

HISTORIC CONTEXT FOR AIDS TO NAVIGATION IN DELAWARE

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SUMMARY

Historic Theme

Aids to navigation are a property type within the historic theme of Transportation and Communication. Aids to navigation are closely associated with:

Other property types within this historic theme such as landings, ports, harbors, canals, piers, jetties, breakwaters, and shipwrecks.

Major subthemes of water and land transportation.

The historic themes of Fishing and Oystering;
Architecture, Engineering, and the Decorative Arts;
Settlement Patterns and Demographic Change.

Geographic Zone

Aids to navigation occur in Delaware's Coastal Zone. The Coastal Zone is a band that roughly parallels the Delaware coastline. The inland boundary projects to include waterways and surrounding land to the limits of navigation. The boundaries and size of the Coastal Zone have changed with:

Changes in the environment (erosion, sedimentation, and dredging).

Changes in technology (ship construction, dredging, waterway and harbor improvements).

Changes in the economies of settlements, commodities, and shipping.

The establishment, operation, replacement, and abandonment of aids to navigation in Delaware's Coastal Zone have been influenced by the same changes.

Chronological Period

Aids to navigation in Delaware were planned, constructed, maintained, and operated as part of a national system under a federal administration. The federal administration of aids to navigation may be structured into three periods (1789-1939 overall, with a first period covering minimal colonial administration before 1789) that occur within the third, fourth, and fifth chronological periods (1770-1940) identified in the Delaware Plan.

Definition of Property Types

Delaware aids to navigation may be classified according to the following property types:

Harbor lights: primarily lighthouses

Range lights: lighthouses and light towers

Channel lights: lighthouses and light towers

Lightships

Buoys

Natural marks

Other aids to navigation and associated structures

The location of property types within the Coastal Zone is known or can be predicted according to the particular function of each property type. The overall current condition of all property types is expected to be poor to fair, due to harsh environment, loss of maintenance, and abandonment. Aids to navigation are threatened by large-scale environmental changes and manmade efforts to resist them. Aids to navigation are also threatened by land development trends.

Considerations and criteria for evaluation of significance and integrity of Delaware's aids to navigation are related to the characteristics and function of each property type.

Preservation Goals

Aids to navigation are an important overall property type in relation to the priorities for historic theme, geographic zone, chronological period, and historic contexts established in the Delaware Plan. Fifteen specific preservation goals are recommended for nine aids to navigation property types as a function of ownership, level and extent of expected significance, and specific property type characteristics. Ranked priorities are suggested for the fifteen overall goals (independent of property types) and for each property type within the group of property types to which each overall goal applies. Also, overall relative priorities are suggested for each combination of goal and property type.

BACKGROUND AND SCOPE OF PROJECT

This historic context was prepared by Gredell & Paul for the Delaware Bureau of Archaeology and Historic Preservation (BAHP), of the Division of Historic and Cultural Affairs, under a grant from the Bicentennial Lighthouse Fund. The grant was administered by the National Park Service of the U. S. Department of the Interior. Michael Johannes Paul was author of the historic context; William S. Lynch was research assistant. Preparation of the historic context was reviewed for the Bureau by the Center for Historic Architecture and Engineering of the University of Delaware.

The scope of the project, as defined by the Bureau's instructions for survey and planning grant applications under the Delaware Bicentennial Lighthouse Fund Fiscal Year 1988, was to develop an historic context for aids to navigation in Delaware according to the framework and process described in the Delaware Comprehensive Historic Preservation Plan (Delaware Plan) and the Historic Context Master Reference and Summary, both published in June, 1989. As part of Delaware's historic preservation program, this historic context also was developed in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation.

DEFINITION AND BRIEF HISTORY OF U.S. AIDS TO NAVIGATION

"Aid to navigation" is a technical term that is defined by both national¹ and international² governing agencies. The technical definition may be paraphrased as: a recognizable object used in conjunction with nautical charts to guide the movement of a ship. This definition draws on the sense of navigation that emphasizes the guidance, control, or plotting of a ship instead of its simple act of passage. The most well known aids to navigation are lighthouses; other types of aids are lightships, buoys, towers, and range lights. As discussed later, aids to navigation also include natural landmarks and seamarks such as promontories, trees, protruding reefs, and shipwrecks. Aids to navigation do not include waterways (i.e., channels, canals) or waterway or harbor improvements (i.e., dredging, piers, jetties, breakwaters, docks).

¹ Aids to Navigation Manual, Ed. C.G. No. 222, United States Coast Guard, Washington, DC: Government Printing Office, 1945.

² International Dictionary of Aids to Marine Navigation, as cited in J. M. Naish, Seamarks, Their History and Development, London, England: Stanford Maritime Limited, 1985.

Natural and simple, manmade aids to navigation were probably used in the earliest commercial arrivals of settlers to North America. The first aids to navigation likely were distinctive natural features such as hills, cliffs, and trees that would mark safe harbor, and protruding rocks that would warn of hazardous shoals or reefs. Later, crude towers would have been made from coastal timbers or stones to mark a landing during the day; lanterns would be hung to do the same at night. These early aids were temporary and insubstantial; probably nothing remains of them today.

The first lighthouse³ in what later became the continental United States was Boston Light, a stone tower first erected on Little Brewster Island in 1716. During colonial times other lighthouses were built at significant ports of trade along the Atlantic coast: Brant Point (Nantucket Harbor, Massachusetts, 1746), Tybee Island (Savannah, Georgia, 1748), Beavertail (Newport, Rhode Island, 1749), New London (New London Harbor, Connecticut, 1760), Sandy Hook (New York, 1764), Morris Island (Charleston Harbor, South Carolina, 1767), Plymouth (Plymouth Bay, Massachusetts, 1769), Portsmouth (Portsmouth Harbor, New Hampshire, 1771), Cape Ann (Massachusetts Bay, 1771). At about the same time that Sandy Hook Light was built, business interests from Pennsylvania funded the construction of the first lighthouse on Cape Henlopen, Delaware, at the entrance to the Delaware Bay and, thence, the port of Philadelphia. Cape Henlopen Lighthouse was completed and lit in 1767.

Most colonial lighthouses (and the buoys that were used near them) were requested, funded, and operated by local interests -- the merchants, shippers, and other townspeople who used and depended upon the economy of the harbor. For this reason, the colonial aids to navigation were located in or very near populated areas. Few colonists were willing to pay for, build, or maintain aids to navigation in remote, unpopulated areas, even though the needs of and value to navigation may have been great.

On August 7, 1789 the newly formed United States Congress passed an act that gave the federal government responsibility for lighthouses (and other types of aids to navigation), including those then in existence and under construction. This action curtailed the localism that had been inherent in the colonial development of aids to navigation, and replaced it with a concern for overall effectiveness and efficiency. Aids to navigation in the United States have remained a federal charge to the present

³ For a history of the U. S. lighthouse service, see F. R. Holland, America's Lighthouses, An Illustrated History, Mineola, NY: Dover Press, Inc., 1988.

day. In 1789, at the time of transfer, there were approximately 12 lighthouses, existing or under construction, and an unknown number of buoys.

Federal responsibility in the earliest years of the United States involved the personal attention of presidents in the larger affairs of aids to navigation, with most routine matters being increasingly handled by the secretary of the treasury. In 1820 responsibility was shifted to the fifth auditor of the treasury, Stephen Pleasonton, whose tenure lasted some thirty years. During this period, the concern for efficiency was warped into a parsimony that left U. S. aids to navigation in a wretched state of marginal utility. Although the number of lighthouses increased from 55 in 1820 to 331 in 1852, the quality of the nation's aids to navigation deteriorated. Proven European developments in optics and construction were ignored in favor of outmoded, inferior methods and materials that had become institutionalized. Federal responsibility was being replaced by private, commercial efforts such as Blunt's American Coast Pilot.

In 1852, following a comprehensive and critical investigation, Congress created the Lighthouse Board, within the department of commerce, to supervise and direct the nation's aids to navigation. The nine member board, with strong military and scientific representation, effected a rapid resurgence in quality, quantity, and effectiveness, in part through administrative reforms, in part by incorporating technological advances. Under the Board's stewardship the number of aids to navigation of all types (including buoys) grew to over 11,700 by 1910. The Board effectively promoted caisson construction of lighthouse foundations, iron lighthouse superstructures, gas lighting of buoys and lighthouses, and fresnel lenses.

In 1910, responding to the increasing complexities of administration and operation of the nation's aids to navigation, Congress replaced the Lighthouse Board with the Bureau of Lighthouses, headed by a single commissioner, still within the department of commerce. Under the twenty-five year leadership of Commissioner George R. Putnam and a cadre of capable district inspectors, the Bureau initiated growth and technological advancements that made the U. S. system of aids to navigation the finest in the world. By 1924, the U. S. lighthouse service, with over 16,800 aids to navigation, was the largest such organization worldwide. During its existence, the Bureau of Lighthouses introduced electric lighting, electric fog signals, electric buoys, radio beacons, and, most importantly, automation of aids to navigation.

In 1939, the Bureau of Lighthouses was abolished and responsibility for aids to navigation was transferred to the U. S. Coast Guard, which was then within the Treasury Department. The Coast Guard continued the progressive management and operations of its predecessor, and the nation's system of aids to navigation has continued to grow and improve to the present day⁴. Improvements under the Coast Guard included introduction of Loran and Shoran (radio) navigation signals, the significant addition of ice-resistant lights, and the near completion of automation.

The history of aids to navigation may also be structured by examining the technological development of optics (and other signals), structure (both foundations and superstructure), construction, architectural style, and operation. However, in the U.S. and in Delaware, all of these technological themes were controlled, especially until the 1880s, by the regressive intransigence of the federal administration of aids to navigation that had been institutionalized under the leadership of the fifth auditor. European advances in lighting, optics, and structure effectively were ignored for half a century, then were suddenly implemented throughout the system of aids to navigation under the mature administration of the Lighthouse Board. The development of the technological history of aids to navigation is outside the scope of this historic context.

HISTORIC THEME

As identified⁵ in the Delaware Plan and the Historic Context Master Reference and Summary, aids to navigation is a property type within the historic theme of Transportation and Communication. Aids to navigation is integrally and synergistically related to other property types, such as landings, ports, ferries, and canals, as well as to the subthemes of maritime shipping and land transportation.

Because the purpose of aids to navigation is to facilitate guidance, control, and plotting of a ship's course, aids to navigation were often positioned in relation to points of intermediate or final destination -- landings, ports, and harbors as well as canals and confluent waterways. The earliest known aid to navigation in Delaware, Cape Henlopen Light, was erected in 1767 to mark the entrance to Delaware

⁴ Some critics would claim that the Coast Guard has not shown sufficient concern for its heritage. Loss of maintenance with automation has led to rapid deterioration of many lighthouses, associated outbuildings, and sites. As always, technological advancement shows many effects.

⁵ "Lighthouses, lightboats, and buoys," Delaware Comprehensive Historic Preservation Plan, op. cit., p. 145.

Bay, waterway to the port of Philadelphia. Similarly, Mispillion Lighthouse was first constructed in 1831 to show the entrance to the Mispillion River, the inland port of Milford, and intermediate, downstream landings. Range lights, such as those for Marcus Hook Range and, earlier, those for Port Penn Range, (as well as numerous buoys) were constructed to mark a path of safe passage in a natural or dredged channel.

Aids to navigation also were positioned to warn ships away from hazardous conditions -- shoals, reefs, and shipwrecks. Lighthouses such as Fourteen Foot Bank Light, lightships such as Overfalls, and numerous buoys performed this function.

Aids to navigation and shipping are thoroughly interdependent. Without water transportation there is no need for aids to navigation. As the technology of ships and shipping progresses, as the reach and extent of water transportation grows, and as the value of cargo increases, so does the need for aids to navigation grow. However, the relation is not simple; advances in ship construction may easily lead to the abandonment of ports and waterways, with the attendant decommissioning of aids to navigation -- abandonment of the lights at Port Penn, for example. Conversely, to the extent that they augment safe passage for life and cargo, aids to navigation enable the development of shipping. The establishment of Cape Henlopen Lighthouse and the many later range lights greatly increased traffic to and from ports on the Delaware River.

To a lesser but no less certain extent, aids to navigation are tied to the subtheme of land transportation. As overland hauling began to compete for cargo, the nature and extent of shipping changed, as did the deployment of aids to navigation. The development of Delaware's north-south railroads in the 1850s presaged the decline of ports in the lower part of New Castle County, with the abandonment or change in use of such lights as Mispillion and Bombay Hook.

Related Historic Themes

Other historic themes are closely associated with aids to navigation. Fishing and Oystering, as water trades, have a direct relationship. Although aids to navigation were seldom established at the behest of watermen, whose travels were relatively local and whose ships were relatively small, buoys and lights certainly guided the passage of fishing and oystering schooners. Also, such watermen most certainly maintained systems of poles and buoys (much as they still do) to mark populated shoals and beds. However, it is

equally certain that such private aids to navigation are long gone, being frequently moved and nondurable.

Architecture, Engineering, and the Decorative Arts is another closely associated theme. As public facilities, lighthouses were often built according to prevailing architectural styles. Mispillion Lighthouse was constructed in the 1870s in a carpenter gothic style that was representative of residential architecture at that time. Other aids to navigation were constructed or equipped in ways that exemplified state of the art engineering, either in structure, optics, or fog signals. Fourteen Foot Bank Light, for example, is exemplary in several respects: founded on a pneumatic caisson, constructed of cast iron plates in a classical revival style, equipped with a fourth order fresnel lens.

Settlement Patterns and Demographic Changes is a final closely associated historic theme -- one that is difficult to discuss because it is related to all the others. Aids to navigation are affected by, and, to a lesser degree, affect settlement patterns and demographic changes because aids are tied so tightly to land and water transportation, which, in turn are completely intertwined with such patterns and changes. Early lighthouses, including Cape Henlopen, were located in early settlements that had ports. Conversely, the establishment of such lighthouses facilitated shipping, the use of such ports, and the growth of the same settlements. The relationship is obvious, but one that deserves mention.

Summary and Considerations for Significance

Aids to navigation are a property type within the historic theme of Transportation and Communication. Aids to navigation are closely associated with:

Other property types within this historic theme such as landings, ports, harbors, canals, piers, jetties, breakwaters, and shipwrecks.

Major subthemes of water and land transportation.

The historic themes of Fishing and Oystering;
Architecture, Engineering, and the Decorative Arts;
Settlement Patterns and Demographic Change.

Resources within the property type aids to navigation may possess significance according to the four specific criteria established by the National Register of Historic Places:

Association with significant events.

Association with persons significant in our past.

Distinctive characteristics of a type, period, method of construction, a master, or high artistic values.

Information, or potential information, important to history or prehistory.

Because of the federal, nonlocal, bureaucratic nature of the U. S. lighthouse service, which has had responsibility for aids to navigation since 1789, individual resources in Delaware are less likely to possess significance according to the first two criteria. Nonetheless, a resource such as Fourteen Foot Bank Light would demonstrate significance according to the first criteria as an early, if not first U. S. deployment of iron caisson construction. Many buoys and, perhaps, some lightships would have significance in association with disastrous shipwrecks.

Delaware's aids to navigation are more likely to possess significance according to the last two criteria. Because of the relatively modest number of aids established in Delaware, and, moreover, because of the smaller number of resources that are known to remain, probably every resource above a buoy would show distinctive characteristics according to the third criteria. Likewise, shoreline lights and lighthouses, such as Mispillion, Mahon, and Bombay Hook, would have the potential to provide important information regarding the development of communities and local transportation.

GEOGRAPHIC ZONE

Common sense and the scope of this project, as stated in BAHF request for grant applications, identify the Coastal Zone as the relevant geographic zone (of the five identified in the Delaware Plan) for development of an historic context for aids to navigation in Delaware. The Coastal Zone, by definition,

encompasses the coastline of Delaware and extends out to the three-mile limit or the state line on the water side; on the inland side, it reaches to the head of navigation. ... The zone boundary is not a line running parallel to the coastline, but also includes the land in the immediate vicinity of a river or stream up to the head of navigation.⁶

The zone also would include navigable portions of manmade waterways, such as the Chesapeake and Delaware Canal.

⁶ Ibid., p. 35.

Because of environmental, technological, economic, and political changes, the boundaries of the Coastal Zone have shifted and the zone has expanded, contracted, and moved. Environmental changes have had the greatest impact in littoral and offshore parts of the zone. The coastline is a fragile physical and ecological transition that shows constant change.⁷ Submarine erosion, sedimentation, and dredging have altered the navigability of waterways, with attendant changes in aids to navigation. For example, the second Mispillion Lighthouse was abandoned in 1859 when the depth of the Mispillion River at its mouth was too shallow to allow passage except to the smallest of boats.⁸ Dredging of shipping channels in the Delaware River by the Army Corps of Engineers⁹ in the nineteenth and twentieth centuries resulted in continual rearrangement or replacement of range lights along the Delaware coastline. Thus the Port Penn Lights were replaced by the Liston Range Lights in 1904 when the dredging of a new channel was completed. Similarly, slower changes in reefs and especially shoals caused the deployment of new buoys or the repositioning of existing buoys.

On the inland side of the zone, the navigability of Delaware's many rivers and creeks would also be affected by erosion, sedimentation, and dredging. Sedimentation in the waterways would be directly tied to the extent and nature of farming in the nearby watershed and the development of land immediately adjacent to the waterway. Thus the history of shoreline aids to navigation, such as Mispillion Lighthouse, will correlate to some degree with agricultural development in the region surrounding the marked inlet.

Navigability of waterways and, hence, aids to navigation was also affected by technological changes in ship building and dredging.¹⁰ In the former case, the reach and extent of shipping continually changed as the size, weight, draft, width, construction, and motive power of ships changed. In the latter case, advances in dredging techniques and

⁷ The fragility and mutability of the coastline is discussed under the effects of the natural environment on aids to navigation.

⁸ A new light was established in 1873, after the river again became navigable.

⁹ For a history of dredging of the Delaware River by the Philadelphia District of the U. S. Army Corps of Engineers, see F. E. Snyder and B. H. Guss, The District, A History of the Philadelphia District U. S. Army Corps of Engineers 1866-1971, Philadelphia, PA: U.S. Army

¹⁰ For a description of the effect of ship technology on shipping in the Delaware and a history of dredging technology, see Snyder and Guss, op. cit.

equipment improved the safety of shipping and promoted its growth. In both cases, aids to navigation were established, repositioned, improved, or abandoned in response to the demands of maritime shipping.

Interrelationships among the economics of markets, cargo, and shipping would also influence effective navigability and the boundaries of the Coastal Zone. For example, a community's need for certain manufactured commodities and the availability of certain local raw materials initially may make shipping to an inland port a very lucrative enterprise for ocean going, wooden vessels with relatively shallow drafts. Later, however, the local manufacture of some commodities, the drop in export value of locally available raw materials, and the need to transfer cargo to and from deeper, larger vessels, which are unable to reach the inland port directly, may significantly diminish use of the inland port. Finally, perhaps, maritime shipping to the port may cease as it is replaced by regional transportation of the railroads. Such a scenario, although hypothetical, could be applied to the historical analysis of Delaware's inland port towns such as Seaford, Smyrna, and Milford, which were once part of the Coastal Zone and had aids to navigation to mark their waterways.

The navigable waterways that define the Coastal Zone can be considered both boundaries and links. As boundaries, rivers such as the Delaware, Smyrna, and Mispillion mark political divisions, deriving ultimately from the historical difficulty of crossing. As links, waterways allow shipping to connect towns, cities, states, and countries.

With economic and technological advancement, the role of smaller waterways initially evolved from boundary to link. Coastal and inland shipping fueled the settlement and early development of Delaware. However, with continued advancement, the importance of maritime shipping decreased, and the smaller waterways returned to the role of boundary.

Larger bodies of water, such as the Delaware River, have maintained a dual role. As a boundary, the Delaware River separates the states of Delaware and New Jersey.¹¹ As a

¹¹ The boundary between the two states was not settled until the early years of the twentieth century. Also, the legal location of many aids to navigation in the Delaware River vacillated in the early light lists. For example, Fourteen Foot Bank Lighthouse was listed in New Jersey and later in Delaware. Before the boundary finally was set, the lighthouse service, a federal agency, overcame this irrelevant technicality by listing many aids to navigation as located in "Delaware Bay."

link, the Delaware supports local, regional, national, and international maritime commerce. The effect of this linkage is far more profound than simple economic impact. Up until the mid twentieth century, maritime commerce was the vehicle for the exchange and cross fertilization of social, political, religious, cultural, scientific, and technological ideas, advancements, and systems. Thus Delaware's Coastal Zone, marked by its aids to navigation, has a broad historic importance.

Summary and Considerations for Significance

Aids to navigation occur in Delaware's Coastal Zone. The Coastal Zone is a band that roughly parallels the Delaware coastline. The inland boundary projects to include waterways and surrounding land to the limits of navigation. The boundaries and size of the Coastal Zone have changed with:

- Changes in the environment (erosion, sedimentation, and dredging).

- Changes in technology (ship construction, dredging, waterway and harbor improvements).

- Changes in the economies of settlements, commodities, and shipping.

The establishment, operation, replacement, and abandonment of aids to navigation in Delaware's Coastal Zone have been influenced by the same changes.

Resources within the property type aids to navigation may possess significance according to the four specific criteria established by the National Register of Historic Places:

- Association with significant events.

- Association with persons significant in our past.

- Distinctive characteristics of a type, period, method of construction, a master, or high artistic values.

- Information, or potential information, important to history or prehistory.

Delaware's aids to navigation are likely to have significance under the latter two criteria. Resources may have distinctive characteristics particular to a style or period of construction in the Coastal Zone. Most resources will impart information that would be important to the history or prehistory of settlement, shipping, commerce, and

construction in the Coastal Zone. For example, the struggle to maintain the foundations of Cape Henlopen Lighthouse illustrates the changing nature of Delaware's coastline and the engineering efforts that attempted to control it. The series of structures and site improvements made for Lights at Mispillion, Port Mahon, and Bombay Hook illustrate similar developments. The continuing movement, replacement, and addition of range lights along the Delaware coast document the history and advancement of waterway improvements.

CHRONOLOGICAL PERIOD

The Delaware Plan identifies the following chronological periods:

- 1630-1730+/-: Exploration and Early Settlement
- 1730-1770+/-: Intensified and Durable Occupation
- 1770-1830+/-: Early Industrialization
- 1830-1880+/-: Industrialization and Early Urbanization
- 1880-1940+/-: Urbanization and Early Suburbanization

The first period was excluded from this historic context by BAHP in its request for grant applications. This exclusion is supported by the history of aids to navigation in Delaware and resources that have been identified to date.

The first known aid to navigation in Delaware, Cape Henlopen Lighthouse, was completed in 1767, at the end of the second period. Aids to navigation have continued to be in service in Delaware since that time. Thus, the third through fifth chronological periods, from 1770 to 1940, effectively do include the beginning and development of this property type in Delaware.

Administration of Aids to Navigation

As briefly described previously, the administrative history of U. S. aids to navigation may be summarized as follows:

Before 1789: Colonial administration responsive to local business and maritime interests.

1789-1820: Federal administration overseen by the president with regular, ordinary administration handled through the department of the treasury.

1820-1852: Federal administration overseen by the Fifth Auditor of the Treasury through local collectors of customs in each of eight districts.

1852-1910: Federal, quasi-military administration of the Lighthouse Board with inspectors in each of 12 districts.

1910-1939: Federal administration of the Bureau of Lighthouses overseen by a commissioner with civilian inspectors (and military superintendents) for each of 12 to 19 districts.

1939 to present: Federal administration of the U. S. Coast Guard.

Further, the history of the administration of aids to navigation may be collapsed into four periods:

Before 1789: Colonial/local administration.

1789-1852: Early federal administration.

1852-1910: Developed federal, quasi-military administration.

1910-1939: Modern federal, civilian administration.

Actual improvements of the developed federal period lagged somewhat behind the nominal reorganization under the Lighthouse Board in 1852. Rapid growth and extensive modernization of aids to navigation were realized in the late 1870s to early 1880s. Thus the demarcation between early and developed administration is not distinct. Also, after 1939 the modern administration of aids to navigation returned to a quasi-military character under the jurisdiction of the Coast Guard, but these times are outside the scope of this historic context.

Although Delaware's aids to navigation were assigned to a customs district under the early federal administration, their functional organization prevailed and they were "listed" on a state basis. During most of the developed federal administration, Delaware's aids were included in the Fourth District, which extended from Squan Inlet, New Jersey to Metomkin Inlet, Virginia. During the modern federal administration, Delaware's aids remained in the Fourth District, which was modified to extend from Cape May, New Jersey to Fenwick Island, Delaware, including the entire Delaware River and Bay.

Summary and Considerations for Significance

Aids to navigation in Delaware were planned, constructed, maintained, and operated as part of a national system under a federal administration. The federal administration of aids to navigation may be structured into three periods (1789-1939 overall, with a first period covering minimal colonial administration before 1789) that occur within the third, fourth, and fifth chronological periods (1770-1940) identified in the Delaware Plan.

Resources within the property type aids to navigation may possess significance according to the four specific criteria established by the National Register of Historic Places:

Association with significant events.

Association with persons significant in our past.

Distinctive characteristics of a type, period, method of construction, a master, or high artistic values.

Information, or potential information, important to history or prehistory.

Delaware's aids to navigation are likely to have significance under the latter two criteria, as previously discussed under historic theme and geographic zone, with respect to the later chronological periods established in the Delaware Plan. In addition, resources may have significance according to the first two criteria to the extent that the resources are associated with notable events or persons in the federal administration of aids to navigation. For example, the construction of several nineteenth century Delaware lighthouses was contracted to Winslow Lewis, who was a notorious character in the early federal administration of the fifth auditor. Similarly, the rapid addition and refitting of Delaware range lights in the late nineteenth and early twentieth centuries were a direct demonstration of the discipline and dedication of the developed federal administration under the Lighthouse Board.

DEFINITION OF PROPERTY TYPES

Aids to navigation may be classified according to many criteria, including:

Location: land (shore) or water

Creation: natural or manmade

Information imparted: alignment with channel, warning about hazard, fixing location of vessel

Time of operation: day, night; clear, obscure

Type of signal: sight (powered/unpowered), sound, radio

Fixity: rigid, tethered

Construction: materials and structure

Duration: permanent, temporary

A simple but useful classification uses a combination of criteria, relying primarily on, in order, fixity, information imparted, type of signal/time of operation, and location. Such a classification would list traditional aids to navigation as follows:

Fixed light beacons

Harbor lights: primarily lighthouses

Range lights: lighthouses and light towers

River or channel lights: lighthouses, light towers, and pole lights

Lightships

Buoys

Natural marks

Other aids to navigation and associated structures

This classification ignores some distinctions and omits some types of aids to navigation. For example, all buoys are lumped together, ignoring whether they are lit or unlit, whistling/ringing or silent, spar or nun, wood or metal, harbor/channel or hazard. Finer distinction, although justified in a detailed discussion of navigation, is not warranted because of the relatively short duty and mass production of most buoys, especially from 1880 to 1940. Buoys from earlier periods, usually made from perishable wood, are unlikely to remain. Also, the multitude, replaceability, and interchangeability of buoys argues that the significance of any one resource is minor.

Fog signals, such as horns, bells, and canons, are omitted as a separate type, tacitly including them as an additional

signal that may be present on any of the fixed lights, lightships, or buoys. Similarly, other manmade landmarks, such as smoke stacks and church steeples, are omitted under the assumption that they likely will have significance for other reasons, and that their additional significance as aids to navigation will be obvious or easily discovered. Finally, radio beacons are omitted, both because the date of their pervasive use effectively falls outside the scope of this historic context, and because their early use was as supplementary signals on existing aids to navigation.

Natural marks, such as trees and promontories, are included as a separate type both because of and despite their present rarity. Any that survive, whether as below ground or above ground resources, undoubtedly will have great historic significance simply because of such rarity.

The final type is a catch-all for unusual aids to navigation, which do not fit neatly under the specific types, such as "lanbys" (large navigation buoys) and day beacons. The final type also acknowledges the possible importance of outbuildings, such as fuel houses and detached keepers' houses; associated facilities, such as buoy depots; and site structures, such as piers, wharves, jetties, and breakwaters.

Although harbor, range, and channel lights are listed as subtypes of fixed light beacons, they are most usefully considered as separate property types, on an equal with other types in the classification. They are shown above as subheadings to emphasize the common characteristics of being fixed and being lighted. Channel lights are those that are used to mark the edge of or a bend in a channel (or the area of safe passage); in this classification channel lights also include those that mark a specific hazard (usually a shoal, ledge, or bank on the edge of a channel). Range lights are those that are used in (at least) pairs and, when aligned, indicate the course of safe passage (along a channel, through a harbor, etc.). Harbor lights are those that mark safe harbors and are used for general navigation; traditionally, they were prominent and distinctive in both appearance and signal. Harbor lights sometimes serve as a rear range lights.

This classification is proposed as a working list of property types. Each property type, even in Delaware, will include at least several individual resources. No type, except, perhaps, buoys, includes too many resources or groups together resources with strong, obvious differences. In summary, the following are proposed as aids to navigation property types for this historic context:

Harbor lights: primarily lighthouses

Range lights: lighthouses and light towers

Channel lights: lighthouses and light towers

Lightships

Buoys

Natural marks

Other aids to navigation and associated structures

Distribution and Potential Distribution

By definition, harbor lights are most often found and most likely to be found on or near shore, at harbors, ports, and inlets, both present and former. Delaware examples of resources within this property type include: Bombay Hook, Mispillion, Fenwick Island, and Delaware Breakwater.

Channel or river lights are most often found and most likely to be found along channels, whether natural or dredged, and along safe passage in rivers and other waterways. In addition, such lights would be located along canals. Delaware examples of resources within this property type include: Fourteen Foot Bank, Fort Delaware, and those for the Chesapeake and Delaware Canal.

Range lights are most often found and most likely to be found along major waterways that have constricted, changing, and heavily traveled channels, especially those that require dredging. Range lights also are found at inlets. Because range lights often mark dredged channels, the lights are repositioned or replaced when the alignment of the channel is changed through dredging. Delaware examples of resources within this property type include: New Castle, Port Penn, Cherry Island, Reedy Island, Liston, Bellevue, and Marcus Hook.

Lightships were traditionally located to temporarily mark a sudden, temporary hazard such as a shipwreck, to temporarily replace a fixed light that had been damaged or destroyed, or to indefinitely mark a hazard where a fixed light could not be built. An individual lightship "station" often involved a series of ships that were renamed and renumbered. No functioning lightships remain in use in Delaware. Examples of former resources within this property type in Delaware include: Upper Middle Shoal, Five Fathom Bank, Fenwick Island, and Overfalls.

Buoys may be found and were formerly found within and around regularly traveled portions of all waterways. Buoys were and are ubiquitous. Notable, representative examples of resources within this property type within Delaware include: Brown Buoy (at Brown Shoal), Buoy of the Middle (near Fourteen Foot Bank), Hamburg Buoy (above Reedy Island), and Hens and Chicken Shoal Buoy (off Cape Henlopen).

Natural landmarks (and seamarks) are most often found and are most likely to be found on or near the shoreline. The notable example of an such an individual resource in Delaware is Liston's tree, at Liston's Point north of Duck Creek, which is shown on U. S. nautical charts from circa 1850 to 1880 and on private charts and guides from the late eighteenth century.

"Other" aids to navigation may be found throughout the Coastal Zone. Day beacons are likely to be found along main waterways, as supplements to lighted beacons, and as the principal markings for secondary, less-traveled waterways. Outbuildings and site structures will be found only near fixed, usually land based aids to navigation such as harbor and range lights; however, resources may be either above or below ground, depending on surrounding development and age and deterioration of the resources. Associated facilities, such as buoy depots, are likely to be found near other port facilities, especially those belonging to the federal government. Delaware examples of such resources include Christiana Depot, Cherry Island Flats Depot, Edgemoor Supply and Depot, and Lewes Depot.

Expected Current Condition

The overall current condition of all property types is expected to be poor to fair, due to several factors. First, deterioration is accelerated by the naturally aggressive physical environment of the Coastal Zone -- salt-air, often open-water exposure that is progressively hostile to most building materials, especially metals. Second, deterioration is exacerbated by the loss of maintenance that accompanied the wholesale automation of all property types that had been manned, especially lighthouses. Third, many individual resources are actually or effectively abandoned; this complete lack of maintenance is especially destructive.

The potential for deterioration and degradation is influenced both by the characteristics of the physical environment and by the materials and type of construction typical for each property type. Resources or portions of resources that are located in the splash zone are most prone to rapid deterioration, no matter what construction. Similarly, certain construction, such as tightly fitted

stone masonry, is more resistant to deterioration. Other construction, such as relatively thin metal framing or castings, is prone to progressive deterioration.

Property types that are likely to be in poorer condition are those that are generally older, of less resistant construction, and in more severe exposures. Such property types would include channel lights and water-based range lights, especially those of metal or wood frame construction that were automated long ago or have been abandoned.

Property types that are likely to be in better condition are those that are of more resistant construction, in less severe exposures, and have been continually maintained. Such property types would include land-based harbor and range lights that are well maintained (or occupied), especially those constructed of masonry on solid foundations.

Effects of Natural and Social Environments

As just discussed, the physical environment of the Coastal Zone directly affects the materials and structures of aids to navigation. In addition to this chemical-mechanical interaction, the natural environment has large-scale influences on structures and sites. Such influences, which derive directly from the character of the Coastal Zone, have greatest impact on the shoreline property types of harbor lights and range lights.

Littoral movement is the most obvious large-scale threat from the natural environment. The relentless action of wind and wave erode Delaware's mainly soft shoreline, transport the sand and silt, and either deposit it to augment another area of the coast or wash it to deeper waters. Two notable Delaware resources, the first Mispillion Lighthouse and Cape Henlopen Lighthouse, have been destroyed by shoreline erosion.

Efforts to preclude, halt, and stall erosion in the Coastal Zone can pose more serious threats to aids to navigation than erosion itself. Resources -- especially earlier, abandoned resources -- can be partially or completely covered by fill that is brought in to raise or expand a shoreline site. Resources can be damaged or destroyed by the construction of seawalls, bulkheads, revetments, and piers (on land sites) or breakwaters and jetties (on submarine sites). Alterations to a resource, such as encasement in mass concrete, may attenuate integrity of a resource. Finally, resources may be moved to safer sites. (Such movement or major alteration may also contribute to significance by documenting the struggle between man and

nature in the development of aids to navigation in Delaware's Coastal Zone.)

Delaware's aids to navigation also are threatened by land development in the Coastal Zone, a process that involves both natural and social environments. Development pressures are higher along Delaware's lower coastline, where recreational and residential improvements are fueled by a resort economy that depends on the beaches. Fortunately, the number of resources along the lowest, resort laden coast is relatively small, and the resources, in general, are located within public lands. Resort development is moving up the coast, however, into upper Sussex and lower Kent counties. Also, the general residential expansion in lower New Castle and upper Kent counties has begun to include private lands along corresponding sections of the coastline. In a sense, Delaware's coast between Delaware City and Slaughter Beach is caught between the pincers of residential development from metropolitan Wilmington and resort development from Atlantic coast beaches. In addition, this same section of coastline is seeing growth in commercial recreational uses such as boat marinas, which represent much more intensive development than the oystering and fishing facilities that they often replace or displace. No matter what the cause, the development of coastal lands poses a serious threat to aids to navigation that are privately owned and in the midst of private lands. The threat is less to resources that are still operated by the Coast Guard on public lands.

Considerations and Criteria for Evaluation of Significance

Because **harbor lights** were generally established to mark a port or an inlet to an inland port, resources within this property type, especially those that first were constructed before approximately 1920, are likely to have historic significance as direct or correlational sources of information important to the history of settlement, shipping, commerce, and construction in Delaware's Coastal Zone.

Channel lights and **range lights** are likely to have historic significance related to waterway improvements, which, in turn, are related to settlement, shipping, commerce, and construction in the region, if not in Delaware itself. However, this latter relation is not as direct as it is for harbor lights. Channel lights and range lights have greater historic significance in relation to the history of waterway improvements themselves, such as the technology of dredging and the administration of the Philadelphia District of the U. S. Army Corps of Engineers.

All three fixed light property types also may have historic significance deriving from distinctive characteristics of a type, period, or method of construction. Lights constructed before approximately 1860 were usually unique design and construction projects; therefore such resources are likely to show distinctive characteristics particular to the time and location of construction. After approximately 1920, lights were increasingly constructed according to standard designs, which, with automation, moved away from lighthouses toward more economical steel towers; these resources are less likely to have significance except as local examples. Lights constructed between approximately 1860 and 1920 make a transition: they may possess distinctive characteristics for Delaware, at least.

Because of their rarity, both nationally and in Delaware, every extant resource within the property type **lightships** is very likely to have historic significance deriving from distinctive characteristics and as a source of information important to both national and local history. In addition, lightships are very likely to have historic significance deriving from association with significant events (i.e., great storms, shipwrecks) and significant persons (i.e., heroic captains).

Buoys are a difficult property type in considering historic significance. There is little question that certain resources are significant for the information they provide concerning the history of aids to navigation in the United States, in the Delaware Bay, and in the state of Delaware. Similarly, there is little question that certain resources are significant as representatives, with distinctive characteristics of a period and method of construction, of particular classes or types in the development of buoys. For these two reasons at least one buoy of each class or type would have at least local or regional significance. However, buoys were manufactured objects during virtually the entire time period included within this historic context, and they were manufactured and deployed in quantity. The historic significance of the buoy itself, as an object, is probably secondary to the location or hazard that was marked and the function that the buoy performed. Such is the case for Delaware named buoys such as Brown Buoy (on Brown Shoal), Buoy of the Middle (near Fourteen Foot Bank), and Hamburg Buoy (above Reedy Island), where the location was marked by a series of buoys that were routinely replaced because of loss, damage, or obsolescence. Therefore, in general, an individual resource will have significance only if it is a good, intact example of a particular type; if it imparts information about the history of aids to navigation at a particular site, about the history of navigation at the site itself, or about the

history of the particular site; or if it is associated with significant events, such as shipwrecks or rescues.

Natural landmarks, such as Liston's tree¹² and the "white dunes"¹³ of Cape Henlopen, have historic significance simply because of their rarity in Delaware and on the entire early Atlantic seaboard. Most of these resources are completely destroyed (Liston's tree) or have changed radically in form or character (Henlopen's dunes). However, some resources (perhaps Liston's tree) may remain as archaeological sites, and others (such as the dunes of Cape Henlopen) have greater significance beyond their use as landmarks.

As previously mentioned, **manmade landmarks**, within the property type other aids to navigation, are likely to have historic significance more important than that associated with their use as landmarks. For example, coastal churches and their prominent steeples probably have architectural, cultural, and religious significance. At present, no resources of this property type have been identified in Delaware.

Buoy depots, within the property type other aids to navigation, are likely to have historic significance that is heightened by their rarity in Delaware. Only four such resources are known to have existed in the state. Significance may derive either from the characteristics of construction and equipment or from information that the resources impart about the history of aids to navigation, harbor facilities, or adjacent coastal communities.

Outbuildings, within the property type other aids to navigation, may have historic significance in direct physical and functional association with an actual aid. For example, a fuel house may be important to understanding the development, operation, and improvement of the harbor light it serves. Alternatively, an outbuilding such as a freestanding keeper's dwelling may have historic significance that is virtually independent of and greater than that possessed by the actual aid with which it is associated. Similar considerations hold for **site structures**.

Considerations and Criteria for Evaluation of Integrity

Harbor lights, range lights, channel lights, and lightships that are still active aids to navigation are likely to

¹² Map of Delaware Bay and River, Survey of the Coast of the U. S., Washington D. C.: Coast Survey Department, 1848.

¹³ Edmunds M. Blunt, The American Coast Pilot, New York, New York: 1798, 1817.

possess integrity of design, materials, workmanship, and (to a lesser extent) setting. Such integrity directly acknowledges the continual repairs, modifications, and improvements that fixed lights have undergone in the development of aids to navigation -- nationally, regionally, and in the state. These modifications, although perhaps nominally working against more traditional interpretations of integrity, are essential to understanding the development of a particular resource and property type.

Harbor lights, range lights, channel lights, and lightships that are no longer active aids to navigation may have integrity of design, materials, workmanship, and setting that has been compromised, perhaps severely, by modifications that were made after decommissioning or by degradation that occurred after abandonment. Modifications that were made after decommissioning may have intrinsic significance or they may contribute to significance of the resource in its life after decommissioning, but they attenuate the integrity of the aid to navigation regardless.

Because of their short and traumatic service life, surviving **buoys** will exhibit major modifications to and degradation of materials and workmanship, though integrity of design may still exist. As for fixed lights and lightships, such modifications are as likely to heighten integrity as to diminish it. In general, because individual buoys were frequently replaced or relocated, surviving buoys will not possess integrity of setting. Individual resources that never were put into service (e.g., they were forgotten in a warehouse) would possess integrity of design, materials, and workmanship.

Natural landmarks, by definition, are likely to possess integrity of location and setting. They may also possess integrity of materials (the dunes of Cape Henlopen), feeling, and association (Liston's tree). The aggressive environment of the Coastal Zone is certain to have altered primarily inorganic resources, and it may have completely destroyed organic resources (so that they only exist as archaeological sites).

Outbuildings and site structures are likely to possess integrity that is similar to, though less than that possessed by the aids to navigation, typically fixed lights, with which the outbuildings or site structures are associated. Because outbuildings are usually secondary structures, they often are of less ornate and substantial construction, they are more likely to have been altered (especially in ways that are unrelated to possible historic importance), and they are more likely to have lost integrity due to lack of maintenance. Similarly, site structures are

more likely to degrade in their open exposure to the aggressive Coastal Zone environment, and structures such as piers, bulkheads, and wharves are more likely to have undergone continual, radical modification to accommodate changes in function and protection.

Associated facilities such as **buoy depots** were usually minor parts of larger, public harbor works. This lesser status of buoy depots resulted in frequent relocation, as they lost space to more important government harbor functions. The four buoy depots known to exist in Delaware had a series of short lives, less than 25 years at each location. Because of their low status and the continual modifications to more important harbor facilities, any remains of Delaware's buoy depots are likely to have weak integrity of design or materials. Integrity of location and setting also may be weak from major alterations in form or function of the overall harbor facility in which the depot was located.

Effect on Strategies for Identification, Evaluation, Registration, and Treatment

Aids to navigation that are still active are operated and maintained by the Coast Guard, which, as a federal agency, must comply with federal historic preservation regulations. Such active resources generally are maintained, and any alterations to them must at least consider their significance and address mitigation. Therefore, such active aids to navigation, especially within the harbor light, range light, and channel light property types, require the least direct attention within the Delaware Plan and its programs. Nonetheless, the state should review preservation planning efforts undertaken by the Coast Guard for conformance with the goals and priorities of the Delaware Plan. The state should also assist in considering local significance leading to registration as a local resource. For Delaware these considerations are most applicable, in order, to range lights, harbor lights, and channel lights.

Resources that are no longer active aids to navigation, but that still exist and are used by private owners, should be identified, evaluated for significance and integrity, and (if appropriate) registered. Land based range lights and harbor lights on nonindustrial sites, especially those that are under early residential or commercial development, need such attention soon. These resources are being or will be destroyed, or they are being altered radically for new uses in ways that diminish their integrity as aids to navigation.

Privately owned resources that are abandoned should be treated similarly. Such resources are most likely to be land based range and harbor lights, but might also include

lightships, buoys, buoy depots, outbuildings, and site structures.

Further research should be conducted to identify natural landmarks that were used in the seventeenth, eighteenth and nineteenth centuries. Once identified, such resources should be surveyed to determine integrity. In many cases, this will involve archaeological research.

Similarly, further research should be conducted to identify and survey manmade landmarks. Significance as aids to navigation should be determined and should be related to historic significance arising from other uses, periods, and associations.

PRESERVATION GOALS

Aids to navigation, as an overall property type that includes the specific property types identified in this historic context, relates in several notable ways to the priorities listed in the Delaware Plan.

Relation to Delaware Plan Priorities for Theme, Period, and Zone

As previously discussed, aids to navigation is a property type, or subtheme, of Transportation and Communication, the fifth ranked historic theme for above ground resources. Aids to navigation is a property type that is closely related to Settlement Patterns and Demographic Change, the second ranked historic theme for above ground resources and the first ranked theme for below ground resources. Aids to navigation is closely related to Architecture, Engineering, and Decorative Arts, a theme that "cuts across all other themes and provides the basic framework for developing physical property types."¹⁴ Finally, aids to navigation is also closely related to Fishing and Oystering, the fourth ranked historic theme for below ground resources.

The development of aids to navigation in Delaware matches reasonably well the priority rankings of chronological periods for above ground resources. The entire time of federal administration of aids to navigation is contained within the top three chronological periods (1770-1940). In addition, the rapid growth and improvement of aids to navigation under the developed and modern federal administration is contained within the second (1830-1880) and third (1880-1940) ranked chronological periods.

¹⁴ Delaware Plan, op. cit., p. 79.

Aids to navigation, by definition, occur in the Coastal Zone, the first ranked geographic zone for both above ground and below ground resources.

Relation to Delaware Plan Priority Historic Contexts

Aids to navigation, as a property type or focused historic context, relates to the following priority historic contexts:

Priority #2 for above ground resources: Settlement Patterns and Demographic Change, 1830-1880 and 1880-1940, Urban.

Aids to navigation is closely related to the historic theme. The mature development of aids to navigation occurs entirely within the chronological periods.

Priority #3 for above ground resources: Settlement Patterns and Demographic Change, 1770-1830 and 1830-1880, ... Coastal.

Aids to navigation is closely related to the historic theme. The early development of aids to navigation occurs within the chronological periods. Aids are located in the geographic zone.

Priority #1 for below ground resources: Settlement Patterns and Demographic Change, 1630-1730, Coastal.

Aids to navigation is closely related to the historic theme. Aids occur in the geographic zone. Possible resources within the chronological period are likely to be natural and manmade landmarks, now completely or largely present in archaeological sites.

Goals for Property Types

Goals for property types may be formulated and stated according to several criteria:

Ownership: As previously discussed, aids to navigation that are publicly owned, usually by the Coast Guard, a federal agency, are less likely to need attention than those that are privately owned.

Significance: Aids to navigation may possess historic significance that is national, regional, or local. The presence or absence of significance at one level neither implies nor precludes significance at another level. Aids to navigation that are owned by the Coast Guard are most likely to have been evaluated only for national historic significance.

Property Types: Because of their typical function, construction, and environment, some property types, such as harbor lights and rear range lights, are more likely both to possess significance and to have integrity that is threatened, either by internal deterioration or by external development pressures.

Goals for property types may be itemized as follows:

All property types, except buoys, owned and operated by the Coast Guard:

For national significance:

- A.a Review determination of significance, evaluation of integrity, and plans for treatment performed by the Coast Guard.
- A.b Identify resources that have potential for significance and integrity and that have not been evaluated by the Coast Guard. Recommend such evaluation by the Coast Guard, according to level of significance, integrity, and external threats, in the following relative priority according to property types:

Harbor lights, especially lighthouses

Range lights, especially rear range lights

Site structures

Outbuildings

Channel lights

For regional and local significance:

- A.c Coordinate with and assist the Coast Guard in at least identifying resources that have the potential for regional or local significance and have not been determined to have national significance, according to the priority for property types listed above.
- A.d Coordinate with the Coast Guard to determine the significance and evaluate the integrity of resources that have not been determined to have national significance, according to the priority for property types listed above. Encourage the Coast Guard to nominate such resources.

- A.e Coordinate with and assist the Coast Guard in planning treatment for nominated resources that have not been determined to have national significance, according to the priority for property types listed above.
- A.f If possessing significance and integrity, and if immediately threatened by external pressure or internal deterioration, assist Coast Guard in determining treatment, again according to the relative priority for property types listed above.

All privately-owned property types except buoys:

- B.a Identify and survey, working from the list of known resources, to assess potential significance (national, regional, and local) and integrity, in the following relative priority according to property types:

- Harbor lights
- Range lights
- Natural landmarks
- Associated facilities
- Outbuildings
- Site Structures
- Channel lights
- Lightships

- B.b If possessing significance and integrity, and if immediately threatened by external pressure or internal deterioration, determine treatment, again according to the relative priority for property types listed above.
- B.c Using results of survey, determine significance and integrity of aids to navigation that show potential significance. Proceed according to the relative priority for property types listed above.
- B.d Nominate aids to navigation that have been determined to have significance and integrity. Proceed according to the relative priority for property types listed above.

- B.e Plan preservation treatment for aids to navigation that have been nominated. Proceed according to the relative priority for property types listed above.

Buoys:

- C.a Conduct further research (develop more focused historic context) for Delaware buoys. Identify relevant types or classes. Identify significant sites.
- C.b Identify and survey remaining resources that represent particular types or classes or that were placed at significant sites.
- C.c Determine significance and integrity.
- C.d Establish plan for treatment.

Table 1 shows ranked priorities for these goals and for the property types covered by each goal. Table 1 also gives relative priorities for each combination of goal and property type.

Goals for Historic Contexts

The following historic contexts should be developed, in order of importance:

Historic context for Delaware's inland ports (Seaford, Smyrna, Milford, etc.).

Historic context for private, secondary aids to navigation, primarily those used for fishing and oystering.

Historic context for Delaware waterway improvements of the Philadelphia District of the U.S. Army Corps of Engineers.

In addition, other appropriate historic contexts developed under the Delaware Plan should consider the relation of maritime shipping to other transportation modes, especially railroads, and the interrelationship between ship technology, ship building, and maritime shipping.

TABLE 1. PRIORITIES FOR GOALS AND PROPERTY TYPES. Bracketed numbers give overall relative priority for particular goal and property type. Unbracketed numbers give ranked priority within row (property types) or column (goals). "1" = most important.

GOALS		PROPERTY TYPES							
Rank No.	Paraphrased Description	HARBOR LIGHTS	RANGE LIGHTS	CHANNEL LIGHTS	LIGHT-SHIPS	BUOYS	NATURAL MARKS	ASSOC FACIL'S	OUT-BUILDINGS SITE STRUCTURES
RESOURCES OWNED BY USCG									
10	A.a Review national significance, integrity, and treatment performed by USCG	1 [5]	2 [5]	3 [5]				4 [5]	5 [5]
9	A.b Identify potential national significance where no evaluation by USCG	1 [2]	2 [2]	3 [3]				4 [2]	5 [2]
7	A.c Assist USCG in identifying regional or local significance	1 [2]	2 [2]	6 [3]				3 [2]	4 [2]
8	A.d Assist USCG in determining regional and local significance	1 [4]	2 [4]	6 [5]				3 [4]	4 [4]
12	A.e Assist USCG in planning treatment for resources having local significance	1 [5]	2 [5]	6 [5]				3 [5]	4 [5]
2	A.f If immediately threatened by pressure or deterioration, determine treatment with USCG	4 [1]	5 [1]	6 [1]				3 [1]	2 [1]
PRIVATELY OWNED RESOURCES									
3	B.a Identify and survey to assess potential significance and integrity	5 [2]	6 [2]	7 [3]	8 [3]		1 [2]	2 [2]	3 [2]
1	B.b If immediately threatened by pressure or deterioration, determine treatment	1 [1]	2 [1]	7 [1]	8 [1]		3 [1]	4 [1]	5 [1]
4	B.c Determine significance and integrity	5 [2]	6 [2]	7 [3]	8 [3]		1 [2]	2 [3]	3 [3]
5	B.d Nominate if possessing significance and integrity	5 [3]	6 [3]	7 [4]	8 [4]		1 [2]	2 [3]	3 [3]
11	B.e Plan treatment for nominated resources	5 [5]	6 [5]	7 [5]	8 [5]		1 [5]	2 [5]	3 [5]
6	C.a-d See text for particular goals								

SOURCES, INFORMATION NEEDS, AND RESEARCH ISSUES

The establishment and operation of aids to navigation within the federal bureaucracy produces both benefits and problems for research. On the one hand, transactions were meticulously recorded according to the detailed priorities of federal administration. On the other hand, the many changes in responsibility for aids to navigation within the bureaucracy resulted in losses, or at least modest disorganization of records. Also, priorities for documentation by the federal administration effectively excluded local perspective and commentary.

Although the State Archives contain a significant amount of information about Delaware's aids to navigation, the most complete and comprehensive collections of primary and secondary source materials are maintained by the federal government. Light Lists, Annual Reports, and Descriptions of Light-House Towers... for Delaware are maintained in the Library of Congress (Adams Building) and the National Archives (main archives) in Washington, D.C. Nautical charts published by the federal government are maintained in the National Archives Cartographic Branch in Alexandria, Virginia.

Early private and commercial maps and some charts can be found in the State Archives. Early charts, maps, and guides can be found in the Philadelphia Maritime Museum. A comprehensive listing and description of early maps and charts for Delaware may be obtained from the Cartographic Information Center of the Delaware Geological Survey at the University of Delaware.

The multiplicity, replaceability, and interchangeability of buoys presents a special challenge for research, in particular, and historic preservation, in general. There is no doubt that either particular buoys or particular sites, or some combination of buoy and site, have historic significance. Defining the nature and extent of resources and evaluating integrity may be complicated. As previously noted, more research concerning Delaware's buoys is required.

More research is also required for natural landmarks and private, secondary aids to navigation. Natural landmarks are documented only sparsely in early nautical charts of the federal government. They occur more frequently in commercial charts and guides, both of which are difficult to obtain. Private, secondary aids to navigation are not documented at all in charts of the federal government, precisely because they are not public aids. Research for both natural landmarks and secondary, private aids to

navigation should include nonbibliographic sources such as oral histories, private records and charts, and folklore of watermen and river pilots.

APPENDIX: List of Known Resources

RESOURCE NAME	PROPERTY TYPE	LOCATION	COORDINATES	DATE IN	DATE OUT	STATE	REGIS
Cape Henlopen Lighthouse	Harbor Light	Cape Henlopen	364642 750503	1767	1924		
Upper Middle Shoal No. 2	Lightship	NW Brandywine Shoal	398045 751413	1823	1876?		
Cape Henlopen Beacon *	Harbor Light	Cape Henlopen	384635 750544	1825	1884?		
Bombay Hook Lighthouse	Harbor Light	Bombay Hook Island	392149 753038	1831	1915		R
Port Mahon Lighthouse *	Harbor Light	Little Creek	391106 742404	1831	1940+		N
Misplillion Lighthouse *	Harbor Light	Millford	385634 751924	1831	1929		
Christiana Lighthouse	Harbor Light\Range	Wilmington	394318 753115	1835	1908		
Brandywine Shoal Light--vessel No. 1 *	Lightship	Brandywine Shoal		1839	1850?		
Five Fathom Bank Light--vessel No.18 *	Lightship	Five Fathom Bank	385330 743900	1839	1869?	DE/NJ	N
Reedy Island Lighthouse	Harbor Light\Range	Reedy Island	393003 753409	1839	1932		
Delaware Breakwater Beacon	Channel Light	Delaware Beacon	384750 750730	1841	1849?		
Delaware Breakwater Light	Harbor Light\Range	Delaware Breakwater	384750 750601	1849	1903		
Brandywine Shoal Lighthouse *	Channel Light	Brandywine Shoal	395911 750649	1850	1940+	DE/NJ	
Cross Ledge Lighthouse	Channel Light	Cross Ledge Shoal	390947 751413	1855	1900?	DE/NJ	
Fenwick Island Lighthouse	Harbor Light	Fenwick Island	382704 750318	1859	1940+		
Christiana Depot	Other: Buoy Depot	Wilmington		1871	1881		
Ship John Shoal Lighthouse	Channel Light	Ship John Shoal	391819 752237	1874	1940+	DE/NJ	
New Castle Rear Range Light	Range	New Castle	393854 753558	1876	1940+		
New Castle Front Range Light	Range	New Castle	393833 753544	1876	1940+		
Port Penn Rear Range Light	Range	Port Penn	393041 753634	1877	1899		
Port Penn Front Range Light	Range	Port Penn	392932 753522	1877	1899		
Cherry Island Front Range Light	Range	Edgenoor	394503 752940	1880	1940+		
Cherry Island Rear Range Light	Range	Wilmington	394543 752924	1880	1940+		
Cherry Islands Flats Depot	Other: Buoy Depot	Cherry Island		1881			
Delaware Breakwater Rear Lighthouse	Range	Lewes	384723 751010	1881	1916?		
Edgenoor Supply and Buoy Depot	Other: Buoy Depot	Edgenoor	394436 753003	1881	1918+		
Christiana Beacon	Channel Light	Wilmington	394304 733056	1884	1940+		
Cape Henlopen Day Marker	Other: Day Beacon	Cape Henlopen		1885			
Delaware Breakwater East End Beacon	Harbor Light\Range	Delaware Breakwater	384750 750602	1885	1940+		
Broadkill River Day Marker	Other: Day Beacon	Broadkill River		1886			
Fourteen Foot Bank	Channel Light	Fourteen Foot Bank	390257 751057	1887	1940+		R
Fenwick Island Shoal Lt. Vessel No. 52 *	Lightship	Fenwick Island Shoal	382647 755044	1888	1940+	MD/DE	
Delaware Breakwater East Day Beacon	Other: Day Beacon	Delaware Breakwater		1891			
Delaware Breakwater West Day Beacon	Other: Day Beacon	Delaware Breakwater		1891			
Delaware Breakwater West End Beacon	Harbor Light	Delaware Breakwater		1895	1940+		
Murderkill River Rear Range Light	Range	Bowers	384802 750701	1895	1940+		
Murderkill River Front Range Light	Range	Bowers	390319 752423	1895	1940+		
St. Jones Creek Front Range Light	Range	Bowers	390327 752357	1895	1940+		
St. Jones Creek Rear Range Light	Range	Bowers	390401 752405	1895	1940+		
Overfalls Lightship No. 46 *	Lightship	3.5 miles off Cape	390400 752410	1895	1940+		
Grubbs Landing Beacon	Harbor Light	Holly Oak	384757 750124	1898	1901		
Christiana South Jetty Beacon	Channel Light	Wilmington	394709 752752	1899	1940+		
			394857 753104	1901	1940+		

APPENDIX: List of Known Resources

RESOURCE NAME	PROPERTY TYPE	LOCATION	COORDINATES	DATE IN	DATE OUT	STATE	REGIS
Overfalls Light-vessel No. 69 *	Lightship	3.5 miles off Cape	384757 750124	1901	1940+		
Harbor of Refuge North End Beacon	Channel Light	Harbor of Refuge	384959 750623	1902	1940+		
Reedy Island Front Range Light	Range	Reedy Island	392643 753436	1902	1940+		
Baker Front Range Lighthouse	Range	Port Penn	393206 753410	1904	1940+		
Lewes Depot	Other: Buoy Depot	Lewes		1904			
Reedy Island Rear Range	Range	Taylor's Bridge	392422 752526	1904	1940+		R
Baker Rear Range Lighthouse	Range	Port Penn	393229 753412	1906	1940+		
Edgenoor Beacon	Channel Light	Edgenoor	394436 753003	1906	1910		
Liston Rear Range Light	Range	St. Georges	393126 753823	1906	1940+		R
Listons Front Range Light	Range	Port Penn	392858 753531	1906	1940+		
Smyrna Front Range Light	Range	Smyrna	392050 753049	1907	1940+		
Smyrna Rear Range Light	Range	Smyrna	392149 753056	1907	1940+		
Harbor of Refuge Lighthouse	Channel Light	Harbor of Refuge	384851 750533	1908	1940+		
Bellevue Front Range Lighthouse	Range	Edgenoor	394406 753016	1909	1940+		
Bellevue Rear Range Lighthouse	Range	Wilmington	394313 753108	1909	1940+		R
Leipsic River Front Range	Range	Leipsic River	391446 752437	1909	1940+		
Leipsic River Rear Range Light	Range	Leipsic River	391446 752437	1909	1940+		
Appoquinimink Front Range Light	Range	Appoquinimink River		1909	1940+		
Appoquinimink Rear Range Light	Range	Appoquinimink River		1912	1940+		
Little River Front Range Light	Range	Little River	3010?? 7525??	1912	1940+		
Little River Rear Range Light	Range	Little River	3910?? 7526??	1913	1940+		
Miah Maul Shoal Lighthouse	Channel Light	Miah Maul Shoal	390735 751234	1913	1940+	DE/NJ	
Rehoboth Canal Jetty	Channel Light	Rehoboth		1913	1940+		
Broadkill Beacon	Harbor Light	Broadkill River	3849?? 7512??	1915?	1940+		
Delaware City Beacon	Range\Harbor Light	Delaware City		1916	1940+		
Markus Hook Rear Range Light	Range	Bellevue	394546 753011	1916	1940+		
Broadkill Beacon	Channel Light	Broadkill River		1919	1940+		
Fort Delaware Beacon	Channel Light	Fort Delaware		1921	1940+		
Markus Hook Front Range Light	Range	Markus Hook	394635 752833	1925	1940+		
Harbor of Refuge Lighthouse	Channel Light	Harbor of Refuge		1925	1940+		R
Chesapeake & Delaware Canal North Jetty	Channel Light	Delaware City		1926	1940+		
Chesapeake & Delaware Canal #1 thru #9	Channel Lights	Delaware City		1927	1940+		
Chesapeake & Delaware Canal South Jetty	Channel Light	Delaware City		1927	1940+		
Mispillion South Jetty	Channel Light	Millford	3856?? 7518??	1927	1940+		
Bulkhead Bar Rear Range Light	Range	New Castle		1928	1940+		
Bulkhead Bar Front Range Light	Range	New Castle		1929	1940+		
Delaware City Branch Canal #1 thru #3	Channel Lights	Delaware City		1929	1940+		
Reedy Island Jetty	Harbor Light	Reedy Island		1930	1940+		
Pea Patch Island Dike Middle	Harbor Light	Pea Patch Island		1930	1940+		
Pea Patch Island Dike Gap	Harbor Light	Pea Patch Island		1932	1940+		
Pea Patch Island Dike Upper	Harbor Light	Pea Patch Island		1932	1940+		
Christiana Rear Range Light	Range	Pea Patch Island		1932	1940+		
Christiana Front Range Light	Range	Wilmington	3943?? 7532??	1934	1940+		
	Range	Wilmington		1934	1940+		

APPENDIX: List of Known Resources

NOTES TO LIST OF RESOURCES

1. Resources are listed in order of date first placed in service.
2. Resources marked with "*" indicate known multiple resources at the same location.
3. Resource name is that commonly used in government documents.
4. Property type is identified in text.
5. Dates indicate when resource was first placed in service and, if applicable, when resource was decommissioned.
6. If not otherwise noted, resource was (is) located in the state of Delaware. Last state noted, for each resource, indicates state of location as finally determined.
7. Registration status is noted as: "R" -- listed on National Register of Historic Places; "N" -- Nominated for listing on National Register of Historic Places.

BIBLIOGRAPHY

Aids to Navigation Manual, Ed. C.G. No. 222. United States Coast Guard. Washington, DC: Government Printing Office, 1945.

The American Coast Pilot. New York, NY: Edmunds M. Blunt, 1798, 1817, 1854.

Annual Report. U.S. Lighthouse Board. Washington, DC: Government Printing Office, 1899, 1901, 1910.

The Bay and River of Delaware. (Chart) Newberryport, CT: Edmunds M. Blunt, 1809.

Chronology of Aids to Navigation and the Old Lighthouse Service, 1716-1939. United States Coast Guard Chronology Program, Public Affairs Division, United States Coast Guard, Department of Transportation. Washington, DC: Government Printing Office, 1974.

"Clipping File," Annual Report. U.S. Lighthouse Board. (National Archive Record Group 26, Records of the U.S. Coast Guard.) Washington, DC: Government Printing Office, 1857-1918.

Delaware Bay and River, Survey of the Coast of the U.S. (Chart) Washington, DC: U.S. Coast and Geodetic Survey, 1880, 1901, 1936.

Delaware Bay and River, United States, East Coast. (Chart) Washington, DC: National Oceanic and Atmospheric Administration, 1983.

Delaware Comprehensive Historic Preservation Plan (by David L. Ames, Mary Helen Callahan, Bernard L. Herman, and Rebecca J. Siders). Newark, DE: Center for Historic Architecture and Engineering, College of Urban Affairs and Public Policy, University of Delaware, 1989.

Description of Light-House Tower, Buildings, and Premises at . . . (dates and facilities vary, see below) Report for the U.S. Lighthouse Board. Washington, DC: Government Printing Office:

Baker Range Front Light Station, 1907.

Baker Range Rear Light Station, 1907.

Bellevue Range Front Light Station, 1910.

Bellevue Range Rear Light Station, 1910.

Bombay Hook Light Station, 1907.

Brandywine Shoal Light Station, 1914.

Cape Henlopen Light Station, 1907.

Cherry Island Range Front Light Station, 1907.

Cherry Island Range Rear Light Station, 1907.
Christiana Light Station, 1907.
Christiana North Jetty Light, 1907.
Christiana South Jetty Light, 1910.
Delaware Breakwater Range Front Light Station, 1908.
Delaware Breakwater Rear Light Station, 1907.
Delaware Breakwater West End Beacon, 1908.
Edgemoor Light Station, 1907.
Fenwick Island Light Station, 1907.
Fourteen Foot Bank Light Station, 1910.
Grubbs Landing Beacon, 1907.
Harbor of Refuge Light Station, 1910.
Harbor of Refuge North End Light Station, 1909.
Leipsic River Range Front Light Station, 1910.
Leipsic River Range Rear Light Station, 1910.
Listons Range Front Light Station, 1908.
Listons Range Rear Light Station, 1908.
Mahon River Light Station, 1907.
Marcus Hook Range Rear Light Station, 1920.
Mispillion River Light Station, 1907.
Murderkill River Front Light, 1907.
Murderkill River Rear Light Station, 1907.
New Castle Front Light Station, 1907.
New Castle Range Rear Light Station, 1907.
Old Reedy Island Light Station, 1907.
Reedy Island Range Front Light Station, 1910.
Reedy Island Rear Light Station, 1908.
Smyrna Front Range Light, 1907
Smyrna Rear Range Light, 1907.
St. Jones Creek Front Light, 1907.
St. Jones Creek Rear Light, 1907.

Documents Relating to the U.S. Lighthouse Board. U.S. Lighthouse Board. 1789-1871. Washington, DC: Government Printing Office, 1871.

Historic Context Master Reference and Summary (by Bernard L. Herman and Rebecca J. Siders, with David L. Ames and Mary Helen Callahan). Newark, DE: Center for Historic Architecture and Engineering, College of Urban Affairs and Public Policy, University of Delaware, 1989.

Holland, Francis Ross, Jr. America's Lighthouses, An Illustrated History. Mineola, NY: Dover Publications, Inc., 1988.

International Dictionary of Aids to Marine Navigation, Vols. I & II. Cited in Naish, 1985.

Light List (Including Fog Signals), Atlantic and Gulf Coast of the United States. Federal Bureau of Lighthouses, U.S.

Department of Commerce, Lighthouse Service. Washington, DC: Government Printing Office, 1911, 1916, 1924, 1933.

List of Buoys and Other Aids to Navigation. U.S. Lighthouse Board. Washington, DC: Government Printing Office, 1911.

List of Light-Houses, Beacons, and Floating Lights of the U.S. U.S. Light-House Board. Washington, DC: Government Printing Office, 1854-1891.

List of Lights and Fog Signals of the U.S. U.S. Light-House Board. Washington, DC: Government Printing Office, 1892-1910.

Map of Delaware Bay and River, Survey of the Coast of the U.S. (Chart) Washington, DC: Coast Survey Depot, 1848.

Map of Delaware Bay and River. (Chart) New York, NY: Beers, 1868.

Map of Lower Delaware. (Map) Philadelphia, PA: Francis Shallus, 1799-1801.

Naish, John M. Seamarks: Their History and Development. London, England: Stanford Maritime Limited, 1985.

Snyder, Frank E., and Guss, Brian H. The District, A History of the Philadelphia District U.S. Army Corps of Engineers, 1866-1971. Philadelphia, PA: U.S. Army Engineer District Philadelphia, 1974.

United States Coast Guard Annotated Bibliography. United States Coast Guard, U.S. Department of Transportation. Washington DC: Government Printing Office, 1982.