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The Seal Cove Shipwreck Project: Investigating an Historical Wooden Vessel on Mount Desert Island, Maine

Franklin H. Price, Stephen Dilk, and Baylus C. Brooks, Jr.

Two one-week field projects, carried out during the summers of 2011 and 2012, investigated an historical wooden shipwreck in the intertidal zone on the western side of Mount Desert Island, Maine. Salvage, tide, ice, and other environmental forces have reduced the wreck to a keel, frames, and outer hull planking. Despite this, some observations can be made from the limited surviving evidence. The vessel appears to have been heavily-built, with a full-bodied hull, and constructed in the mid to late 19th century. Its location, hull, and the wood shavings and brick chips found between its timbers suggest that it may represent a sailing vessel engaged in the coasting trade. Archaeological investigation of the site also served as an informal field school, providing experience in maritime site recording to Acadia National Park staff and members of the public.

Deux projets de terrain d'une durée d'une semaine chacun ont été menés pendant l'été en 2011 et 2012. Ces projets ont permis d'investiguer une épave historique en bois dans la zone intertidale du côté ouest de l'île Mount Desert, dans le Maine. Un nombre de facteurs comme la récupération des matériaux, les marées, les glaces et d'autres forces environnementales ont affecté l'épave de sorte qu'il n'en reste que la quille, la structure et l'extérieur du bordé. Des observations à propos de l'épave ont tout de même été possibles malgré le peu d'éléments encore en place. Ce bateau muni d'une coque ample semble avoir eu une construction assez robuste et aurait été construit entre le milieu et la fin du 19e siècle. L'endroit où il se situe, sa coque, ainsi que les fragments de bois et de brique trouvés entre les membrures suggèrent qu'il s'agit possiblement d'un voilier impliqué dans le cabotage. Ces travaux archéologiques ont aussi servi de chantier école informel en offrant au personnel du parc national Acadia et au public l'occasion d'apprendre les rudiments de l'enregistrement d'un site maritime.

Introduction

The Seal Cove Shipwreck Project, funded by the National Park Service's Submerged Resources Center and the Institute for Maritime History, archaeologically recorded an historical wooden shipwreck (Site ME 436-029) on Mount Desert Island, Maine (FIG. 1). The hull remains are in the intertidal zone on Acadia National Park easement land owned by the town of Tremont. The wreck was surveyed for one week in July–August 2011 and a second week in July 2012. Project objectives were twofold. First, archaeologists investigated and recorded an historical shipwreck in Seal Cove, producing a site plan and profile drawings of the frames (FIGS. 2 and 3). Second, they used the process to provide training in maritime archaeological methods and techniques for participants. The exercise of shipwreck recording provided park staff and volunteers with experience in documenting maritime cultural resources and gave project personnel an opportunity to conduct community outreach, highlighting the importance of preserving Maine's maritime heritage (FIG. 4). The project also provided four internships for graduate

and undergraduate students from East Carolina University's Program in Maritime Studies and from College of the Atlantic in Bar Harbor, Maine. This article is largely based upon a synthesis of two site reports (Price 2011, 2013).

As a non-intrusive investigation, archaeologists' observations were limited to the visible structure with the exception of partial excavations along the keel. With vessel remains reduced to a keel, frames, outer hull planking, and scattered outlying elements, interpretation was a considerable challenge. Despite the limited remaining structure, the project hoped to answer a number of research questions. Could the vessel type be ascertained? What is its place in the greater chronology of shipbuilding? What part did it play in local history? Also, could these questions be answered while simultaneously using the resource, and the project, as a tool for public outreach and education? Comparisons of vessel remains to historical sources, as well as the archaeological record, combined with an examination of the hull structure, allowed the wreck to be placed in context. The Seal Cove wreck was apparently a heavily built, historical, wooden watercraft with a full-bodied hull. From the remaining structural evidence one can

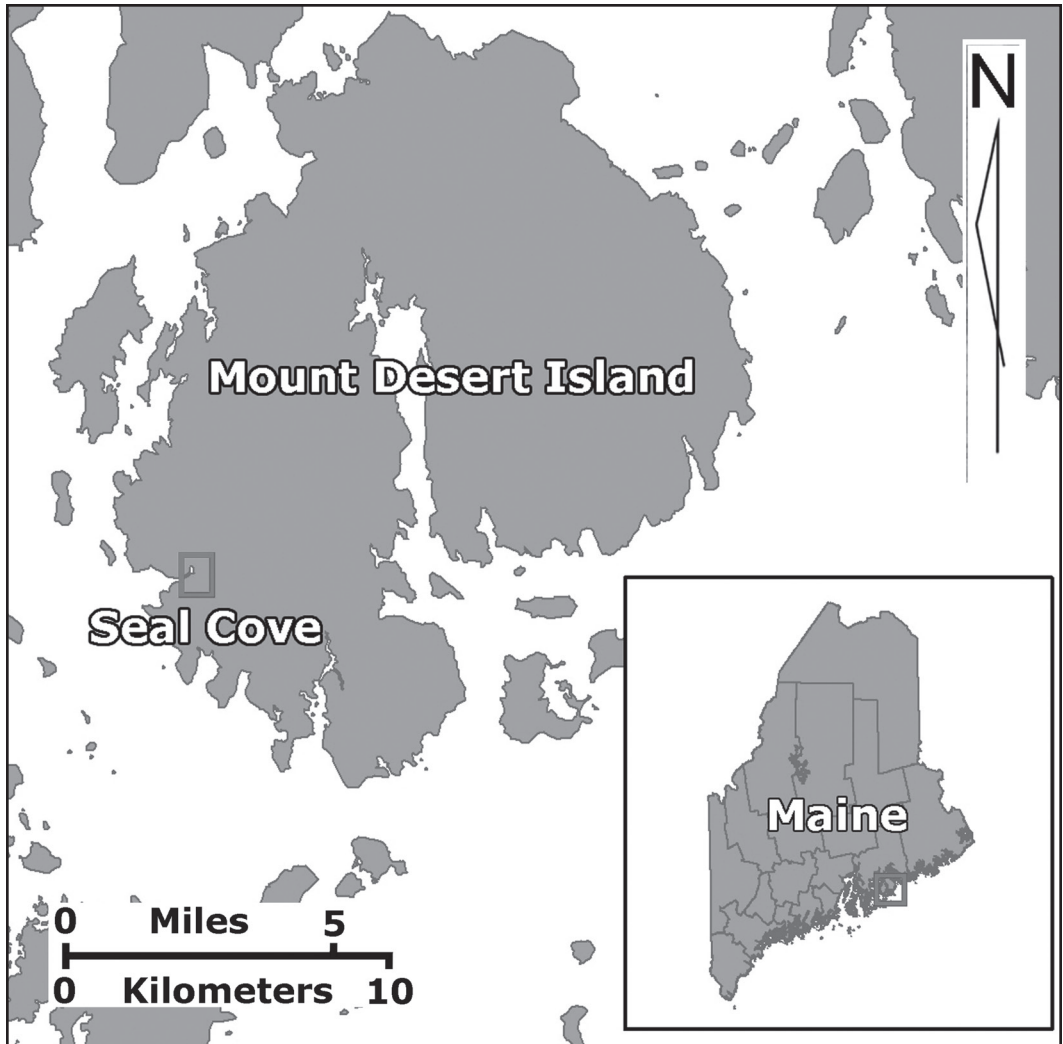


Figure 1. Site location. (Figure by Joshua Daniel, 2011.)

estimate a vessel originally about 70–85 ft. (21.34–25.91 m) in length. Fasteners and construction techniques are consistent with 19th-century manufacture. Wood damage, associated with a specific mollusk species discussed below, shows that the vessel sailed at least as far south as New Jersey and was likely involved in trade. Brick chips, coal, and sawdust found between frames and accumulated near the keel suggest a vessel that carried bulk cargoes, perhaps associating the remains with the lumber industry that once thrived in Seal Cove.

After consulting historical sources and local informants, identification of the vessel has

proven elusive. Yet, even as an unidentified hulk, this vessel is important because the combination of the abovementioned characteristics suggests a vessel engaged in the coasting trade, the lifeline of isolated coastal communities before the advent of adequate roads (Leavitt 1970). Few coasting vessels have been archaeologically investigated in northern New England, so the data described here adds to the limited knowledge of these vessels from an archaeological standpoint. Claesson (1998: 82), writing about another coasting vessel, states that historical vernacular watercraft, such as the Seal Cove wreck, are important to study because they

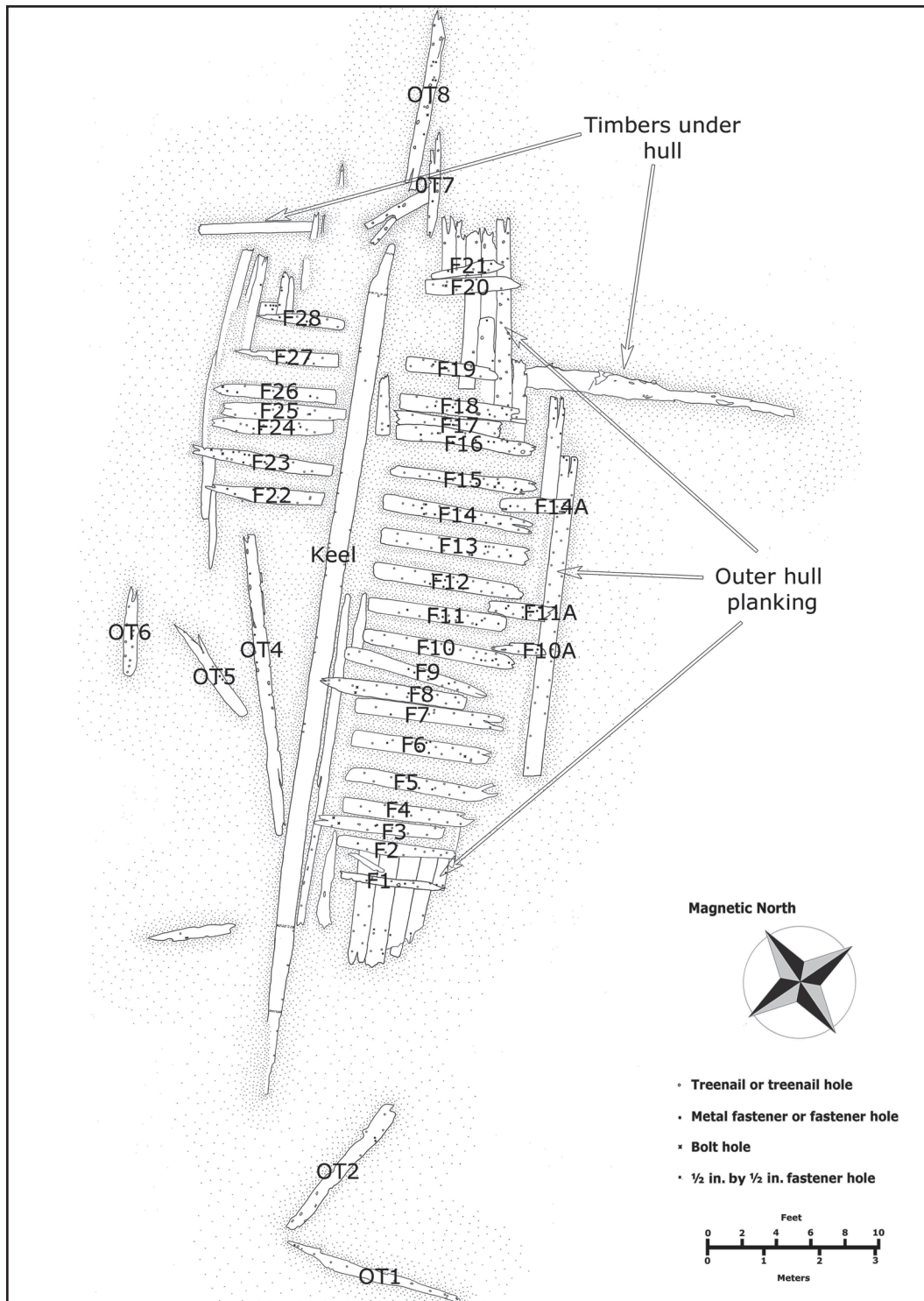


Figure 2. Site plan. (Figure by Franklin H. Price, 2013. Funded by the National Park Service and the Institute of Maritime History.)

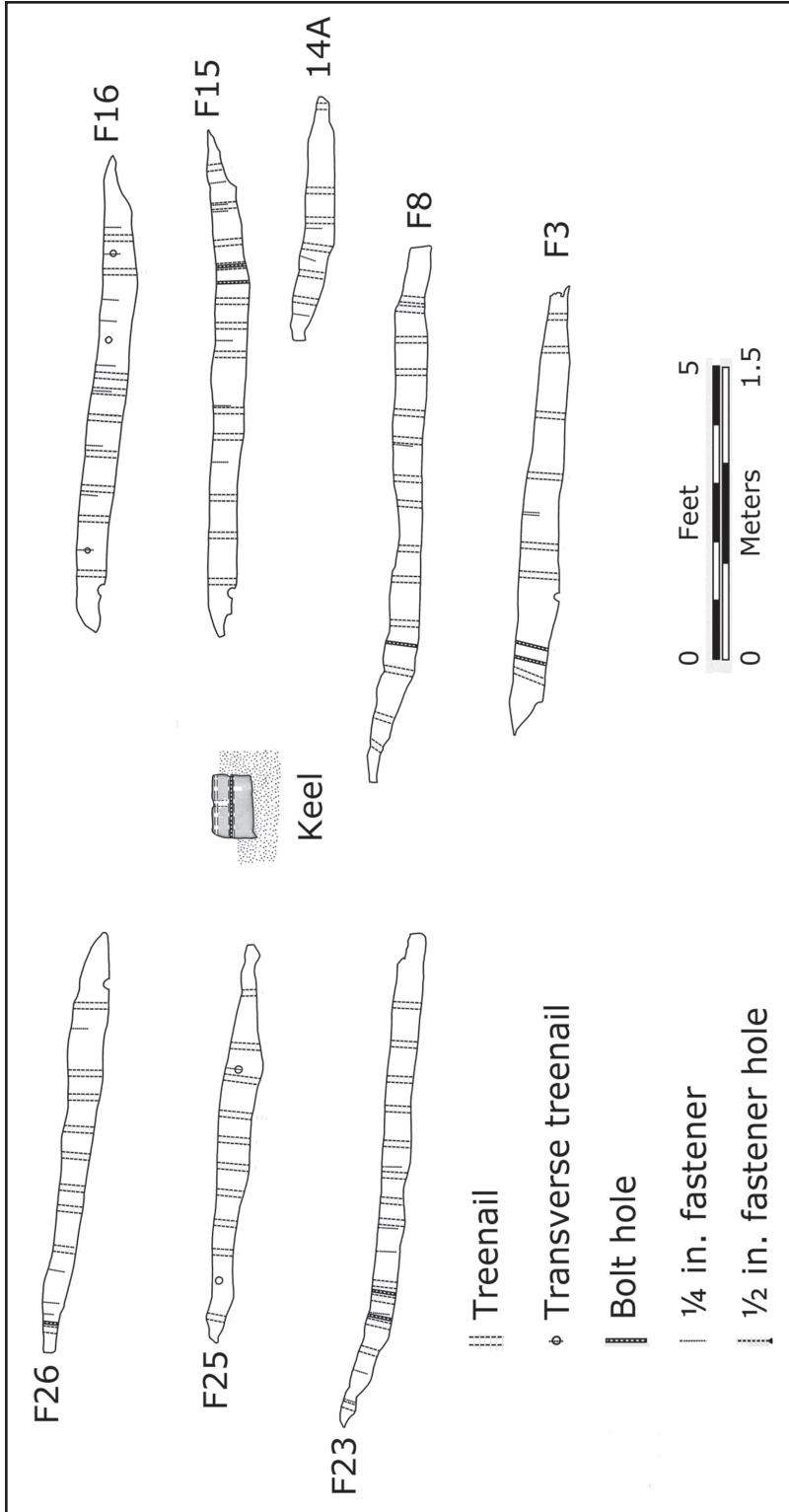


Figure 3. Selected frame profiles, and keel in cross-section. (Figure by Franklin H. Price, 2011.)



Figure 4. Fieldwork. *Clockwise from top left*: measuring lumber; comparing notes; volunteers on site; and drawing a frame. (Photos by Steve Dilk, 2012; and Franklin H. Price, 2011 and 2012.)

embody shipbuilding in practice, often with construction features that depart from literature on the subject. Sadly, intertidal wrecks in Maine are subject to ongoing deterioration; it is vital that these vessels are recorded while they are still available to study.

Site Description

The shipwreck is located on the north shore of the eastern end of Seal Cove, on Mount Desert Island, in the intertidal zone (FIG. 5). East of the main part of the cove, the site is next to a narrow channel that is nearly dry at low tide, limiting the draft of vessels able to enter. The site was reported by local informants in 2006 and listed with the Maine Historic Archaeological Sites Inventory in July 2007 by Anthony Booth of Independent Archaeological Consulting (Maine Historic Preservation Commission 2007: 1–2; Price 2007).

Wooded land meets the shore near the wreck, with an exposed rock ledge at the shoreline. Rocks and boulders are scattered about the site, and a few rocks sit within the vessel structure. The rocks and boulders appear

to be local. Exposed bedrock on the western side of the wreckage gives way to a mixture of mud and gravel, with a layer of fine mud covering vessel timbers. The vessel rests in an intertidal, sheltered, low-energy environment. The cove itself is well-suited for careening, a practice that carries on today when boats are leaned against floats so that their lower hulls can be maintained when the tide recedes. Even in times of storm, the narrow entrance does not permit rough seas to enter its shielded waters.

The vessel is deposited on largely flat terrain, slightly sloping downward to the east. The hull to the west appears to have been broken by the bedrock, while on the east, parts of the hull were cushioned by mud and gravel. Most of the vessel is missing, with no structure remaining above the turn of the bilge. Almost all the frames stop before reaching the keel. The lone exception hangs slightly over the keel and may represent a floor. Much of what is left is degraded, eroded, and weathered, making it difficult to differentiate the bow from the stern. A piece resembling stem structure, however, is northeast of the keel. At least three nonstructural timbers are pinned underneath

the wreck, suggesting that it was careened, or propped up, at its final deposition. The site itself is largely contiguous, with a few outlying pieces nearby that may be part of the vessel, as well as a few farther away in the cove that likewise appear to be disassociated parts of the wreck. These outlying elements share dimensional characteristics with the vessel and also feature wooden fasteners.

The remains of the vessel have been subjected to tidal submergence, with alternating exposure to air and water, which has had a deleterious impact on structural integrity. Biologically, the wreck is home to barnacles, mollusks, crabs, and seaweed, which play a role in its degradation. Ice damage has also been a significant factor, because the cove is subject to freezing in winter. In Maine intertidal zones, ice negatively impacts wreck sites by degrading the wood and physically removing structure (Green 2002: 109–110). Silt deposited on the wreck on the incoming tide may have helped with its preservation; frames covered in sediment are

far better preserved than exposed wood. There were no obvious signs of vandalism, but the site is free from associated rigging or machinery, suggesting extensive post-depositional salvage. As discussed below, the site was subjected to extensive souvenir hunting.

Brief Notes on the History of the Cove

In the historical period, Seal Cove has been a locus of maritime activity since the first decade after the Revolutionary War. American families settled on both sides of Seal Cove in the 1780s (Street 1905: 150). It was the site of a sawmill, built in 1785, and appeared on maps as early as the 1790s (Peters 1795: 1; Maine Historical Society 1891: 442–448). The settlement grew to the extent that by the latter 19th century the workforce expanded and stratified. Seal Cove had a store, a post office, boatbuilders, house carpenters, ship carpenters, civil engineers and surveyors, justices of the peace, a turner, trader, ship contractor, caulkers, painters, blacksmiths,



Figure 5. The Seal Cove shipwreck, from north of the wreckage. (Photo by Franklin H. Price, 2011.)

and other artisans (Dodge 1871: 50–55; Lapham 1886: 20).

In all, at least 13 vessels appear to have been launched at Seal Cove in the 19th century, many of them at the Hiram Flye shipyard immediately south of where the wreck lies today (Spiker 1961; Stanley 2003; 2006). In these decades, “lumber, ice, fish and granite” were the primary industries on Mount Desert Island, with the sawmill contributing to the former (Street 1905: 309). From Seal Cove, a retired Captain Hodgdon recalled in a 1934 interview that he took lumber to ports on the eastern seaboard, carrying coal back in return (Hodgdon 1934). In the early 20th century the lumber and shipbuilding industries declined and disappeared, leaving Seal Cove to become the quiet fishing harbor that it is today.

Methods

The site was recorded using an engineer’s scale of feet and tenths of feet instead of metric measurements. Planking thicknesses, fastener dimensions, and most diagnostic scantlings were taken in feet and inches. English measurements were used for two reasons. First, the vessel was built in feet and inches, and, second, the contemporary literature regarding these components uses feet and inches. This allows for easier comparisons to shipbuilding treatises and other nautical reference works that used English measurements.

To facilitate the discussion of vessel parts, archaeologists employed a numbering system created during the 2011 season: frames were numbered F1 to F28 beginning on the eastern side heading northward, F1 to F21, and then following the same procedure for the remaining frames on the western side, F22 to F28. Three partial frames at the turn of the bilge were given the numbers F10A, F11A, and F14A. Outlying elements were assigned numbers OT1 through OT9.

Archaeologists solved the challenge of creating a baseline that could withstand tidal fluctuations by using a come-along cable puller to stretch polypropylene pot warp, or fishing rope, between two boulders. A fiberglass tape fastened to this line provided reference points. In 2011, archaeologists and volunteers created a site plan using baseline offsets and trilateration. Participants drew each frame in profile in 2012, using string levels as baselines, and augmented

the site plan with new observations on each frame. Data from the site plan and profiles were used in tandem to create a three-dimensional reconstruction of the vessel, greatly aiding in interpretation.

Observations

Sawdust, brick chips, and tar were present in the sediment in the limited excavations undertaken near the keel, as well as between the frames occasionally, but the interior of the vessel was devoid of diagnostic artifacts. Artifact scatter in the eastern cove includes ceramics, pipe stems, glass, and other objects from the late 18th through the 20th centuries.

The remaining continuous structure is close to 23 ft. (7 m) wide and nearly 50 ft. (15.24 m) long. A nonstructural timber extends eastward from under the hull. Overall dimensions of the site, including elements from the vessel scattered nearby, are 74 × 42 ft. (22.56 × 12.80 m). The three remaining identifiable components are the keel, the frames, and the outer hull planking (FIG. 6). The vessel lacks any indication of a form of propulsion, because the parts that would have provided this evidence are missing. If there were one or more mast steps, they would have been on the keelson, which is absent. There is no evident engine bed. The deadwood stern assembly, which would have been drilled to fit a propeller shaft were this vessel engine powered, is also missing.

Keel

What is left of the keel is slightly less than 50 ft. (15.24 m) long (for scantlings and fastener measurements, see Table 1). It is incomplete, and tapers at the northern end, likely a split, but it may indicate where it was scarfed into the stem, or perhaps where it ended at the stern by rising into the deadwood (Van Gaasbeek 1918: 27–28). The shape of the keel is uneven in cross section; the eastern edge retains a pointed piece that is absent on the opposite side. Whether intentional or formed by a split in the wood, the odd shape of the keel is curious, and at this point, unexplained. During the course of excavations near the keel, investigators found sawdust, tar, coal, and mud above a substrate of clay. Upon learning that sawdust was discovered in the sediment by the keel, one lobsterman/boatbuilder noted that a cheap way to caulk seams was to careen

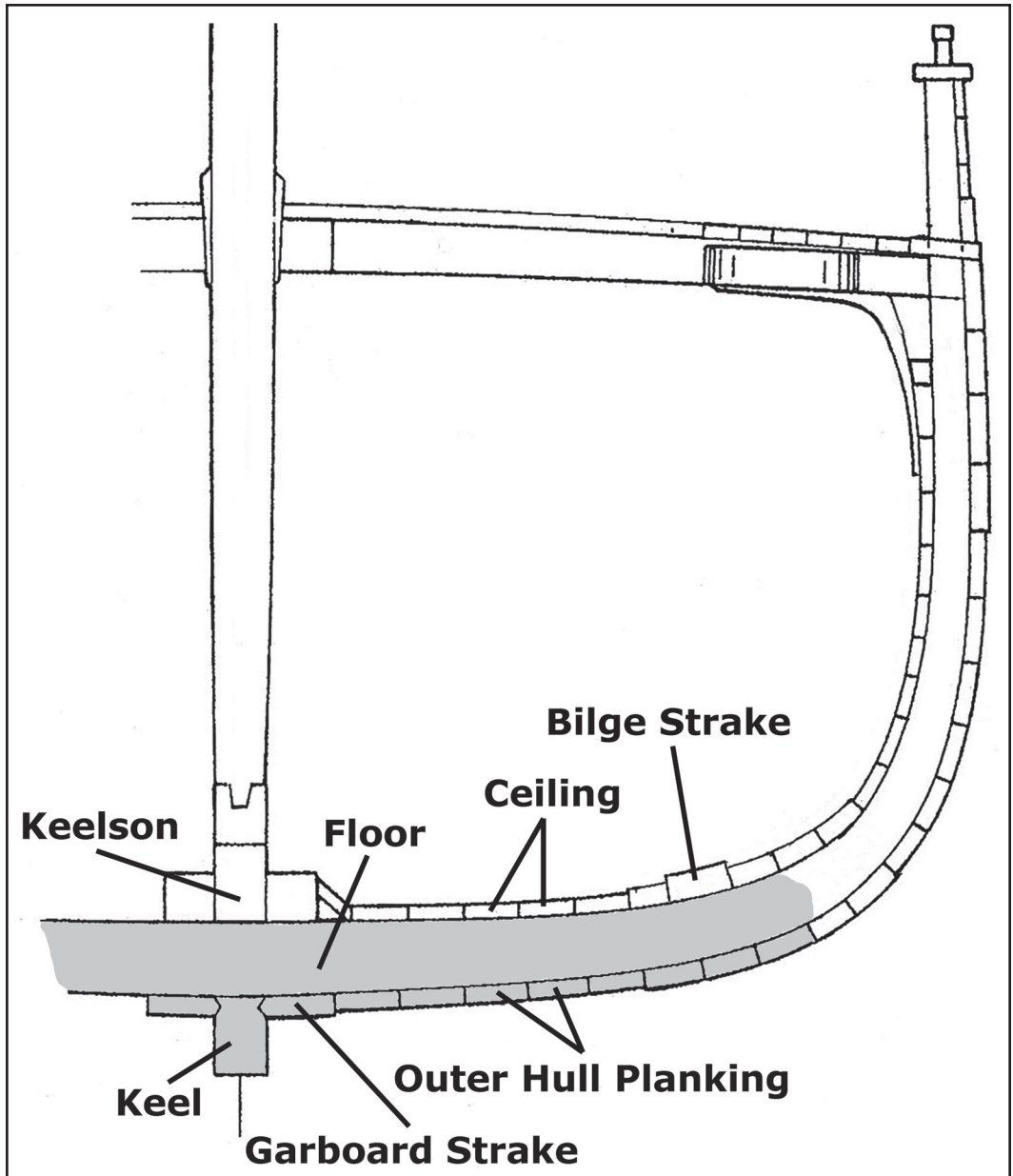


Figure 6. Cross section of 19th-century schooner, remaining structure at Seal Cove in gray. (Drawing after Greenhill and Manning, 1988.)

a vessel and put sawdust and mud into the seams; when the tide rose the water would push the mixture into the cavities (Wayne Rich 2012, pers. comm.). Of course, the sawdust could also have been from cargo, as packing material, as insulation to keep ice cool during shipment, or from the historical sawmill

nearby, but use in repair provides one potential explanation for its presence. Keel excavations also revealed a section of the outer hull planking on the west side. One rounded timber, likely not part of vessel structure, protrudes from underneath the outer hull planking. Two others found under the vessel, a large timber

Table 1. Scantlings and fastener measurements.

Structural component	Molded height (in.)	Sided width (in.)	Length (ft.)	Molded height (cm)	Sided width (cm)	Length (m)
Keel (observed)	8 ¾	14	50	22.2	36.0	15.24
Keel (estimated)	9 or 10	14	50+	25.4	36.0	15.24+
Smallest frame	6	6	—	15.2	15.2	—
Largest frame	7 ½	11 ¼	—	19.1	28.6	—
Fastener or fastener hole	Diameter or width (in.)	Diameter or width (cm)				
Bolt	¾–1 ⅛	1.9 to 2.9				
Square planking fastener	½	1.3				
Ceiling fastener	¼ × ½, or ¼ × ¼	0.6 × 1.3, or 0.6 × 0.6				
Treenail	1 ¼	3.2				

under the east side at F19, and another to the northwest in line with the end of the keel, suggest that the vessel may have been up on logs or timbers for repair or maintenance at its final deposition.

Frames

Twenty-eight frames, transverse structural members, remain attached to the outer hull planking. None is still attached to the keel. It is difficult to determine with certainty which of the remaining frames are floors, the structural members that cross the keel, and which might be futtocks, which do not cross the keel. By the nature of their construction, stopping short of the keel, most appear to be futtocks. Frames F3 and F8 (and potentially F17, F21, and F25) appear to be floors. Inboard edges of the first two reach in the direction of the keel, and they have bolt holes at angles consistent with through bolts that would have extended through keelson, floor, and keel. The vessel exhibits a wide variation in frame dimensions. It is unknown whether this is a function of the frames' degraded nature or a variety of sizes on the original vessel. The frames are not square; the upper edges are rounded or degraded from erosion, and they are wider than they are thick. The distance between futtocks, center to center, is 24 in. (61 cm), while small distances between paired frames suggest a heavily built hull or an early build date. The

outer hull planks are fastened through the frames with treenails, and treenails pin some of the frames together. The tops of the frames also have metal fastener holes, some with the remains of fasteners in them. As with the keel, archaeologists noted sawdust, coal, tar, and brick fragments where some of the frames met the planking. Tar also coats the outboard face of the easternmost outer hull strake, indicating that the hull was likely waterproofed with pitch, a common practice for schooners in the 19th century (Greenhill and Manning 1988: 156–157).

Limbers are transverse passages cut into the bottom inboard edges of the futtocks and floors, allowing for the movement of water in the lower reaches of a vessel and facilitating the use of a bilge pump. Limbers on the Seal Cove vessel are 2 in. (5.1 cm) wide, 1 in. (2.5 cm) deep, and half circular in shape. They average 8 in. from the inboard edge of the frames, with the exception of frames like F3 and F8, which are likely among the remaining floors. On these frames the limbers line up with the other examples, providing further evidence that they were floors and not futtocks.

Outer Hull Planking

The outer hull planking is 2¼ in. (5.7 cm) thick. Chapelle (1994: 568) described large American fishing schooners of the late 19th century as having outer hull planking 2½ in. (6.4 cm) thick, not far from the dimension recorded at Seal Cove. The planks are shaped to fit, with strakes becoming wider at the midships and narrowing at bow and stern. Narrowing toward both ends of the vessel, the planks are attached to the frames in a treenail double-fastener pattern (Desmond 1919: 6; Steffy 1994: 292). The planks meet along the same strake at butt joints, and at these junctures the fastener pattern included square metal fasteners, ½ in. (1.3 cm) on a side. A partial example of potential

furring or sacrificial planking, a small piece of worm-eaten wood is under the hull to the southeast end of the site. It appears to be fastened to the outer hull planking, but this has not been established with certainty.

Outlying Structure

Several individual parts lie scattered about the western side of the vessel. By their size, proximity to the wreck, and fasteners, they appear to be associated with the rest of the wreckage. Beyond the north end of the keel is one component, OT8, with a slightly curved shape reminiscent of part of the stem apron or other bow construction. The high rake of the angle of the fasteners suggests that they were toe-nailed in, providing a clue that this piece might have been at a vertical orientation in comparison to the others. Outlier OT9 is nearly 40 ft. (12.19 m) from the north end of the keel and resembles a knee, perhaps a deadwood knee. Treenails, its location near the wreck, and its shape suggest that it is likely a part of the wreck. Only one face could be investigated because the timber is mostly buried.

Fasteners

Since this was not an intrusive survey, the only fasteners recorded were those readily

apparent after a mild rinsing of the tops of the frames. The wreck exhibited three different material types of fasteners: wood, iron, and copper alloy. Of the extant fasteners, only wooden treenails were readily identified, although circular holes with evidence of rust were observed, small square holes that often had ferrous corrosion products in them, as well as square holes, measuring $\frac{1}{2}$ in. (1.3 cm) on a side, that match the size of a copper alloy fastener found on the northwest part of the wreck. Also, some rectangular ferrous-fastener holes are perhaps evidence of cut nails.

On the Seal Cove site treenails were employed for three uses. First, they acted as through-fastenings, running completely through both the outer hull planking and the frames (FIG. 7). Second, they pinned double frames together, as with the example of F25, F28, and a treenail between F16 and F17. Third, treenails were observed on the keel, driven vertically and horizontally, with at least two examples of each. This is not particularly surprising, as it was not uncommon for treenails to be used in the keel (Chapelle 1969: 178). The treenails might be defined as unwedged, since neither wedges nor pegs were conclusively observed locking the treenails in place. However, the lack of wedges could be a result of the eroded nature of the frames. In the

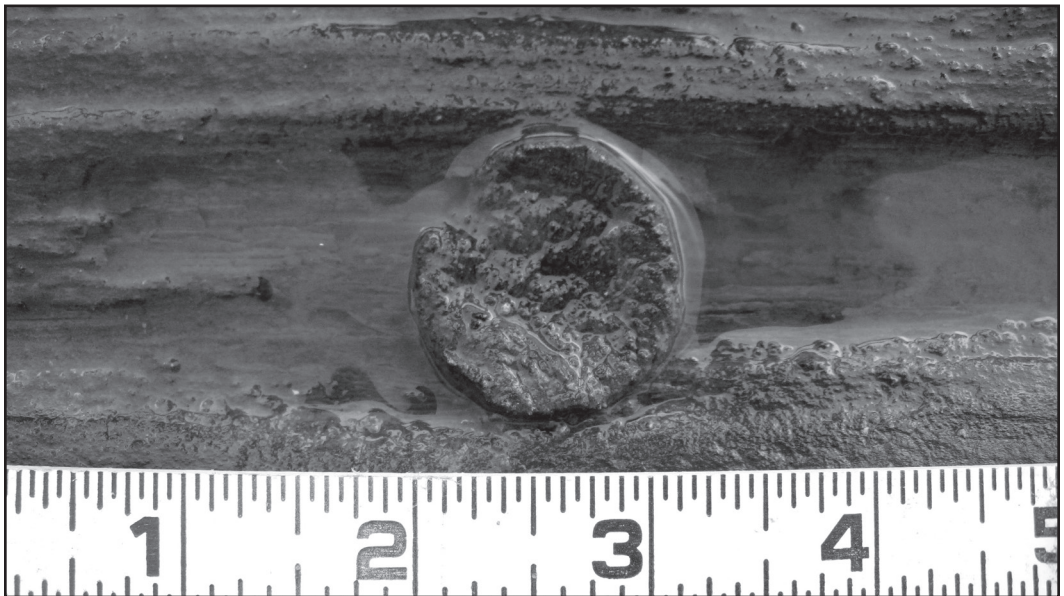


Figure 7. Treenail, scale in inches. (Photo by Franklin H. Price, 2011.)

“long” treenail type, the fastener runs through outer hull, frame, and ceiling planking (De Kerchove 1961: 860; McCarthy 2005: 68). The wedges, if these are “long” treenails, were removed by ice and tide along with the ceiling planking that they once held in place.

In a few locations side-by-side treenails are indicative of repair, either at the time of construction or later. As a lobsterman pointed out, when a fastener is driven improperly, or works slack, one solution is to drive another fastener in a space immediately beside it, tightening up the bond (Ailin Rafferty 2012, pers. comm.).

The remnants of ferrous fasteners, mostly in the form of iron-stained holes, were present throughout the wreck. These were rectangular, square, or circular in shape. The latter were of various sizes, with the most variability in the keel. Bolts on the frames held floors to the keel, while outboard bolts may have held a bilge keelson, also called a bilge strake, in place (*New-York Marine Register* 1857; DeKerchove 1961: 62). Iron impregnation has preserved the original wood face of the keel better near some of the bolt holes while the surrounding wood decayed, a phenomenon noted on other historical wooden shipwrecks (Hocker and Wendel 2006: 149). Ferrous angular fasteners, apparently cut nails, likely held or tacked ceiling planking in place. Industrially manufactured cut nails date from the first few decades of the 19th century into the 1880s and beyond (Nelson 1968: 3–4; W. Adams 2002: 71). However, cut nails continue to be used for specialized construction techniques even to the present day.

Diameters of empty fastener holes along the keel revealed a variety of fastener sizes. Deep sediment prohibited the investigation of much of the eastern face and of most of the western face. A curious pattern of almost all the fasteners occurring on the side of the keel suggests that the keel itself is currently on its side, with the top now facing west. One interpretation for this, given the lack of metal fasteners remaining, is that the keel could have been put on its side to facilitate driving out fasteners during salvage (Nathan Lipfert 2013, pers. com.).

In addition to ferrous and wooden fasteners, a copper-alloy fastener might be associated with the wreck. A local informant provided investigators with a copper-alloy fastener that he found on the site. It is square, measuring ½

in. (1.3 cm) on a side (FIG. 8). The dimension matches some of the fastener holes in the outer hull planking, notably a well-preserved example on the western side of the wreck just north of frame F28. The fastener has been bent into a contorted shape, whether from stresses incurred as the vessel broke apart, from being pulled from the wreck, or from being clenched as part of vessel construction, is unknown. Degradation of the metal is considerably more pronounced toward the head, where it may have been exposed to the elements.

Worm Damage

The vessel exhibits worm or gribble damage in several locations. Some of the damage has been identified by marine biologist James T. Carlton as the work of *Bankia gouldi* (2013, pers. comm.). This mollusk species ranges between New Jersey and Brazil, providing evidence that the vessel at Seal Cove traveled at least as far south as New Jersey during its career (Turgeon et al. 2009: 737). The mollusk’s range may have extended during the 20th century; reports from the 1920s place its habitat south of the Virginia capes (Bartsch 1922: 11–12). If this historical report is correct, the vessel may have sailed at least as far south as Virginia, if it dates to the 19th century.

Vessel Structure: Interpretation

Interpretation of fragmentary remains in the attempt to answer the research questions posed in this project created interesting challenges. None of the interpretations put forth here is conclusive and all are limited by the paucity of available data. However, some observations can still be made regarding the vessel type, its structure, and the time range of its potential construction date. This section explores three methods available to interpret the structure, including a three-dimensional reconstruction, comparison of the archaeological evidence to vessel treatises, and comparison with previous archaeology. These methods allow for tentative conclusions regarding the vessel’s age and original dimensions, placing it into the context of local history and ship construction.

Three Dimensional Reconstruction

The site-plan and profile drawings were combined to create a reconstruction of the

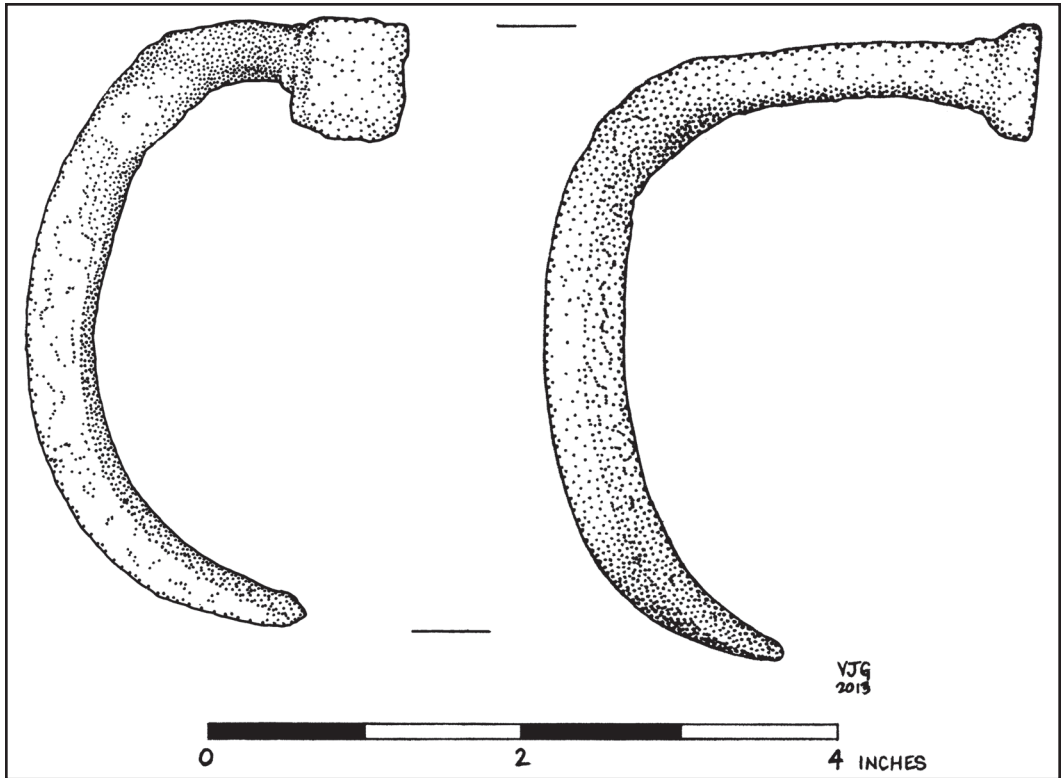


Figure 8. Copper-alloy fastener. (Drawing by Valerie J. Grussing, 2013.)

wreck using *Rhinoceros*, a three-dimensional drafting program. The component parts were modeled to make tentative inferences regarding the shape of the original hull. Although this representation has its limitations, it is a valuable interpretive tool that can be used to make observations about the vessel's construction and the site-formation process.

Two of the frames, F3 and F8, appear to be floors that crossed the keel and were bolted to it. Assuming that these bolts were set plumb, the shape of the lower hull can be estimated by shifting the frames upward 10° along their outboard edges and placing them over the keel so that the through-bolt holes are centered (FIG. 9). Admittedly, there are potential problems with this interpretation. For example, the damaged ends of several of the frames have been cracked and now deviate from their original orientation, making the outer hull illustrated here conjectural. Also, in general terms, all the bolts going into a keel are not necessarily plumb, there may have been slight deviations. Still, valuable observations can be made with this tentative

reconstruction. First, the Seal Cove wreck appears to have a mild deadrise, not inconsistent with plans for full-bodied sailing vessels (FIG. 10). In other words, the rise of the floor between the keel and the turn of the bilge results in a shape suitable for carrying cargo. Second, the heels of the futtocks touch, or nearly touch, one another on the keel (FIG. 11). This has ramifications for the potential date of the wreck, as will be explored below. Third, in three-dimensional space the frames farthest north on the vessel are more readily interpreted as cant frames. Cant frames fill the spaces as a vessel narrows toward the bow and stern, suggesting that the vessel narrowed significantly near frames F20 and F21. This allows for an interpretation of the potential length and shape of the vessel.

The three-dimensional reconstruction also assists in understanding the site-formation process. The current state of the wreck is the result of structural collapse, ice damage, and decades of alternating exposure to air and water twice daily. The frames have cracked, and while the outer hull planking has held

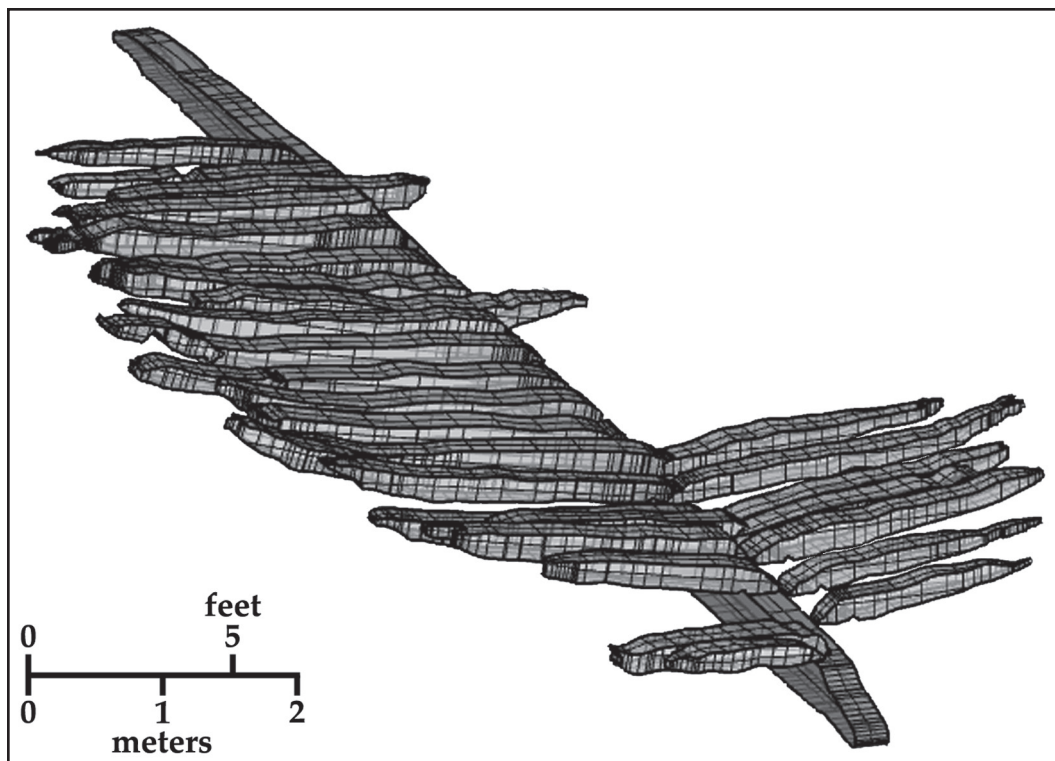


Figure 9. Three-dimensional reconstruction, looking south southwest. (Image by Joshua Daniel and Franklin H. Price, 2013.)

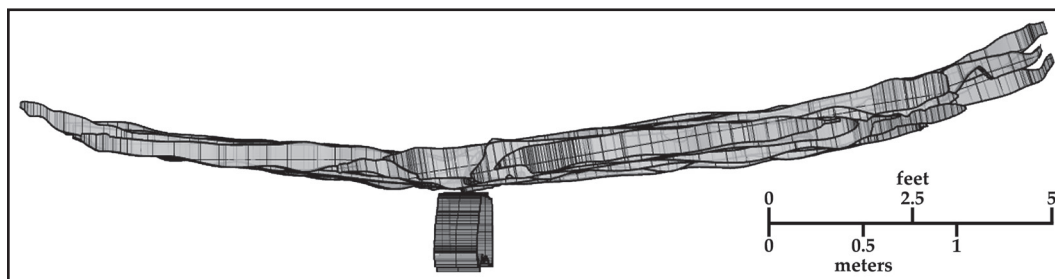


Figure 10. Three-dimensional reconstruction showing deadrise, looking northwest. (Image by Joshua Daniel and Franklin H. Price, 2013.)

them in their original positions relative to one another, the frames are not in their original positions relative to the keel. The keel has fallen over and the hull has broken, with the frames and hull planking falling outward and away from the keel on either side. The weight of the collapse has warped some of the frames, cracking the outboard third and flattening their lines from the original shapes. Before the frames were distorted, the hull shape exhibited a more pronounced curve.

Using Shipbuilding Sources to Estimate Size and Age

Although conclusions based on shipbuilding formulas should be taken with caution, some sources can assist in estimating the vessel's original size. The date of publication for the original document must be taken into consideration. Also, wide variation in vernacular shipbuilding traditions shows that published formulas and rules were not followed in all cases. Given the

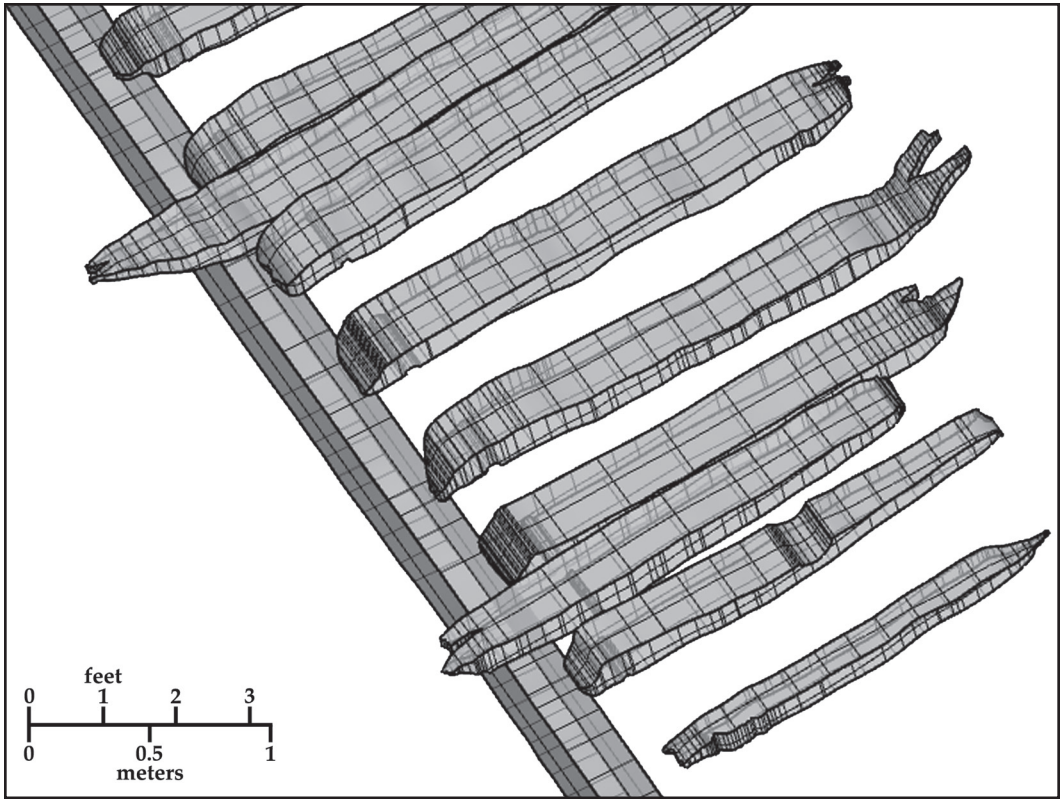


Figure 11. Three-dimensional reconstruction with futtock heel placement, top view. (Image by Joshua Daniel and Franklin H. Price, 2013)

paucity of structural evidence on this wreck, however, these sources are worth examining as another line of inquiry. Two of the most relevant and potentially useful formulas are discussed below.

The thickness of outer hull planking can be used to estimate the original size of a vessel. Using one such formula, length plus beam plus depth divided by 50, or $(L + B + D)/50$, equals hull-planking thickness in inches (Chapelle 1969: 395). If this is calculated for the 2¼ in. (5.7 cm) hull planking present on the Seal Cove shipwreck, the vessel may have been approximately 80 ft. (24.38 m) long, 25 ft. (7.62 m) in beam, and 7 ft. (2.13 m) in depth of hold. This is consistent with interpretation of the archaeological evidence, which suggests an overall length on the order of 70 ft. (21.35 m) to 85 ft. (25.91 m). Comparing these dimensions to 19th-century registries, such a vessel would have been approximately 75–125 tons.

Another formula, using the beam measurement to calculate suggested outer hull-planking

dimensions, multiplies the beam by 0.1 to get the outer hull-planking thickness in inches (Desmond 1919: 20). Taken in the reverse, the hull-planking thickness on the site would be multiplied by ten and changed from inches to feet; this would provide a beam of 22.5 ft. (6.86 m), slightly smaller but roughly consistent with the wreck and illustrative that some of these formulas, although limited, may have real-world applications in interpreting wreck sites.

Shipping Registers and Insurance Rules

Shipping registers, such as that of the American Shipmasters Association, have been used successfully to make deductions about vessel size, and even identification, using component parts (Russell 2002: 147). This technique is only valid if construction followed the association's rules. It appears that the vessel in Seal Cove did not adhere to these guidelines, because the treenails were larger, and the room and space was greater than suggested in the

rules. Another example of this deviation is limber-hole construction. An 1889 rule requires them to be 2½ in. (6.4 cm) wide and 1½ in. (3.8 cm) deep (American Shipmasters Association 1889: 40). With limbers of 2 × 1 in. (5 × 2.5 cm), the Seal Cove wreck was not built consistent with these rules. As a result, any deductions about size relating to the component parts need to be made with a healthy amount of caution.

Still, the manner of departure from these rules suggests that the vessel at Seal Cove may be categorized as “heavily built.” As an example, a comparison of suggested sizes of treenail per plank thickness shows a robust use of wooden fasteners. The treenails on the wreck measure 1¼ in. (3.2 cm) in diameter. Traditionally, treenails were usually used in diameters of up to 1½ in. (3.8 cm) (Chapelle 1969: 178). This puts the size of the wooden fasteners used on the Seal Cove wreck at the larger end of the spectrum for boatbuilding purposes. Shipbuilding insurance rules for 1871 require 1¼ in. (3.2 cm) treenails for 5–5½ in. (12.7–14 cm) planking; rules of 1889 call for this size of treenail in planking of 4–4½ in. (10.2–11.4 cm) thickness, and 20th-century sources also report a 1¼ in. (3.2 cm) treenail as suitable for much thicker hull strakes than the 2¼ in. (5.7 cm) outer hull planking evident at Seal Cove (American Shipmasters Association 1871: xii, 1889; American Bureau of Shipping 1900: 44; Thayer 1921: 842). It could be that it was built with especially robust fastenings for a specific task, such as carrying heavy or bulky cargo like lumber, brick, or stone. Also, the deviation from shipbuilding rules could simply indicate a vernacular construction and/or an earlier date of build.

Frame spacing provides more evidence for a heavier construction than recommended by 19th- and early 20th-century shipbuilding sources. For example, if this vessel had been built under 1858 *New-York Marine Register* rules, it should have been of approximately 300 tons, as the room and space, or the distance from the far edge of one frame pair to the corresponding edge on the next pair for a vessel of this size was “not to be over 22 inches” (55.9 cm) (*New-York Marine Register* 1858). Likewise, shipbuilding books in the 20th century recommended 24½ in. (62.2 cm) of timber and space for a vessel of 300 tons burden (Desmond 1919: 20). The vessel at Seal

Cove had a center to center measurement of 24 in. (61 cm), suggesting that it was built consistent with a vessel of roughly 300 tons, yet research into 19th-century vessel registries indicates that a 300 ton schooner would have been substantially larger than that suggested by the wreckage at Seal Cove. A comparison of 50 random vessels in the 300 tons range, built between 1864 and 1892, reveals an average length of 123 ft. and a 30 ft. beam (United States Treasury Department 1894). If the supposition is valid that the Seal Cove vessel was in the range of 70–85 ft. (21.33–25.91 m) in length (and corresponding to 75–125 tons), then it appears to have been robustly constructed for its length and beam.

Negative evidence can assist in an assessment of the vessel’s age. One clue comes from the heels, or inboard edges, of the first futtocks. At Seal Cove they are rounded and do not create the continuous structure described in 20th-century shipbuilding sources (Van Gaasbeek 1918: 180). Another detail rests in the fastening of floor to futtock. By the 20th century, the frames are transversely fastened with ferrous bolts, as well as treenails (Desmond 1919: 53). Treenails alone fasten the floors to the futtocks on the Seal Cove wreck. Taken together, the lack of these two construction features suggest that the vessel was built before the 20th century, but again the problem resurfaces that not all shipbuilders followed the accepted guidelines.

Using Archaeological Sources to Estimate Age and Size

A lack of diagnostic material culture associated with the wreck heightens the challenge of assigning a date range to this vessel. The brick chips, sawdust, and tar found on site are common materials in much of the historical period, but the cylindrical treenails provide a clue because they replaced octagonal treenails in the 19th century. Cylindrical wooden treenails turned on a power lathe were used in construction well before mid-century because of the economy of their manufacture (Silliman and Silliman 1840: 295; Bentham 1848: 152–153).

Comparisons to vessels in the archaeological record are consistent with 19th-century construction for the Seal Cove shipwreck. A study, comparing structural characteristics of shipwrecks dating from the close of the 17th century to the middle of the 19th, noted general

changes in design that may be applied here (Morris, Watts, and Franklin 1995). Two features of the Seal Cove wreck place the vessel at the latter part of this temporal continuum. First, the vessel employs double frames, with examples transversely fastened to one another. In the period covered by the article, double frames are a more modern feature, with horizontal fastening appearing later in the archaeological record (Morris, Watts, and Franklin 1995: 125). Second, the close location of the heels of the first futtocks in relation to the centerline also suggests a vessel more likely built later in the Morris, Watts, and Franklin study period; other research also interprets futtocks offset from the keel as a general 18th-century characteristic, if not an identifiable evolutionary trend (Vanhorn 2004: 186–187, 213).

However, two characteristics suggest an earlier date. First, the frames at Seal Cove have larger sided than molded dimensions; they are wider than they are high. According to Morris, Watts, and Franklin (1995), comparative sided and molded measurements of the frames change with time gradually to favor the molded dimension. Also, the frames are tightly spaced in Seal Cove, an earlier characteristic. This tight frame spacing, however, might be the result of a craft purpose built for bulk cargo. These comparisons, taken together, may suggest a vessel from some time in the 1800s, but not too late in the century. Of course, as stated by Morris, Watts, and Franklin (1995: 125), their observations are not meant to be solid rules, but provide a “point of departure for further study.” Furthermore, shipbuilders used construction techniques temporally peculiar to their region.

While the above work explored the archaeological signatures of a vessel’s age, the coasting schooner *Annabella*, also investigated in Maine, may provide a comparison regarding vessel size. Similar to the remains at Seal Cove, *Annabella* was left to disintegrate outside the shipping channel (Claesson 1997). Also like the Seal Cove wreck, excavations of *Annabella* revealed wood chips and brick fragments, showing that these artifacts are perhaps not uncommon on 19th-century trading vessels in Maine (Claesson 1997: 44). Built in New Jersey in 1834, *Annabella* was less than 70 ft. (21.33 m) in length, approximately 24 ft. (7.32 m) in beam, and less than 70 tons, making it smaller than the estimation for the vessel at Seal Cove (Claesson 1997: 53–54). Futtocks on the Seal

Cove wreck average 6.8 in. (17.3 cm) in molded height and 9.5 in. (24.13 cm) of sided width, while on *Annabella* the average futtock dimensions were 7.1 in. (18 cm) molded and 5.4 in. (13.7 cm) sided (Claesson 1999: 18). *Annabella*’s frame dimensions are consistently smaller than those on the Seal Cove wreck, corroborating the supposition that the vessel at Seal Cove was more than 70 ft. (21.33 m) in length and of a higher tonnage than *Annabella*. *Annabella*’s keel, however, was approximately 60 ft. (18.29 m) long, while the remains at Seal Cove are just under 50 ft. (15.24 m). It would be fair to ask how the Seal Cove shipwreck could be 70–85 ft. (21.33–25.91 m) in length with so short a keel, but the keel at Seal Cove is incomplete.

The shipbuilding rules and formulas changed with time and should be used with great caution, but they provide general ideas about the wreck at Seal Cove. The sources suggest a heavily built vessel, at least 22.5 ft. (6.86 m) wide, approximately 80 ft. (24.38 m) long, and likely built before the 20th century. It did not necessarily follow shipbuilding or insurance rules, but exceeded them in its stout components compared to its probable tonnage. The lines of archaeological evidence also suggest a vessel of greater than 70 ft. (21.33 m) in length, and of more than 70 tons, likely built sometime in the 19th century.

Identification

One of the greatest challenges in the study of shipwrecks is positively identifying the wreckage. At Seal Cove, informant reports couple with historical accounts to offer potential candidates. While some candidates are consistent with the archaeological evidence, the vessel cannot be named with certainty. This section explores historical and anecdotal evidence surrounding the Seal Cove shipwreck.

Local Informants

Local informants have provided some clues regarding the vessel, its deposition, and its purpose. Stanley Black of Tremont was told by his father that the wreck was an abandoned stone barge (Price 2007; Stanley Black 2006, pers. comm.). There is a valid argument that the site represents discarded watercraft. Its deposition outside the shipping channel and

near a center of industry is consistent with abandoned-watercraft patterns in Maine, in other parts of the United States, and abroad (Shomette 1982; Shomette and Eshelman 1998; Claesson and Shelley 2000: 36; Claesson and Butler 2001: 47; Richards 2002: 231). The Seal Cove site has all three of Richards' features of abandonment: it lacks propulsion artifacts, has "a scarcity of portable material culture," and has "highly articulated structural remains" (Richards 2008: 145). Timbers found trapped underneath the hull, including the large example protruding roughly eastward, may suggest that the vessel was careened for repair or maintenance. Its location could be interpreted as further evidence against it being a true shipwreck. Its placement around a bend in the cove makes it an unlikely place to have been blown ashore.

Local informants provide more information regarding the site. One man recounted that in the 1970s he paced the vessel's length at approximately 85 ft. (25.91 m), considerably more structure than remains today (Maine Historic Preservation Commission 2007: 1–2). Another recalled playing on the wreck when he was a child (Carl Butler 2008, pers. comm.). This gives an idea of how long the wreck has been there; he is now more than 70 years old and recalls that it was an old wreck even then, approximately 60 years ago. Aerial photographs of Seal Cove from 1964 show the wreck, proof that the vessel has been at the same location for at least 49 years.

Candidates from the Historical Record

In addition to information provided by members of the community, historical sources provide potential evidence to identify the vessel. If the Seal Cove wreck represents a catastrophic loss, two potential candidates emerge from historical records. The first is *Rinaldo*, lost in 1876. It was a 20.69 ton schooner that hailed from Southwest Harbor, although in 1869 it had Deer Isle listed as its homeport (United States Treasury Department 1869: 204). It grounded after breaking loose from where the "vessels had been lying during the winter," presumably the current anchoring area to the west of where the Seal Cove wreck is now situated (United States Life-Saving Service 1876: 28; United States Treasury Department 1877: 148). The size of the vessel is

quite small for the wreckage in Seal Cove. However, it is not only its dimensions but also the location that may exclude it as a likely candidate. *Rinaldo* was lost on the "western side of Seal Cove" (United States Life-Saving Service 1876: 28, 1877: 148). The Seal Cove wreck is in the western part of the inner cove, but is in the eastern end of Seal Cove.

A second candidate is the schooner *Levant*, forced ashore on the northern side of Seal Cove in December of 1884. A foreboding description of the conditions surrounding the incident simply reads "heavy wind rough sea dark" (United States Life-Saving Service 1884: 15). Like *Rinaldo*, at the time of loss it was registered out of Southwest Harbor. According to records of 1883, its hailing port was Bangor and it was built in Stockton, Maine, in 1846. *Levant* had a gross tonnage of 59.98 tons, was 68.4 ft. (20.85 m) long, 20.4 ft. (6.22 m) in beam, and had a 6 ft. (1.83 m) depth of hold (American Shipmasters Association 1883: 34). Constructed with iron fasteners, it was rebuilt in 1866, and by 1883 was registered as having iron and copper fasteners (New York Register 1857: 251, 1858: 276; American Shipmasters Association 1883: 34). Although copper fastening is consistent with the copper-alloy fastener potentially associated with the site, and the vessel is on the north side of the cove, *Levant* may be too narrow in beam to be the Seal Cove wreck.

Anecdotal Evidence: Clara B. Kennard

Another possible identification comes from anecdotal sources, another local informant. In the 1960s, two men took fasteners off the wreck, mounted them on boards, and sold them to tourists. One of these fasteners is now on display at a restaurant in Bass Harbor, the Seafood Ketch. A label affixed to the frame reads: "Clara B. Kennard. A 60' sailing vessel built about 1890 and used in waters of Mount Desert Island." The fastener at the restaurant matches the copper-alloy fastener recovered at the site. The wives of the two men clearly remember the family picnic when the fasteners were removed from the wreck. Although the other man, interviewed by Muriel Davison of the Tremont Historical Society, suffers from Alzheimer's (making the information tenuous), the label that identifies the vessel was affixed at the time the men recovered the spikes

(Muriel Davisson 2012, pers. comm.). Since this is the only source directly naming the wreck, it is worth examining to determine if the identification is corroborated by the archaeological evidence.

A 75 ton schooner built in 1886 in North Weymouth, Massachusetts, *Clara B. Kennard* hailed from Portsmouth, New Hampshire, between 1887 and 1900. At 77.3 ft. (23.56 m) long, 25 ft. (7.68 m) in breadth, with a 6.3 ft. (1.83 m) depth of hold, *Clara B. Kennard* fits the general size for the Seal Cove wreck (American Shipmasters Association 1887: 267; American Bureau of Shipping 1900: 365). Unfortunately, 19th-century records for the schooner lack information on fastener materials or the woods used in the schooner's construction, so these cannot be matched to the wreck.

Further investigation into its 20th-century history reveals that *Clara B. Kennard* remained under sail for the first third of the century. After its early years sailing from New Hampshire and carrying out the brick trade (Portsmouth Herald 1898; Leavitt 1970: 142; J. Adams and Clark 1976: 114, 189), the schooner was sold and sailed from a variety of Maine ports: Deer Isle until 1912, Stonington until 1917, Castine until 1922, Belfast until 1928, and finally Bar Harbor to 1934 (United States Department of Commerce and Labor 1912: 20, 1913: 81; United States Department of Commerce 1917: 14, 1918: 14, 1922: 316, 1923: 311, 1927: 564–565, 1928: 578–579, 1935: 648–649). In 1909 *Clara B. Kennard* carried lumber between Bangor and Boston, and in 1915 it carried wood between Stonington and Bar Harbor (Portsmouth Herald 1909; Bar Harbor Times 1915). Bar Harbor remained its home port through the end of the schooner's working life, putting it in the Mount Desert Island area until it disappears from records after 1935.

Although a positive identification of the Seal Cove wreck as *Clara B. Kennard* is not possible with an acceptable degree of reliability, there are several points at which the wreck evidence and the historical record are in agreement. The schooner's dimensions and build year of 1886 are consistent with the archaeological remains. *Clara B. Kennard* would have been abandoned after 1935, putting it in Seal Cove in time to be there in the 1964 aerial photograph and already be in a degraded state in the early 1950s when Mr. Butler recalled playing on it.

The vessel's working life, hauling brick from Portsmouth, fits with the archaeological record of brick chips found in the remains, although those could be there from other sources. Despite the fact that the archaeology and the history fit the Seal Cove wreck, without more evidence *Clara B. Kennard* remains merely a potential, if very possible, identification.

Conclusions

This attempt to learn more about the Seal Cove wreck may in some manner aid in future low-cost, non-intrusive, interpretations of similar sites. While hardly revolutionary, the use of volunteers, interns, and park staff allowed for the project to become both an excellent teaching tool and an outreach opportunity. Two field schools of students and volunteers, more than 20 people each summer, learned experientially about nautical archaeology while documenting the keel, frames, and outer hull planking of this historical wooden vessel. Press coverage in local and regional newspapers, a web site, and blog postings raised public awareness of Maine's maritime heritage (Idlebrook 2011: 5; Whitney 2011: 8–9; Trotter 2012: A1–2). Despite limitations, the investigators recorded a previously unstudied vessel, produced a site plan and frame drawings, and shed light on the mystery of an historical wooden shipwreck on the western side of Mount Desert Island, Maine. In the process, Acadia National Park staff and members of the public were given an opportunity to participate in a project that not only exposed them to maritime archaeology in practice, but gathered substantive data to answer research questions about a seldom-investigated vessel type.

Little remains of the Seal Cove Shipwreck. It most likely is not a true shipwreck at all, but an abandoned vessel careened and left to fall apart in an out-of-the-way part of the harbor. It remains there today in the latter stages of disintegration. Despite the potential candidate for identification, the schooner *Clara B. Kennard*, few things can be stated with certainty about the wreck, but the characteristics that have emerged from this investigation place the vessel in context. Temporally, it is likely from the 19th century and exhibits characteristics from both earlier and later in the century. Worm damage, specifically from a species

of mollusk, shows that the vessel traveled to a warmer climate than Down East Maine, suggesting involvement in trade. Although its propulsion could not be ascertained from the available evidence, it was heavily built, and a tentative reconstruction reveals a full-bodied hull, consistent with a cargo carrier. The most likely candidate for identification, *Clara B. Kennard*, fits the criteria, but identification is not definitive. Seal Cove's former lumber mill may have provided cargo, tying the wreck into the local economy. Even without a positive identification, the vessel is still of value, because it is likely representative of the coasting trade, an economic lifeline that connected towns of the Maine coast to the rest of the country (Leavitt 1970: 3). The Seal Cove wreck is significant because of the integral role that such watercraft played in local and regional economic history, and also because few others of its type have been documented in the field, a fact that makes the archaeological data that has survived all the more valuable. The remains of these once prevalent, and yet understudied, vessels are slowly degrading up and down the Maine coast. It is hoped that more work of this kind will be undertaken before these vessels are lost to the elements.

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