 57 located in Wisconsin's Lake Michigan waters, is listed in the National Register of Historic Places. It did not sink while on duty but had previously been decommissioned, transferred out of government ownership, and eventually scrapped and abandoned (Watts 1989).

Table 1. Located light vessel shipwrecks other than the LV 71

Number	Built	Name	Location	State	Archeological Work Done	Notes	Active when sunk
JJ	1825	Long Shoals	Roanoke	NC	Yes (NC site # 0019ROR)	Sunk on station	Yes (sunk 1861)
LV 9	1857		Merrimac River	MA	Yes (but not positively identified)	Retired 1925	No
LV 39	1875	Brenton Reef	Marblehead	MA		Retired 1935, sank while under tow in 1975	No
LV 57	1891	Gray's Reef	Milwaukee	WI	Yes (Watts 1989)	Retired 1935, later scrapped and abandoned (sunk), now listed in National Register of Historic Places	No
LV 51	1892	Cornfield Point	Saybrook	CT	Yes (Saunders and Payne n.d.)	Sank on station. Designated a Connecticut archeological preserve in 2003.	Yes (sunk 1919)
LV 58	1894	Nantucket	Nantucket	MA		Sank while under tow	Yes (sunk 1905)
LV 73	1901	Vineyard Sound	Buzzards Bay	MA		Pulled off station during storm and sank	Yes (sunk 1944)
LV 78 / WAL 505	1904	Relief	Sandy Hook	NJ		Sank on station	Yes (sunk 1960)
LV 117	1930	Nantucket	Nantucket	MA		Sank on station	Yes (sunk 1934)
LV 189 / WLV 189	1946	Boston	Atlantic City	NJ		Sunk as artificial reef 1994	No

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8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- B. Property is associated with the lives of persons significant in our past.
- C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations

(Mark "x" in all the boxes that apply.)

- A. Owned by a religious institution or used for religious purposes
- B. Removed from its original location
- C. A birthplace or grave
- D. A cemetery
- E. A reconstructed building, object, or structure
- F. A commemorative property
- G. Less than 50 years old or achieving significance within the past 50 years

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Areas of Significance

(Enter categories from instructions.)

MARITIME HISTORY

ARCHITECTURE

ENGINEERING

COMMERCE

TRANSPORTATION

ARCHEOLOGY – Historic – Non-Aboriginal

Period of Significance

1897 to 1918

Significant Dates

28 December 1897 (launch)

6 August 1918 (sinking)

Significant Person

(Complete only if Criterion B is marked above.)

Cultural Affiliation

N/A

Architect/Builder

Bath Iron Works, Bath, Maine (Builder)

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Statement of Significance Summary Paragraph

The LIGHT VESSEL 71 Shipwreck is a sunken lightship that was built in the last part of the nineteenth century as part of the Federal Government program to provide and maintain navigational aids in United States waters. Light vessels such as this served as primary aids to navigation in areas unsuited for placing buoys or lighthouses. The LV 71 Shipwreck is representative of the U.S. Lighthouse Board's adoption of steam engine power for lightships so that they would be self-propelled, and of composite hull design for their construction. The design of composite hull ships was an important late nineteenth advancement in naval architecture in which hulls made with metal and wood were developed. The LIGHT VESSEL 71 Shipwreck is an underwater archeological site that retains substantial integrity. Its location far from shore in approximately 200 feet of water has served to enhance its preservation. This property is historically significant on the National level under National Register of Historic Places Criteria A, C, and D. Its period of significance extends from 1897 when it was constructed by the Bath Iron Works in Maine, and ends in 1918 when it was sunk by a German submarine while in service on the Diamond Shoal Light Station during World War I.

Narrative Statement of Significance

The LIGHT VESSEL 71 Shipwreck is a historic Federal government lightship that was built in 1897, commissioned in 1898, and sunk by a German submarine in 1918 during World War I. It qualifies for listing under National Register of Historic Places (NRHP) Criteria A, C, and D.

This property is eligible for inclusion in the NRHP under Criterion A based upon its association with the development and growth of the long-term U.S. government program to promote maritime safety through the establishment and maintenance of aids to navigation. This program began during the late eighteenth century administration of President George Washington, and later adopted the use of light vessels to mark locations where building a lighthouse was not feasible. A total of 179 light vessels were placed in service from 1820 to 1952. In 1909, the peak year of Federal lightship operations, there were 51 light vessels on station in United States waters. The growth of U.S. maritime commerce and international trade would have been hampered without light vessels to provide visual and audible points of reference to navigating mariners. The presence of lightships was especially important offshore of North Carolina's Cape Hatteras and the Outer Banks. North-south shipping lanes came dangerously close to shallow shoals swept by strong currents in this area, making it notorious as the "Graveyard of the Atlantic." The Diamond Shoals southeast of Cape Hatteras was an especially dangerous hazard to navigation and several shipwrecks and groundings occurred there through time. The LV 71 was assigned to the Diamond Shoal Station for various periods between 1898 and 1918. Its presence there served to prevent accidents and provided an at-sea

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presence for aid to passing ships needing assistance. The LIGHT VESSEL 71's operation by the U.S. Lighthouse Board and its successor agency, the U.S. Lighthouse Service, included serving as a relief ship at a number of other lightship stations from North Carolina to Massachusetts. The LV 71 remained on station at the Diamond Shoals during World War I while the surrounding waters became a maritime battleground where German U-boat submarines targeted U.S. merchant ships and those of other nations. It was ultimately attacked and sunk by a U-boat after transmitting a radio message alerting other ships and onshore stations of the submarine's presence in the vicinity. The LIGHT VESSEL 71 Shipwreck is one of the limited number of surviving pre-1930 United States lightships, and is one of two Federal government vessels lost to enemy attack in home waters during World War I (the other was the cruiser USS *San Diego* sunk by a submarine-laid naval mine). The LV 71 is also the only U.S. light vessel sunk by enemy action during the twentieth century.

The LV 71 Shipwreck qualifies for listing under National Register Criterion C based upon the vessel's distinctive characteristics. It embodies naval architecture design and maritime technology during a time of transition from wooden hulls to steel hulls in light vessels constructed for use by the United States government. It was one of only 13 wood-and-steel composite hull lightships built for the U.S. Lighthouse Board, and the only one of them that has been located and is available for study. The LV 71 was also designed and constructed during a period when the adoption of marine steam engines for making light vessels self-propelled was still a recent development. The LIGHT VESSEL 71's engine and associated machinery are exemplary of late nineteenth century American maritime technology. This lightship was successfully operated by the Lighthouse Board and U.S. Lighthouse Service for over 18 years. The long and reliable service of this and similar light vessels demonstrated that composite hull construction and steam-powered self-propulsion were feasible, safe, reliable, and economical. The electric light and audible signals provided by the LV 71's aids to navigation are also exemplary of early twentieth century maritime safety technology. They proved to be effective measures for enhancing the safety of U.S. and foreign mariners navigating the Diamond Shoals area.

This property qualifies for listing under the NRHP Criterion D based on its archeological potential and likelihood to yield information important to history. The LV 71 is the only one of the 13 composite-hull light vessels built for the U.S. Lighthouse Board that has been located and archeologically documented. It is also one of just six composite-hull lightships that were self-propelled using their own steam engine. These vessels were a transitional design between wooden-hull and steel-hull lightships, and between light vessels without propulsion and those that were self-propelled. The LIGHT VESSEL 71 and other composite-hull lightships laid the groundwork for the widespread use of steel hulls and steam engines by the Lighthouse Board and its successor agency, the U.S. Lighthouse Service (which was later merged with the U.S. Coast Guard). The LIGHT VESSEL 71 Shipwreck can provide important information on early light vessel construction. Details about its hull and machinery resulting from archeological investigation will add primary source data on this particular vessel type, for which builder's

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plans and machinery blueprints have been mostly lost to history. Future archeological research may also indicate how the LV 71 was modified during its 20 years of service to accommodate the U.S. lightship fleet's technological development, such as adoption of the wireless telegraph radio. In addition, documenting the LV 71's material culture has the potential to provide important information concerning its crew such as data relating to their shipboard life, social interactions, and ethnicity. The LV 71's crew abandoned ship hastily shortly before it was sunk, leaving their personal effects behind. Archeological investigation of the shipwreck's hull, machinery, aid to navigation apparatus, and cultural artifacts may provide useful information that supplements and expands upon the limited historical records presently available.

This National Register nomination was coordinated with Dr. Robert M. Browning, Chief Historian, U.S. Coast Guard Historian's Office (CG-09224). Daniel Koski-Karell, Ph.D., USCG Office of Environmental Management (CG-47) rewrote the draft NRHP registration form provided by NOAA and administered the nomination process.

INTRODUCTION

Lightships were critical and essential partners with America's lighthouses as part of the federal government's commitment to safe navigation on the nation's coasts and on the Great Lakes. While the first American lighthouse dates to the colonial era, the use of lightships is a more recent 19th century phenomenon in the United States, though employed earlier in Europe. Moored over treacherous reefs, or marking the narrow approaches to a channel or harbor entrance where lighthouses could not be built or placed in areas too far offshore for a shoreside lighthouse's lens to reach, lightships were fewer in number than the estimated 1,500 lighthouses built in the United States. In all, 179 lightships were built between 1820 and the 1952. In 1909, the heyday of the United States Lighthouse Service, there were 51 lightships (46 on the eastern seaboard and five on the Pacific Coast) on station in the United States (Delgado 1989).

DEVELOPMENT OF LIGHT VESSELS IN THE UNITED STATES (1820 TO 1897)

The U.S. Lighthouse Establishment undertook the creation of lightship stations and the management of vessels assigned to them during the early nineteenth century. This was continued under the U.S. Lighthouse Board from the 1850s to 1910, from 1910 to 1939 under the U.S. Lighthouse Service, and after 1939 by the U.S. Coast Guard. The Federal government's lightship program was a sustained nationwide effort that served to provide mariners with navigational aids in waters that could not be marked with lighthouses. Light vessels equipped with visual and sound signals were valuable points of reference and gave warning of hazards on

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America's inland, coastal and oceanic waters and the Great Lakes, even in time of war. Lightships such as the LIGHT VESSEL 71 effectively protected ships of all countries in assisting their safe passage 24 hours a day.

Between 1820 and 1983, the U.S. government established 116 lightship stations along the Atlantic, Gulf of Mexico, and Pacific coasts and in the Great Lakes (Flint 1989). These station locations were designated where there was a need to provide navigational guidance coupled with impracticality for constructing a lighthouse. Areas of concern included approaches to coastal bays or ports, and offshore reefs and shoals. Inland navigational channels and oceanic hazards required marking to ensure ships could transit without harm. Lightships, also known as light vessels, had advantages over permanent lighthouses for several reasons. They provided light signals at night, sound signals in foggy conditions, and highly visible day beacons in conjunction with the added capability for being moved easily if required by changes in underwater topography or conditions. During the twentieth century, lightships also provided transmissions of electronic signals to passing vessels for calculating bearing and distance.

The biggest advantage to using light vessels was their versatility. They could be stationed close to shore or far offshore, placed near shifting shoals, moored in waters where no fixed structure could be built, and repositioned on short notice. The main disadvantages of light vessels were their expense to build and maintain, and the risk that a vessel would be pulled away from its mooring (Putnam 1933:201). However, when considered overall, "During their relatively brief era, U.S. lightships evolved into highly sophisticated and efficient aids to navigation" (Flint 1993:4).

The first recorded use of light vessels was in the Roman Republic during the rule of Fabius Maximus approximately 200 years BCE. Roman galleys on coastal patrol to protect ports and shipping would hang a lighted fire basket from a mast during the night to show both friendly and hostile vessels that coast guards were on duty (Holland 1972:55; MacKenzie 2011:1-2). The use of vessels for displaying light signals at night continued through Rome's transition into an empire.

References to light vessels appear to be absent from the historical record for approximately a millennium following their use in the Roman Empire. They reappear during the seventeenth century when England's King Charles I attempted unsuccessfully to place a light vessel at the mouth of the River Thames. Another important development in England occurred in 1730 when King George II issued the first patent for a light vessel. Based on this, a single-mast sailing vessel was modified two years later and placed at the Nore, a sandbank where England's Thames River meets the North Sea near Kent (MacKenzie 2011:2). The Nore was a dangerous hazard for shipping navigating to and from London. The vessel modified for service there was given the name *Nore* and carried two oil-burning ship's lanterns hung 12 feet apart from a cross arm high above its deck. It was a success and by 1819 England had nine lightships in operation. This became the model for future light vessel programs and "... emphasized the

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inadequacies of coastal trade, creating a standard that several countries began to adopt” (MacKenzie 2011:2).

In United States waters, a number of small boats with visible day-beacon markers on their masts served as navigational aids in sheltered areas during the late 1700s. They carried no illumination or sound mechanisms. These beacon boats provided only limited protection for passing vessels and were subsequently replaced with unmanned anchored boats equipped with lanterns mounted on their masts and bells for warning mariners. These were maintained by men who rowed out at sunset to light the lanterns and at sunrise to extinguish them. Unfortunately, they also proved to be inadequate. Other early efforts to light waterways were made by local and state governments that managed to build a few rudimentary lighthouses and other aid to navigation structures. A major change occurred in 1789 when the ninth law passed by the First United States Congress placed all financial obligations for support, maintenance, and repair of lighthouses, beacons, buoys, and public piers under Federal jurisdiction.

By the early nineteenth century, the expansion of maritime commerce in the United States made it clear that light vessels were needed. The Federal government followed England’s lead regarding lightships, and in 1819 awarded its initial contract for a manned light vessel to John Pool of Hampton, Virginia. He proposed to outfit American wooden schooners with European-style lanterns (MacKenzie 2011:12-13).

The first true light vessel in the United States began operating in 1820. It was anchored in Virginia’s southern Chesapeake Bay off Willoughby Spit, east of the mouth of the Elizabeth River which led to the ports of Norfolk and Portsmouth. A description of this vessel described it as being “. . . of 70 tons burden, copper fastened . . . a cabin with four berths, at least . . . spars, a capstan, belfry, yawl, and davits” (Flint 1993:2). After it became apparent that the light vessel’s initial position was too exposed to harsh environmental conditions, it was moved to a safer place off Craney Island at the Elizabeth River’s mouth. This became the first official United States light vessel station.

John Pool’s vessel, also known as *Light Vessel C*, remained in service until 1859. Four additional light vessels went into service in the Chesapeake Bay in 1821, and in 1823 the first open-ocean light vessel began operating off Sandy Hook, New Jersey. Still another lightship took up station in 1824 at the Diamond Shoals off Cape Hatteras, North Carolina.

In a short period of time, the number of light vessels increased and surveys were undertaken throughout the United States to identify priority locations for them to be stationed. In 1825 there were 10 light vessel stations. This increased to 30 by 1839, and by 1858 there were 48 (Putnam 1933:202). During the mid-nineteenth century, lighthouse construction replaced several light vessel stations, especially in the Chesapeake Bay and North Carolina sounds. However, the need for light vessels grew as offshore commerce increased and charting efforts by the U.S. Coast Survey identified additional shoals and hazards previously not widely known to mariners.

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The Federal government's organizational structure proved to be inadequate for managing light vessels during their early developmental years. This resulted in their being constructed with limited regard for design relative to onsite functioning and operating conditions. The first generation of American lightships did not differ much from contemporary standard merchant vessels. They had round-bottom wooden hulls made with iron and copper fastenings, copper sheathing, a bluff bow, and a straight stern (Delgado 1989). Several of these light vessels were not built with sufficient draft to alleviate the effects of rolling and pitching while occupying a fixed position on station for long periods of time. Such motions caused damage to the lanterns and mooring gear, and made life onboard difficult for the crew to bear (Flint 1993:4-5). U.S. light vessels during the first half of the nineteenth century were equipped with poor illumination apparatus and were not well-maintained. They were subject to being forced away from their stations by storms, and lacked relief vessels and supporting tenders. These problems were not alleviated until the late 1850s when bilge keels were placed on light vessels to reduce rolling, improved ballasting techniques aided stability, and steam engines were installed to assist in keeping on station.

The U.S. Lighthouse Establishment (USLHE) was formed in 1820 as a component of the Treasury Department to manage Federal aids to navigation including light vessels. The USLHE was a loosely structured organization administered at a local level by the government's Collectors of Customs. It was characterized by unstandardized operating procedures which did not improve the unsafe and inadequate situation regarding light vessels. The overall situation did improve, however, after Congress took action in 1838 to divide the country into lighthouse districts. This led to better management, standardization, and organizational control of the Federal aids to navigation program. Despite these efforts a report in 1851 confirmed that lighthouse and light vessel problems continued, including poor lighting, poorly-trained crews, and rotten vessels. Congress responded in 1852 by creating the U.S. Lighthouse Board which instituted substantive reforms. These included increasing the number of lighthouse districts, each having a U.S. Navy officer as district inspector, and forming committees of qualified persons to address and solve problems. The new Lighthouse Board also focused on finance and contract management, design and engineering, lighting improvements, and better light vessels. A subcommittee of qualified persons was established to test and evaluate new equipment, determine requirements, and develop maintenance procedures (Flint 1993:4-10).

Light vessel design in the U.S. underwent a process of adaption and improvement during the nineteenth century.

American lightship construction demonstrated adaptability and ingenuity, especially considering modifications and factors influencing ship design. Serving as purpose-built navigational markers as well as converted beacons, lightship construction and alteration spanned 163 years of American shipbuilding techniques (MacKenzie 2011:42).

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Despite continuing issues with light vessels, substantive improvements were made including to outfit them with better lamps and reflectors, and taking steps toward standardizing vessel design and construction. In 1855, a wooden-hulled light vessel was built by the Portsmouth Navy Yard in Kittery, Maine. Later renamed No. 1 or LV 1, it measured 103 feet long by 24 feet wide. The LV 1 was strongly built of oak and rigged as a schooner with two lanterns atop each mast. Its lines and design were adopted for later wooden light vessels, thus establishing the first "standard" for American lightships (Delgado 1989). Not all of the Federal government's early light vessels were built from scratch. Some were former merchant vessels purchased and modified for light vessel duty. These included the LV 8, formerly the brig *Thomas J. Haight*. The first iron-hulled light vessels were obtained in 1847. They were the former U.S. Revenue Marine steam cutters *Spencer* and *Legare* which were modified to fulfill their new assignments. A number of other iron-hulled steam-powered craft were purchased in subsequent years and modified for use as light vessels. The first iron-hulled vessel built purposely for lightship duty was the LV 55, constructed in 1882.

Through time, the Federal government's light vessels became more suitable for service and increased in number until the outbreak of the Civil War in 1861. Over the course of this 1861 to 1865 warfare, 24 light vessels were destroyed or lost. This was the first conflict in which U.S. lightships were sunk due to enemy action. Even though so many light vessels became casualties, the U.S. Treasury Department replaced only nine of them while the war raged. This resulted in a decreased number of navigational aids and an increase in vessels being wrecked throughout the 1860s (MacKenzie 2011:21-26). Work was undertaken to salvage sunken light vessels after the war ended, along with replacing other navigational aids and clearing waterways of obstructions. Appropriations from Congress were also requested to secure funding for building new light vessels. Over the 10 years following 1865, the Federal government built five new light vessels and added many more navigational markers. This promoted maritime safety and helped commerce to flourish.

U.S. light vessels were not identified by number until following the Civil War. Before then they were known by the name of the station they occupied or were given alphabetical identifiers. In addition, there were no specifications for their color or marking. As individual vessels were moved from station to station, trying to maintain adequate record-keeping without an individual identifier became problematic. In 1867 the Lighthouse Board directed that light vessels be given a standardized official and permanent number beginning with the abbreviation "LV," and also have the station they occupied written on both sides of the hull. When a light vessel was moved to a new station, its hull would be repainted with the new station name. Individual light vessels that were held in reserve to replace ones on station when they needed maintenance were marked with the name "Relief." After the U.S. Coast Guard acquired responsibility for light vessels in 1939, the "LV" prefix was retained until February 1942 when it was replaced by "WAL." The Coast Guard's "WAL" designation for light vessels was later changed to "WLV" (Flint 1989).

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The earliest U.S. light vessels were sail-powered, wooden-hull craft that were towed or sailed to and from their stations. They generally had had two masts and a schooner rig that was used for maintaining position rather than forward movement. Their hulls were commonly made of white oak, live oak, red cedar, pine, or locust with iron fastenings and copper sheathing. Rolling from side to side at sea was diminished through the use of bilge keels and ballast. Small fore and aft deckhouses provided work space for maintaining the lanterns. The crew of six to eight men lived below decks. Wooden light vessel design and construction lasted from 1820 through 1902 with an estimated lifespan per vessel of 40 years. Ninety-two wooden light vessels were built in the United States. Today, no examples of these remain afloat or are readily accessible for archeological investigation.

Early nineteenth century light vessels had sharp bows and round bilges. Naval architects of those times were slow to realize that a standard vessel design used for speed and cargo capacity did not work well for stationary light vessels. Designs developed later had round bows and flat bottoms to increase stability. The Lighthouse Board adopted and published a series of improved standards for light vessel construction in 1857, 1862, and 1871. These included advancements in naval architecture and technology, along with robust and resilient construction requirements, and contributed to reducing later costs.

The second generation of American light vessels was characterized by the early 1870s adoption of steam engines to power auxiliary equipment such as fog whistles, pumps, and deck gear such as the anchor windlass. The first lightship to be equipped with steam-powered machinery was the LV 39, built in 1875. It had two boilers providing steam power for a pump and fog whistle. The LV 41, launched in 1876 by the shipyard of S. Gildersleeve and Sons of Portland, Connecticut, was equipped with two auxiliary steam boilers. Auxiliary steam engines eventually became standard light vessel equipment, increasing capabilities and enabling them to be more self-sufficient.

Late nineteenth century developments in lightship design were also characterized by the development of improved construction methods and materials. This was associated with a transition in shipbuilding in which wooden hull components were increasingly replaced with metal ones. Until this process began, lightships were built with interior wooden frames supporting an exterior wooden hull. These vessels were prone to damage, rapid deterioration, and generally required substantial annual maintenance and repair costs which could run to greater than \$15,000 in a year. The adoption of new shipbuilding materials and methods was implemented to help reduce the financial burden for upkeep.

The Lighthouse Board experimented with a transitional form of hull construction in the 1880s that used metal and wooden components to produce composite hulls. The term "composite" in late nineteenth century naval architecture refers to combining two materials together in the hull structure. In the case of light vessels, composite building was generally used

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in one of three ways: (1) iron or steel frames covered with wood inner and outer hull planking; (2) steel frames with iron or steel outer hull plating sheathed in wood; or (3) steel frames with wood planking and steel topside (Flint 1989). These composite vessels were described in 1890 by Arnold Burges Johnson, Chief Clerk of the U.S. Lighthouse Board as ". . .intended to be the most powerful and complete light-vessels ever built" (Johnson 1890:41).

Composite-hull light vessels were a small percentage of the lightship fleet. They included 13 vessels built for the U.S. Lighthouse Board from 1881 to 1897 (see Table 2.). Composite-hull light vessel construction began in 1881 when the LV 43 was built by the Pusey and Jones shipyard in Wilmington, Delaware. The LV 43 had an iron hull with yellow pine sheathing. Six more lightships with composite hulls were built from 1887 to 1892 (LV 45, LV 46, LV 47, LV 48, LV 49, and LV 50), and another group of six from 1896 to 1897 (LV 66, LV 67, LV 68, LV 69, LV 70, and LV 71) (Flint 1989). An additional composite-hull vessel was transferred from the U.S. Coast Survey in 1898 and modified for lightship service.

Table 2. Composite-Hull Light Vessels Constructed for the U.S. Lighthouse Board (MacKenzie 2011:65-68; U.S. Coast Guard Lightship Histories)

Number	Date Launched	Builder	Hull	Length in feet	Retired from Service	Notes
LV 43	1881	Pusey and Jones of Wilmington, DE	Iron hull and pine sheathing	118	1920	No steam propulsion
LV 45	1887	Houston and Woodbridge of Linwood, PA	Steel frames with iron plating and pine sheathing	124	1918	No steam propulsion
LV 46	1887	Houston and Woodbridge of Linwood, PA	Steel frames with iron plating and pine sheathing	124	1923	No steam propulsion
LV 47	1891	Harrison and Loring of South Boston, MA	Steel frames with pine planking and oak sheathing	120	1930	No steam propulsion
LV 48	1891	Harrison and Loring of South Boston, MA	Steel frames with pine planking and oak sheathing	120	1925	No steam propulsion
LV 49	1891	Harrison and Loring of South Boston, MA	Steel frames with pine planking and oak sheathing	120	1941	No steam propulsion
LV 50	1892	Union Iron Works of San Francisco, CA	Steel frames with pine planking and oak sheathing	120	1909	No steam propulsion
LV 66	1896	Bath Iron Works of Bath, ME	Steel frame with pine planking and oak sheathing	122	1934	Steam propulsion
LV 67	1897	Wolf and Zwicker of Portland, OR	Steel hull and wood sheathing	123	1930	Steam propulsion
LV 68	1897	Bath Iron Works of Bath, ME	Steel frame with pine planking and oak sheathing	122	1932	Steam propulsion
LV 69	1897	Bath Iron Works of Bath, ME	Steel frame with pine planking and oak sheathing	122	unknown	Steam propulsion
LV 70	1898	Wolf and Zwicker of Portland, OR	Steel frames with wood planking	122	1930	Steam propulsion
LV 71	1897	Bath Iron Works of Bath, ME	Steel frame with pine planking and oak sheathing	122	1918 (sunk)	Steam propulsion

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The 13 composite-hull light vessels ordered by the Lighthouse Board were built on both coasts by various firms and generally measured approximately 120 feet in length with two-masts and schooner rigs with fore and main sails on spencer masts. The six composite-hull light vessels built from 1896 to 1897 had steam engines for both propulsion and auxiliary use. The two masts of these vessels were equipped with lantern galleries as well as additional day beacons and fog signals. Composite-hull light vessels were an important stepping stone in the development of lightship design and use. They remained in service for 35 years on average. The longest-serving one was the LV 49 which was operated for 50 years.

The last composite-hull lightships were the LV 68, LV 69, LV 70, and LV 71. They were built with keel, frames, stem, stern, bilge strake, and topside plating all made of steel, while the bottom from the line of the main deck down was planked with wood and sheathed in metal.

Despite these experiments, the development of metal hulled lightships lagged behind the adoption of iron and steel hulls in commercial and military vessels in the United States, in large part due to timber dependent United States shipbuilders' initial reluctance to build ships of metal, and the belief by the Lighthouse Board that wood hulls better withstood heavy seas and collisions than "brittle" iron. The rusting of iron hulls also encouraged fears of frequent maintenance. The operational experiences of the composite lightships in time would counter these beliefs (Delgado 1989).

The Lighthouse Board also experimented with iron hulls. A year after the Pusey and Jones shipyard launched the Lighthouse Board's first composite vessel (the LV 43), the same yard constructed the Board's first iron-hulled light vessel. It was the LV 44, launched in 1882. The LV 44 was also outfitted with steam-powered auxiliary gear. All-metal hull construction for lightships lagged behind all-metal construction for merchant and naval vessel use. This was because the Lighthouse Board believed that wooden hulls had the advantage of easing the impacts from heavy seas, and that metal hulls required more maintenance. As a consequence there was a 16-year period during which composite hulls were adopted for light vessel construction, until it became clear that all-metal hulls were superior. Metal hulls replaced wooden hulls and composite hulls after it was demonstrated conclusively that they were stronger, rust resistant, stiffer, and cheaper to build and maintain (Flint 1998). The last wooden-hulled light vessel to be built was the LV 74, constructed in 1902 by the Petersburg Iron Works of Virginia (MacKenzie 2011:42-63).

Yet another important advancement in light vessel design and technology was the adoption of steam power for light vessel propulsion. This enabled lightships to be self-propelled, making them safer, more reliable, and easier to keep on station. Most early light vessels equipped with steam engines were still towed to and from their stations. Even after steam machinery for propulsion and navigation came into widespread use, light vessels carried riding sails on spencer masts for stability into the early twentieth century.

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The installation of steam engines in newly built, self-propelled light vessels lasted for some 45 years. The first steam-propelled light vessels to be built for the Lighthouse Board were the LV 55, LV 56, and LV 57, launched in 1891 for use on the Great Lakes. A single vertical, surface condensing compound engine was adopted as the light vessel standard in the early twentieth century and remained so until 1923 when diesel engines began to be used. The LV 112, built for the U.S. Lighthouse Service in 1936, was the last steam-propelled light vessel constructed for use in U.S. waters (Delgado 1989).

CONSTRUCTION OF THE LIGHT VESSEL 71 (1897)

The Lighthouse Board's Annual Report for 1895 noted that it had received petitions from several mariner groups that a light vessel was needed to mark the Overfalls Shoals at the mouth of the Delaware Bay due to the difficulty of entering the Bay from the Atlantic, especially during inclement weather (Lighthouse Board 1895:88-89). At that time, there were 41 light vessels in position throughout the United States, with another four in reserve for relief duty. The Fourth Lighthouse District which included Delaware Bay had four lightships in position, but none of them marked the Overfalls Shoals.

The Overfalls Shoals is a complex of submerged sand bars that poses a hazard to vessels entering and exiting the mouth of Delaware Bay. It is located off the south side of the Delaware Bay's entrance, approximately 3.5 miles east of Cape Henlopen, Delaware, and 8.5 miles southeast of Cape May, New Jersey. The Lighthouse Board wanted a light vessel to be located there because it was near channels followed by vessels going to and from Philadelphia and other ports along the Delaware River, was halfway between New York Harbor and the Chesapeake Bay in an area having heavy maritime traffic, and was close to the important Delaware Bay Harbor of Refuge at Lewes, Delaware. In addition, the Chesapeake and Delaware Canal contributed to the Delaware Bay's substantial maritime traffic by providing a route between Europe and Baltimore that was shorter than navigating farther south to the Chesapeake Bay's entrance.

The Lighthouse Board received a Congressional appropriation of \$80,000 on 4 June 1897 to construct and equip a first class steam-powered lightship with a steam fog signal for assignment to the Overfalls Shoals. The Lighthouse Board determined that this proposed lightship would be designated as LIGHT VESSEL 71. A contract for \$70,700 to build the LV 71 was awarded on 11 September 1897 to the Bath Iron Works of Bath, Maine. Designated as Bath Iron Works Hull Number 22, it was to be the fourth vessel built by that company for the Lighthouse Board in two years (see Table 3.).

The Bath Iron Works had a good business relationship with the Lighthouse Board. In addition to the contracts to build four light vessels (the LV 66, LV 68, LV 69, and LV 71) and the lighthouse tender *Mayflower*, the company did extensive repair and alteration work on the

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lighthouse tenders *Armesia*, *Myrtle*, and *Lilac* (Snow 1987). The Bath Iron Works continued its relationship with the Lighthouse Board in later years and in 1921 to 1922 constructed six more light vessels, the LV 106, LV 107, LV 108, LV 109, LV 110, and LV 111 (Snow 1987).

Table 3. Light vessels built in 1896 to 1898 by the Bath Iron Works
 (Snow 1987; U.S. Coast Guard Lightship Histories)

Name	Order Date	Keel Laid	Launch Date	Date Delivered	Length	Width	Draft	Tonnage	Machinery	Sister Ships
LV 66	7/12/1895	Unknown	3/26/1896	6/13/1896	123'	28'6"	13'	590	1 steam	
LV 68	1/2/1897	1/16/1897	6/17/1897	8/6/1897	122'10"	28'6"	12'6"	590	1 steam	LV 69
LV 69	1/2/1897	1/16/1897	6/17/1897	8/14/1897	122'10"	29'6"	13'6"	590	1 steam	LV 68
LV 71	9/7/1897	10/5/1897	12/28/1897	2/10/1898	122'10"	28'6"	13'6"	590	1 steam	LV 68 and LV 69

The LV 66, LV 68, LV 69, and LV 71 were constructed under the direction of Charles R. Hanscom, Bath Iron Works naval architect and shipyard superintendent. The Lighthouse Board was represented during this process by Mr. S. A. Savage who inspected the work done in building each vessel (Marine Engineering 1897:15).

The keel for Hull Number 22 (LIGHT VESSEL 71) was laid down on 5 October 1897. (Its specifications are described in Section 7 of this NRHP registration form.) The LV 71 had two sister ships, the LV 68 and LV 69. They shared the same design and were constructed with almost identical dimensions including the single steam engine. These composite light vessels were "built extremely strong with a hull excellently adapted for a vessel whose duty it is to remain off the coast in rough weather" (*Bath Daily Times*, 29 December 1897).

The LV 71's launching on 28 December 1897 was described in the *Bath Daily Times* on 29 December 1897 as having been "carried out to perfection. As the vessel started down the ways Miss Emily Hyde, daughter of Chas. E. Hyde, christened her with a bottle of American champagne" (Flint 1989; *New York Times*, 3 April 1903).

The LIGHT VESSEL 71 departed Bath Iron Works on 10 February 1898 for the Edgemoor Buoy Depot near Wilmington, Delaware. It was described by the *Lewiston [Maine] Saturday Journal* as, "one of the best craft of her kind." The LV 71 was manned on her maiden trip by a crew composed mostly of men from Maine under the command of Captain Enoch Reed. Its Engineer was named Mr. Trafton and the vessel's pilot was named Mr. Lindsay. Mr. S. A. Savage, Lighthouse Board Inspector, was onboard to ensure the electrical systems, an essential component of the light vessel, were working properly (*Lewiston Saturday Journal*, 10 February 1898). Upon arrival at the Edgemoor Buoy Depot, the LV 71 was officially turned over to the Lighthouse Board.

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THE DIAMOND SHOALS STATION AND THE LV 71 IN COMMISSIONED SERVICE (1898 TO 1918)

The Diamond Shoals extends off Cape Hatteras in a southeasterly direction for nine miles and includes the Hatteras Shoals, Inner Diamond Shoal, and Outer Diamond Shoal. Cape Hatteras is one of the most easterly points along North Carolina's Outer Banks, making it a treacherous point to pass, especially when water depths in the area can be as little as several feet. More than 2,000 vessels have wrecked or sunk in the Cape Hatteras and Outer Banks area, making it notorious among mariners as the "Graveyard of the Atlantic."

Every seafarer knows the Diamond Shoals, and gives them a wider berth than any other danger spot in the seven seas. For some seven and a half miles out to sea from the prominent headland, the Atlantic, according to its mood, bubbles, boils, or rolls calmly over the shoals and...rows of submerged banks (Talbot 1913:205).

In 1823, Congress authorized an expenditure of \$25,000 to pay for a vessel of not less than 250 tons to be stationed off Cape Hatteras to mark the Outer Diamond Shoals. This vessel, known as the *Cape Hatteras*, was built by Henry Eckford and arrived on station in 1824. It served intermittently until 1827 when it was blown ashore and later broken up for salvage (Putnam 1933:93). After that, the Diamond Shoals lightship station remained vacant until 1897.

During the 1827 to 1897 period there were several unsuccessful efforts to mark the shoals with bell beacons or gas buoys, along with consideration of the feasibility for establishing a more permanent structure such as a light tower or lighthouse. "Time after time the engineers have sought to subjugate this danger, but without avail. The seabed is so soft and absorbing that a firm foundation for a tower defies discovery" (Talbot 1913:206).

It was ultimately determined that a light vessel was the best choice for a reliable aid to navigation. A light vessel at the Diamond Shoals would be less expensive than a lighthouse. In addition, positioning it at anchor in deeper water offshore of the shoals' terminus would enable mariners to verify their position and determine a safe course with a great degree of certainty.

Many persons, doubtless, will wonder how a lightship can take the place of a lighthouse, for almost everyone knows that the former cannot be seen as far as the latter. . . The popular idea is that a lighthouse is situated on some dangerous spot which its light enables the mariner to see. This is a greatly mistaken idea. . . It is merely a landmark by which a mariner shapes his course. . . but a lightship will make it possible for her to keep several miles away [from danger], and that is all that is necessary (*New York Times*, 29 September 1897).

The Lighthouse Board's 1896 Annual Report included proposed plans to station a light vessel on the Diamond Shoals, as well as to establish additional aids to navigation there such as

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an offshore lighthouse. Concerning this, Congress passed an act on 11 June 1896 directing that part of a previous appropriation for a light station on the Diamond Shoals would be used to construct a light vessel (the LV 69) with the remainder of the cost coming from the Department of the Treasury (Lighthouse Board 1896:88). The LV 69 was slated to be sent to mark the Diamond Shoals following its completion. It was a sister ship to the LV 71 and identical in design.

The Diamond Shoal Station was part of the Lighthouse Board's Fifth District. It was located offshore of the Outer Diamond Shoal's eastern end at a position 15 miles at 128 degrees from the Cape Hatteras Light. When the LV 69 came into service, the Fifth Lighthouse District had three light vessels already in position in other locations. The LV 49 marked the entrance to the Chesapeake Bay off Cape Charles, the *Bluff* lightship marked the entrance to the port of Norfolk, and the LV 46 was stationed at Smith Point near the mouth of the Potomac River.

The LV 69 was delivered to the General Lighthouse Depot at Staten Island, New York, in August 1897. It was officially placed on station at the Diamond Shoals on 30 September 1897.

A nautical graveyard is Diamond Shoals, and with the arrival there of the new steam lightship, officially known as No. 69, coastwise pilots and navigators will breathe a sigh of relief. . .Numerous plans have been projected for the protection of vessels and seamen at this fatal point, and it now looks as though the problem had been finally solved (*Bath Daily Times*, 15 December 1897).

The lightship was an extremely important mark, assisting north-south coastwise traffic in staying clear of the hazardous shoals, while at the same time avoiding the strong set of the Gulf Stream...a short distance to the eastward" (Flint 1989).

The Lighthouse Board's 1897 placement of a light vessel on the Diamond Shoals was a trial to see if a vessel could withstand the exposed station's conditions. It "is largely in the nature of an experiment; the results are awaited with interest" (*Marine Engineering* 1897:8, 15). The LV 69 was moored by a 90-fathom (540-foot) cable that passed through the center of a large, square mooring buoy chained to a mushroom anchor in water 45 fathoms (270 feet) deep. The buoy held the sag of the chain and relieved the mushroom anchor from direct strain by the light vessel. The mushroom anchor weighed around 7,800 pounds its 900-foot long chain weighed 2,300 pounds (Putman 1933:206). The LV 69 maintained its position without incident until 26 February 1898 when constant chafing (friction) at the buoy's hawse pipe had worn the mooring chain to less than an inch of thickness and pierced the buoy's hull, causing it to fill with water and sink. A replacement buoy was secured but additional problems arose. The LV 69's electrical plant and its donkey (auxiliary) boiler broke down, and its hull suffered severe leaking from improper caulking and inadequate protection from wet weather. The lightship had to return to port for repairs as a result (Lighthouse Board 1898:110-111).

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Meanwhile, the LV 71 had remained at the Edgemoor Buoy Depot in Delaware since its February 1898 arrival. Although plans had been made for deploying it to mark the Overalls Shoals off Delaware Bay, the Lighthouse Board decided to change the LV 71's station assignment. It was transferred from the Lighthouse Board's Fourth District to the Fifth District for lightship service at the Diamond Shoal Station off Cape Hatteras. The Fifth Lighthouse District extended from Metomkin Inlet on the Delmarva Peninsula in Virginia to New River Inlet in southeastern North Carolina (Lighthouse Board 1897:94-103). The reasons for this station change are not explained in the historical record, but it may be that the Lighthouse Board decided that the need for a new lightship at the Diamond Shoals was a higher priority. Around the time the LV 71 was built a second breakwater was constructed at the Delaware Harbor of Refuge, near the Overfalls Shoals, which enlarged its anchorage area for vessels seeking refuge from stormy weather and ice flows (Kirklin 2007:75, 78). A lightship was eventually dispatched to the Overfalls Shoals when the LV 46 took up station there on 2 December 1898.

The lighthouse tender *Maple* towed the LIGHT VESSEL 71 out to the Diamond Shoals on 9 March 1898 to replace the absent LV 69. Its assigned location was almost 15 miles southeast by east from Cape Hatteras Lighthouse in 39 fathoms (234 feet) of water, well outside the outer limit of the shoals. The LV 71 had a red hull with white markings. The number "71" was painted on each side near the bow and stern with the words "Diamond Shoal" on the middle part of each side. The "Diamond Shoal" marking was shortened to "Diamond" after 1913.

During the one-year period following the September 1897 establishment of the Diamond Shoal Station, a total of 1,977 steamships, three sailing ships, 39 barks, 16 brigs, and 1,843 schooners had passed either the LV 69 or LV 71 (Lighthouse Board 1898:111). "She furnished a safe point of departure for all vessels bound up and down the coast, and has been much appreciated by navigators passing that locality."

The LV 71 was outfitted with that time's most modern electrical systems and light vessel equipment. Its exterior characteristics marking it as a U.S. light vessel included a brightly colored hull, luminary devices for visual warnings, and audible signaling devices such as signal bells, fog horns, and whistles. These were standard for all United States lightships during their period of operation from the late nineteenth century to the late twentieth century. Luminary devices were the most common light vessel feature. Following its launching, the Bath Iron Works installed a cluster of three lens lanterns powered by electricity on both of the LV 71's two masts above the gallery. Each lantern had a 100-candle power lamp and hung on a ball and socket joint. The lanterns were fabricated by the Lighthouse Board while their lenses were made in France. The lanterns on the masts were commonly called masthead lights. "There is a flashing device on the dynamo bed plate which causes the lights to burn twelve seconds between intervals of four seconds, thus shining four times a minute." These lights could be seen at a distance of 11 miles in clear weather (*Lewiston Saturday Journal*, 10 February 1898). While the LV 71 and the newer light vessels had electric-lamp lens lanterns, earlier light vessels had used lanterns fueled with oil or kerosene and equipped with reflectors instead of lenses. To help give

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warning to mariners during inclement weather, light vessels were also equipped with fog signals that provided an audible signal. The LV 71 had a hand-operated fog bell and a steam powered automatic fog whistle. The latter was a Crosby chime whistle that sounded three notes and was worked by hand or with an electric clock apparatus furnished by the Signal Control Company of Brooklyn, New York. An electric magnet controlled the whistle valve for turning it on and off (*Bath Daily Times*, 9 February 1898).

Between March 1898 and February 1901, the LV 71 and LV 69 cycled in and out of the Diamond Shoal Station, relieving one or another as required for overhaul and maintenance (see Table 4.). The harsh environmental conditions at the Diamond Shoals caused considerable wear and tear on the light vessels. The LV 71 sustained damage during its first rotation from being fouled up in the mooring buoy to which it was chained. Its copper hull sheathing under and along its counter was damaged and a blade was broken off its propeller. The LV 71 was relieved by the LV 69 on 24 November 1898 so it could return to port for repairs (Lighthouse Board 1898:111). This was the first of many such projects. The LV 71 required annual repairs throughout its time on the Diamond Shoals.

Table 4. Chronology of the LV 69 and LV 71 on the Diamond Shoals in 1897 to 1901 (Lighthouse Board 1898-1900; *New York Times*, 12 August 1900)

Light Vessel	Station	Date on Station	Date off Station	Notes
LV 69	Diamond Shoals (NC)	9/30/1897	3/9/1898	Buoy damaged
LV 71	Diamond Shoals (NC)	3/9/1898	11/24/1898	Buoy damaged copper hull sheathing and propeller
LV 69	Diamond Shoals (NC)	11/24/1898	8/18/1899	Broke adrift 1/8/1899; replaced on station 1/11/1899; dragged off station 2/14/1899; dragged off station 4/4/1899; ashore 8/18/1899 in cyclone
LV 71	Diamond Shoals (NC)	10/9/1899	9/2/1900	Dragged out of position on 11/6/1899, 1/20/1900, 2/4/1900, 2/21/1900, 3/13/1900, 4/5/1900, and 5/11/1900
LV 69	Diamond Shoals (NC)	9/2/1900	2/17/1901	

The LV 69 and LV 71 were dragged off station on at least 11 occasions between 1898 and 1900. Strong storms hitting the Diamond Shoals made it hard for the light vessels to stay in position. In such circumstances, the lightships would raise steam and use their engines to keep headway in order to relieve tension on the anchor. However, it was inevitable that heavy weather would drag them away from their ideal position and require the crew to return to station afterwards for repositioning. Lighthouse tender supply vessels visited on a regular schedule throughout the year to deliver coal and stores for keeping the vessel and crew supplied and outfitted. Keeping station on the Diamond Shoals was described as being, “arduous and difficult, especially in the winter season” (Lighthouse Board 1899:109).

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In August 1899, the LV 69 was on station while the LV 71 underwent its first major overhaul maintenance since being launched. This overhaul included removing the copper hull sheathing, felt layer, and wooden outer hull planking down to the center of the bilge and replacing it. The oakum used to seal seams was also removed from the remaining wooden outer planking as well as the spar, main, and lower decks. Following this, all seams were wedged up and re-caulked with new oakum. Other work included installing diagonal plate strapping (10 inches wide) which was added in pairs transversely on the frames to connect the sheer and lower bilge strakes. The ship's engine, condenser, air pump, circulating pump, feed pump, and bilge pump were opened and repaired, which included replacing some of the condenser tubes. The main boiler fastenings were strengthened and some new tubes installed. The engine's superheater piping system was removed from the smokestack uptake and connections made to feed it through check valves. Wrought iron stanchions were placed under every second deck beam and the fresh water tanks were cleaned inside, cemented, and painted. A breakwater was also built on the deck forward of the chain stoppers to prevent water from entering the hawse pipes and flooding the vessel's main deck (Lighthouse Board 1900:101-102).

After repairs were completed, the LV 71 was loaded with stores arrived back at the Diamond Shoal Station on 7 October 1899. It remained there until 2 September 1900. During that period, strong gales dragged it one to two miles away from its station on seven occasions. It was able to reposition itself back on the correct station each time. Even so, the Lighthouse Board wrote in its 1900 Annual Report that "Before another winter the vessel on this station will be furnished with heavier and improved moorings, and it is expected that less difficulty will be experienced in keeping her in position" (Lighthouse Board 1900:102). The LV 71's primary assignment remained the Diamond Shoal Station for the next 18 years (1900 to 1918).

When the LV 69 relieved the LV 71 on 2 September 1900, it was the last time that it would be assigned to the Diamond Shoals. The LV 69 transferred to the Fourth Lighthouse District in Delaware Bay in February 1901 and assigned to the Overfalls Shoals Station. It served there from 1901 to 1925, and was then reassigned to the Scotland Station off Sandy Hook, New Jersey, from 1925 to 1936.

Following the LV 69's reassignment to the Fourth District, a new lightship was assigned to the Diamond Shoal Station to partner with the LV 71. It was the LIGHT VESSEL 72, a 123-foot long self-propelled steel-hulled light vessel built by the Fore River Shipyard of Quincy, Massachusetts, and launched in 1900. The LV 72 served at the Diamond Shoals as its primary station 1901 to 1922. The LV 71 and LV 72 alternated in relieving each other at the Diamond Shoal Station on a rotation schedule of intervals lasting approximately three months. The LV 72 served temporary duty at other stations as well, including Cape Charles (Virginia) in 1903, Overfalls Shoals (Delaware) in 1904, and Cape Lookout Shoals (North Carolina) in 1906.

The average yearly cost for maintaining a light vessel in 1900 was \$6,000, but by 1905 that amount rose to \$15,000. These amounts did not take into account unexpected repairs which

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were needed frequently. The Lighthouse Board constantly lobbied for additional appropriations to pay for new lightships, necessary maintenance of existing light vessels, and upgrading older ones with modern equipment. By 1900, there were 44 light vessels in position and another eight in relief around the United States. The Fifth District, which included the Diamond Shoals, had three light vessels in position at one time. In 1905 there were 40 lightships in position and another 10 relief vessels, with the Fifth District having five in position and two for relief (Lighthouse Board 1900:26, 30, 95; Lighthouse Board 1905:10, 78).

By October 1901, the LV 71 needed another overhaul for general repairs. This included refurbishing its pumps, fitting drain pipes to the donkey boiler's safety valve, fitting braces to the steam whistle, and replacing two broken scuppers. Leaks in the deck and around the scuppers were also repaired to make the vessel watertight. The LV 71 also received two mushroom anchors that were larger than before to provide added holding strength (Lighthouse Board 1902:131). The LV 71 needed repairs again in April 1902 when it was hauled out and its bottom cleaned. Other work done at that time included repairing the copper sheathing, installing a new stock for the rudder, and overhauling the scuppers. Several leaks also needed work to make them watertight including the cabin and dynamo room skylights (Lighthouse Board 1902:131).

The frequency and magnitude of repairs for the LIGHT VESSEL 71 and most other lightships resulted from the wear and tear of sitting in exposed areas subject to constant ocean forces and adverse weather conditions (see Table 5.).

Table 5. LV 71 and LV 72 time on station and upkeep expenses from 1911 to 1918
 (Lighthouse Board 1911-1918)

Year	Light Vessel	On Station	Cost of Repairs	Cost of Maintenance
1911	LV 71	8 months 23 days	\$2,281.00	\$13,094.00
1911	LV 72	8 months 16 days	\$4,319.00	\$12,671.00
1912	LV 71	6 months 14 days	\$173.00	\$15,820.00
1912	LV 72	10 months 25 days	\$1,394.00	\$11,853.00
1913	LV 71	2 months 15 days	\$24,142.00	\$12,840.00
1913	LV 72	11 months 23 days	\$599.00	\$12,748.00
1914	LV 71	12 months	\$1,724.00	\$14,015.00
1914	LV 72	6 months 6 days	\$9,026.00	\$8,592.00
1915	LV 71	9 months 17 days	\$924.00	\$12,472.00
1915	LV 72	9 months 22 days	\$301.00	\$10,850.00
1916	LV 71	7 months 22 days	\$3,490.00	\$11,324.00
1916	LV 72	10 months 11 days	\$1,980.00	\$10,653.00
1917	LV 71	9 months 9 days	\$7,323.00	\$12,322.00
1917	LV 72	7 months 28 days	\$5,714.00	\$11,932.00
1918	LV 71	10 months 22 days	\$2,382.00	\$15,961.00
1918	LV 72	10 months 10 days	\$356.00	\$17,418.00

A heavy southwesterly gale in February 1903 drove the LV 71 from its station after the cable to the mooring buoy parted. This caused the mooring buoy, 1,200-pound mushroom

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anchor, and 135 fathoms (810 feet) of chain to be lost. The vessel's captain attempted to re-anchor the next day with spare mooring gear consisting of a 5,000 pound mushroom anchor and 90 fathoms (540 feet) of chain. After dropping the anchor and paying out the chain, the strain caused the lashing securing it to the ship in the chain locker to part and it, too, was lost. This made it necessary for the ship to return to its depot for new ground tackle (Lighthouse Board Annual Reports 1903:58).

The LV 71 received an extensive overhaul in 1913 consisting of new boilers, engine work, and installation of a mineral oil engine to replace one of its steam-driven electric generators powering the signal lights and wireless telegraph radio. These improvements increased the vessel's speed from 7 to 7.4 knots while reducing coal consumption from 1,120 pounds to 790 pounds per hour (Lighthouse Board 1913:23; Bureau of Lighthouses 1913:83).

During a normal year in service, a lightship might serve as a temporary or relief light vessel for an interval of time while a lightship station's regular vessel was undergoing repairs. While some Lighthouse Districts had one or more dedicated relief vessels, a regular light vessel could be dispatched for temporary service if needed. A dedicated relief light vessel would oftentimes have the word "Relief" painted on its side. When a relief or substitute light vessel was sent to serve on station, it would always change its signaling devices to match the temporary station's mast-head lantern light flash interval and duration characteristics. The LV 71 functioned as a relief vessel several times from 1900 to 1906 off the coasts of Virginia, North Carolina, and Massachusetts (see Table 6.). It also served temporarily on station until a light vessel under construction was ready for duty. The Lighthouse Board Annual Reports do not consistently provide specific details about individual light vessel movements for relief or temporary duty. It is unclear whether or not the LV 71 functioned as a relief vessel after 1906.

Table 6. LV 71's temporary lightship stations as a relief light vessel from 1900 to 1906 (Lighthouse Board 1900-1906)

Dates	Temporary Station
10/15/1900 to 6/23/1901	Temporary duty on Tail of Horseshoe (VA)
4/10/1903 to 4/29/1903	Temporary duty on Tail of Horseshoe (VA)
4/29/1903 to 6/15/1903	Temporary duty on Winter Quarter Shoal (VA)
7/20/1903 to 9/6/1903	Temporary duty on Cape Charles (VA)
10/14/1903 to 11/29/1903	Temporary duty on Cape Charles (VA)
8/1/1905 to 8/15/1905	Temporary duty on Cape Lookout Shoals (NC)
1/19/1906 to 3/7/1906	Temporary duty on Nantucket Shoals (MA)
5/1/1906 to 6/1/1906	Temporary duty on Cape Lookout Shoals (NC)
9/9/1906 to ?/25/1906	Temporary duty on Cape Charles (VA)
12/3/1906 to 12/25/1906	Temporary duty on Cape Lookout Shoals (NC)

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A government reorganization in 1910 resulted in the Lighthouse Board being dissolved and the Federal government aids to navigation program including light vessels becoming the U.S. Lighthouse Service (USLHS). The USLHS was administered by a new Bureau of Lighthouses assigned to the U.S. Department of Commerce and Labor. That department was subsequently split in 1913 to form the Department of Commerce and Department of Labor.

The LV 71's service history includes three notable incidents prior to 1918. On 27 December 1902, the lightship was backing out of its berth in Norfolk, Virginia, when its engine failed. This caused it to collide with the schooner *Bayard Barnes* which was at anchor off the Lambert Point coal pier. The collision split some of the schooner's outer hull planks and caused \$12 in damages (Lighthouse Board 1903:169). A second incident occurred on 9 January 1912 at the Diamond Shoal Station when the schooner *John Bossert* rammed the LV 71. The schooner's owners paid \$2,506.50 for damage repairs to the lightship's outer hull planking and engine room machinery (Lighthouse Board 1912:68). The third event was in early April 1915 when the LV 71's crew took onboard the master, his wife, and the 10-man crew from the shipwrecked five-masted lumber schooner *M.D. Cressy*. They were given food and clothing, and later transferred to a passing vessel (U.S. Coast Guard Historian's Office webpage on the LV 71).

The LIGHT VESSEL 71 and other lightships underwent modernization from time to time during their periods of service as improvements to maritime technology and aids to navigation were adopted. These upgrades to the LV 71's onboard equipment enhanced navigational safety in the Diamond Shoals vicinity. An important development followed the U.S. Navy's January 1905 establishment of a wireless telegraph radio station. A compatible wireless system for service at sea was installed aboard the LV 72 just a month later (Lighthouse Board 1905:84). The LV 71 received its wireless not long after. Another 1905 improvement was a new light signal installed on both the LV 71 and LV 72. This was an experimental electric 18-inch searchlight with a beam that projected southward and eastward from the station, midway between the horizon and the zenith (directly overhead). "Under suitable atmospheric conditions this beam may be seen many miles beyond the geographic range of the regular masthead lights to the southward and eastward, and thus give earlier warning to vessels of their proximity to the Diamond Shoals" (Lighthouse Board 1906:69-70). In 1906, the LV 71's two original masthead lantern clusters were replaced with a single 375 mm lens lantern on each mast, lighted with electric incandescent lamps. These were converted to electric arc lights in 1908, but subsequently changed back to electric incandescent lamps in 1910 (U.S. Coast Guard Historian's Office webpage on the LV 71).

By mid-1906, both the LV 71 and LV 72 were equipped with a submarine bell signal device. This signaling system consisted of two parts, a transmitter on one vessel and a receiver on another. The transmitter was a sound-producing submerged bell apparatus mounted on the light vessel. The sound signal receiver was a hydrophone (underwater microphone) installed aboard a different vessel passing through the vicinity. The bell would be submerged 25 to 30 feet deep over the side of the light vessel and struck at specific intervals. A passing vessel

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equipped with the receiver could detect the signal and time its characteristic intervals to determine which light vessel was transmitting, and thus determine its location. The submarine bell signal device was effective as much as 15 miles away (Lighthouse Board 1908:612-13; Submarine Signal Company 1906:3-5).

In 1912, the LV 71 received an up-to-date wireless transmitter-receiver. This improved radio communications to and from the light vessel. During the LV 71's final retrofit in 1917, arrangements with the U.S. Navy and U.S. Weather Bureau resulted in installing meteorological equipment to record and report weather observations twice daily via radio (U.S. Coast Guard Historian's Office webpage on the LV 71). Ironically, the lightship's radio equipment contributed to it being sunk during World War I.

THE WORLD WAR I BATTLE OF THE ATLANTIC OFF THE UNITED STATES EAST COAST (MAY 1918 TO OCTOBER 1918)

The LIGHT VESSEL 71 Shipwreck is an important historic resource and significant component of the larger maritime cultural landscape of the Graveyard of the Atlantic. This oceanic area off the North Carolina coast contains tangible connections to our past in the form of shipwrecks representing links between communities from around the country and the world.

The outbreak of World War I in Europe in 1914 did not initially affect the LIGHT VESSEL 71's service on the Diamond Shoal Station. Combat during the war's early years was far from America's shores and there seemed to be no direct danger to the LV 71 or other United States lightships. This eventually changed after Germany declared unrestricted submarine warfare in early 1917. By that time, the effectiveness of the German *Unterseeboot* (Underseaboat) fleet had been proven through the sinking of hundreds of ships by "U-boat" submarines. The United States entered World War I on 6 April 1917, joining the Allied Powers (France, Great Britain, et al.) in combat versus the Central Powers (Germany, Austria-Hungary, and the Ottoman Empire).

Typical World War I-era German U-boats were ocean-going, could submerge to a maximum depth of 50 meters (165 feet), and had a range of as much as 9,000 miles. These submarines generally measured some 71 meters (234 feet) long, 6 meters (20 feet) wide, and 4 meters (13 feet) deep. On the surface, a U-boat's 2,400 horsepower diesel engine could propel it to a speed of as much as 16 knots (faster than typical merchant ships of that period, but slower than the fastest warships). A U-boat relied on battery-powered electric motors when submerged, and had a top speed of eight knots. Its speed and mobility were limited when submerged, and awareness of its surroundings restricted to what could be seen through a periscope and sounds that could be heard underwater. A World War I U-boat's armament consisted of one or two deck-mounted cannon and from six to approximately 16 torpedoes fired from both bow and stern torpedo tubes. The crew consisted of approximately 39 men. A submarine's major advantage is that it can submerge and hide from enemy ships until getting into position to launch a surprise

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attack with torpedoes. Another offensive advantage of a World War I U-boat was that it could attack with its deck guns while on the surface, using its supply of artillery shells instead of expending torpedoes.

World War I submarine tactics differed from those used in later wars because torpedoes of that period were often unreliable or ineffective. This was due to the difficulty of positioning a submarine for making an accurate attack, or internal mechanical or guidance issues within the torpedo after it was launched. U-boats did fire torpedoes when they could expect success, but the number of these carried aboard a submarine was limited so they were expended only when necessary. It was frequently more effective to attack an unarmed merchant ship by making an artillery attack with shelling from deck guns, or to demand surrender and then dispatch a boarding party to place bombs onboard. U-boats often made a surface approach to an enemy merchant ship, which could provide time for the ship's crew to escape in lifeboats. This manner of attack also permitted U-boat crews to seize supplies and valuables from a targeted ship that surrendered. Valuable items could be taken from the helpless ship before it was sunk, sometimes hours after being captured. In addition, some U-boat types were designed to transport and deploy naval mines. These underwater bombs were placed in areas of maritime traffic and proved to be very effective in sinking or damaging passing vessels, sometimes long after a mine was initially laid.

Germany had a submarine fleet of just 29 U-boats when World War I began in 1914. By the war's end, the German Navy had commissioned 375 U-boats of 41 types belonging to six general classes. Certain of these types were built with sea-going ranges measured in several thousands of miles, proving that submarines could make successful trans-oceanic voyages.

History's first multi-submarine patrol occurred in August 1914 when a group of 10 German U-boats left their base and dispersed to attack British Navy warships in the North Sea. This particular operation was not a success, however. No British vessels were damaged and two of the U-boats were sunk. Later that month, however, the tactical promise of the U-boat was realized when the U-21 sank the British cruiser HMS *Pathfinder* off the heavily guarded entrance to Scotland's Firth of Forth. It was the first time a vessel was sunk in combat by a self-propelled torpedo launched from a submarine. This was the second successful submarine attack in history. The first had been made in 1864 during America's Civil War by the Confederate States submarine *Hunley*.

In September 1914, the U-9 sank three British cruisers in quick succession off Holland, firmly establishing forever the submarine's essential role in naval warfare. This loss of HMS *Aboukir*, HMS *Hogue* and HMS *Cressy* with 1,459 British sailors (only 837 men were rescued) was a major blow to the Allies' morale even though the warships sunk were of late nineteenth century design and outdated.

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The conduct of World War I naval combat expanded beyond warship-to-warship encounters on 20 October 1914 when the first U-boat capture and sinking of an unarmed merchant ship occurred. In that incident, a boarding party from the U-17 captured and then scuttled the British steamer SS *Glitra* off Norway.

Great Britain proclaimed a naval blockade of Germany in August 1914, and subsequently declared in November 1914 that German waters were a war zone covered by an “enter at your own risk” policy. The German government interpreted this action as an effort to starve its people by cutting off food imports. In retaliation, the German Navy imposed a U-boat blockade of the British Isles and the English Channel. Germany considered these waters to be a war zone where enemy and even neutral ships were subject to attack. Unrestricted submarine warfare came into full effect in 1915 with a U-boat focus on commercial shipping. This led to the 7 May 1915 torpedo attack by the U-20 on the British liner RMS *Lusitania*, 13 miles off Ireland. The *Lusitania* sank in just 18 minutes. Of the 1,198 people onboard, 1,959 were killed, 128 of them U. S. citizens. Another notorious attack occurred on 19 August 1915 when the U-24 torpedoed the White Star liner SS *Arabic* which was westward bound for America. It sank in less than 10 minutes with the loss of 44 passengers and crew including three Americans.

A German U-boat finally made it to United States waters in 1916 with the arrival of the non-combat merchant submarine *Deutschland*, which was operated by a subsidiary of the North German Lloyd shipping company. It had been built to carry cargo and crossed the Atlantic twice in 1916 as a demonstration project, making visits to Baltimore, Maryland, and New London, Connecticut. It remains unclear what were Germany’s true intentions concerning the *Deutschland*.

A more ominous submarine visit was made by the armed U-53 in October 1916. It arrived unexpectedly at Newport, Rhode Island, where its captain arranged courtesy visits with senior officers of the U.S. Navy. The United States was a neutral nation at that time and not at war with Germany. Before long, the U-53’s captain became concerned that port authorities at Newport might place the submarine under quarantine and he quickly put to sea. The U-53 navigated to the vicinity of the Nantucket lightship where it attacked and sank a number of non-American merchant ships affiliated with Great Britain. The U.S. Navy sent several warships to the area in response but did not attack the submarine because the United States was a neutral party. The U-53 soon departed for home after expending its last torpedo. This action was seen as an affront to the U.S. which, following later German provocations, declared war against Germany on 6 April 1917.

The Allies during World War I were slow to develop ways to counter the German submarine threat, although a number of effective strategic, tactical, and technological measures were adopted over time. These included maritime minefields, depth charges dropped from surface ships and detonated using hydrostatic triggers, rammings, Q-ships (warships disguised as unarmed merchant ships), zig-zag maneuvers, radio direction finding, and British submarines.

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The introduction of the convoy system with armed escorts proved to be an important and successful countermeasure against the U-boat. The British Admiralty opposed using convoys for more than two years, believing that the Royal Navy did not have the capability to protect very many ships. However, the spectacular number of ships sunk by U-boats in early 1917 convinced the British to adopt the convoy system. The technological limitations of World War I U-boats restricted their potential for successful action against escorted convoys.

U-boat operations continued through 1918 as Germany strove to shut down Allied Nation shipping around the British Isles, in the Arctic and Mediterranean Sea regions, and even in United States coastal waters. German U-boats eventually became a serious threat to merchant and naval shipping along the U.S. East Coast. Following the United States' declaration of war against Germany the U.S. military focused on sending vast manpower, supplies, and naval forces to Europe. However, it was unable to provide an adequate defense against submarine attacks close to the homeland. This left shipping traffic in U.S. waters vulnerable from April 1917 until the war's end in November 1918. During this period four U-boats voyaged across the Atlantic and attacked vessels in U.S. waters. Three of them - the U-151, U-140, and U-117 - sank a total of 10 vessels off North Carolina (Stick 1952:197).

The arrival of the U-151 off the U.S. East Coast in May 1918 made it the first foreign enemy naval ship to invade American waters since the War of 1812 (Stick 1952:194). The German submarine's initial actions included cutting undersea communication cables near the port of New York, laying mines off Long Island, New York, and the entrances to the Delaware Bay and Chesapeake Bay, and sinking three schooners off Virginia. After this, the U-151 went on to sink and damage additional vessels off North Carolina and New Jersey.

The U-151's warfare activities off North Carolina began on 5 June 1918 when it sighted the British steamer *Harpethian* with 40 men onboard and westward bound in ballast from Plymouth, England, to Newport News, Virginia. The steamer was 90 miles southeast of Cape Henry and directly east of Knotts Island, North Carolina, when the U-151 torpedoed the unarmed vessel. The *Harpethian* sank eight minutes later without loss of life. The U-151 struck again nine hours later some 50 miles east of the Virginia-North Carolina coast when it sank the Norwegian steamer *Vinland* which was en route from Cuba to New York with a cargo of sugar. The American steamer *Pinar Del Rio*, on its way to Boston with sugar from Cuba, was shelled by the U-151 on 8 June 1918 and sank 80 miles northeast of Nags Head, North Carolina, without loss of life. The submarine's attacks continued with the sinking of the Norwegian steamer *Henrick Lund* on 10 June 1918. It was carrying a general cargo and coal when it went down approximately 200 miles offshore of the Virginia-North Carolina border. The U-151 continued its patrol and moved north before returning to Germany in July. In total, this submarine sank 23 ships in the Western Atlantic during its 94-day voyage from Germany to the U.S. coast and back (Stick 1952:193-198).

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With the German submarine threat now in United States home waters, the U.S. military dispatched naval ships and pressed a number of smaller vessels such as yachts, fishing boats, and powerboats into action to act as sub chasers and minesweepers. Other anti-submarine measures included using aircraft for aerial anti-submarine patrols and the placing of large submerged nets outside harbors to stop U-boats from entering (Stick 1952:193). These efforts were partially successful against Germany's 1918 submarine campaign in U.S. waters. They also provided a learning experience that helped later in combating the enemy submarine threat during World War II.

THE AUGUST 1918 DEMISE OF LIGHT VESSEL 71

Following the U-151's departure, the next German submarine to prowl the North Carolina coast was the U-140, under the command of Fregattenkapitän Waldemar Kophamel. The U-140 was a new vessel of the U-cruiser type, launched on 22 June 1918 and larger and more modern than the U-151. It was 296 feet, 6 inches long and had a range of 12,000 miles. The U-140's cruising speed on the surface was 15 knots, and eight knots while submerged. Its armament consisted of two deck guns, four bow torpedo tubes, and two stern torpedo tubes.

The U-140 crossed the Atlantic in the summer of 1918, arriving off the Virginia coast in early August. While en route it sank the Portuguese sailing vessel *Porto* on 27 June approximately 550 miles off America's northeastern coast, and the Japanese steamer *Tokuyama Maru* some 200 miles off of New York on 2 August. On 4 August, it sank the American tanker *O.B. Jennings* some 60 miles southeast of Cape Henry, Virginia. The U-140 then navigated southward and on 5 August sank the American four-masted coal schooner *Stanley M. Seaman* 110 miles off Cape Hatteras. The *Stanley M. Seaman* was headed from Newport News, Virginia, to the Dominican Republic when the U-boat fired a warning shot at the ship's rigging. The crew scrambled quickly into their yawl boat without bringing supplies or launching the schooner's motorized lifeboat. When Captain Kophamel learned of the crew's situation, he allowed them to return to the *Stanley M. Seaman* to collect provisions and switch to the motor lifeboat. Men from the U-140 then boarded the schooner to place bombs and scuttle it (Stick 1953:198-200).

On 6 August 1918 the U-140 attacked the unarmed American steamship *Merak*, approximately four miles north of the LIGHT VESSEL 71 which was anchored on the Diamond Shoal Station. The *Merak* was headed from Newport News, Virginia, to South America with a cargo of coal and was traveling at eight knots when the U-140 fired its deck gun at the ship's bow. The *Merak's* captain quickly turned the ship toward shore and started an evasive zig-zag course, but the submarine followed it to continue the attack. Before long, the *Merak* ran aground and its 43-man crew launched lifeboats to escape. The entire scene that afternoon played out in view of the LV 71's crew, including first mate Walter L. Barnett who was in charge. At that time the vessel's assigned captain, Charles Swanburg, was on liberty along with two other crew members (Stick 1953:200).

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Upon hearing the sound of cannon fire, Barnett climbed one of the masts and observed smoke in the distance. After sighting the German submarine on the surface north of the lightship, Barnett directed the LV 71's wireless (radio) operators to broadcast a message telling of the attack. The transmission went out using the LV 71's call sign, KMSL. It was received by the American steamer *Mariners Harbor* and transcribed as follows:

KMSL SOS. Unknown vessel being shelled off Diamond Shoal Light Vessel No. 71. Latitude 35° 05', longitude 75° 10' (Navy Department 1920:78).

The message transmitted from the LV 71 was received by other ships in the vicinity as well. A Lighthouse Service Bulletin from 1919 stated that 25 vessels heard the warning and sought shelter from possible attack in the Cape Lookout Bight, southeast of Cape Hatteras (Bureau of Lighthouses 1919:69).

The U-140 changed course after the LV 71's message was broadcast and made for the light vessel. The lightship was unable to take any evasive action because it required five hours to get steam up for its engine and raise anchor. The submarine soon began to shell the LV 71 with its deck guns. The lightship's chief engineer, Alonzo Roberts, remarked later that he believed the U-140 attacked the lightship because it had monitored the transmitted warning (*Richmond Times-Dispatch*, 15 August 1918).

The submarine's gunfire soon disabled the LIGHT VESSEL 71's radio and showed that the ship's destruction was imminent. Its 12-man crew hastily lowered a lifeboat and evacuated the vessel without gathering supplies or saving any of their personal belongings. The U-140 continued to fire on the LV 71 as they rowed west. First mate Barnett recounted that "Finally we could see her go down in the distance. By then the sub was way out of sight, so I told the boys to pull in the oars, and I mounted the sail, using the sweep oar for a mast" (Stick 1953:202). The light vessel's crew consisting of two officers, two radio operators and eight others left the LV 71 around 2:30 PM and reached shore a short distance north of the Cape Hatteras wireless station at 9:30 PM. After finishing off the LV 71, the U-140 returned to the grounded *Merak* and sent men with explosives aboard the abandoned steamer to destroy it. The submarine also fired shells at another vessel in the vicinity, the British steamer *Benleuch*, but it escaped.

Secretary (of the Navy) Daniels said today that undoubtedly the purpose of the submarine commander in destroying the lightship was to hinder commerce as much as possible. Great volumes of both coastwise and overseas commerce pass Cape Hatteras both to and from Southern ports, and the German probably believed that with the lightship gone some vessels might be wrecked on the shoals (*New York Times*, 8 August 1918).

The attack upon the lightship may represent a new phase of enemy submarine operations off the American coast, designed to hamper shipping by destruction

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of important navigation signals. On the other hand it may merely represent an isolated case of frightfulness. If the raider has definitely set out to destroy lightships, exposed light houses and the like, it is believed that he cannot do very extensive harm before his ammunition supply is exhausted (*Macon Telegram*, 8 August 1918).

A newspaper article stated that the U-140 headed for the North Carolina coast after sinking the LIGHT VESSEL 71 and *Merak*, and came as close as a half a mile from shore. The submarine remained off North Carolina for several more days. On 10 August it attacked the Brazilian steamer *Uberaba* which radioed for help. The USS *Stringham*, a destroyer, was nearby and hurried to the scene where it sighted the U-140 which submerged. The USS *Stringham* dropped depth charges but the submarine escaped, leaving the *Uberaba* undamaged. Three days later the U-140 opened fire with its deck guns on the USS *Pastores*, a naval supply ship. The American ship returned fire and the U-140 broke off contact. On 21 August far to the north, the U-140 sank the British steamer *Diomed* which was en route to New York Harbor. A day later it attacked the American cargo vessel *Pleiades* which escaped. After this the U-140 began its return voyage and arrived at the port of Kiel, Germany, on 20 September 1918.

The next German submarine to arrive off North Carolina was the U-117 which had departed Kiel, Germany, just nine days after U-140. Following arrival in U.S. waters, the U-117 laid several mines off New Jersey, Delaware and Virginia, and then headed to North Carolina where it laid more mines before attacking merchant shipping around Cape Hatteras. On 16 August the U-117 torpedoed the British tanker *Mirlo* off the Wimble Shoals. The ship's flammable cargo caught fire and nine of the 52 aboard lost their lives. A heroic rescue effort by U.S. Coast Guard personnel from the Chicamacomico Lifeboat Station under the command of Warrant Officer John Allen Midgett, Jr., brought the others safely ashore. The U-117's next and last attack off Cape Hatteras was against the Norwegian bark *Nordhav* which was sunk two days later farther offshore. The submarine then headed back across the Atlantic to Germany.

The German Navy was in the process of sending three additional U-boats into U.S. waters when the war ended in November 1918. These submarines were ordered to cancel their missions and surrender.

Almost 5,000 merchant ships (amounting to approximately 12,000,000 tons) were sunk during World War I by the submarines of Germany and Austria-Hungary, with the loss of approximately 15,000 Allied sailors (Brechtelsbauer 1995-2012). Great Britain suffered the worst losses with almost 3,800 attacks on its vessels. The United States suffered less than 200 attacks. The most successful U-boat was the U-35 which sank 226 ships between 1915 and 1918, totaling over 5,000,000 tons. Following the close of World War I, Germany surrendered or broke up all of its U-boats as required by the war's Armistice and the subsequent Treaty of Versailles. Despite Germany's defeat, submarines had proven to be an immensely successful weapon against the island nation of Great Britain which depended heavily on seagoing

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commerce. During the peacetime years from the end of World War I to the outbreak of World War II, German naval commanders internalized the lessons of submarine warfare and continued to improve its technology. The U-boat would return with a vengeance during World War II.

Immediately following the LIGHT VESSEL 71's sinking in 1918, mariners called for another lightship to be placed at the Diamond Shoals along with patrols by anti-submarine vessels to prevent another incident. It was also recommend that ships like the LV 71 be outfitted with defensive deck guns to deter or defend against U-boat attack (*Charlotte Observer*, 9 August 1918). On 14 August 1918 the *New York Maritime Register* reported that the U.S. Hydrographic Office would mark the Diamond Shoal Station as soon as possible with a combination gas, whistle, and submarine bell buoy which would be painted red and rise 16 feet above the sea.

The Diamond Shoals were not marked with a lightship again until 30 March 1919 when the LV 72 arrived on station with first mate Walter Barnett aboard (Bureau of Lighthouses 1919:69). On 4 November 1919, Congress appropriated \$450,000 to construct and equip a new lightship to replace the lost LV 71. Its construction began on 24 January 1920. Designated as the LIGHT VESSEL 105, this steel-hulled lightship was delivered to the Federal government on 8 April 1922 and dispatched to the Diamond Shoal Station soon afterward (Commissioner of Lighthouses 1922:39).

A lightship remained on duty at the Diamond Shoals until 1966 when a manned lighthouse named the Diamond Shoals Light was established. This light station was a rectangular steel structure supported by pilings and resembled an offshore oil platform. It was subsequently automated in 1977 and remained active until being discontinued in 2001. The inactive light station platform was sold at auction in 2012 and is now privately owned. A U.S. Coast Guard lighted buoy now marks the Diamond Shoals.

CONCLUSION

The number of American light vessel stations at any one time reached a maximum of 56 in 1909 during the period when the LV 71 served on the Diamond Shoals. Today, only a limited number of lightships survive in the U.S. either above water level or below. Fourteen light vessels are known to be afloat, one more is preserved in a dry berth on land, and an additional one may have been scrapped recently (U.S. Coast Guard Lightship Sailors Association International, Inc. 2014). The National Register of Historic Places online database includes one light vessel shipwreck, 10 floating lightships, and one dry-berthed lightship that are listed in the NRHP or have been designated a National Historic Landmark (see Table 7.).

All of the NRHP-listed and NHL lightships and shipwreck have either an all-wood or all-steel hull. None of them are composite-built as is the LIGHT VESSEL 71. The only light vessel shipwreck previously included in the National Register is the LV 57 which did not sink while in

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active service as a lightship. Since the LV 71 sank during active service, it was then in its original operating condition and fully outfitted for duty on station.

Table 7. Light vessels surviving afloat in the U.S., and those listed in the National Register of Historic Places (NRHP) or designated a National Historic Landmark (NHL)

Original Number	Name and Other Number	NRHP or NHL	Current Use	Current Location	Shipwreck or Vessel	Date Launched	Decommissioned
LV 57	Gray's Reef	NRHP, 1991	Shipwreck	Milwaukee, WI	Shipwreck	1891	1923 (repurposed, later scrapped, abandoned, and sunk)
LV 75	Lake St. Claire	No	Private	Staten Island, NY (possibly scrapped)	Vessel	1902	1939
LV 79	Barnegat (WAL 506)	NRHP, 1979	Private	Camden, NJ	Vessel	1904	3 March 1967
LV 83	Swiftsure (WAL 508)	NHL, 1989	Museum	Seattle, WA	Vessel	1905	1960
LV 87	Ambrose (WAL 512)	NHL, 1989	Museum	New York, NY	Vessel	1907	4 March 1966
LV 101	Portsmouth (WAL 524)	NHL, 1989	Museum	Portsmouth, VA	Vessel	1916 (12 Jan)	23 March 1964
LV 103	Huron (WAL 526)	NHL, 1989	Museum	In dry-berth at Port Huron, MI	Vessel	1920 (1 May)	25 August 1970
LV 107	Winter Quarter (WAL 529)	No	Restaurant/Office	Jersey City, NJ	Vessel	1923	1968
LV 112	Nantucket (WAL 534)	NHL, 1989	Museum	Boston, MA	Vessel	1936	1975
LV 115	Frying Pan (WAL 537)	NRHP, 1999	Bar/ Event Space	Chelsea, NY	Vessel	1930	4 November 1965
LV 116	Chesapeake (WAL 538))	NHL, 1989	Museum	Baltimore, MD	Vessel	1930	6 January 1971
LV 118	Overfalls (WAL 539)	NHL, 2011	Museum	Lewes, DE	Vessel	1938	1972
WLV 196	Umatilla	No	Private	Ketchikan, AK	Vessel	1946	1971
WLV 604	Columbia	NHL, 1989	Museum	Astoria, OR	Vessel	1950	1979
WLV 605	Relief	NHL, 1989	Museum	Oakland, CA	Vessel	1950 (4 May)	1 January 1976
WLV 612	Nantucket I	No	Private	Boston, MA	Vessel	1950	1983
WLV 613	Nantucket II	No	Private	Wareham, MA	Vessel	1952 (4 Feb)	20 December 1983

The LIGHT VESSEL 71 Shipwreck is one of the few surviving pre-1930 United States light vessels, and is one of two U.S. government ships lost to enemy attack in home waters during World War I. The other was the USS *San Diego*, sunk off Long Island, New York, in

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July 1918 by a mine laid by the U-151. The LV 71 is also the only U.S. lightship sunk by enemy action during the twentieth century.

When the U.S. Coast Guard took over control of lighthouses and light vessels in 1939 there were only 30 active lightship stations, many less than in the early 1900s. The number of light vessels continued to decline until 1983 when the last active lightship, stationed on the Nantucket Shoals, was replaced with a navigational buoy. That event marked the end of lightship usage in the United States.

The story of the LIGHTSHIP LV 71 is significant in the history of the United States government's long term nation-wide program for establishing and maintaining aids to navigation. It is a story of innovation and of service to the nation in times of peace and war, and of men who risked their lives to ensure safe navigation and protection to merchant shipping during a time of conflict. The archeological remains of the LV 71 Shipwreck retain integrity of location, setting, design, materials, workmanship, feeling, and association. This property is historically significant at the national level and qualifies for inclusion in the National Register of Historic Places under Criteria A, C, and D.

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LIGHT VESSEL 71 Shipwreck
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Previous documentation on file (NPS):

- preliminary determination of individual listing (36 CFR 67) has been requested
- previously listed in the National Register
- previously determined eligible by the National Register
- designated a National Historic Landmark
- recorded by Historic American Buildings Survey # _____
- recorded by Historic American Engineering Record # _____
- recorded by Historic American Landscape Survey # _____

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other

Name of repository: National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries (Silver Spring, MD) and U.S. Coast Guard Historian's Office (COMDT CG-09224), U.S. Coast Guard Headquarters (Washington, DC)

Historic Resources Survey Number (if assigned): _____

10. Geographical Data **Confidential under NHPA Section 304*

Acreeage of Property Less than one acre

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates

Datum if other than WGS84: _____ (enter coordinates to 6 decimal places)

1. Latitude: _____ Longitude: _____

Or

UTM References Datum (indicated on USGS map):

NAD 1927 or NAD 1983

1. Zone: 18N Easting: 470274 Northing: 3882734

LIGHT VESSEL 71 Shipwreck

Dare County, NC

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Verbal Boundary Description (Describe the boundaries of the property.)

The LIGHT VESSEL 71 Shipwreck is located offshore approximately 14.5 miles southeast of Cape Hatteras, North Carolina, in United States federal waters. It rests upon the sea floor in water approximately 185 feet deep. The LV 71 Shipwreck site consists of articulated remains of the vessel's hull structure and associated artifact material that is contained within or separated from the main hull structure. This associated artifact material includes equipment such as the steam engine, chronometer, lanterns, anchors, and anchor chain, as well as disarticulated shipwreck remains such as hull fragments, parts of the lightship's superstructure, and masts.

Boundary Justification (Explain why the boundaries were selected.)

The National Register boundary of the LIGHT VESSEL 71 Shipwreck encompasses the sunken vessel and remains which are Federal government personal property owned by the U.S. Coast Guard.

11. Form Prepared By

name/title: Deborah Marx, Maritime Archaeologist, and James Delgado, Ph.D., Director of Maritime Heritage

organization: NOAA/Office of National Marine Sanctuaries

street & number: 1305 East West Hwy Building: SSMC4

city or town: Silver Spring state: MD zip code: 20910

e-mail: Deborah.Marx@noaa.gov

telephone: 781-545-8026 ex 214

date: 8 May 2015

LIGHT VESSEL 71 Shipwreck

Dare County, NC

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County and State

Additional Documentation Submitted herewith:

- **Map:** Figure 1. LIGHT VESSEL 71 Shipwreck location.
- **Photographs:** Prints and DVD in enclosed envelope.

Name of Property: LIGHT VESSEL 71 Shipwreck
City or Vicinity: Offshore of Cape Hatteras
County: Dare County
State: NC
Name of Photographer: See below
Date of Photograph: See below
Location of Original Digital Files: NOAA Office of National Marine Sanctuaries,
1305 East West Hwy Building: SSMC4, Silver Spring, MD 20910.
Number of Photographs: 4

Photo # 1 (NC_Offshore_Dare_County_Light Vessel LV 71_001)
Bath Iron Works plan for LIGHT VESSEL 71's construction. "Profile view of U.S. Light
Vessels 68-69-71, Hulls 19-20-22." Courtesy of Maine Maritime Museum, Bath, ME.
Name of Photographer: Unknown
Date of Photograph: Unknown (original document is dated August 22, 1897)

Photo # 2 (NC_Offshore_Dare_County_Light Vessel LV 71_002)
LIGHT VESSEL 71 port side. NOAA *Monitor* National Marine Sanctuary collection,
Newport News, Virginia.
Name of Photographer: Unknown
Date of Photograph: Circa 1898-1918

Photo # 3 (NC_Offshore_Dare_County_Light Vessel LV 71_003)
Side scan sonar image of LIGHT VESSEL 71.
Name of Photographer: NOAA *Monitor* National Marine Sanctuary
Date of Photograph: 2014

Photo # 4 (NC_Offshore_Dare_County_Light Vessel LV 71_004)
Side scan sonar image of LIGHT VESSEL 71.
Name of Photographer: NOAA *Monitor* National Marine Sanctuary
Date of Photograph: 2014

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management, U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

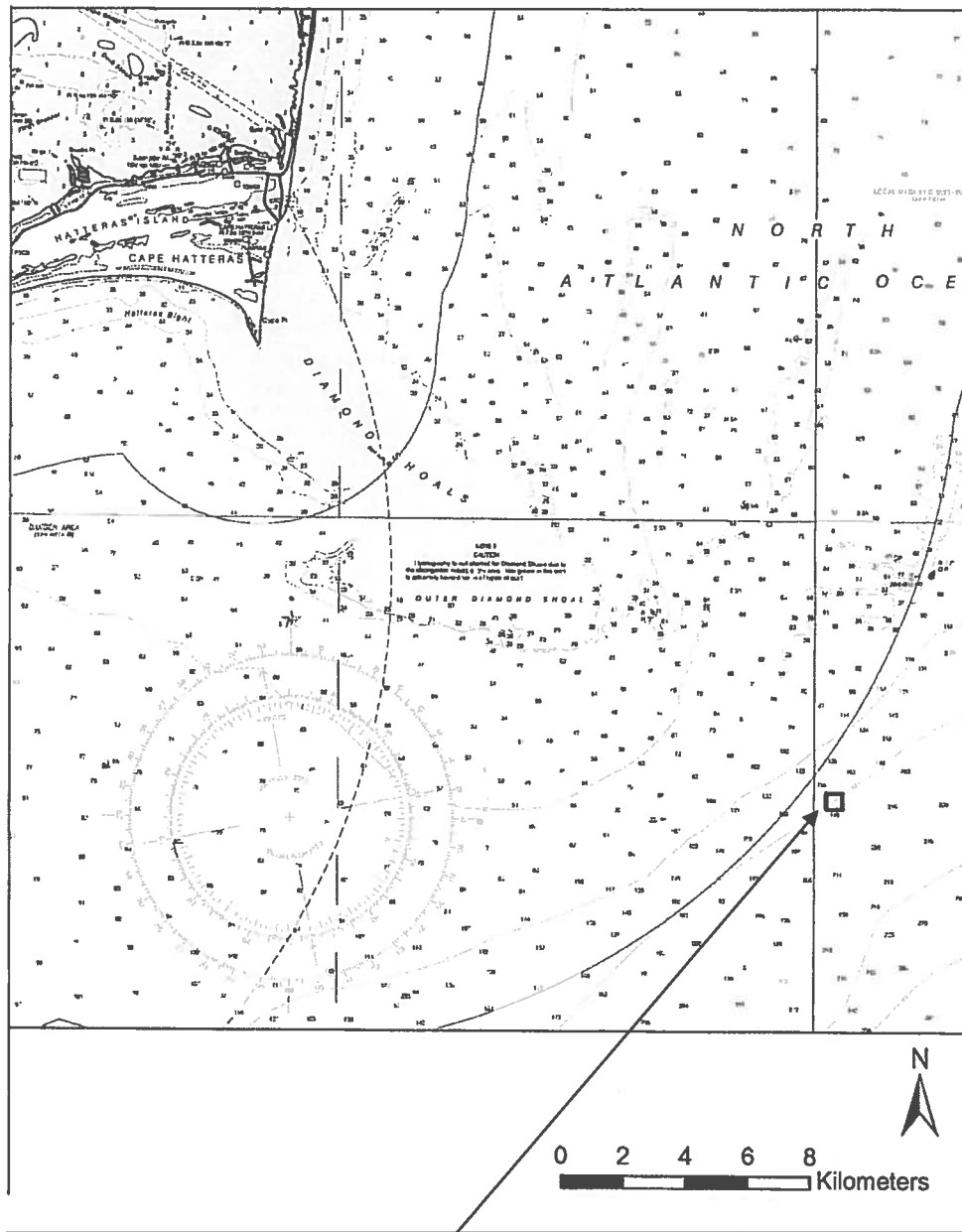
United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

LIGHT VESSEL 71 Shipwreck
Name of Property
Dare County, NC
County and State
Name of multiple listing (if applicable)

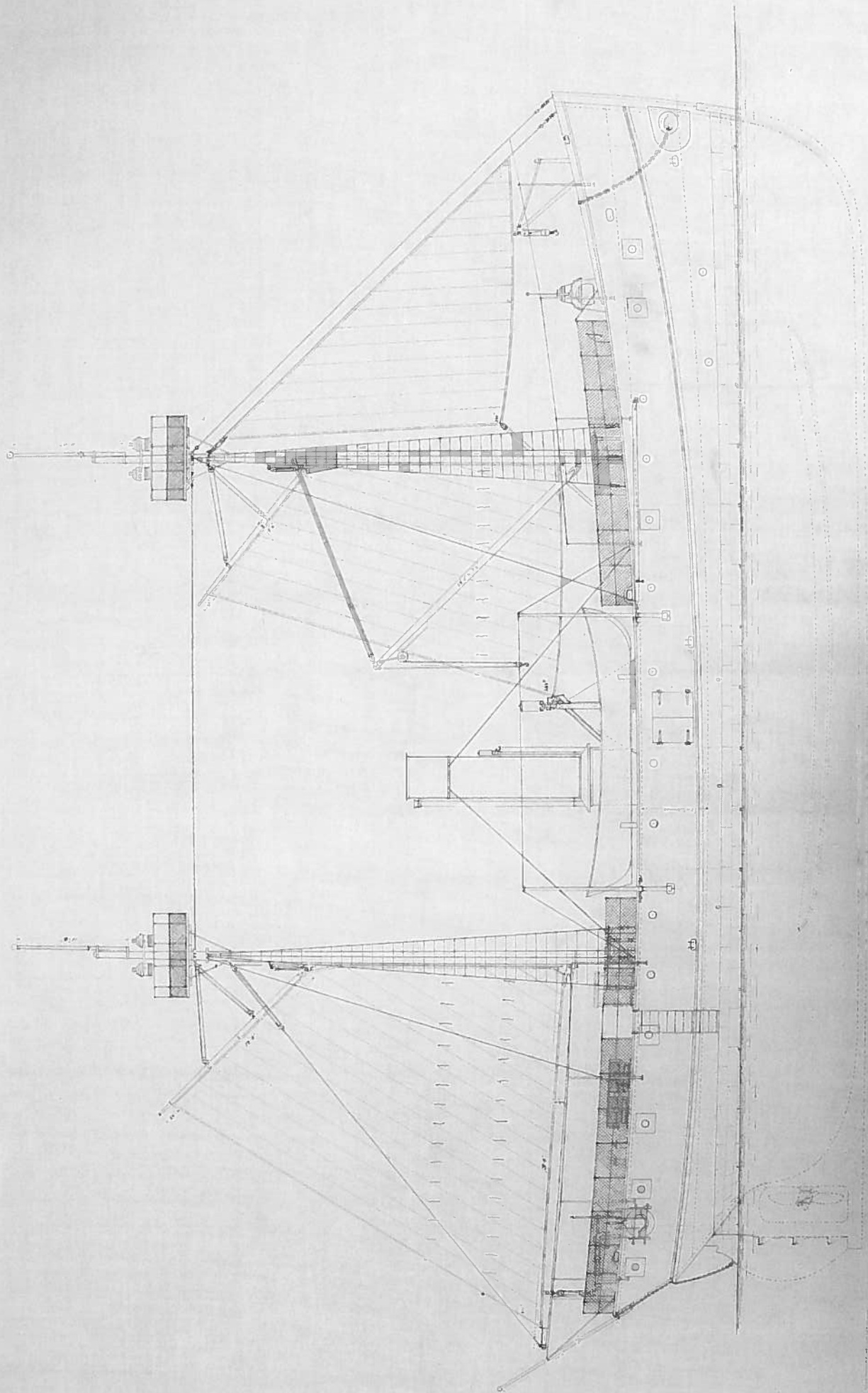
Section number Additional Documentation - Map Page 1

Figure 1. LIGHT VESSEL 71 Shipwreck location (portion of NOAA Nautical Chart Number 11555, 41st Edition, March 2012). **Confidential under NHPA Section 304*



LIGHT VESSEL 71 Shipwreck

SCALE 1/4" = 1'



U-S-LIGHT VESSELS 68-69
HULLS 19-20
BATH IRON WORKS
BATH - MAINE

Wm. B. ...

503

AUG 22 - 1887

Wm. B. ...



