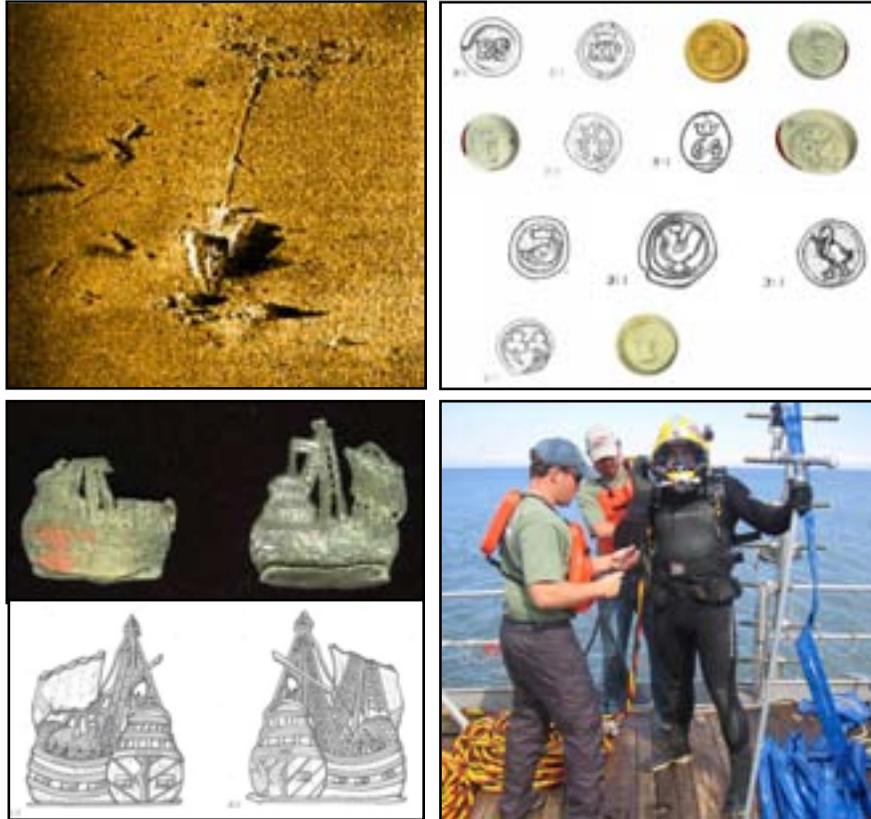


UNDERWATER ARCHAEOLOGICAL INVESTIGATION OF THE ROOSEVELT INLET SHIPWRECK (7S-D-91A)

VOLUME 1: FINAL REPORT



State Contract No. 26-200-03
Federal Aid Project No. ETEA-2006 (10)

Prepared for:
Delaware Department of State
Division of Historical and Cultural Affairs
21 The Green
Dover, Delaware 19901
And for the
Federal Highway Administration and
Delaware Department of Transportation

By:



APRIL 2010
www.searchinc.com

UNDERWATER ARCHAEOLOGICAL INVESTIGATION OF THE ROOSEVELT INLET SHIPWRECK (7S-D-91A)

State Contract No. 26-200-03
Federal Aid Project No. ETEA-2006 (10)

Prepared for

Delaware Department of State
Division of Historical and Cultural Affairs
21 The Green
Dover, Delaware 19901

And for the

Federal Highway Administration and
Delaware Department of Transportation

By

SOUTHEASTERN ARCHAEOLOGICAL RESEARCH, INC.



Michael Krivor, M.A., RPA
Principal Investigator

AUTHORED BY:
MICHAEL C. KRIVOR, NICHOLAS J. LINVILLE, DEBRA J. WELLS, JASON M. BURNS, AND
PAUL J. SJORDAL

APRIL 2010

www.searchinc.com

ABSTRACT

In the fall of 2004, a dredge struck an eighteenth-century wreck site during beach replenishment, resulting in thousands of artifacts being scattered along the beach in Lewes, Delaware. Local residents informed archaeologists with the Delaware Department of State (State) Division of Historical and Cultural Affairs (Division) about the artifacts, and investigations were undertaken to locate the source of the historic material. Approximately 40,000 artifacts from Lewes Beach were recovered by archaeologists from the Division as well as many private citizens who donated their artifacts to the Delaware Department of State.

In consultation with the U.S. Army Corps of Engineers, Philadelphia District, a Phase I and Phase II underwater archaeological survey and diver investigation (conducted by Dolan Research, Inc.) of the area confirmed the presence of an eighteenth-century shipwreck site in 2005. Initial estimates conjectured that approximately 80% of the shipwreck remained undisturbed offshore. The wreck site was deemed eligible for listing on the National Register of Historic Places (NRHP) and was placed on the NRHP on November 16, 2006.

The State of Delaware subsequently contracted with Southeastern Archaeological Research, Inc. (SEARCH) of Florida, to accomplish a variety of field investigations relative to the *Underwater Archaeological Investigation for the Department of State For The Roosevelt Inlet Shipwreck (7SD-91A)*, State Contract No. 26-200-03, Federal Aid Project No. ETEA-2006 (10). From September 27 through October 27, 2006 SEARCH conducted a preliminary remote sensing survey, a non-intrusive hydro probe survey, controlled surface collection of artifacts, a controlled excavation of eleven 10-x-10-foot grid squares, and a post-remote sensing survey of the Roosevelt Inlet Shipwreck. The phased investigation conducted by SEARCH, in cooperation with the State, was successful in better defining the nature and elements of the Roosevelt Inlet Shipwreck.

Results of the preliminary remote sensing survey, utilizing a magnetometer and side scan sonar, were successful in providing data critical to understanding the condition and extent of the Roosevelt Inlet Shipwreck prior to diver investigations. The side scan sonar survey clearly identified the exposed concretions at the north end of the site, a longitudinal timber extending north/south along the length of the site, and an area of exposed artifacts near the dredge pit at the southern extent of the site.

The hydro probe survey and surface collection of artifacts proved extremely beneficial in determining the extent of buried hull remains in a non-intrusive manner. In addition, the surface collection of artifacts helped in gathering data relative to the distribution of artifacts across the entire site. The most interesting result from the hydro probe survey was the overall lack of extant hull structure associated with the Roosevelt Inlet Shipwreck.

Partial excavation of the Roosevelt Inlet Shipwreck, utilizing two 10-x-10-foot grid squares, a 3-inch venturi-style dredge, and a variety of measuring devices was successful in mapping extant hull construction features, artifacts, and site remains. Close examination and mapping of the site confirmed that only a small portion of the hull associated with the Roosevelt Inlet Shipwreck remains intact. The post-remote sensing survey, including a side scan sonar integrated with a Differential Global Positioning System, was conducted after the excavation. This survey was useful in providing a visual image of the site, post-excavation.

Analysis of the hull remains, artifact assemblage, and material culture of the Roosevelt Inlet Shipwreck offers insight into the research objectives proposed by the State prior to the current investigation. The hull analysis conducted by SEARCH is limited, due to relative lack of hull remains. A review of the substantial artifact assemblage recovered during the current investigation indicates that the vessel grounded in the shallows off Roosevelt Inlet and became stranded sometime between 1772 and 1800. Review of primary and secondary sources have identified 31 vessels wrecked at or near Lewes, Delaware between 1772 and 1800.

The hull and artifact analysis have also enabled SEARCH to answer additional questions regarding the wreck site. The Roosevelt Inlet Shipwreck provides an intriguing look into the late-eighteenth century merchant trade. This is evidenced by the broad array of artifacts recovered from the site during the current investigation. The vessel appears to have been an inbound merchant vessel, loaded with cargo bound for Philadelphia. The lack of hull remains indicates that the vessel was likely extensively salvaged and has been exposed to environmental conditions which have affected the vessel's integrity.

It is unfortunate that the Roosevelt Inlet Shipwreck was impacted by dredging activities in 2004. This type of incident can be averted in the future by close review of submerged cultural resource survey reports prior to potentially damaging impacts, such as dredging or marine-related construction activities. To date there are no current survey standards for submerged cultural resource surveys within the State of Delaware. It is recommended the State implement a standard set of guidelines for all submerged cultural resource surveys within State waters. This includes any State waterways that may have been utilized by historic watercraft. The State has a rich maritime past, and its submerged cultural resources, which are finite, should be protected from any future threats that may impact potentially significant submerged cultural resources.

ACKNOWLEDGEMENTS

Southeastern Archaeological Research, Inc. (SEARCH) would like to acknowledge all of the individuals and organizations that made this project a success, beginning with the State of Delaware, Department of State and former Secretary of State Harriet Smith Windsor and the Division of Historical and Cultural Affairs Director and State Historic Preservation Officer, Tim Slavin and Deputy Director, Steve Marz. State project personnel included Chuck Fithian, Curator of Archaeology, Craig Lukezic, Archaeologist, Gwen Davis, Archaeologist, Faye Stocum, Archaeologist, Susan Ritter, Archaeologist, Jessica Lingo, Project Senior Research Assistant, Francis Lukezic, Project Senior Research Assistant, and Mary Harper, IT Specialist. Sharyn Murray contributed artifact illustrations, including ones featured on the cover of this report. Laboratory volunteers included: Caroline Whalen-Strollo, Lawrence and Lana Wesley, Jean Coggins, Peter Bon, June-Rose Fatcher, Gabrielle Copans, Nichol Thomson, Joanne Stickel, Betty Hunsberger, Brian Lindsay, Charles Sheppard, Terri DePrima, John and Alana Bansch, Bill Brown, John Walker, Joan Myer, Carol Hastings, Ann Robertson, Mary Jane Temple, Susan Griffith, Daniel Miller, Kathy Boyd, Bridget McVae, Jennifer Gardner, John McGovern, Jill Showell, Ellie Menser, Cheryl Hostetler, Karen Fischer, Kent Slavin, Kurt Winkler and Jane Clifton, and Gary Schmidt. Steve Bilicki volunteered on the water. Other contributors include contract historian Diane Hungate and archeobotanical consultant Justine Woodard McKnight.

Additional invaluable assistance was provided by Captain Paul Hepler and Ruth Hepler of the *M/V Venture III*; U.S. Army Corps of Engineers Philadelphia District Archeologist Bob Dunn; Captain Art Sundberg, Assistant Director, Marine Operations at the University of Delaware; the Roosevelt Inlet Marine Unit and Sergeant Brian Austin; and the U.S. Coast Guard Station Indian River Inlet and MSD Roosevelt Inlet. The staff and volunteers at the Zwaanendael Museum, and Dave Moore and Dr. Nathan Richards should also be recognized for providing analysis resources.

Special recognition is given to Dan Griffith, former Project Director, Lewes Maritime Archaeology Project. Without Dan, this entire project would not have been successful.

The Underwater Archaeological Investigation of the Roosevelt Inlet Shipwreck was performed by SEARCH under contract to the State of Delaware, Department of State, Division of Historical and Cultural Affairs. SEARCH's Principal Investigator was Michael Krivor, M.A., RPA. Nick Linville, M.A., served as the Project Historian. Jason Burns, M.A., RPA served as Project Manager and was assisted in the field by John W. Morris III, M.A., RPA, James W. Hunter, M.A, Paul Sjoldal, M.A, RPA, Michael Murray, M.A, and Matthew DeFelice, B.A, ABT. SEARCH's Lab Director, Debra Wells, M.A., RPA, contributed to the overall success of the project through her tireless efforts conducting the artifact analysis and write-up, as well as GIS and Figures creation.

This Page Intentionally Left Blank

TABLE OF CONTENTS

VOLUME 1: FINAL REPORT

ABSTRACT.....i
ACKNOWLEDGEMENTSiii
TABLE OF CONTENTS..... v
LIST OF FIGURES ix
LIST OF TABLES..... xvii

CHAPTER 1

INTRODUCTION 1

CHAPTER 2

ENVIRONMENTAL SETTING5
 Historic Chart and Map Review6
 Project Background.....12

CHAPTER 3

HISTORIC CONTEXT 17
 Early Maritime Trade.....17
 Maritime Trade of the Mid-Eighteenth Century.....19
 Maritime Trade of the Revolutionary War24
 Maritime Trade of the Post-Revolutionary War Period27

CHAPTER 4

RESEARCH OBJECTIVES AND METHODOLOGIES..... 29
 Research Objectives29
 Archival Research Methods.....30
 Remote Sensing Survey Methods30
 Site Investigation Methods34
 Hydro Probe Survey Methods40
 Site Excavation43

CHAPTER 5

FIELD INVESTIGATION RESULTS..... 49
 Preliminary Remote Sensing Survey49
 Hydro Probe Survey.....53
 Test Unit Results56
 Test Unit Conclusion77
 Post-Remote Sensing Survey.....77

CHAPTER 6	
THE ARTIFACT ASSEMBLAGE AND ITS CULTURAL CONTEXT	79
Architectural	81
Clothing	90
Furnishings.....	100
Kitchen	106
Personal.....	166
Armaments.....	205
Activities.....	207
Vessel Architecture	224
Undetermined.....	227
Indeterminate.....	233
Modern/Intrusive Material	234
CHAPTER 7	
SPATIAL ANALYSIS.....	235
CHAPTER 8	
HULL REMAINS	259
Longitudinal Timber	259
Planking.....	259
Fasteners.....	260
Lead Sheathing.....	260
Wood Species.....	260
Wreck Analysis.....	261
CHAPTER 9	
CONCLUSIONS	265
Preliminary Remote Sensing Survey	265
Hydro Probe Survey.....	265
Excavation of the Roosevelt Inlet Shipwreck.....	266
Artifact Analysis	267
Spatial Analysis	268
Hull Analysis	271
Post-Remote Sensing Survey.....	272
Research Objectives	272
Vessel Candidates for the Roosevelt Inlet Shipwreck	279
Interpreting the Roosevelt Inlet Shipwreck	283
Recommendations	285
REFERENCES CITED.....	291
ADDITIONAL RESOURCES CONSULTED.....	310

VOLUME 2: APPENDIX A-L

APPENDICES

Appendix A National Register of Historic Places Nomination Form
Appendix B SEARCH Data Recovery Plan
Appendix C Master Site Plan
Appendix D Hydro Probe Survey Results
Appendix E Test Unit Results
Appendix F Correspondence with Researchers
Appendix G Artifact Analysis Tables
Appendix H Pewter Toys Analysis
Appendix I Analysis of Stone Mortars and Pestles
Appendix J Identification of Wooden Elements Recovered from the RIS
Appendix K Notice to Mariners
Appendix L Mississippi State Guidelines for Underwater Archaeological Research

VOLUME 3: ARTIFACT INVENTORY

This Page Intentionally Left Blank

LIST OF FIGURES

Figure 1.1	Roosevelt Inlet Shipwreck (7S-D-91A) location relative to Lewes, Delaware and Delaware Bay. .3
Figure 2.1	A view of Cape Henlopen, August 1780..... 5
Figure 2.2	1639 Vinckeboons chart and the approximate location of the Roosevelt Inlet Shipwreck 7
Figure 2.3	1776 Dury chart showing the approximate location of the Roosevelt Inlet Shipwreck 8
Figure 2.4	Circa 1785 del Campo chart showing the approximate location of the Roosevelt Inlet Shipwreck 9
Figure 2.5	1836 Bache chart showing the approximate location of the Roosevelt Inlet Shipwreck 10
Figure 2.6	1914 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck. 11
Figure 2.7	1946 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck. 13
Figure 2.8	1973 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck..... 14
Figure 2.9	Wreck site and Borrow Areas in relation to Roosevelt Inlet Shipwreck (as presented in Dolan Research, Inc. 2005:2)..... 15
Figure 3.1	Philadelphia port in the first half of the eighteenth century 19
Figure 3.2	Broadside from the Philadelphia Committee on Tarring and Feathering..... 23
Figure 3.3	St. Eustatius in 1782 25
Figure 3.4	1780s Dutch cartoon depicting Britain on the defensive..... 26
Figure 4.1	The Marine Magnetics Explorer magnetometer, left, and the Klein® 3000 side scan sonar, right, ready for deployment..... 32
Figure 4.2	Pre-plotted track lines, shown in green, were 500 feet in length and spaced at 50-foot intervals (NOAA Chart #12216 “Cape Henlopen to Indian River Inlet Breakwater Harbor”)..... 33
Figure 4.3	Morning dive safety meetings occurred each day of the project prior to leaving the dock 34
Figure 4.4	Diver outfitted with surface supplied air (including a Kirby-Morgan SuperLite®-27 helmet), preparing to excavate a portion of the Roosevelt Inlet Shipwreck 34
Figure 4.5	The Kirby Morgan Air Control Station-2A (KMACS-2A) allowed the Dive Supervisor to monitor the diver’s air supply, dive time, and communications at all times 35
Figure 4.6	The stern of the <i>Venture III</i> (based out of Shark River Inlet, New Jersey) had ample space for all project-related activities 36
Figure 4.7	Current Roosevelt Inlet Site Plan with the location of the three color-coded baselines. These three baselines assisted divers in moving efficiently across the sea floor in reference to the shipwreck and served as a guide for the placement of test unit grid squares..... 37
Figure 4.8	SCUBA diver preparing to set a screw anchor for one of the three baselines..... 39
Figure 4.9	Each baseline was color coded (yellow shown) and secured with large screw anchors in the bay floor by divers using surface supplied air. 39
Figure 4.10	A 5-foot hydro probe was used to delineate the extant remains of the Roosevelt Inlet Shipwreck. The hydro probe is 1/2-inch in diameter and is used to probe beneath the sea floor to locate buried hull remains 40
Figure 4.11	A total of 121 hydro probes were dropped at 10-foot intervals (denoted with black dots), guided by a movable baseline. The survey started from Transect East 0 (left) and proceeded to Transect East 100 (right)..... 41
Figure 4.12	Both 10-x-10-foot stainless steel grid squares (shown here) were constructed on land and taped at one-foot intervals to assist divers in controlling artifact provenience during the excavation .. 43
Figure 4.13	One of the 10-x-10-foot stainless steel grids (with cross members) specially built for the project. The grids were taped at one-foot intervals for reference underwater 44
Figure 4.14	The grid squares were disassembled on land, lowered to the sea floor in sections, and reassembled by divers 44
Figure 4.15	A 3-inch venturi-style dredge was used during the excavation phase of the project 45

Figure 4.16 All dredge material removed from the wreck site was filtered through a fine-mesh bag. The recovery of small beads and pins indicate that the level of recovery of small artifacts was high. 45

Figure 4.17 Director Dan Griffith (left), Captain Paul Hepler (center), and archaeologist John William Morris III (foreground) inspect recovered dredge material from the Roosevelt Inlet Shipwreck 46

Figure 4.18 Location of all eleven 10-foot by 10-foot grid squares excavated during SEARCH’s investigation..... 48

Figure 5.1 Two-dimensional magnetic contour map of the Roosevelt Inlet Shipwreck site 50

Figure 5.2 Three-dimensional contour map of the Roosevelt Inlet Shipwreck site 50

Figure 5.3 Raw sonar image of the Roosevelt Inlet Shipwreck (7S-D-91A) collected by Dolan Research, Inc. in 2005. Note that the longitudinal timber is not exposed and there is very little exposed debris to the east (right) of the site (image modified from Dolan Research, Inc. 2005:8) 51

Figure 5.4 Side scan sonar image of the Roosevelt Inlet Shipwreck collected by SEARCH in 2006. Note the prominent concretions at the north end of the site as well as the large, exposed longitudinal timber extending the length of the site. The south end of the site was impacted by dredging activities in 2004..... 52

Figure 5.5 Partial millstone recovered from the Southwest Quadrant of N50/E50 for conservation and analysis 57

Figure 5.6 Brass iron recovered from the Southeast Quadrant of N75/E60. Note the dolphin-shaped handle supports. The wood handle has since eroded away 65

Figure 5.7 Intact stoneware jug recovered from the Southwest Quadrant of N75/E70 67

Figure 5.8 Post-side scan sonar image clearly showing the trenched areas excavated during the current investigation. Both the north and south baselines are also visible and labeled above 78

Figure 6.1 Representative examples of bricks recovered from the Roosevelt Inlet Shipwreck site 82

Figure 6.2 Side view of bricks showing the variation in thickness 83

Figure 6.3 Lead glazed tiles with pre-drilled nail holes, suggesting possible roofing tiles 84

Figure 6.4 Roofing tile with pre-drilled holes from the Flowerdew Hundred 84

Figure 6.5 Examples of tin glazed tiles recovered from the site; side view (top) and front view (bottom).... 85

Figure 6.6 Slate fragments recovered from the site..... 86

Figure 6.7 Nail types 87

Figure 6.8 Representative sample of window glass recovered from the site 88

Figure 6.9 Flattened lead came (2006.33.222) 89

Figure 6.10 Straight pins from the Roosevelt Inlet Shipwreck site. Inset shows pin detail of pin heads 91

Figure 6.11 Examples of hooks and eyes recovered from the Roosevelt Inlet Shipwreck site 91

Figure 6.12 Detail illustration of thimbles recovered from the site (by Sharyn Murray) 92

Figure 6.13 Thimbles recovered from the Roosevelt Inlet Shipwreck site 92

Figure 6.14 Thimble case with eagle insignia (2006.33.185); side view (left) and detail of insignia (right). Note the sword and orb clasped in the talons..... 93

Figure 6.15 Thimble cases from the Roosevelt Inlet Shipwreck site..... 94

Figure 6.16 Thread case made of bone (2006.33.198) 95

Figure 6.17 Bone bobbin (2006.33.143) 95

Figure 6.18 Bone needle case (2006.33.177). 95

Figure 6.19 Shoe sole recovered from the Roosevelt Inlet Shipwreck site (2006.33.181) 96

Figure 6.20 Shoe sole recovered from the Roosevelt Inlet Shipwreck site (2006.33.230) 96

Figure 6.21 Dark green glass linen smoothers; convex view (top), concave view (bottom) 97

Figure 6.22 Illustration, rear and side views of brass pressing iron with dolphin-shaped handle supports (drawing by Sharyn Murray)..... 98

Figure 6.23 Circa 1765-82 portrait of a maid using an iron similar to the one recovered from the site (painted by Henry Morland) 99

Figure 6.24 Candlestick holder, multi-piece design similar to Dutch styles of the seventeenth century (Schiffer 1978:148-149) (2006.33.149)..... 101

Figure 6.25 Candlestick holder, two piece mold design with tulip shaped holder and square base similar to English style of the early eighteenth century (Shiffer 1978:195B) (2006.33.153)..... 101

Figure 6.26	Tulip shaped candle holder with a drilled clean-out hole (2006.33.155)	102
Figure 6.27	Copper alloy Rococo style arm from either a sconce or a chandelier (2006.33.152)	102
Figure 6.28	Curtain tie back with crest (2006.33.078)	103
Figure 6.29	Side view of curtain tie back	103
Figure 6.30	Copper alloy finial (2006.33.159)	103
Figure 6.31	Shell shaped curtain tie back (2006.33.185)	103
Figure 6.32	Copper alloy drawer pull and pewter finials	104
Figure 6.33	Possible bracket or faceplate (2006.33.159)	104
Figure 6.34	Possible clock foot with foliate pattern (2006.33.148)	104
Figure 6.35	Plain foot from a decorative object (2006.33.158)	104
Figure 6.36	Feet from a clock or decorative object (2006.33.148)	105
Figure 6.37	Small furniture parts (2006.33.219)	105
Figure 6.38	Escutcheon plate (2006.33.215)	105
Figure 6.39	Copper alloy upholstery tacks	105
Figure 6.40	Red bodied, lead glazed coarse earthenware fragments from a large vessel	107
Figure 6.41	Distinctive bright apple green perforated vessel sherd from the beach surface collection	108
Figure 6.42	Yellow bodied German Frankfurter ware handle fragments (2006.33.229 and 2006.33.204)	109
Figure 6.43	Assortment of Frankfurter ware vessel fragments	110
Figure 6.45	Examples of Frankfurter ware from the Netherlands	111
Figure 6.45	Example of red bodied Frankfurter ware from the Netherlands	111
Figure 6.46	Red bodied slip decorated vessel fragments (2006.33.203)	113
Figure 6.47	White bodied slip decorated sherds recovered from the Roosevelt Inlet Shipwreck	113
Figure 6.48	White bodied slip decorated sherds from the beach surface collection	113
Figure 6.49	Intact tin-glazed earthenware plate with blue painted flower-in-urn pattern (2006.33.162)	116
Figure 6.50	Detail illustration of tin-glazed earthenware plate (2006.33.162) (by Sharyn Murray)	117
Figure 6.51	Purple Floral motif tin-glazed earthenware (2006.33.168)	118
Figure 6.52	Polychrome-painted tin-glazed earthenware bowl fragment (2006.33.149)	118
Figure 6.53	Blue Fern motif tin-glazed earthenware (2006.33.139)	118
Figure 6.54	Blue Fern and Flowers-in-Urn motif tin-glazed earthenware (2006.33.155)	118
Figure 6.55	Blue Fern and Flowers motif with Scallop border tin-glazed earthenware (2006.33.197)	119
Figure 6.56	Blue Floral motif tin-glazed earthenware (2006.33.149)	119
Figure 6.57	Blue Flower and Fern motif tin-glazed earthenware (2006.33.208 and 2006.33.221)	119
Figure 6.58	Blue Flower with Foliage and Stars motif tin-glazed earthenware (2006.33.223)	119
Figure 6.59	Oriental Landscape motif tin-glazed earthenware (2006.33.207)	120
Figure 6.60	Landscape with Figure motif tin-glazed earthenware (2006.33.220)	120
Figure 6.61	Oval Border and Floral motif tin-glazed earthenware (2006.33.146)	120
Figure 6.62	Plain Border and Circular motif tin-glazed earthenware (2006.33.134)	120
Figure 6.63	Plain Border with Blue Line motif tin-glazed earthenware (2006.33.156 and 2006.33.162)	121
Figure 6.64	Plain Border and Floral motif tin-glazed earthenware (2006.33.210)	121
Figure 6.65	Oriental Scroll and Flower motif tin-glazed earthenware (2006.33.196)	122
Figure 6.66	Scroll, Fern, and Flower motif tin-glazed earthenware (2006.33.189)	122
Figure 6.67	Squiggled Lines motif tin-glazed earthenware (2006.33.167)	123
Figure 6.68	Trellis-and-Dot Border motif tin-glazed earthenware (2006.33.199)	123
Figure 6.69	Trellis-and-Dot with Floral Border motif tin-glazed earthenware (2006.33.200)	123
Figure 6.70	Trellis with Dot, Scroll, Fern, and Flower motif tin-glazed earthenware (2006.33.190)	123
Figure 6.71	Trellis and Floral Border motif tin-glazed earthenware (2006.33.192 and 2006.33.198)	124
Figure 6.72	Royal pattern creamware rim fragment (2006.33.204)	125
Figure 6.73	Vessel base with foot ring (2006.33.220)	125
Figure 6.74	Examples of Westerwald stoneware tankards with copper alloy lids	127
Figure 6.75	Examples of press molded plate rims through time	128
Figure 6.76	Complete brown salt-glazed stoneware bottle (2006.33.187)	130
Figure 6.77	Brown salt-glazed stoneware bottle fragment with handle and incised lines (2006.33.226)	131
Figure 6.78	Brown salt-glazed stoneware bottle fragment with partial Bartmann face (2006.33.139)	132

Figure 6.79	Brown salt-glazed stoneware bottle fragment with partial Bartmann face (2006.33.229)	132
Figure 6.80	Capacity mark (2006.33.185).....	132
Figure 6.81	Brown salt-glazed stoneware wide-mouth jar with handle and incised lines (2006.33.183)	133
Figure 6.82	Incised lines and shield-like stamp (2006.33.204)	134
Figure 6.83	“1½” Capacity mark and incised lines (2006.33.166)	134
Figure 6.84	Rouletted stamps and incised lines (2006.33.187)	134
Figure 6.85	Stars and incised lines (2006.33.126).....	134
Figure 6.86	Gray and manganese purple decorated Westerwald stoneware (2006.33.195).....	135
Figure 6.87	Gray and cobalt blue Westerwald stoneware with incised decoration (2006.33.215).....	136
Figure 6.88	Gray and cobalt blue Westerwald stoneware with incised and painted floral motif (2006.33.215)	136
Figure 6.89	Gray and cobalt blue Westerwald stoneware with incised decoration (2006.33.218).....	137
Figure 6.90	Mineral water bottle with “Selters” mark (2006.33.216).....	138
Figure 6.91	Mineral water bottle fragments with “Tolles” mark (2006.33.139 and 2006.33.149).....	138
Figure 6.92	Mineral water bottle fragments with “Selters” mark and “HS” stamp (2006.33.215 and 2006.33.205).....	138
Figure 6.93	Base of a mineral water bottle recovered from the Roosevelt Inlet Shipwreck showing wire cut-off marks	140
Figure 6.94	Whole mineral water bottle (2006.33.097).....	141
Figure 6.95	Mineral water bottle with Selters mark, “R” and “126”; front view detail of marks (2006.33.097)	141
Figure 6.96	Examples of white salt-glazed stoneware sherds	141
Figure 6.97	Examples of red-painted overglaze porcelain (2006.33.185 and 2006.33.229)	143
Figure 6.98	Hand painted Oriental figure on porcelain (2006.33.220)	143
Figure 6.99	Crescent shaped maker’s mark on porcelain	143
Figure 6.100	Brown-painted and molded porcelain fragments.....	144
Figure 6.101	Open fret work basket (2006.33.219).....	144
Figure 6.102	Cylindrical beer (a and b) and wine (c and d) bottles of the eighteenth century.....	145
Figure 6.103	Schematic showing the anatomy of a cylindrical wine/beer bottle	146
Figure 6.104	Olive green bottle bases.....	148
Figure 6.105	Olive green bottle neck and lip (2006.33.155).....	148
Figure 6.106	Case of square bottles.....	148
Figure 6.107	Case bottle base, bottom view (2006.33.227)	149
Figure 6.108	Case bottle base, side view (2006.33.145)	149
Figure 6.109	Case bottle shoulder, neck, and lip, side view (2006.33.189)	150
Figure 6.110	Light blue glass (2006.33.178)	150
Figure 6.111	Very thin olive green glass (2006.33.177).....	150
Figure 6.112	Left: Example of a “Wrythen” ribbed goblet. This goblet dates to c. 1760. Right: Example of a “Lynn” glass	151
Figure 6.113	Cut stemware fragments with hexagonal facets.....	152
Figure 6.114	Angular knop and opaque twist (2006.33.229)	153
Figure 6.115	Plain stemware (2006.33.217 and 2006.33.218).....	153
Figure 6.116	Wheel-engraved stemware form the Roosevelt Inlet Shipwreck.....	154
Figure 6.117	Chronological changes in drinking glass stem styles.....	155
Figure 6.118	Applied glass string decorated tumbler fragments	156
Figure 6.119	Tumbler base, bottom and side views (2006.33.167).....	156
Figure 6.120	Tumbler base, side view (2006.33.226)	157
Figure 6.121	Left: Glass cup or mug handle fragment. Right: Detail view (29006.33.229)	157
Figure 6.122	Spire-shaped glass stoppers faceted in the mid-eighteenth century style, 1745-1770.....	158
Figure 6.123	Chronological changes in eighteenth-century lead glass decanter styles	158
Figure 6.124	Pewter teapot spout (2006.33.159).....	159
Figure 6.125	Pewter teapot (2006.33.152)	160
Figure 6.126	Fragment of a jug or ewer lid, hinge, and blue and gray stoneware handle (2006.33.214).....	160

Figure 6.127 Lid hinge on gray stoneware handle (2006.33.203).....	160
Figure 6.128 U-shaped metal handle (2006.33.192)	161
Figure 6.129 Pewter plate warmer (2006.33.081)	161
Figure 6.130 Solid copper alloy four-tined fork (2006.33.190).....	162
Figure 6.131 Pewter serving spoon (2006.33.189).....	162
Figure 6.132 Detail illustration of pewter serving spoon (2006.33.189) (by Sharyn Murray).....	163
Figure 6.133 Pewter tableware spoon (2006.33.148).....	164
Figure 6.134 Detail illustration of pewter spoon handle (2006.33.148) (by Sharyn Murray).....	164
Figure 6.135 Wooden knife handle with pewter cage (2006.33.212).....	164
Figure 6.136 Detail illustration of a bone knife handle with pewter cage (2006.33.212) (by Sharyn Murray)	165
Figure 6.137 Mid-eighteenth-century Whieldon ware ceramic knife handle (2006.33.212)	165
Figure 6.138 Copper alloy rumbler bell (2006.33.162).....	166
Figure 6.139 Cranberry red/dark purple beads (2006.33.185).....	168
Figure 6.140 Cranberry red/dark purple beads (close-up) (2006.33.185)	169
Figure 6.141 Examples of buckles recovered from the Roosevelt Inlet Shipwreck site.....	170
Figure 6.142 Buckles recovered from the Roosevelt Inlet Shipwreck site (2006.33.153)	171
Figure 6.143 Detail illustration of knee buckles recovered from the site (2006.33.217) (by Sharyn Murray)	171
Figure 6.144 Knee buckles recovered from the 1785 shipwreck of the British merchant vessel <i>General Carlton</i> in Poland.....	172
Figure 6.145 Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site (2006.33.222) (by Sharyn Murray).....	173
Figure 6.146 Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site (2006.33.217) (by Sharyn Murray).....	174
Figure 6.147 Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site. Drawings by Sharyn Murray.....	175
Figure 6.148 Artois style shoe buckles from the <i>General Carleton</i> shipwreck.....	176
Figure 6.149 Possible hat buckles from the <i>General Carleton</i> shipwreck	177
Figure 6.150 Additional buckles from the <i>General Carleton</i> shipwreck.....	177
Figure 6.151 Typical men's clothing from the latter half of the eighteenth century.....	179
Figure 6.152 Jewel buttons from the Roosevelt Inlet Shipwreck site.....	181
Figure 6.153 Assortment of pressed glass button insets	181
Figure 6.154 Colored pressed glass insets	181
Figure 6.155 Decorative clear pressed glass button insets (2006.33.155).....	181
Figure 6.156 Representative examples of sleeve button links recovered from the site. Note quatrefoil design of link in 2006.33.180.....	182
Figure 6.157 Partial bone button (2006.33.217)	182
Figure 6.158 Four-holed wooden button (2006.33.203).....	182
Figure 6.159 Photograph of the cast button with the caricatured profile of a man	183
Figure 6.160 Illustration of the cast button with the caricatured profile of a man (by Sharyn Murray)	183
Figure 6.161 Fouled Anchor button from the Roosevelt Inlet Shipwreck site.....	184
Figure 6.162 Fouled Anchor button from Burial 6 of the African-American Burial Ground in NYC.....	184
Figure 6.163 British Royal Navy Fouled Anchor button circa 1774-1860 similar to one recovered from the Roosevelt Inlet Shipwreck site	184
Figure 6.164 Fouled Anchor button of the French Navy.....	184
Figure 6.165 Fouled Anchor button of the British Navy circa 1780	184
Figure 6.166 Salesman's button sample card from circa 1780.....	185
Figure 6.167 Buttons from the Roosevelt Inlet Shipwreck site (2006.33.162).....	185
Figure 6.168 Buttons from the Roosevelt Inlet Shipwreck site (2006.33.155).....	185
Figure 6.169 A variety of sleeve buttons from the Roosevelt Inlet Shipwreck site (2006.33.154). See Figure 6.170 for scale.....	186
Figure 6.170 Sleeve buttons, or links, from the Roosevelt Inlet Shipwreck site (2006.33.154)	186

Figure 6.171	Examples of colored and clear glass pastes recovered from the Roosevelt Inlet Shipwreck	188
Figure 6.172	Neck stock clasp with scrolled floral motif (2006.33.218).....	188
Figure 6.173	Pewter false watches	189
Figure 6.174	Photograph of the 1768 Zelandia province coin (2006.33.218).....	190
Figure 6.175	Illustration of a 1768 coin from the Zelandia province of the Netherlands (2006.33.218) (by Sharyn Murray).....	191
Figure 6.176	Jettons recovered from the Roosevelt Inlet Shipwreck (2006.33.229).....	191
Figure 6.177	Illustration of a Louis XV jetton (by Sharyn Murray).....	191
Figure 6.178	Examples of glass lenses recovered from the Roosevelt Inlet Shipwreck	193
Figure 6.179	Side view of a glass lens illustrating the convex shape (2006.33.204).....	193
Figure 6.180	Cut and polished bone fragment, possibly from a hand fan (2006.33.217).....	194
Figure 6.181	Watch or clock key (2006.33.218).....	194
Figure 6.182	Pistol grip style pen knife scales with floral design (2006.33.215)	194
Figure 6.183	Pistol grip style pen knife scales with floral design (2006.33.231 and 2006.33.227)	195
Figure 6.184	Slate pencil (2006.33.177)	195
Figure 6.185	Dutch kaolin pipe bowls recovered from the Roosevelt Inlet Shipwreck	196
Figure 6.186	Linear decorated and stamped pipe stems	197
Figure 6.187	Examples of changes in Dutch pipe bowl profiles during the eighteenth century	198
Figure 6.188	Floral decorated pipe stems from the Roosevelt Inlet Shipwreck	199
Figure 6.189	Detail illustration of a floral decorated pipe stem (by Sharyn Murray).....	199
Figure 6.190	Maker's marks from Dutch pipe bowls. Drawings by Sharyn Murray.....	200
Figure 6.191	Date ranges for pipe makers' marks recovered from the Roosevelt Inlet Shipwreck site	202
Figure 6.192	Examples of molded pipe bowls recovered from the Roosevelt Inlet Shipwreck. Inset is a circa 1750 molded pipe bowl from Gouda with a similar shield design to 2006.33.185.....	203
Figure 6.193	Copper alloy smoker's companion (2006.33.155).....	204
Figure 6.194	Polished agate snuff box lid, recovered in two sections and reconstructed	204
Figure 6.195	Examples of shot recovered during the October 2006 excavations.....	205
Figure 6.196	Illustration and photograph of copper alloy sword scabbard tip (2006.33.154). Drawing by Sharyn Murray.....	206
Figure 6.197	Bone dominoes with drilled pips.....	208
Figure 6.198	Turned bone or wood (left) and stone (right) gaming pieces, possibly from chess sets.	208
Figure 6.199	Pewter miniature plates or chargers (2006.33.178 and 2006.33.185).....	209
Figure 6.200	Pewter miniature urn (2006.33.185); photograph and detailed illustration. Drawings by Sharyn Murray.....	210
Figure 6.201	Pewter miniature pitchers; detailed illustration (2006.33.220) (by Sharyn Murray)	211
Figure 6.202	Pewter miniature pitcher (2006.33.186)	211
Figure 6.203	Pewter miniature German Grenadier soldier, circa 1740-1790 (2006.33.232) (see Lefferts 1926).....	211
Figure 6.204	Cast copper alloy stirrup (2006.33.163); photograph and detailed illustration. Drawing by Sharyn Murray.....	212
Figure 6.205	Copper alloy stud and buckle spur (2006.33.152); photograph and detailed illustration. Drawings by Sharyn Murray.....	213
Figure 6.206	Lead bale seal (2006.33.185); detailed illustration and photograph. Drawings by Sharyn Murray.....	214
Figure 6.207	Drafting set	215
Figure 6.208	Divider from the drafting elements recovered from the site	215
Figure 6.209	Pen tips	216
Figure 6.210	Metal points.....	216
Figure 6.211	Pewter ink well liner (2006.33.159).....	216
Figure 6.212	Polished and drilled stone quill stand (2006.33.218).....	217
Figure 6.213	Illustration of similar quill stands and writing sets	217
Figure 6.214	Example of serpentine mortar, interior base (2006.33.226).....	218
Figure 6.215	Serpentine pestles; note the waxy luster	219

Figure 6.216	Strike-a-lights; dark gray chert or flint.....	219
Figure 6.217	Composite millstone, left; and monolithic millstone, right. These are two of several millstones that were identified from the wreck. Others were not collected but remain stable at the site.....	220
Figure 6.218	Barrel hoops recovered from the excavation.....	221
Figure 6.219	Cast copper alloy spigot and two stopcocks recovered from the wreck; photographic example of a similar spigot from the <i>Machault</i> , lower right (Sullivan 1986:60).....	222
Figure 6.220	Antimony ingots (2006.33.174).....	223
Figure 6.221	Lead ingots (2006.33.183).	223
Figure 6.222	Lead sheathing recovered from the Roosevelt Inlet Shipwreck.....	225
Figure 6.223	Lead bilge pump recovered from the wreck.....	225
Figure 6.224	Section of copper sieve recovered from the wreck (2006.33.223).....	226
Figure 6.225	Rose head copper alloy wrought nails.....	226
Figure 6.226	Copper alloy finial, possibly from a clock hood; tip is broken off (2006.33.178).....	227
Figure 6.227	Pewter object similar in style to the Chippendale claw and ball often found on Federal period furniture (2006.33.126). It is possibly the foot to a clock or small chest.....	228
Figure 6.228	Two views of an unidentified pewter artifact similar to a clyster pump.....	229
Figure 6.229	Unidentified pewter artifact similar in shape to the clyster pump pictured below.....	230
Figure 6.230	Eighteenth-century clyster pump.....	230
Figure 6.231	Clear glass heart, possibly from a locket (2006.33.165).....	231
Figure 6.232	Animal bone fragments recovered from the Roosevelt Inlet Shipwreck site.....	232
Figure 6.233	Profile of wooden stopper recovered from the Roosevelt Inlet Shipwreck site (2006.33.152).....	234
Figure 6.234	Bottom view of wooden stopper recovered from the Roosevelt Inlet Shipwreck site (2006.33.152).....	234
Figure 7.1	Architectural Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	239
Figure 7.2	Clothing Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	240
Figure 7.3	Furnishing-Related Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	241
Figure 7.4	Kitchen Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	242
Figure 7.5	Food Prep/Storage/Serving Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	243
Figure 7.6	Food Consumption Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	244
Figure 7.7	Mineral Water Stoneware Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	245
Figure 7.8	Other Coarse Earthenware artifact distribution across the Roosevelt Inlet Shipwreck site.....	246
Figure 7.9	Tin-Glazed Earthenware Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	247
Figure 7.10	Creamware Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	248
Figure 7.11	Glass Bottle Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	249
Figure 7.12	Glass Tableware Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	250
Figure 7.13	Personal Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	251
Figure 7.14	Tobacco Product Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	252
Figure 7.15	Armament-Related Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	253
Figure 7.16	Activity/Recreational Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	254
Figure 7.17	Activity/Transport/Industry Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	255
Figure 7.18	Vessel Architecture Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	256
Figure 7.19	Undetermined Artifact Distribution across the Roosevelt Inlet Shipwreck site.....	257
Figure 9.1	All Artifacts Distribution across the Roosevelt Inlet Shipwreck site.....	270

This Page Intentionally Left Blank

LIST OF TABLES

Table 4.1	Buoy drop locations for the two east/west baselines; coordinates are in Delaware State Plane, (NAD83), U.S. Survey Ft	36
Table 5.1	Test Units in order of artifact density	56
Table 5.2	Test Units and dates of excavation	56
Table 6.1	Recovered bricks by color.	82
Table 6.2	Recovered window glass by color.....	87
Table 6.3	Coins recovered from the Roosevelt Inlet Shipwreck.....	192
Table 6.4	Licensee information for the pipe maker’s marks recovered at the site	201
Table 8.1	Wood sample analysis	261
Table 9.1	Reported vessel losses in and around Delaware Bay from 1772 to 1800.....	280

This Page Intentionally Left Blank

CHAPTER 1

INTRODUCTION

In 2006, the State of Delaware (“State”) Division of Historical and Cultural Affairs (“Division”) contracted with Southeastern Archaeological Research, Inc. (SEARCH) of Newberry, Florida, to accomplish an Underwater Archaeological Investigation of the Roosevelt Inlet Shipwreck (7S-D-91A), State Contract No. 26-200-03, Federal Aid Project No. ETEA-2006 (10). From September 27 through October 27, 2006, SEARCH conducted a preliminary remote sensing survey, a non-intrusive hydro probe survey (including a surface collection of artifacts), a controlled excavation of eleven 10-x-10-foot grid squares, and a post-remote sensing survey of the Roosevelt Inlet Shipwreck. The purpose of the current investigation was to conduct a phased approach to better define the nature of the wreck site, provide more detailed information relative to the management of the site, and to determine the feasibility of a full recovery at a future date. In addition, the investigation was undertaken to recover significant information about the nature of the wreck and its contents, and apply these results to research questions proposed by the State.

The Roosevelt Inlet Shipwreck site is located in Delaware Bay, [REDACTED] near the town of Lewes, Sussex County, Delaware (Figure 1.1).

During the fall of 2004, a sand dredge struck a historic wreck site off Lewes, Delaware during beach replenishment activities. This resulted in thousands of artifacts being scattered along the beach in Lewes, Delaware. Locals quickly informed archaeologists with the Division about the artifacts, and investigations were undertaken to locate the source of the artifacts. Approximately 40,000 artifacts from Lewes Beach were recovered by archaeologists from the Division as well as many private citizens who donated their artifacts to the Delaware Department of State.

In order to determine the extent of damage to the shipwreck and learn more about the remaining site, funding was sought through the Delaware Department of Transportation (DelDOT) Transportation Enhancement Program. In 2004, the “Lewes Shipwreck Research and Recovery” project received a total of \$510,000.00 in federal and locally matched funding. This funding was granted to the Division specifically for archaeological planning and research related to the historic shipwreck.

The Lewes Maritime Archaeology Project was formed by the State to coordinate future fieldwork, conduct artifact conservation/analysis, research the wreck site, and to conduct public presentations and interpretations relative to the wreck site. In consultation with the U.S. Army Corps of Engineers, Philadelphia District (USACE), a Phase I and Phase II underwater archaeological survey and diver investigation of the area confirmed the presence of an eighteenth-century shipwreck site in May 2005 (Dolan Research, Inc. 2005).

Initial estimates conjectured that approximately 80% of the shipwreck remained undisturbed offshore. Extensive artifacts were observed in the general area of the wreck,

including a number of large concretions, and an exposed timber thought to be a keel or keelson. The wreck site was deemed eligible for the National Register of Historic Places (NRHP) and was subsequently listed on November 16, 2006 (Appendix A). Recommendations for future investigation of the site included examination of the north end of the wreck including the large concretions, as well as the south end of the wreck site that had been impacted by dredging activities (Dolan Research, Inc. 2005:81).

In 2006, the State applied for, and was granted, a dredge permit [REDACTED] [REDACTED] from the USACE. The permit allowed for 81.5 cubic yards of material to be dredged during the Phase II portion of the project. In an effort to continue investigations on the Roosevelt Inlet Shipwreck, the State contracted with SEARCH to complete this partial Phase III/data recovery field investigations. A Data Recovery Plan was submitted by SEARCH and approved by the State prior to fieldwork (Appendix B).

These investigations were conducted in accordance with the National Historic Preservation Act 1996, as amended (PL 89-665); the Archaeological and Historic Preservation Act of 1974, as amended (PL 93-291); the Abandoned Shipwreck Act of 1987; and the Advisory Council on Historic Preservation revised 36 CFR Part 800 Regulations. The project also complied with State of Delaware Code Title 7, Chapter §5301 through §5316, *Archaeological Resources in the State*; Title 7, Chapter §5401 through §5410, *Unmarked Human Burials and Human Skeletal Remains*; and the Delaware State Historic Preservation Office's *Guidelines for Architectural and Archaeological Surveys in Delaware* (1993). This project was performed by professional maritime archaeologists who meet the Secretary of the Interior's *Standards and Guidelines for Archaeology* (36 CFR Part 61) and are listed on the Register of Professional Archaeologists (RPA).

Results of the investigation were successful in defining the nature and condition of the Roosevelt Inlet Shipwreck. Findings from the preliminary remote sensing survey suggest the wreck site is isolated and relatively contained (within the area surveyed). In addition, results of the hydro probe survey concluded that much less of the hull remains intact than originally thought. In fact, only a small fraction of the hull remains *in situ*. Results of the partial excavation were successful in recovering over 26,000 artifacts for the State and confirming the paucity of hull remains on site. Conclusions, based on the analysis of the hull remains and recovered artifacts, confirm the wreck site dates to the last quarter of the eighteenth century. The vessel appears to have been an inbound merchant vessel which originated in Northern Europe and was likely bound for the port of Philadelphia. Although the vessel has not been positively identified, the current investigation has provided the State with a wealth of information relative to the wreck site, its current condition, and the potential for future investigations. Recommendations relative to the Roosevelt Inlet Shipwreck, as well as cultural resource management information on submerged investigations within the State of Delaware also have been provided in this report.



Figure 1.1. Roosevelt Inlet Shipwreck (7S-D-91A) location relative to Lewes, Delaware and Delaware Bay.

This Page Intentionally Left Blank

CHAPTER 2

ENVIRONMENTAL SETTING

The Roosevelt Inlet Shipwreck is located in Delaware Bay, [REDACTED] of the Roosevelt Inlet in Sussex County, Delaware. The site is situated in 15 feet of water, [REDACTED]. This is a high-energy environment that is affected by tidal flow and changing weather patterns. The entrance to the bay is located approximately five miles east of the project area (Figure 1.1).

The entrance to Delaware Bay is located between Cape May, New Jersey and Cape Henlopen, Delaware and is obstructed by numerous shoals. Wave refraction and severe winter storms erode sand and gravel from the Atlantic side of the capes and deposit them near the entrance of the bay. Recent studies have found that Cape Henlopen has accretion rates upwards of 30 centimeters per year (Pratt 2007:8). The shoals at the entrance to Delaware Bay have historically been difficult to navigate. In fact, between 1632 and 1850 nearly 200 vessels wrecked, were stranded, or foundered “At the Delaware Capes” (Shomette 2007:321). A drawing of Cape Henlopen (Figure 2.1) captured in 1780, a time period consistent with when it is likely the Roosevelt Inlet vessel wrecked, provides a glimpse into the weather and natural-related challenges facing ships navigating the Delaware Bay. What could very well be exposed wrecks are shown in the lower right of the drawing.

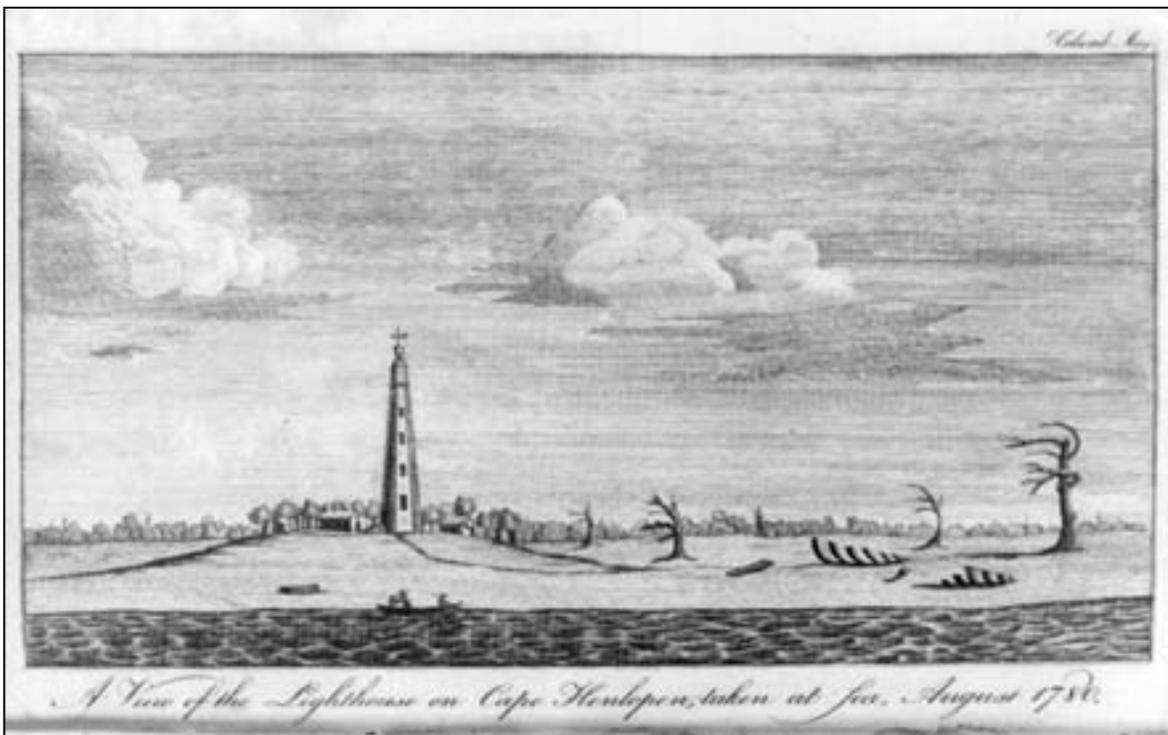


Figure 2.1. A view of Cape Henlopen, August 1780. (Courtesy of the Library Congress)

The river and bay system was formed in large part by glacial activity over the past one million years. As the glaciers retreated, the flow of the river dumped large amounts of sediment downstream, which altered the flow of the river and created land forms (Kraft 1971:15).

The Delaware River, which feeds into Delaware Bay, is 330 miles in length and is the longest un-dammed river in the eastern United States. The river is fed by 216 tributaries before it empties into Delaware Bay and ultimately, the Atlantic Ocean (Kraft 1971:21). Delaware Bay continues to be affected by varying sedimentation, storms, tidal fluctuation, and dredging operations designed to maintain a navigable shipping channel through the bay and river system. In the late 1800s the U.S. Army Corps of Engineers maintained a minimum depth of 18 feet in the shipping channel. As vessels grew in size and required deeper drafts, the channel was dredged to accommodate the larger vessels. The current controlling depth of the shipping channel is 40 feet, though there are sections of the channel that naturally reach as much as 80 feet deep (Dolan Research, Inc. 2005:4).

Sediments in the bay are mostly fine to mostly medium grained sand becoming progressively finer offshore, mixing with silts and clays deposited from the outflow from the Delaware River (Pratt 2007:58). In 1996, the United States Army Corps of Engineers collected a series of core samples in and around Borrow Area A and Borrow Area B, near Roosevelt Inlet. The closest core sample to the Roosevelt Inlet Shipwreck [REDACTED] was collected approximately 200 feet south of the wreck site. Analysis of the 18.36-foot core sample supports the sedimentation trend identified by Pratt (2007). The first five feet consists of gray, poorly graded sand and mixes into fine and gravel-size sediment. At approximately nine feet, the sediment consists of tan-colored, poorly graded sand and fades into tan gravelly sand at 13.5 feet (USACOE 1996). This indicates the Roosevelt Inlet Shipwreck is located in an area comprised of fine/medium to coarse grain sand. Fine sediments which remain suspended in the water column provide archaeologists with very limited visibility. Changing weather conditions or changes in tides typically reduces visibility to zero.

Historic Chart and Map Review

The project area has undergone numerous environmental changes since the colonial period, primarily as a result of manmade attempts to improve navigation in the region. Maps and charts dating to the seventeenth through the twentieth centuries reveal how conditions have changed in the vicinity of present-day Roosevelt Inlet. The following map and chart review corresponds with Figures 2.2-2.8 which include the approximate location of the shipwreck site.

Published around the year 1639, Joan Vinckeboons' chart is a generalized representation of the region. The chart depicts "Cabo Henlopen". An area of shoals, known later as Hen and Chicken Shoals, is shown to the east of the Cape. An inland waterway, most likely

representing Lewes Creek, also is depicted. The chart provides no specific evidence for the project area, however (Vinckeboons c.1639) (Figure 2.2).

Over the next century, charts of the region notably improved. Andrew Dury's 1776 *Chart of Delaware Bay and River* demonstrates a greater understanding of the geography of the bay near Cape Henlopen (which Dury labeled Cape James). The most notable addition in the vicinity of the project area is a shoal called "Part of the Shears" and also three anchorage sites along the shore of Lewes. The area to the west of the Cape and south of "Part of the Shears" is generally labeled "Whorekill Road." Lewes Creek is depicted on this chart (Dury 1776) (Figure 2.3).

Josef del Campo's chart of Delaware Bay from the mid-1780s was very similar to that of Dury's 1776 chart, although del Campo appears to have made his own examination. Del Campo shows the lighthouse on Cape Henlopen (which he calls Cape James [point 26 on the chart]) and Lewes Creek. He notes only one suitable area for anchorage east of the Cape. The project area is located in the general vicinity of this anchorage. Point 27 refers to the "Rada de Whorekill" or (roughly) Whorekill Road (del Campo c.1785) (Figure 2.4).

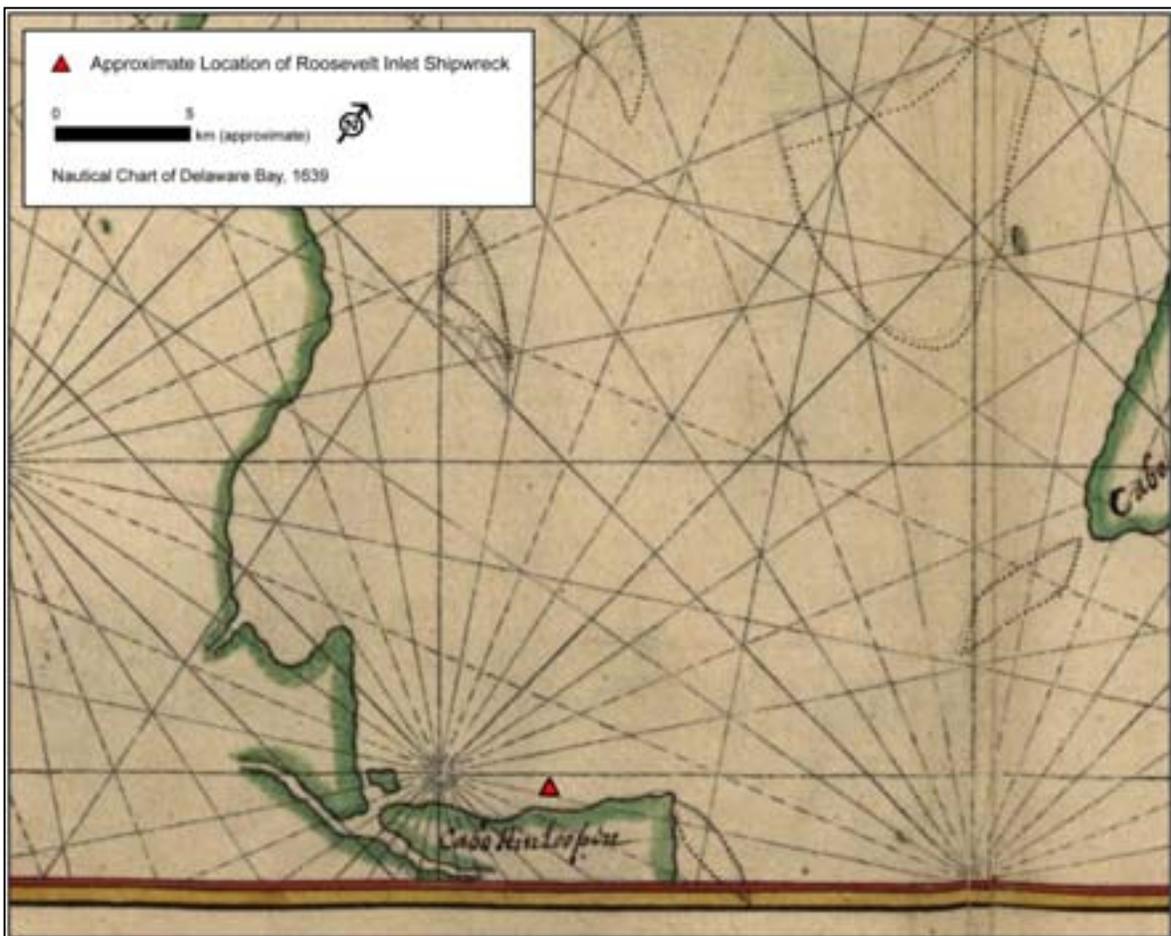


Figure 2.2. 1639 Vinckeboons chart and the approximate location of the Roosevelt Inlet Shipwreck.

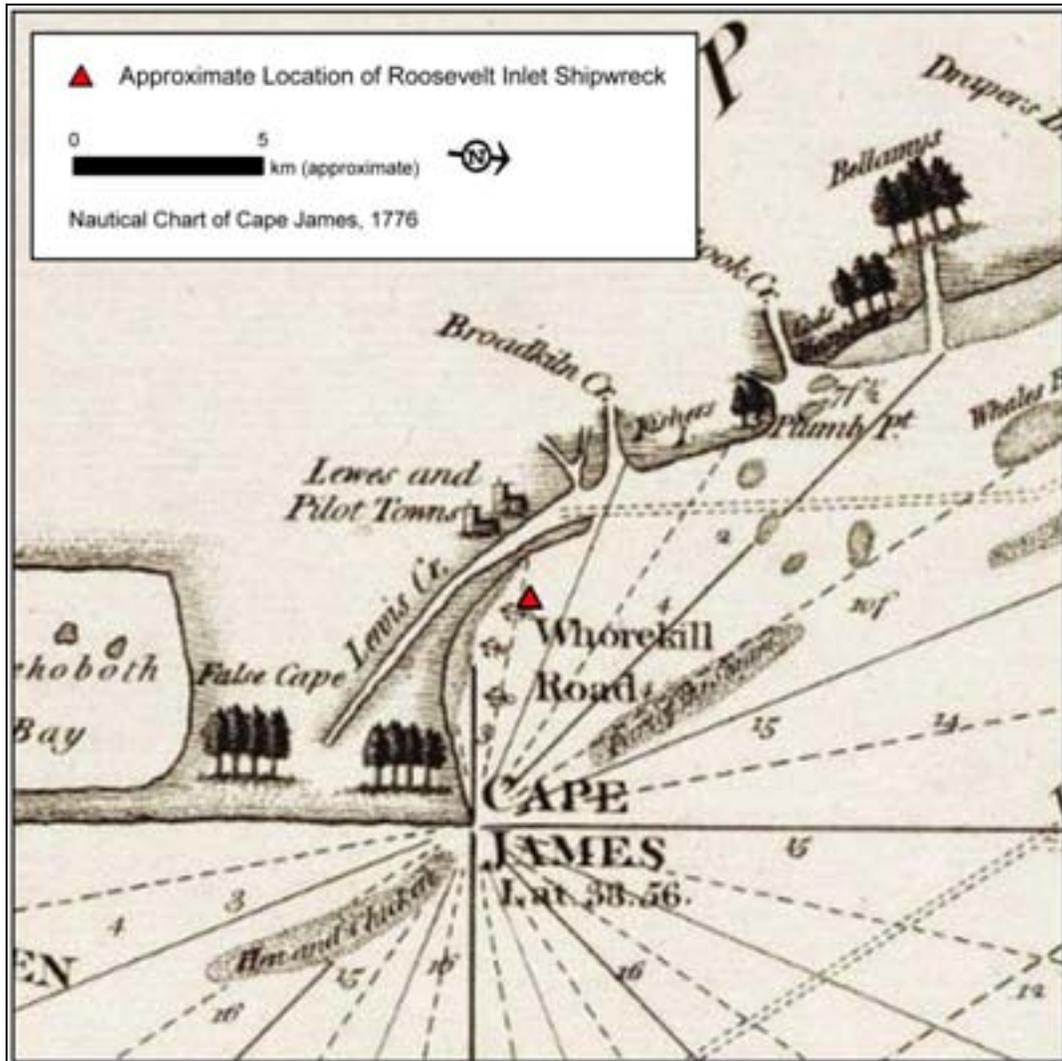


Figure 2.3. 1776 Dury chart showing the approximate location of the Roosevelt Inlet Shipwreck.



Figure 2.4. Circa 1785 del Campo chart showing the approximate location of the Roosevelt Inlet Shipwreck.

In 1836, Hartman Bache created a chart of the entrance of the Delaware River. The shoals around Cape Henlopen are depicted. The “Hen & Chickens” is seen to the west while “Part of the Shears” is visible to the northwest. This is one of the first charts to show the Breakwater and the Icebreaker (Bache 1836) (Figure 2.5). Construction on the Delaware Breakwater began in 1832. The Breakwater was built in order to create a safe harbor for vessels in danger of storms and ice. This massive structure of granite rocks was 1,419 feet in length. Slightly to the northwest, an icebreaker of 575 feet in length also was built in 1832 (Scharf 1888). Both of these structures were maintained and improved into recent times (Brewington 1939).

A post-Civil War chart created in 1866 shows the first pier in the area. This pier was completed in 1838 and lay east of present-day Roosevelt Inlet. Having fallen into decay sometime thereafter, a new pier replaced it in 1851 and was used until about 1885 by a steamship company that ran between Lewes and Philadelphia. This pier was partially destroyed by breaking ice in 1857. Construction of a railroad pier began in 1869. Also around this time, the federal government constructed an iron pier of 2,000 feet in length (Scharf 1888).

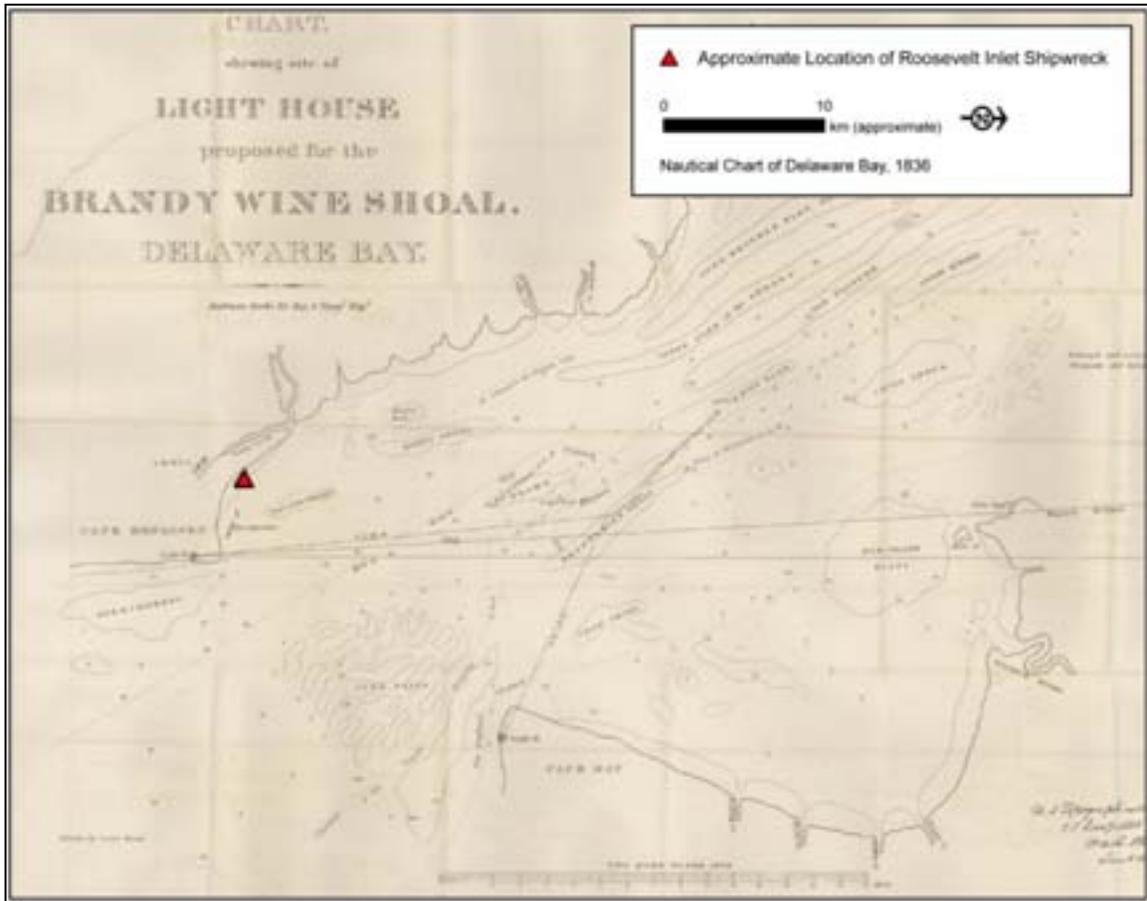


Figure 2.5. 1836 Bache chart showing the approximate location of the Roosevelt Inlet Shipwreck.

Additional works in the late nineteenth century contributed to the increasing silt of the waters surrounding the project area. A Marine signal station was placed on the inner works of the Breakwater in 1880 (Scharf 1888). In 1883 work began on closing the gap between it and the icebreaker. In this same year, yet another iron pier was constructed. Two factories for extracting fish oil also were opened (Scharf 1888). These piers, as well as the relatively undeveloped vicinity of the project area, can be seen in a 1914 chart of Cape Henlopen (United States Coast and Geodetic Survey 1914) (Figure 2.6). During this period, the old Breakwater harbor was too silted to allow ships of large draft to enter; therefore, an additional breakwater to the north was constructed (Shallat 1994).

The United States Army Corps of Engineers completed the Lewes-Rehoboth Canal in 1927. A tidal canal, it stretched 12 miles from Rehoboth Bay northward through the marshes of Cape Henlopen to connect with Lewes Creek. The canal then entered Delaware Bay at Broadkill Inlet. The Army Corps dredged the canal to 6 feet in depth and 50 feet in width (United States Army Corps of Engineers 1927). By 1933, the canal was connected with the Inland Waterway which began in Chincoteague Bay, Virginia (United States Army Corps of Engineers 1933).

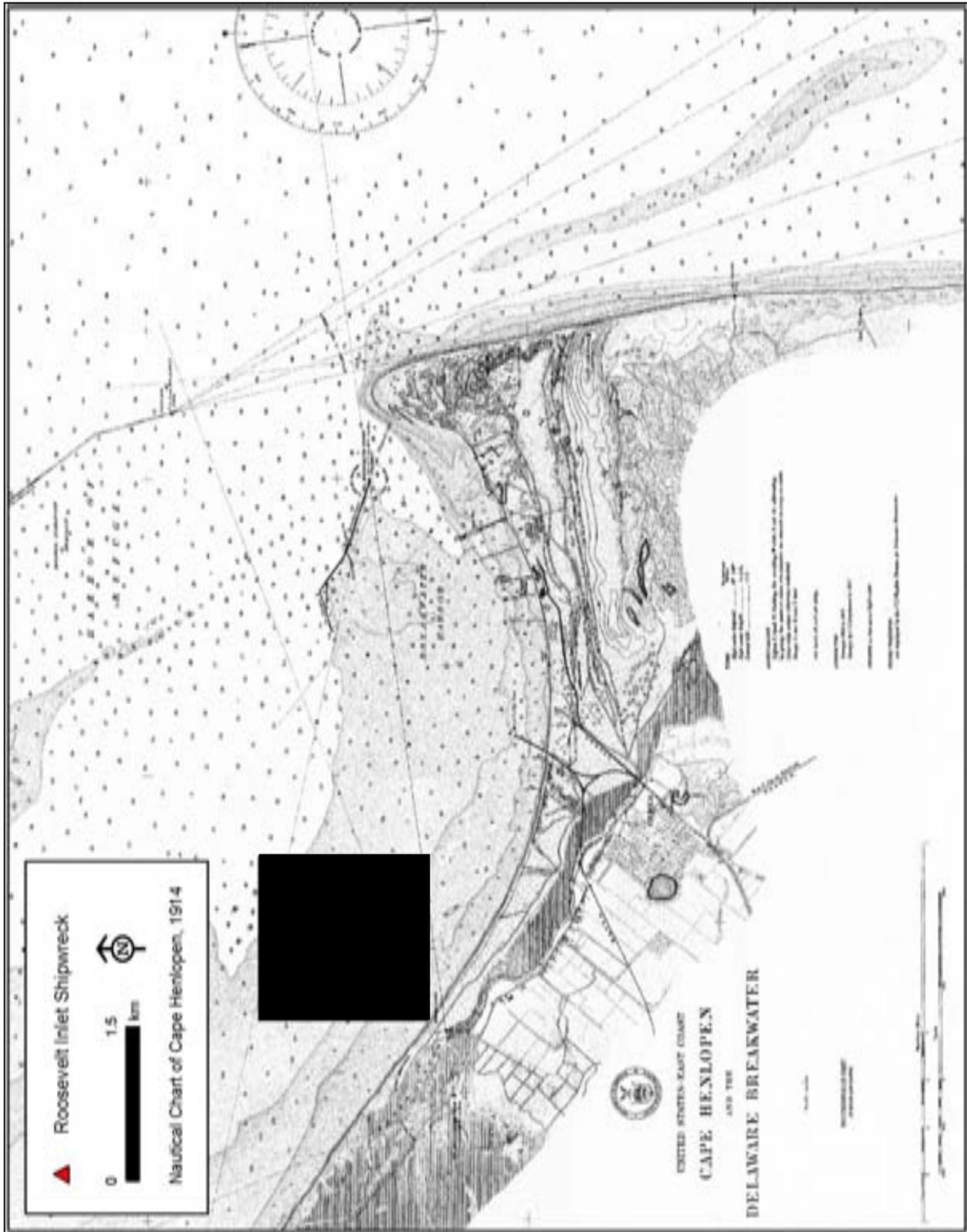


Figure 2.6. 1914 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck.

Sandbars obstructed Lewes Creek to the point that the waterway was impassable at low tide and the inlet at Broadkill began to close. A new inlet, Roosevelt Inlet, was completed two miles to the southeast of the original inlet in 1937 (Dolan Research Inc. 2005). The 1946 and 1973 charts (Figures 2.7 and 2.8) show a wreck (depicted as a sinking ship) to the west of Roosevelt Inlet along the shoreline. Another wreck (depicted as a decaying, sunken ship) is seen to the west of this area and farther offshore (United States Coast and Geodetic Survey 1973) (see Figure 2.8).

Project Background

The Delaware Bay Coastline, Delaware (DE) & New Jersey (NJ)-Roosevelt Inlet-Lewes Beach, DE project was authorized by the Water Resources Development Act (WRDA) in 1999 for navigation mitigation and storm damage reduction (113 STAT.276, 1999:8). It called for dredging material from previously designated Borrow Areas near Roosevelt Inlet for the Lewes Beach Replenishment Program. Borrow Area 1 is located west of Roosevelt Inlet and Borrow Area 2 is located east of the inlet. [REDACTED]

[REDACTED] In 1995, the Borrow Areas were surveyed for submerged cultural resources by Dolan Research, Inc. Analysis of data collected [REDACTED] [REDACTED] revealed “no high probability targets”, and the area was cleared for dredging operations (Dolan Research Inc. 2005:1). Dredging operations took place throughout 2004 and were completed in September 2004.

After dredging operations had been completed, residents reported finding thousands of artifacts scattered across Lewes Beach. The Division sought to determine the source of the cultural material and future dredging operations were halted. The Division secured funding through the DelDOT Transportation Enhancement Program to further investigate the source of the artifact scatter. In 2005, Dolan Research, Inc. was brought back to conduct a more intensive remote sensing survey and diver investigations of targets in both Borrow Areas. [REDACTED] a target was located with a 140-gamma dipolar magnetic signature and a sonar return indicating a “series of hard, undistinguishable features with moderate relief (+/-2') off the bottom surface” (Dolan Research Inc. 2005:33). This target was investigated by divers who found a series of concretions, bricks, ceramics, bottle bases, and an intact salt-glazed stoneware jug. Artifacts recovered from this site were consistent with artifacts collected on Lewes Beach. The site was designated with a State archaeological site number (7S-D-91A), and the Division later made plans for a Phase II investigation of the site. In 2006, the Division contracted with SEARCH to conduct the Phase II investigation of the site. The current investigation took place between September 27 and October 27, 2006.

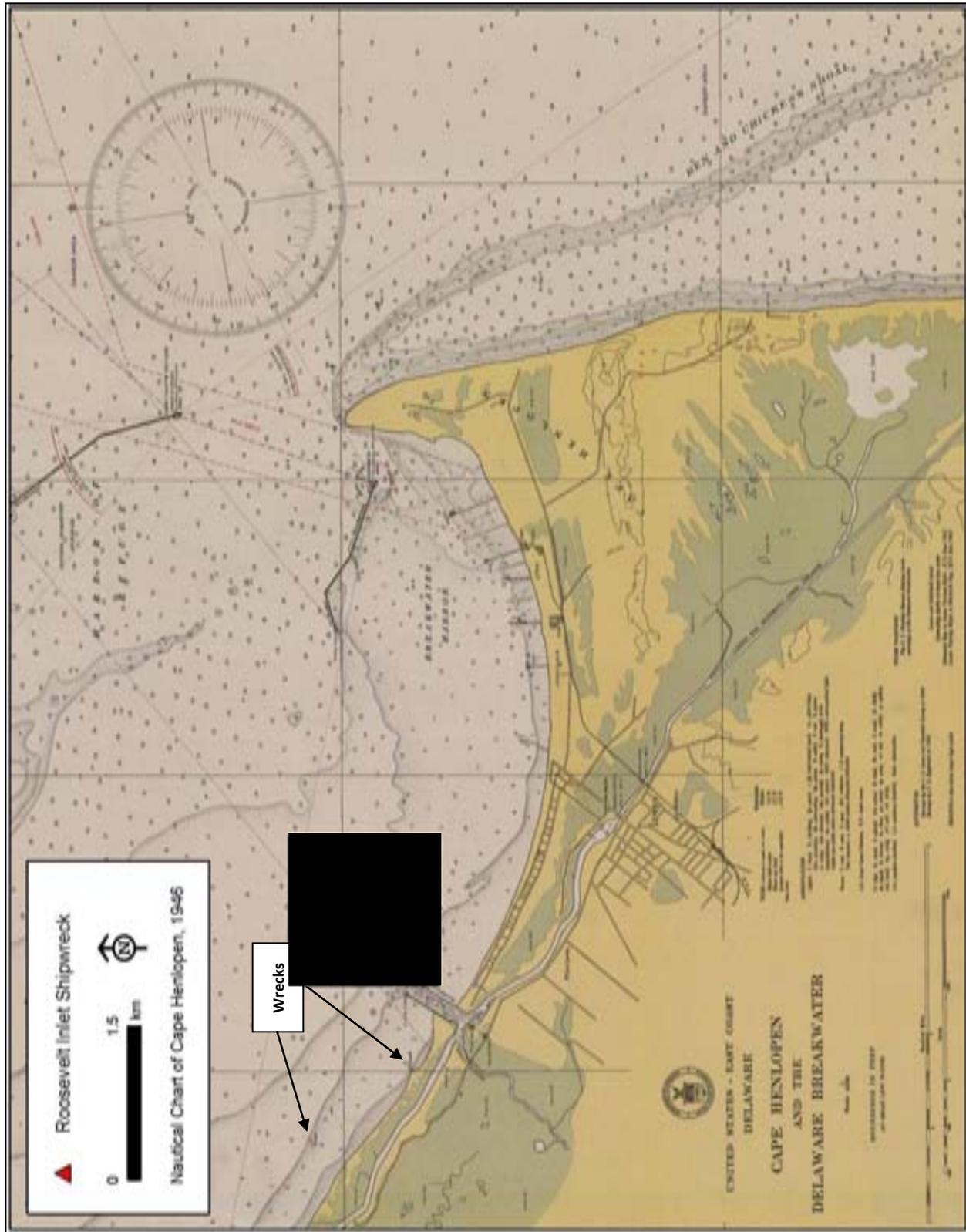


Figure 2.7. 1946 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck.

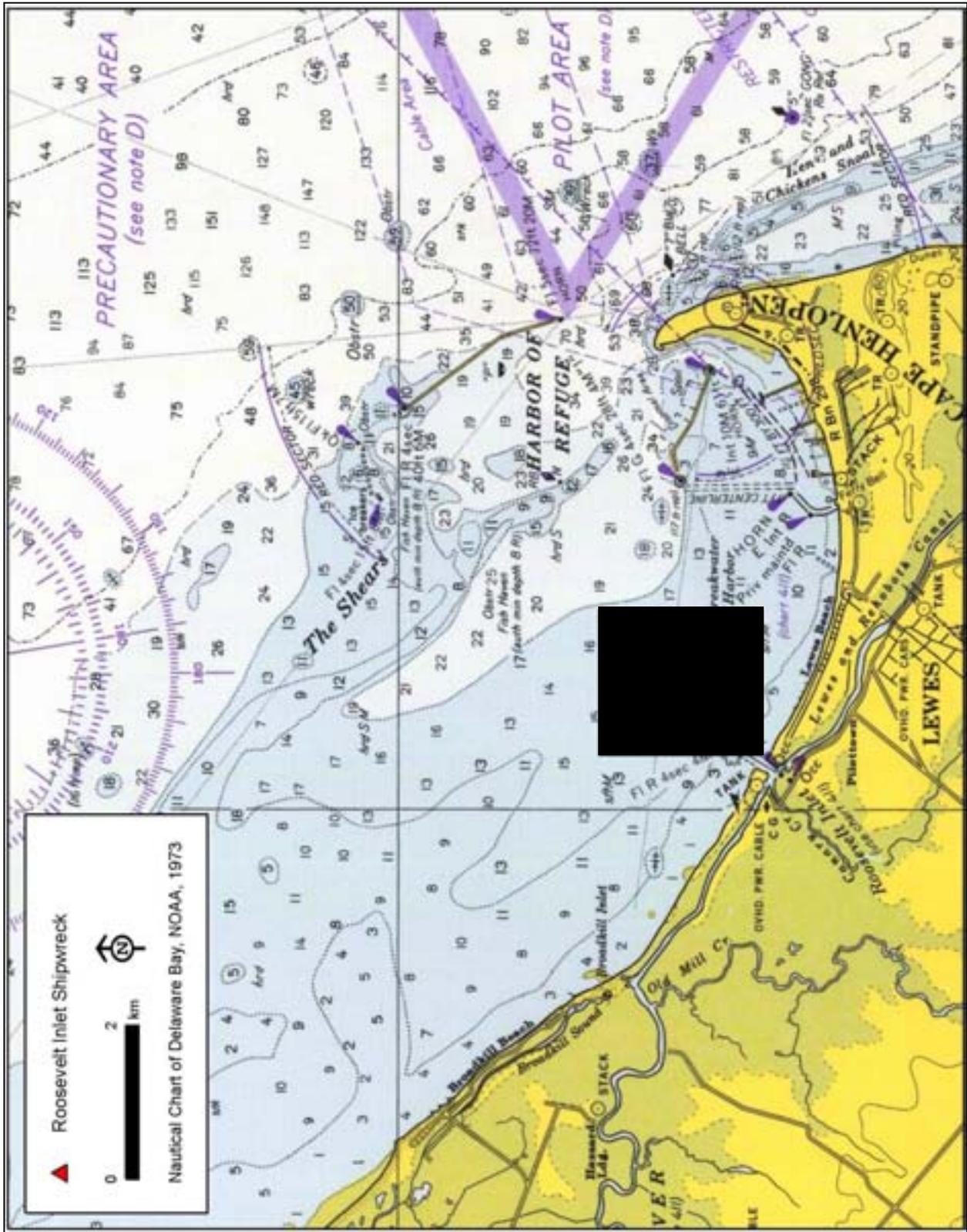


Figure 2.8. 1973 United States Coast and Geodetic Survey chart showing the approximate location of the Roosevelt Inlet Shipwreck.

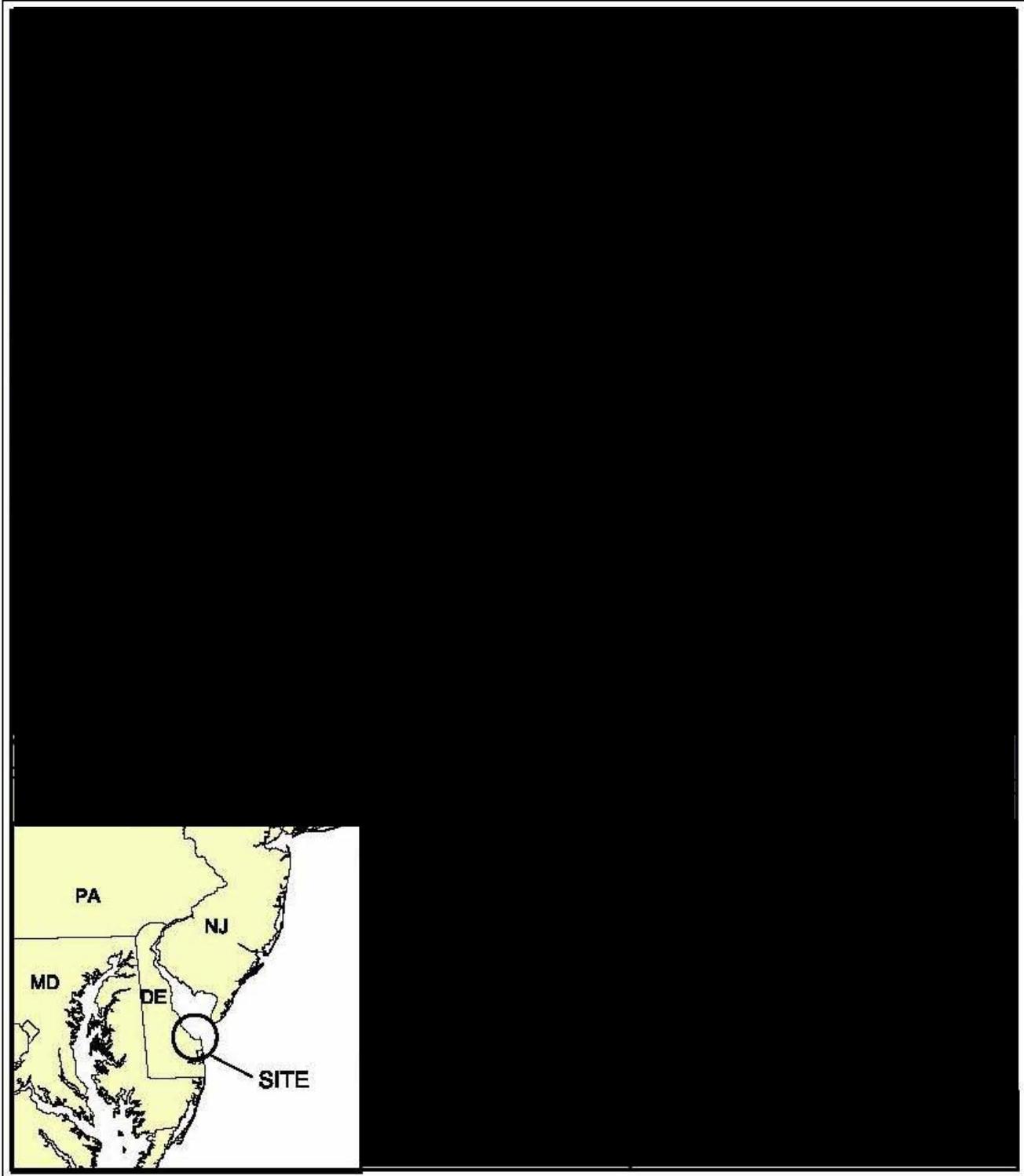


Figure 2.9. Wreck site and Borrow Areas in relation to Roosevelt Inlet Shipwreck (as presented in Dolan Research, Inc. 2005:2).

This Page Intentionally Left Blank

CHAPTER 3

HISTORIC CONTEXT

The following discussion focuses on the maritime trade of the colonial and revolutionary eras with an emphasis on the traffic that plied the Delaware River to and from the port of Philadelphia. As a component of the broader Atlantic World exchange, this dynamic trade was in a state of evolution as the seventeenth and eighteenth centuries progressed. European geopolitics and economic growth, as well as the increasing prosperity of New World colonies, were the most considerable of the many forces that impacted the nature of this trade. Countless ships from ports across the Old World and the newborn colonies passed through Delaware Bay in this period, emptying their hulls of consumer goods at Philadelphia and refilling with mostly agricultural products and raw materials that were needed elsewhere. Of all the ships engaged in this increasingly voluminous trade of the eighteenth century, more sailed under the flag of Great Britain than any other, especially by the time of the American Revolution. Close as they were to monopolizing this trade, Great Britain was never completely successful at closing off the Philadelphia trade and, indeed, the American trade from other countries.

Early Maritime Trade

European trade in the region began in the seventeenth century after the Dutch had established their first settlement of Zwaanendael near the present town of Lewes in 1631 and continued with the Swedish colony at Fort Christina at today's Wilmington in 1638. From these outposts, Dutch and Swedish fur traders occasionally ventured up the Delaware River to trade with Native Americans. From this time forward, the Delaware River was the primary corridor for regional maritime trade which would surge far beyond this fledgling, local activity (Dolan Research, Inc. 2005). Access to and control of the Delaware River, in fact, was a key motivator in regional power struggles. In 1655, the Dutch conquered the Swedish colony and, later, the English expelled the Dutch. The early settlements in what would become the colonies of New Jersey, Pennsylvania, and Delaware heavily relied upon the mother country (England) for survival on this frontier. Decades passed until they, as well as their counterparts across North America, reached the point of basic economic survival. From this point they were able to participate in organized commercial trade through port towns such as Philadelphia, which was chartered as a city in 1701 (McCusker and Menard 1985).

The fight for sovereignty along the Delaware River was an extension of the conflict that was brewing between the Netherlands and England (known as Great Britain after 1707). The outcome significantly influenced maritime trade on a global level. Though allied with the Dutch in the religious wars of early-seventeenth-century Europe, English rulers grew envious of the Netherlands' commercial expansion, national power, and wealth as the century passed. The Dutch trading empire stretched across the globe in the seventeenth century, from Asia to Africa to the Americas (Ormrod 2003).

The expanding settlements of North America, including the Delaware River region, were destined to serve as new trading partners. By the mid-seventeenth century, England was on a mission to destroy the global status of the Netherlands through restrictive trading policies with the North American colonies, known as the Navigation Acts, which effectively cut out Dutch middlemen. Beginning in the mid-seventeenth century with the 1651 order that English ships and only English ships could carry exports from the colonies, England strengthened the Navigation Acts as the century progressed even as war erupted with the Netherlands. In 1660, certain “enumerated commodities” (sugar, tobacco, furs, naval stores, and indigo chief among them) could only be imported to England (McCusker and Menard 1985:77). Three years later, a new Navigation Act commanded that European goods bound for English colonies first had to pass through London, Bristol, or other ports of England. Stricter methods of enforcement such as duties and customs agents in the colonies were promoted with the 1673 and 1696 acts (McCusker and Menard 1985; Morgan 1989).

Three wars—the First Anglo-Dutch War (1652-1654), the Second Anglo-Dutch War (1665-1667), and the Third Anglo-Dutch War (1672-1674)—did much to erode the Netherlands position in the world, and the Dutch position in maritime trade had fallen apart by the start of the eighteenth century (Ormrod 2003). In the treaty ending the last of the three wars, the Netherlands ceded New Netherland (stretching from Delaware to Connecticut) to England. With the Dutch no longer the main player in global trade, England rose in their place. As antagonistic feelings between the two subsided in the early eighteenth century, the Dutch often found themselves as financiers of English commercial ventures (Ormrod 2003).

England’s acquisition of New Netherland did not immediately unleash a bustling transatlantic trade, however. Philadelphia’s merchants, many of whom were Quakers, relied on connections with their co-religionists in other colonies. They carried on little direct trade with England and, on the same note, England infrequently exported to Philadelphia (McCusker and Menard 1985). Transatlantic trade was never expansive in this early period. Until the mid- eighteenth century, Philadelphia’s exports primarily were in foodstuffs to the West Indies. Though most important, the West Indies trade was, in the words of historians who have studied the issue closely, “small, unpredictable, and became intensely competitive in the decades following 1700” (McCusker and Menard 1985:104). By the 1720s, some manufactured goods from Great Britain were trickling into Philadelphia markets. Merchants in the town also had begun to trade with Ireland. The rice and tobacco colonies of North America and New England provided a market for Pennsylvania grain (Bronner 1982; McCusker and Menard 1985). Figure 3.1 shows the bustling port of Philadelphia circa 1720.

The so-called Middle Colonies of Pennsylvania, New Jersey, New York, and Delaware continued the trade with the West Indies that had begun in the latter half of the seventeenth century. Provisions were sent to the islands in exchange for sugar, rum, and molasses. This trade was freely carried on with the British possessions of the West Indies



Figure 3.1. Philadelphia port in the first half of the eighteenth century. (Cooper 1720)

as well as those of other nations, particularly the French, until 1733 when the British Parliament passed the Molasses Act. The act placed a duty on sugar, rum, and molasses from non-British islands in the West Indies. Promoted in large part by British sugar planters, the act intended to make it too expensive for North American colonists to import sugar from anywhere other than the British West Indies. However, the act was neither enforced nor obeyed (McCusker and Menard 1985:163). Nevertheless, the act was regularly renewed until 1764 when the Sugar Act replaced it. The Sugar Act provided stronger enforcement yet provided some encouragement to fair trade in that it also lowered duties on imported sugar products from the non-British West Indies. A perpetual act, the Sugar Act did little to stifle smuggling, but North American colonists were duly antagonized (McCusker and Menard 1985).

It would not be unexpected for such protectionist policies to give rise to significant smuggling, but according to historian T.H. Breen (1986), the merchants of eighteenth century America rarely disobeyed trade restrictions. Although some smuggling occurred and constraints sometimes were ignored, merchants were much more inclined to obey the laws of the empire. After all, as Breen notes, the empire provided naval protection, access to a large free-trading area, easy credit, cheap manufactures, and minimal competition (Breen 1986).

Maritime Trade of the Mid-Eighteenth Century

As the middle of the eighteenth century approached, there was a shift in British trade from Europe to the transatlantic, as well as an overall expansion of colonial markets. Population growth and increasing prosperity in Great Britain's North American colonies created new markets for European consumer goods. Also, the colonies themselves were capable of producing on a higher level the agricultural products and raw materials that allowed them to trade on a larger scale. The English port of Bristol became an important trading partner with Philadelphia and the broader Atlantic World. This "bustling gateway of empire" traded with all the British North American colonies, the West Indies, the West African slave coast, the Atlantic Wine Islands, and the Iberian peninsula in the eighteenth century (Morgan 1993:1). London dominated imports and exports through the eighteenth century, but Bristol and other ports including Liverpool, Glasgow, and Whitehaven reduced the metropolis' share during this era (Morgan 1993).

The "most rapid and major changes" in consumer consumption occurred in the period from the late seventeenth century to the 1770s (DuPlessis 2005:72). English textiles were

the largest single category of consumer items imported into the colonies during this period. Early on, merchants in Philadelphia primarily supplied textiles to white settlers. By the mid-eighteenth century, however, they had also become prominent in the Native American trade. This prominence began to dwindle along with the presence of Native Americans in the 1760s (DuPlessis 2005). As domestic comfort began to replace pioneer conditions in the eighteenth century, colonists found increasingly diverse uses for textiles, and particularly cottons (McCusker and Menard 1985). Bristol vessels bound for the New World were laden with “an infinite variety of export wares” in the eighteenth century (Morgan 1993:89). Kenneth Morgan’s 1993 study of Bristol illustrates how remarkably English domestic products became represented in transatlantic trade. North America and the West Indies received 11% of English exports in 1700-1701, 16% in 1750-1751, 38% in 1772-1773, and 57% in 1797-1798 (Morgan 1993:89). By 1770 the British colonies of the New World received about half of all British exports of ironware, copperware, earthenware, glassware, window glass, printed cotton and linen goods, silk goods and flannels, and also 2/3 or more of all exports of cordage, sailcloth, iron nails, beaver hats, wrought leather, linen, and Spanish cloth woolen goods (Morgan 1993).

During this period, colonial merchants also grew more established and savvy. Early in the eighteenth century, Philadelphia’s merchants worked through agents of large trading firms in Britain. The British agents arranged for shipping, sold the colonial goods, and made orders for manufactured goods that were to be sent in exchange. This arrangement began to dissolve as the colonial market grew after 1740 (McCusker and Menard 1985). Reliance on “Quaker connections” began to dwindle. Philadelphia merchants became better connected, more sophisticated, and more aggressive in the process (McCusker and Menard 1985). Colonists had become prosperous enough that they could provide for their own necessities. As the century progressed, the demand for European manufactured goods increased (McCusker and Menard 1985). Indeed, American colonists became increasingly attached to consumer goods as the eighteenth century progressed. Especially after mid-century, the majority of these goods came from England as a consequence of the Navigation Acts (Breen 1988). As historian Thomas M. Doerflinger (1983) found, Philadelphia was overstocked with dry goods from the mid-eighteenth century well into the 1780s.

In the mid-eighteenth century, Philadelphia’s involvement in maritime trade was burgeoning. The port rose to become the most active in North America, eclipsing New York and Boston, as merchants there took greater control of their own trade and were sending their cargoes to new destinations, for the most part within the terms of the Navigation Acts (McCusker and Menard 1985). The expansion of commerce was visible in the physical growth of the Philadelphia waterfront, which doubled in size. Whereas an average of 85 ships cleared the port in 1723, the number reached an amazing 400 by 1750. The city’s merchants were importing linens from Ireland, wines from Portugal and Madeira, goods from India, woolens and high quality cutlery from England, rum and molasses from the West Indies, and oysters from Rhode Island. Most significant of the new trade destinations for Philadelphia merchants was the Iberian Peninsula and

Mediterranean Europe. Direct trade with Great Britain, infrequent before the 1750s, became regular in the twenty-five years following (McCusker and Menard 1985). Philadelphia's exports were bound for neighboring colonies and the West Indies and primarily consisted of grain and flour but also included meat, lumber, barrel staves, flaxseed, pig and bar iron, deerskins, and furs (Thayer 1982).

The increasing cost of cereals in Europe was another factor that helped stimulate Philadelphia's rise to commercial prominence. Likewise, the increasing population of the Middle Colonies and the expansion of agriculture allowed Philadelphia merchants, who were based in the center of the wheat producing area of North America, to meet the demand in Europe. At the time that this shift in the traditional trade pattern began to take place, 20 percent of ships clearing Philadelphia were bound for Europe. Two decades later, the number reached 30 percent. This trend was seen across the colonies as merchants everywhere were seeking more involvement and a greater profit. Three-fourths of ships outbound on transatlantic voyages would be owned by colonists by the start of the Revolutionary War (McCusker and Menard 1985). The wealth and autonomy of the colonial merchants in Philadelphia and in even in smaller ports accelerated as they continued to bypass British agents and deal directly with British manufacturers and other European suppliers (McCusker and Menard 1985; Breen 1986). Studies of the transatlantic trade in Philadelphia and also Boston and New York for the later colonial period agree that the increasing importation of manufactures from Britain during this period and most of the shipping used was controlled by indigenous merchants. As Nash (2005) notes, Philadelphia's large import trade from England in the 1760s and 1770s was orchestrated by 250-300 independent merchants (Nash 2005).

In addition to increased mutual demand between the Old and New World, and entrepreneurial know-how among colonial merchants, the trade routes themselves were simplified and streamlined. In the eighteenth century, the trade routes of the Middle Colonies (New York, New Jersey, Pennsylvania, and Delaware) as well as New England were not characterized by a triangular trade. Historians have long disproved the triangular trade as a major facet of colonial commerce in the mid-eighteenth century (Ostrander 1973; Walton 1968). Walton (1968) has argued that shuttle routes, or, routes leaving the Old World for one New World port, were the norm for the North Atlantic ports (such as Philadelphia) involved in eighteenth-century trading. Multi-lateral routes involving more than one New World port, as Walton found, were less common as the eighteenth century progressed. Morgan (1993), who looked at hundreds more voyages than Walton and also focused on a broader time span (1749-1770), came to a similar conclusion, at least for the Bristol trade. Morgan speculated that circuitous routes were an attempt by Bristol merchants to make efficient use of their ships in trades where bilateral routes could not provide suitable goods to fill shipping space. Nevertheless, as Morgan writes, "The need to make full use of ships on all legs of voyages, to co-ordinate shipping movements with colonial agents, to time voyages to coincide with the availability of seasonal crops, and to cope with the irregularities of many markets and the instability of prices posed ever-present

problems that made multi-lateral routes more speculative than bilateral routes” (Morgan 1993:281).

Certainly by the 1760s, British merchants were beginning to feel competition from their colonial counterparts. In an attempt to ensure Great Britain’s dominance, their political leaders enacted a new series of restrictive commercial laws which unintentionally interrupted transatlantic trade and ultimately led to the revolt of the colonies. Particularly, the non-importation boycotts by the colonies in 1765-1766, 1768-1770, and 1774-1776 closed Philadelphia as well as New York, Boston, and Charleston to British vessels for long periods (Griffith 2005; Griffith and Fithian 2007; Morgan 2000:39). Passed in 1765, the Stamp Act taxed all written and printed material, from books to paper money. The act met strong opposition in the colonies. Philadelphia merchants, along with others in the colonies, agreed not to import British goods, a strategy that proved effective, since the act was repealed in the spring of 1766 (Oaks 1977; Tinkcom 1982). The Townshend Acts, a series of acts passed in 1767 that placed duties on glass, paper, tea, lead and paint, also elicited a negative response from many a colonial merchant, including those in Philadelphia (Breen 1988). After much internal debate and pressure from anti-British firebrands, in 1769 Philadelphia merchants once more agreed to suspend importation of British goods except for a few specified items such as material for ballast, medicine, and manufacturing. British dry goods were especially targeted for non-importation. In their absence, home manufacturing of woolens and other boycotted items was promoted. Smugglers of British goods often were harassed. While the boycott certainly diminished British trade with the colonies until the repeal of the Townshend Acts in 1770, there were negative consequences for colonial merchants that were unbearable for some. Without imports to sell, many merchants faced closure. Competition from New York and other ports also presented a threat (Brunhouse 1930; Oaks 1977; Tinkcom 1982).

While some diehard colonial merchants vowed to stick with non-importation, the consensus by the fall of 1770 was to end non-importation with the notable exception of tea. Philadelphia only received tea that the Dutch smuggled into the colony. Commenting on this activity, British admiral Lord John Montagu commented “it would amaze their Lordships to see the great Quantity of Holland goods that is run annually into Virginia, Philadelphia, and New York, and I am informed that they do not pay Sixpence Duty for Tea in the Course of the Year, yet every Shop is full of it, and the same of all other East India Goods” (Stout 1973:136). Seeking to put an end to this smuggling, Britain passed the Tea Act in May of 1773. The act made the only legal tea in America that of England’s own East India Tea Company. When the *Polly*, a British vessel, approached Philadelphia in December 1773 with a full cargo of tea, the ship was intercepted and the captain brought into the city. Broadsides from the so-called “Committee for Tarring and Feathering” warned the Delaware River pilots of the consequences if they brought the *Polly* in (Figure 3.2). The bottom of the Broadside shows the appeal to the citizens of Philadelphia to meet at the State House on December 27th, and the 8,000-person meeting was the largest gathering in the colonies up to that point. The protest in Philadelphia was peaceful whereas in Boston several weeks before, protesters held the Boston Tea Party.

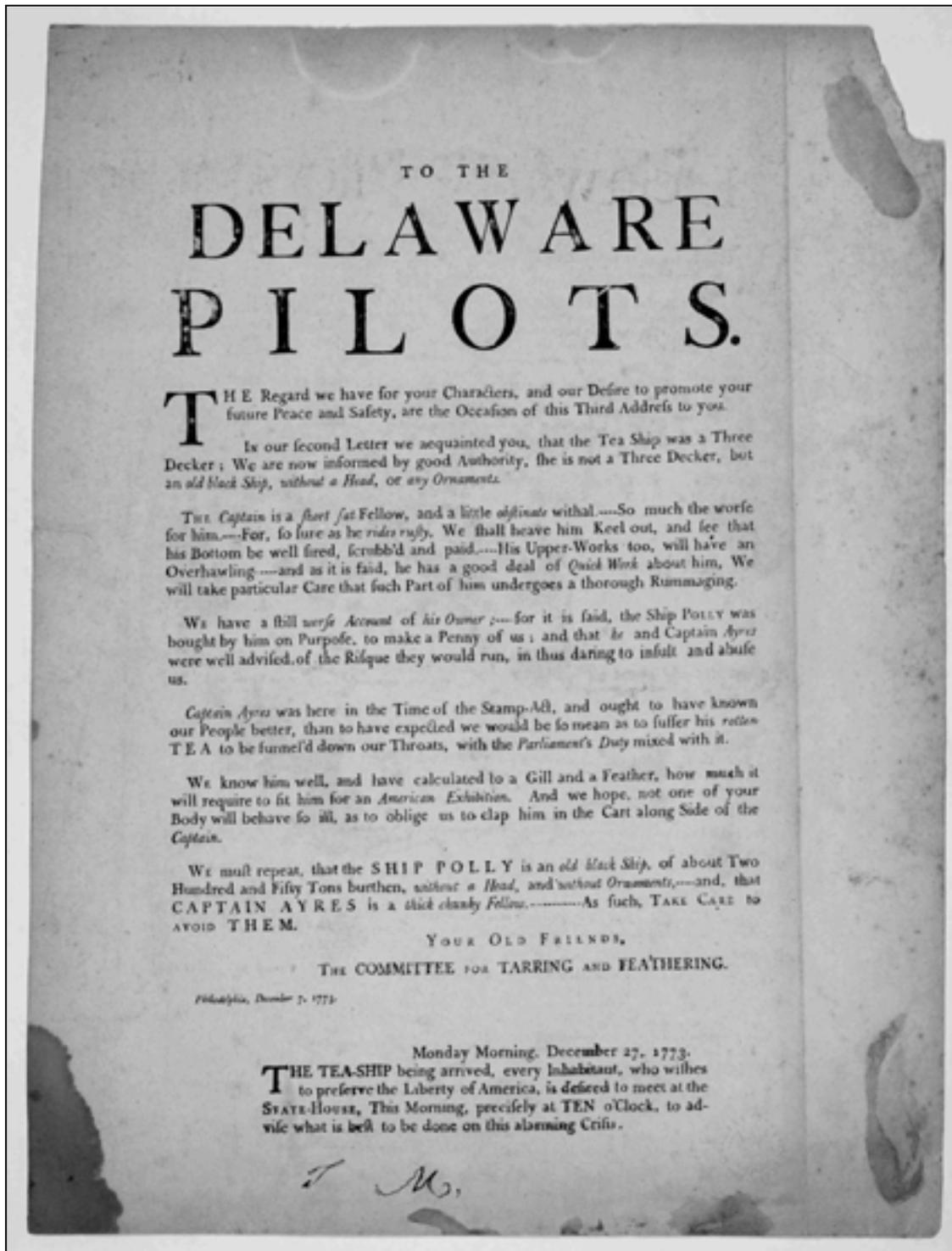


Figure 3.2. Broadside from the Philadelphia Committee on Tarring and Feathering. (Courtesy of the Library of Congress)

The Philadelphia Tea Party, though relatively sedate, was one of the critical events leading to the convening of the Continental Congress (Gifford 1976).

Trade between the British and the colonists rebounded after the end of non-importation, even with the absence of tea (Brunhouse 1930; Oaks 1977). By 1772-1774, the American colonies provided 40 percent of British imports (mostly agricultural) and took over 40 percent of British imports (mostly manufactures) (Nash 2005).

Maritime Trade of the Revolutionary War

Historians have extensively analyzed Atlantic World trade in the century leading up to the American Revolution. Comparatively little has been written about the trajectory of this trade during and directly after the war, however, due to the relative lack of surviving statistical information for the period. Available sources leave little doubt, however, that the American War of Independence severely disrupted the pattern of trade between Great Britain and the revolting American colonies. Shipping between the colonies and Great Britain only occurred when colonial ports such as Charleston, New York City, and Philadelphia were under British occupation (Morgan 1993). But even in this atmosphere of disruption, a low level of trade with countries other than Great Britain occurred. France, Spain, the Netherlands, and their American possessions became “important trading partners of the revolting colonies” (Morgan 1993; Shepherd and Walton 1976:397-398).

With the loss of Britain as a primary trade partner, the colonies sought to create or improve diplomatic and also commercial relationships with other powers. From the start of the war, shortages in munitions and weapons were present, but salt, shoes, woolens, and linens were in demand, too. In 1775, the Continental Congress had authorized trade with the West Indies and in the spring of 1776, trade with foreign countries was allowed (Walton and Shepherd 1976). The British blockade of colonial ports was effective at obstructing shipments between 1776 and 1777, but the ongoing war which included American privateer attacks on British commercial ships focused the Royal Navy’s efforts elsewhere (McCusker and Morgan 1985; Shepherd and Walton 1976).

As historians James F. Shepherd and Gary M. Walton (1976) have explained, American wartime commerce reached its zenith between the years 1778 and 1782. Imports outweighed exports in this wartime trade because of the disorganization of the countryside on account of the fighting. France, Spain, and the Netherlands, after declaring war on Great Britain in 1778, 1779, and 1780, respectively, emerged as important trading partners of the rebellious colonies during the Revolutionary War (Walton and Shepherd 1976). In 1778, France and the colonies entered into a treaty of amity and commerce, which granted recognition of the American cause in addition to reciprocal commercial privileges (Meng 1938). Spanish Cuba became an important trade center for Baltimore and Philadelphia merchants (Shepherd and Walton 1976). Much to the dismay of the British, the Dutch also became important allies to the American cause, supplying arms as well as other trade

goods to the rebellious colonies. Dutch merchants began supplying arms shortly after the eruption of war with the island of St. Eustatius serving as entrepôt for this trade (Figure 3.3). In return for arms, the Dutch received American indigo and tobacco (Jameson 1903). Morgan (1993) has implied that Dutch cargoes of consumer goods, in addition to war materiel, made their way to the colonies via St. Eustatius. The Dutch also were allied with the French and, therefore, the British had little choice but to declare war on the Dutch in 1780. Within a year, the British attacked St. Eustatius, thereby cutting off the Dutch supply of arms to the colonies. Yet, the Dutch continued to support the Revolution, becoming one of the first countries to establish a formal trading relationship with the Americans (the Treaty of Amity and Commerce) in October of 1782 (Jameson 1903).

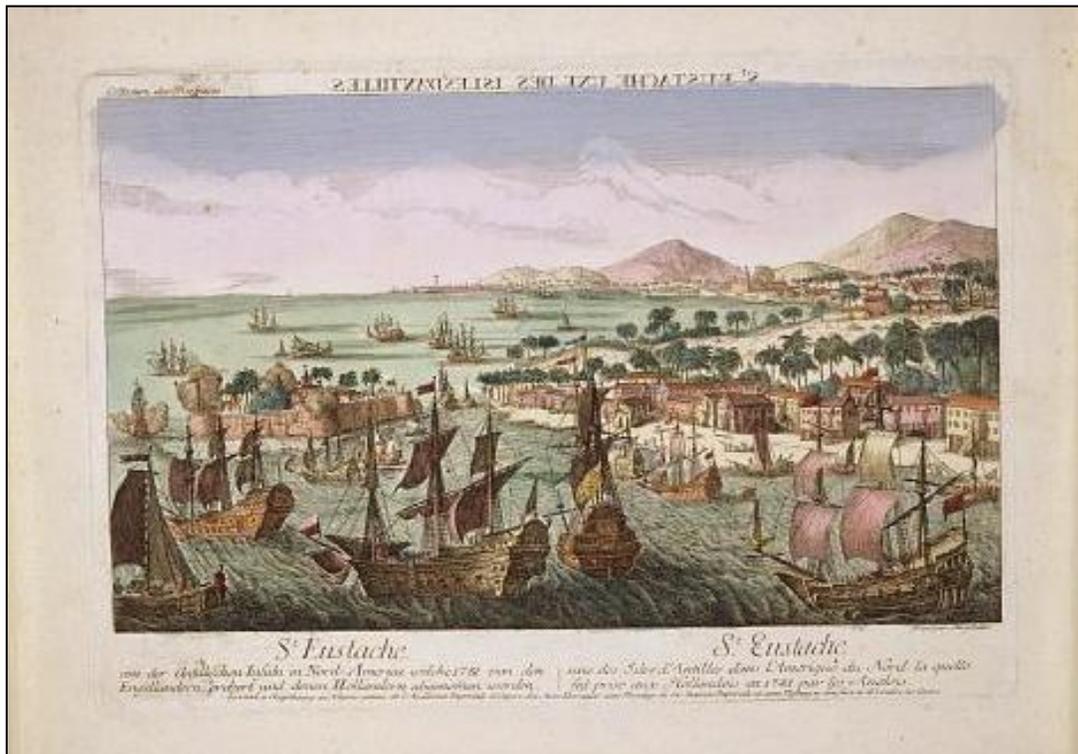


Figure 3.3. St. Eustatius in 1782. (Courtesy of the Library of Congress)

The American Revolution reached a global impact as various European naval powers banded together in a League of Armed Neutrality to oppose British searching of all neutral ships for French contraband during the war (Fremont-Barnes and Ryerson 2006). While it was not an aggressive alliance, that, combined with fighting both the Americans and the Dutch in separate conflicts, fundamentally challenged British supremacy in the late eighteenth century. Figure 3.4 shows a cartoon from the 1780s, presumably Dutch in origin, that shows England represented by a man in a nightshirt being attacked by others representing countries in the League. He is held by a Swede and a Dane, a Frenchman places a foolscap on his head, a Dutchman places shackles around his ankles, an American runs away with his clothes, and a Russian aims with a club all the while a merchant fleet sails away in the background.



**Figure 3.4. 1780s Dutch cartoon depicting Britain on the defensive.
(Courtesy of the Library of Congress)**

The port of Philadelphia provides an example of trading conditions during the Revolutionary War. When the British Army's occupation of Philadelphia became inevitable in the fall of 1777, many of the leading merchants of the city retreated inland, leaving their shops deserted. With the British occupation came merchants who occupied the vacated places of business alongside those Americans who stayed. Initially, British ships from New York delivered supplies and provisions to occupied Philadelphia, but by the winter of 1777, commerce with Europe was open and profitable. By February of 1778, as historian Willard O. Mishoff writes, "there were one hundred twenty-one new stores kept by Englishmen, Irishmen, Scotchmen, or Americans" (1937:167). Crockery, linens, dimity, loaf sugar, medicine, and wine were among the many items sold to civilians as well as British soldiers, and often at a high price. Dry goods overwhelmed the market to the point that Philadelphia merchants warned agents abroad. In June of 1778, the British Army vacated the city for New Jersey, signaling the return of the refugee merchants (Mishoff 1937).

Maritime Trade of the Post-Revolutionary War Period

Contrary to what some observers predicted, the newborn United States became an important player on the scene of transatlantic trade. American merchants reestablished old trading networks free of the fetters of Great Britain and also established new ones in the years between the end of the war and the start of the nineteenth century. In the closing years of the eighteenth century and into the early nineteenth century, the British Atlantic trade grew at unprecedented rates because of the demand generated by an ever growing American population and expanding agriculture. Furthermore, as Shepherd and Walton write, “many of the imports desired by Americans were found in greatest variety and at the best price and quality there” (1976:407). Sugar and other foodstuffs continued to comprise most American exports to the former mother country with increasing importation of raw materials, particularly cotton (Nash 2005; Shepherd and Walton 1976). Even though Great Britain was the major trading partner of the United States in the decades following the Revolution, the development of “a large, direct trade with other northern European countries must stand as a major consequence of independence” (Shepherd and Walton 1976:407).

At the end of the war, the former colonies continued their efforts to negotiate commercial treaties with other European powers. Denmark, Sweden, and Portugal entered into treaties of amity and commerce in 1783, and in 1785 Prussia joined the list of countries that pledged recognition and commercial relations (Burnett 1911). For the first time in nearly century large-scale trading between the United States and northern Europe (particularly France, Germany, the Netherlands, and Scandinavia) was underway and as the decade progressed, these countries became markets of moderate importance for American products that no longer had to be routed through Great Britain (McCusker and Menard 1985). Of these northern European countries, the Netherlands and France were the major trading partners of the United States. The major commodity exported to these countries was tobacco and, to a lesser but notable extent, rice, flour, wheat, and maize (Walton and Shepherd 1976). Christian Febiger, a former American brigadier general, represented Scandinavian merchant interests in Philadelphia. Trade with southern Europe recovered from pre-war levels. Also opened was trade to China and the Far East. American involvement in the direct trade of African slaves also greatly expanded. Moreover, by the end of the 1780s, the commodities trade with the West Indies had resurged (McCusker and Menard 1985; Miller 1982; Walton and Shepherd 1976).

After suffering a post-war reduction, breadstuffs (wheat and flour) came to dominate the exports of the port of Philadelphia in the late 1780s and into the 1790s. American exports of breadstuffs as a whole had dwindled in the half decade after peace. The Caribbean market for American flour was in danger of closing in the immediate postwar years. Britain closed its Caribbean ports to American shipping in 1783 and in the following year, France prohibited the entry of non-French flour to its island possessions. Also, new Spanish trade policies closed the Cuba market. In Europe, Portugal ended the importation of American flour in hopes of nourishing domestic flour production. Nevertheless, by

1790, the volume of exports resurged and actually increased in volume as wheat harvests in Europe were poor. “So successful were breadstuff exports,” historian Geoffrey Gilbert found, “that by the early 1790s they formed the cornerstone of American foreign trade” (Gilbert 1977:386-387).

American trade with France and its West Indies possessions grew in the 1780s. Exports to the French West Indies were larger than prior to the American Revolution (Marzagalli 2008). At Saint-Domingue and other French ports in the Caribbean, vessels sailing from American ports unloaded tobacco, foodstuffs, and naval stores and took on cargoes of French wine, brandies, and manufactured goods. Comparatively little direct trade between the United States and France took place. When war between Britain and France erupted in 1793, France threw open all of its ports to neutral shipping (Marzagalli 2008).

The outbreak of war between France and Britain in 1793 impacted the conditions of Atlantic trade for the neutral United States in significant ways. The American merchant fleet greatly increased and, for the first time in history, American merchant ships sailed the world seas. A phase of “unprecedented growth” was opened (Marzagalli 2008:458-459). Merchants in the United States took over a significant portion of the carrying trade to the West Indies, central and Southern America, China, India, and the Dutch East Indies. In this atmosphere, the ports of Baltimore, New York, Boston, and Philadelphia rapidly grew. Embargoes with Britain and the onset of the War of 1812 elicited a decline in this boom in trade and shipping (Nash 2005).

From the seventeenth to the early nineteenth centuries, colonial and post-revolutionary America was often at the nexus of events transforming the old European order as it related to transatlantic and global trade. On the one hand, as a colonial subject, pre-revolutionary America’s mercantile fortunes depended largely on British economic and legal factors. However, even within that restricted system and amidst a climate of revolution, American merchants were active participants in a network that was complex, and depending on the shifting power structures in Europe, often volatile. While the identity of the Roosevelt Inlet Shipwreck remains uncertain, one thing is not in dispute; the ship and its abandoned cargo both poses more questions and provides a glimpse into eighteenth-century America’s place within a global trading system during the waning days of mercantilism.

CHAPTER 4

RESEARCH OBJECTIVES AND METHODOLOGIES

Research Objectives

A number of research questions were posited by the State of Delaware prior to the fieldwork in an effort to answer specific questions regarding the Roosevelt Inlet Shipwreck. The research questions, as outlined by the State include the following:

- What type of vessel foundered on the shoals of Lewes Beach?
- Why did the vessel sink?
- When precisely did the vessel sink?
- What were the origin and destination of the vessel?
- Were any lives lost during the sinking, and are the remains of seamen and passengers still at the wreck site?
- What was the precise nature of the cargo?
- How was the vessel cargo hold loaded?
- Was the vessel salvaged in part after the sinking by Lewes residents or others?
- What do the vessel and its cargo tell us about political, social, and economic life in Great Britain's Middle Atlantic colonies?
- What does the vessel reveal about regional and coastal trade and its link with the wider Atlantic world?
- What are the best archaeological techniques and historical research approaches to answer these questions?
- How can we learn from this project to identify and protect other historic shipwrecks in Delaware waters?

These questions were considered by SEARCH prior to conducting all archival and archaeological fieldwork. Research objectives and a series of methods were then proposed to the State of Delaware to answer these questions regarding the Roosevelt Inlet Shipwreck. These objectives and methods included: conducting additional archival research relative to the loss and subsequent identity of the vessel; a preliminary remote sensing survey to determine the extent and exposure of the wreck site; a hydro probe survey to determine the amount of extant hull remains and collection of surface artifacts; the excavation of eleven 10-x-10-foot test units to determine the extent of hull/artifact remains; and a post-remote sensing side scan sonar survey of the wreck site.

Following the fieldwork an analysis of all recovered artifacts from the site was conducted by the State. This analysis of the artifact assemblage recovered during the current investigation answers many of the questions hypothesized about the Roosevelt Inlet Shipwreck and are described more fully in the subsequent chapters of this investigation.

A variety of methods were utilized by SEARCH to complete all of the research objectives outlined above (see Appendix B). The following will discuss the methods employed during the archival research, remote sensing survey, diver investigations, hydro probe survey, and test unit excavation of the Roosevelt Inlet Shipwreck.

Archival Research Methods

In the fall of 2006, SEARCH conducted archival research in Philadelphia, Pennsylvania, on behalf of the State regarding the Roosevelt Inlet Shipwreck. This historical information includes the research findings of SEARCH Historian Nick Linville as well as others who have researched this shipwreck to date, including former State Historic State Preservation Officer (Former Delaware SHPO) Dan R. Griffith, Chuck Fithian (Curator of Archaeology), and Diane Hungate (Historian).

Archival research on the Roosevelt Inlet Shipwreck was conducted at the Historical Society of Pennsylvania (HSP) in Philadelphia and the J. Welles Henderson Archive and Library at the Independence Seaport Museum (ISM). This research was completed between December 5 and December 8, 2006. The SEARCH Historian focused his research at the HSP on sources that Daniel R. Griffith and Chuck Fithian identified from their own historical research. Mr. Linville then turned to sources he determined to be of interest. As a supplement to the research at the HSP, the Historian briefly visited the ISM library. The ISM library has a moderate-sized collection of primary and secondary sources relating to local maritime history that had the potential to yield information on the topics of interest to this project.

In light of reviewer comments and suggestions received in the fall of 2009, the SEARCH Historian drafted an historic context discussing maritime trade in the Colonial and Early Federal periods. Secondary sources were collected from the University of Florida libraries, inter-library loan, and through various online repositories. Among these were JSTOR, Project Muse, and Science Direct. Regional contexts were collected from the Delaware Division of Historical and Cultural Affairs. The historic newspaper articles consulted were derived from Accessible Archives, another digital archive. The maps and charts discussed and presented in the Environmental Setting section of this report were obtained from the University of Alabama's online map collection as well as the National Oceanic and Atmospheric Administration's online Historic Map and Chart Project.

Remote Sensing Survey Methods

On September 27, 2006 a preliminary remote sensing survey of the Roosevelt Inlet Shipwreck was conducted utilizing a magnetometer, side scan sonar, and Differential Global Positioning System. All instruments were integrated with Hypack® navigation software which controlled the acquisition of data. A Marine Magnetics Explorer magnetometer and Klein® 3000 side scan sonar were integrated with a Trimble® DSM

232 DGPS providing sub-meter accuracy for the survey. The remote sensing survey was conducted prior to all dive operations and excavation of the Roosevelt Inlet Shipwreck.

Trimble® DSM 232 Differential Global Positioning System

SEARCH operated a Trimble® DSM 232 Differential Global Positioning System (DGPS) during the remote sensing survey. This DGPS receiver is ideal for real time positioning, providing sub-meter accuracy using the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Beacons and Satellite Based Augmentation System (SBAS) corrections. Built for operation in a marine environment the Trimble® DSM 232 offers a range of GPS locational methods to suit a variety of applications. The coordinate system utilized for the project was Delaware State Plane coordinates (NAD83) in U.S. Survey Feet.

Hypack® Navigation Software

For all remote sensing surveys SEARCH utilizes Hypack® navigation software. Hypack®, considered the industry standard for hydrographic survey, allows the survey team to design and delineate survey areas, pre-plan track lines, collect single beam data (i.e. magnetometer, DGPS), process and edit the data, and generate final products such as contour maps (two- or three-dimensional), Triangulated Irregular Network (TIN) models, plotting sheets, output for computer aided drafting (CAD), and side scan sonar collection.

Hypack® is configured to collect data from the DGPS system as well as the magnetometer during survey operations. The software also allows the display of digital navigation charts with the survey area superimposed on a NOAA navigational chart. For this survey all data has been overlaid on the NOAA Chart #12216 “Cape Henlopen to Indian River Inlet Breakwater Harbor.”

Marine Magnetics Explorer Magnetometer

SEARCH operated a Marine Magnetics Explorer magnetometer during the preliminary remote sensing survey. This magnetometer is a lightweight, low-powered unit ideally suited for all aspects of the remote sensing survey. This magnetometer is highly sensitive, accurate, and can be easily deployed from any size survey vessel. The Explorer magnetometer is completely maintenance-free and does not degrade over time (Figure 4.1). The magnetometer collected data at a sample rate of one reading per second. The unit delivers a high-resolution output with a noise level of $0.02\text{nT}/\sqrt{\text{Hz}}$. The Explorer is entirely digital and is ideal for geophysical surveys, archaeology, wreck detection, harbor mapping, and ferrous target detection.



Figure 4.1. The Marine Magnetics Explorer magnetometer, left, and the Klein® 3000 side scan sonar, right, ready for deployment.

Klein® Model 3000 Side Scan Sonar

SEARCH owns and operates a Klein® Model 3000 side scan sonar, which is among the most powerful and accurate pieces of equipment available for commercial side scan use (see Figure 4.1). The Klein® 3000 is an all-digital, single-beam system that is completely software driven. The software, SonarPro™, is a custom-designed data acquisition program featuring survey planning tools, navigation charts, track plotting, and target management. The Klein® Model 3000 system, capable of producing superior digital imagery at long ranges, employs dual (100 & 500 kHz) frequencies and has a standard depth rating to 1,500 meters. The towfish can easily be mounted to various platforms, is very portable, and is accurate at speeds up to eight knots.

A total of eleven track lines were established over the wreck site prior to the survey utilizing coordinates provided by Dolan Research, Inc. (2005:59). These track lines, spaced at 50-foot intervals, were each 500 feet in length and oriented north-south (Figure 4.2). The total survey area was 500 square feet. An additional three track lines, oriented east/west were also established. These are commonly referred to as “tie lines”.

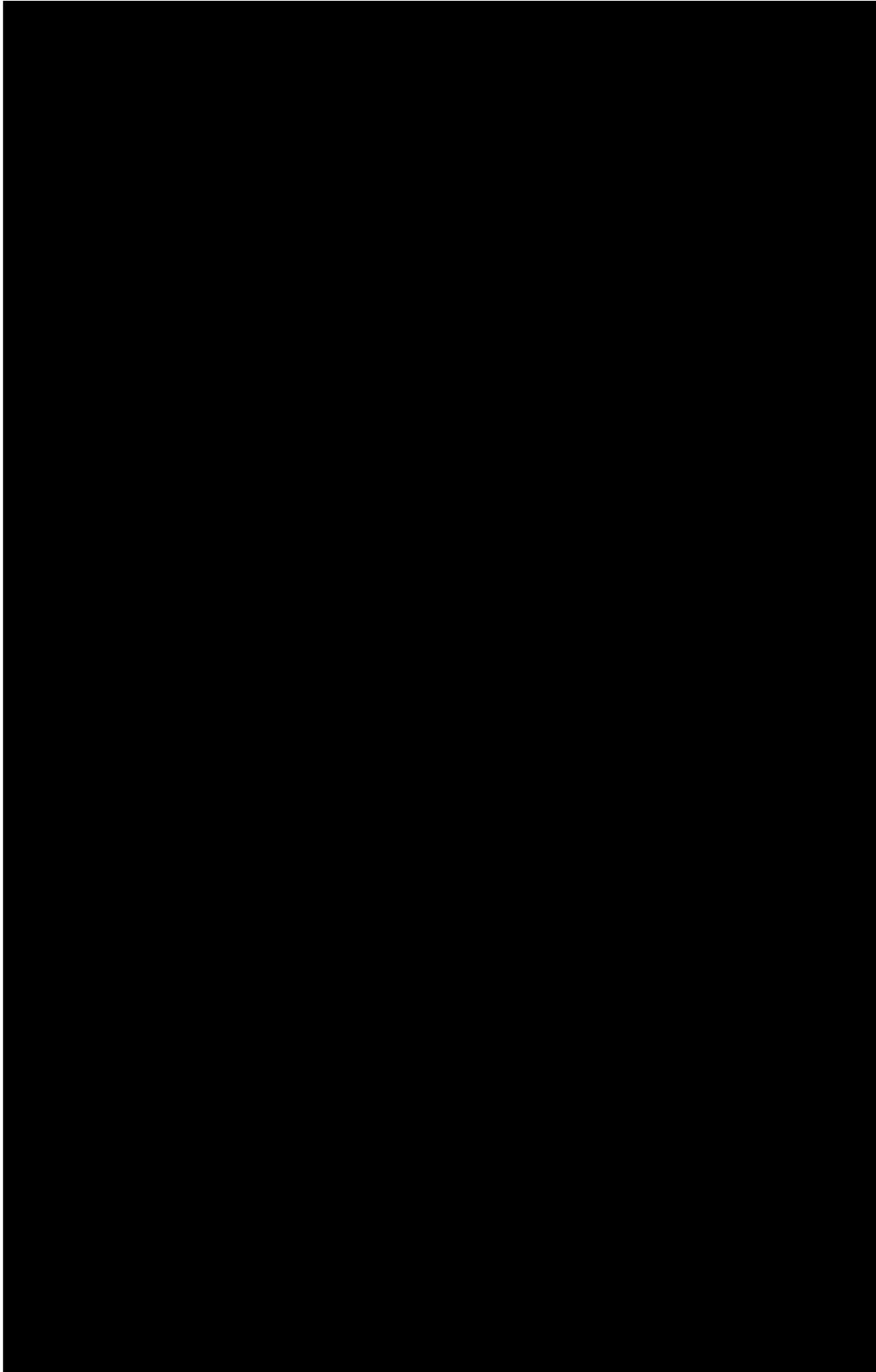


Figure 4.2. Pre-plotted track lines, shown in green, were 500 feet in length and spaced at 50-foot intervals (NOAA Chart #12216 “Cape Henlopen to Indian River Inlet Breakwater Harbor”).



Figure 4.3. Morning dive safety meetings occurred each day of the project prior to leaving the dock.

including weather, equipment, and safety concerns (Figure 4.3). All personnel on the boat were required to attend the briefing to discuss daily objectives and various other topics prior to departing the dock. A Daily Log recording daily activities, time leaving dock, time on site, general observations, and work accomplished was kept by the Principal Investigator.



Figure 4.4. Diver outfitted with surface supplied air (including a Kirby-Morgan SuperLite®-27 helmet), preparing to excavate a portion of the Roosevelt Inlet Shipwreck.

Site Investigation Methods

Site investigations of the Roosevelt Inlet Shipwreck began on September 29, 2006 and concluded on October 25, 2006. SEARCH provided the State with an Emergency Management Plan, Safe Practices Manual, and Dive Operations Plan prior to dive operations. These documents were approved in writing by the State on September 27, 2006.

Each day, prior to dive operations, a dive safety meeting was held on the stern of the work vessel *Venture III* prior to leaving the dock. The purpose of the dive safety meeting was to discuss daily objectives, dive rotations, and any additional issues

Dive Equipment

SEARCH used both Self Contained Underwater Breathing Apparatus (SCUBA) and Surface Supplied Air (SSA) diving equipment during the current investigation. SCUBA was utilized during the preparation of the site including establishing baselines and semi-permanent moorings. SSA was then utilized for the remainder of the project during the hydro probe survey and excavation of the eleven test units. The SSA equipment included Kirby Morgan SuperLite® diving helmets (17b and 27) (Figure 4.4), Diveline floating umbilicals, and a Kirby Morgan Air Control Station-2A (KMACS-2A). The KMACS-2A, a

portable control box for use in all SSA diving operations, controls the diver's air as well as all communications via a built-in communication system (Figure 4.5). This allows two divers to communicate via "round robin" four-wire communications in emergency situations, and it allows the Dive Supervisor total control in any situation by monitoring air supply, diver communication, and the pneumofathometer in one localized area.



Figure 4.5. The Kirby Morgan Air Control Station-2A (KMACS-2A) allowed the Dive Supervisor to monitor the diver's air supply, dive time, and communications at all times.

The Diviline breathing supply hoses used by SEARCH have a working pressure of the total breathing gas system, and they have a rated bursting pressure greater than four times the working pressure. The breathing air supply hoses have connectors made of corrosion-resistant material which also have a working pressure at least equal to the working pressure of the hose to which they are attached. The hoses utilized by SEARCH have been marked at one-foot intervals. This increment allows the tender to feed the diver umbilical at a known distance relative to diver arcs. The Diviline floating breathing supply hoses reduce drag across the sea floor, decrease the potential for diver hangs, and allow the Dive Supervisor to visually track the diver's movement across the sea floor.

All dives and communications from each individual dive were recorded on SEARCH Dive Logs. Each Dive Log contains a variety of information including diver name, purpose of dive, date, dive conditions, time in/time out, air in/air out, work scheduled and accomplished, and general notes and observations.

Work Platform

The work platform utilized during all aspects of the investigation was the 46-foot, aluminum-hulled Breaux-built crew boat *Venture III* (Figure 4.6). The vessel, operated by Captain Paul Hepler and first mate Ruth Hepler, is based out of Shark River Inlet, New Jersey. The vessel was ideally suited for all aspects of the project, including the preliminary remote sensing survey, site preparation, and excavation activities. The vessel had plenty of deck space for all equipment utilized during the project including the remote sensing equipment, SSA dive equipment, and room for daily artifact screening and storage. The *Venture III* conformed to all U.S. Coast Guard specifications according to class and had all required safety equipment including lifejackets, first aid supplies, tool kits, flare gun, and air horn.



Figure 4.6 . The stern of the *Venture III* (based out of Shark River Inlet, New Jersey) had ample space for all project-related activities.

Preliminary Site Preparation

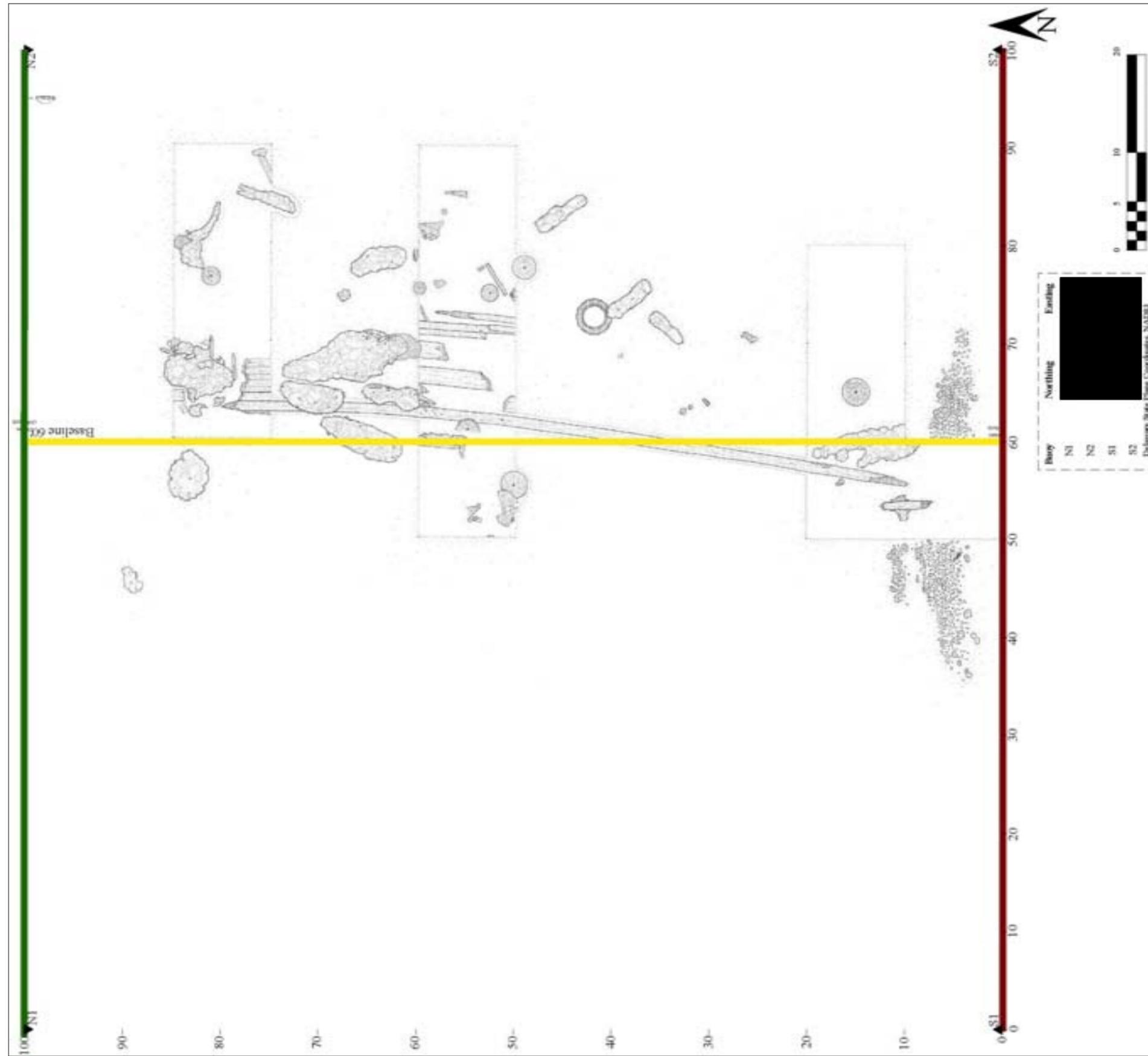
To guide archaeological divers efficiently around the wreck site during the investigation, a series of three semi-permanent baselines were established on site. Two of the baselines were oriented east/west, and a third (established along the centerline of the exposed wreck), was oriented north/south (Figure 4.7).

Table 4.1. Buoy drop locations for the two east/west baselines; coordinates are in Delaware State Plane, (NAD83), U.S. Survey Ft.

Buoy	Northing	Easting
N1	██████	██████
N2	██████	██████
S1	██████	██████
S2	██████	██████

These three baselines were established by dropping four buoys, with sub-meter accuracy, around the perimeter of the wreck site. These buoys were dropped on coordinates identified by Dolan Research, Inc. (2005) during a previous investigation. In an effort to maintain a high degree of context control during the current investigation, the original grid system (established by Dolan Research, Inc. in 2005) was utilized for the current investigation. Data collected by Dolan Research, Inc. and the results of the current

remote sensing survey suggest the two east/west baselines established at these locations would encompass the entire wreck site (Table 1). The coordinates listed in Table 4.1 are Delaware State Plane coordinates (NAD83), U.S. Survey Feet.



This Page Intentionally Left Blank

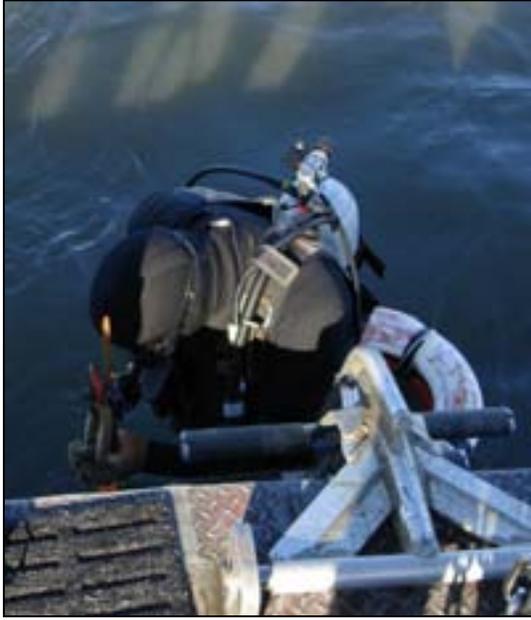


Figure 4.8. SCUBA diver preparing to set a screw anchor for one of the three baselines.

Following the deployment of the four buoys, divers utilizing SCUBA proceeded to the bay floor to insert large screw anchors at these four locations and to secure the color-coded baselines (Figure 4.8). Once the screw anchors were in place, the two east/west baselines were strung between associated anchor points and secured. The third baseline, oriented parallel to the wreck site, was placed on site after the hydro probe survey was completed, using similar screw anchors.

The baselines were marked with high-visibility, color-coded tags at 10-foot intervals (Figure 4.9). These colored tags assisted divers in orienting themselves to the wreck site during dive operations. The use of different colored tags for the three baselines proved an efficient means for divers to navigate across the wreck in a low-to-zero visibility work environment.



Figure 4.9. Each baseline was color coded (yellow shown) and secured with large screw anchors in the bay floor by divers using surface supplied air.

Hydro Probe Survey Methods

Once the two east/west-oriented, semi-permanent baselines were established the next objective was to determine the amount of extant hull remains using a 5-foot hydro probe. The hydro probe is simply a 5-foot piece of 1/2-inch galvanized pipe in which water is forced through from a centrifugal water pump located on the deck of the dive platform (Figure 4.10). This method of delineation allows divers to quickly – and in a minimally-intrusive manner – determine the extent of buried hull remains. Results of the hydro probe survey assisted archaeologists with recommendations relative to the current investigation and allowed for a better comprehension of the remaining hull structure.

In consultation with the State, hydro probe test locations were placed at 10-foot intervals along a moveable baseline strung between the two semi-permanent east/west baselines (Figure 4.11). This moveable baseline, also tagged at 10-foot intervals, allowed absolute control of the placement of each hydro probe test location. Once the hydro probe survey of a transect was complete, the baseline was moved east 10 feet, and the process repeated. If a positive return was identified at any time, a series of one-foot refinement hydro probe test locations were placed to determine the extent of a buried object or hull structure.

In addition to conducting the hydro probe survey, divers were instructed to conduct an arm's length search of the sea floor to collect any exposed artifacts. Divers used mesh bags and mylar labels to maintain context control of any surface artifacts recovered during the hydro probe survey. A total of 121 hydro probes were successfully placed across the entire wreck site (see Figure 4.11). In addition a number of artifacts were collected from the sea floor during the hydro probe survey.

Once the hydro probe survey was complete the third baseline, oriented parallel (north/south) to the remaining hull structure, was established. The third baseline (strung between the two 60-foot marks) was oriented perpendicular to the two other baselines (see Figure 4.7). This baseline also had high-visibility numbered tags to assist divers in maneuvering around the wreck site.



Figure 4.10. A 5-foot hydro probe was used to delineate the extant remains of the Roosevelt Inlet Shipwreck. The hydro probe is 1/2-inch in diameter and is used to probe beneath the sea floor to locate buried hull remains.

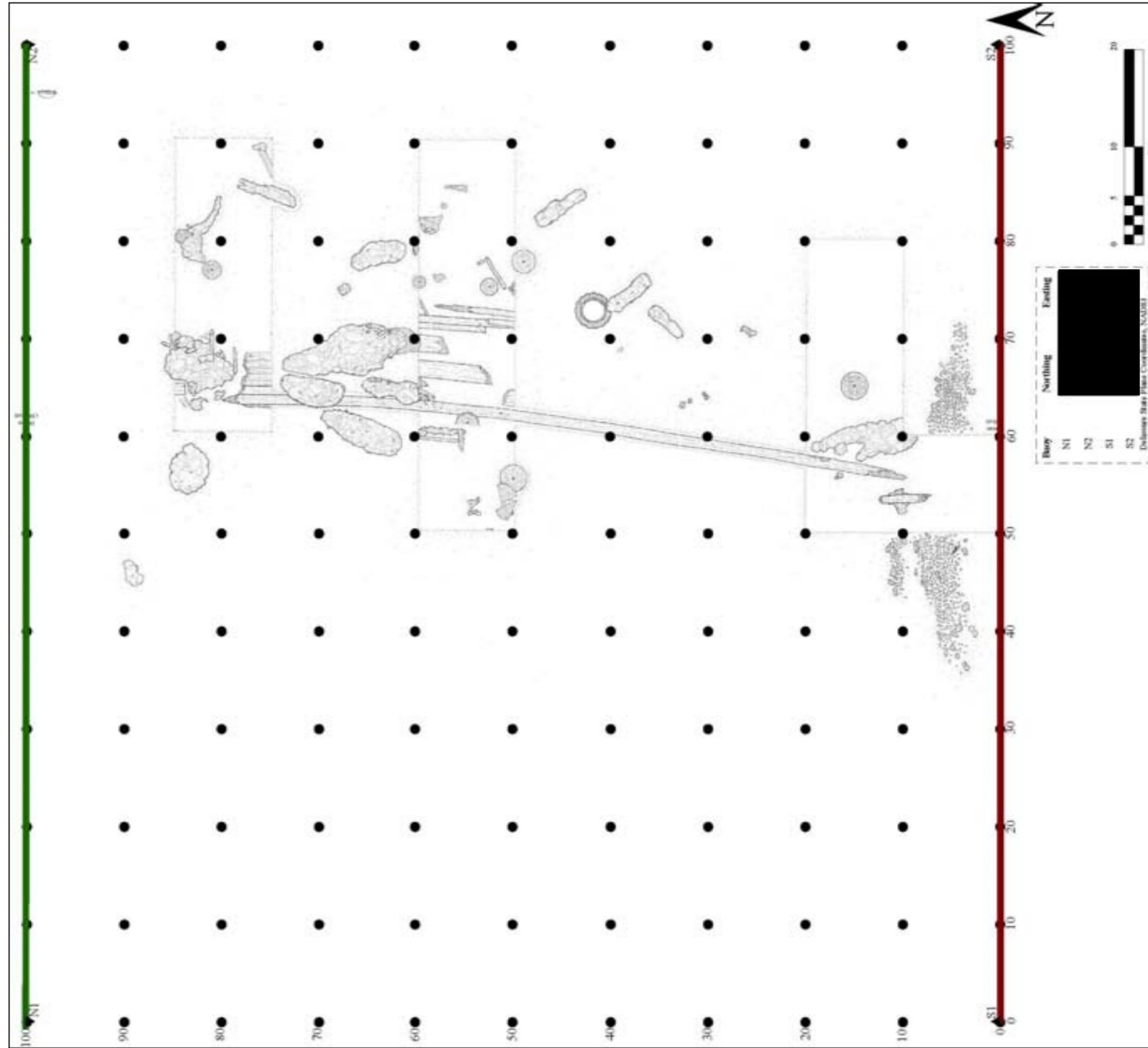


Figure 4.1.1. A total of 121 hydro probes were dropped at 10-foot intervals (denoted with black dots), guided by a movable baseline. The survey started from Transect East 0 (left) and proceeded to Transect East 100 (right).

This Page Intentionally Left Blank

Site Excavation

Once the third semi-permanent baseline was established (parallel to the exposed wreck site), two 10-x-10-foot stainless steel grids, specifically built for the project, were constructed on dry land and taped at one-foot intervals (Figures 4.12 and 4.13). Taping the grids at one-foot intervals assisted divers during the site excavation in accurately mapping *in situ* features in a near zero-visibility work environment.

Each 10-foot grid was divided into four 5-x-5-foot quadrants using stainless steel cross members (see Figure 4.13). These quadrants allowed archaeologists a high degree of context control, the ability to record all surviving hull architecture and fittings, and to assist in determining the distribution of cargo and shipboard functions.

The two grids were partially disassembled and transported to the Roosevelt Inlet Shipwreck via the *Venture III*. The grids were lowered to the sea floor to a diver who reconstructed the grids relative to the north/south baseline (Figure 4.14). Both grids were initially positioned at the amidships area (North 50/East 50 and North 50/East 60) and moved accordingly as each grid was excavated to sterile levels.



Figure 4.12. Both 10-x-10-foot stainless steel grid squares (shown here) were constructed on land and taped at one-foot intervals to assist divers in controlling artifact provenience during the excavation.



Figure 4.13. One of the 10-x-10-foot stainless steel grids (with cross members) specially built for the project. The grids were taped at one-foot intervals for reference underwater.



Figure 4.14. The grid squares were disassembled on land, lowered to the sea floor in sections, and reassembled by divers.

The methods employed for the excavation of each 10-x-10-foot grid included the use of a 3-inch venturi dredge (Figure 4.15). Archaeologists used the dredge to remove sediment from each 5-foot quadrant at 12-inch levels, always beginning in the southwest (SW) quadrant, proceeding to the northwest (NW) quadrant, then to the northeast (NE) quadrant, and finally to the southeast (SE) quadrant. Once an entire grid was cleared to 12 inches, the process repeated itself at 12-inch intervals in a clockwise fashion until sterile sediment was encountered throughout each quadrant. This process repeated itself for each of the eleven test units excavated.

Features including concretions, artifacts, and hull timbers were recorded and mapped as an ongoing process during the entire excavation. Larger artifacts were recovered with mesh bags, then sent to the surface via the diver's umbilical or the derrick crane located on the stern of *Venture III*.

The initial plan for the acquisition of removed sediment from the wreck site included the deposition of the material into a sluice/concentrator located on the deck of the *Venture III*. However, the sheer vertical lift required to transfer excavated material from the sea floor to the deck of the dive platform proved to be too great for the water pumps on site. Although a larger, more powerful pump was obtained, the vertical lift still proved to be too elevated to sufficiently deposit sediment into the sluice/concentrator.

The initial plan for the acquisition of removed sediment from the wreck site included the deposition of the material into a sluice/concentrator

This field method was revised to incorporate a fine mesh bag secured over the exhaust end of the dredge hose located at the water surface off the stern of the *Venture III*. Monitoring of the dredge exhaust and inspection of the cultural material confirmed that all excavated material, even small beads, were successfully retained within the mesh bag (Figure 4.16).



Figure 4.15. A 3-inch venturi-style dredge was used during the excavation phase of the project.



Figure 4.16. All dredge material removed from the wreck site was filtered through a fine-mesh bag. The recovery of small beads and pins indicate that the level of recovery of small artifacts was high.

Once a 5-foot quadrant was excavated to its respective 12-inch level, the exhaust bag was removed and its provenience recorded. Dredged sediment was immediately relinquished to the State which began daily inspection of the material on the stern of the *Venture III* (Figure 4.17). Sediment, shell hash, and cultural material that could not be processed on the stern of the *Venture III* were delivered to the project conservation laboratory in Lewes at the end of every day for future screening and analysis. This process repeated itself until all of the eleven grids were excavated to sterile sediment.

Initial field objectives included conducting a systematic investigation of grid blocks near the apparent amidships area from North 50/East 50 to North 50/East 80. The first two grids of the excavation were established at North 50/East 50 and North 50/East 60, respectively. The investigation then continued east, including the excavation of North 50/East 70 and North 50/East 80. A total of four 10-x-10-foot grids were successfully investigated along the amidships area of the Roosevelt Inlet Shipwreck.

Once the amidships area of the wreck site was excavated and all extant features mapped, a lift bag was used to transport each of the 10-foot grids separately across the sea floor to the next location. Moving the grid squares intact using lift bags and two divers proved to be an effective means of transporting the grids around the wreck site. Divers utilized the baselines, tape measures, and surface directions to assist in moving the grids in the low- to zero-visibility work environment.



Figure 4.17. Director Dan Griffith (left), Captain Paul Hepler (center), and archaeologist John William Morris III (foreground) inspect recovered dredge material from the Roosevelt Inlet Shipwreck.

The investigation then proceeded to the north end of the wreck site. A total of three, 10-x-10-foot grids were successfully excavated at the north end of the wreck site. The grids excavated included North 75/East 60, North 75/East 70, and North 75/East 80. Grids were placed at the 75-foot mark relative to the north/south baseline due to the presence of the large concretion located immediately east of the baseline which terminated at the 75-foot mark. All grids at the north end of the wreck site were placed east of the baseline relative to findings from the hydro probe survey and ongoing assessment of the extant hull structure.

After the three test units were excavated at the north end of the site, the focus of the excavation then proceeded to the south end of the site. Information gathered from the south end of the wreck, adjacent to the 2004 dredge pit, assisted in determining the nature of the wreck site at that terminal end of the site where it was impacted, as well as provide a cultural and natural context for the materials deposited on Lewes Beach during beach replenishment in 2004. The grids examined at the south end of the site included North 10/East 50, North 10/East 60, North 10/East 70, and North 0/East 50.

Overall, a total of eleven, 10-x-10-foot grid squares were successfully excavated during the current investigation (Figure 4.18). All grids were excavated in 12-inch levels until sterile sediment was reached. All artifacts, except large concretions, some millstones, and brick, were recovered during the excavation. Brick and brick fragments were accounted for during the excavation of each 12-inch layer, but not recovered. This was due to the large amount of brick already in possession by the State. Divers excavating test units containing brick would keep a verbal count with the topside Diver Supervisor and place the brick or brick fragments outside of the test unit. All hull timbers uncovered within the excavated units were mapped *in situ* relative to the center baseline and grid squares. Once a grid square was cleared to sterile sediment, all hull components, large artifacts, and concretions (that were not recovered) were mapped in using gridded mylar.

In addition to the excavation of the various grid squares, archaeologists mapped exposed hull remains in an effort to determine the vessel form and type. This included investigating the entire length of the exposed longitudinal timber as well as all timbers uncovered within the excavated grid squares.

During each test unit excavation a summary of the unit was written describing general details of each quadrant. These descriptions include notes on the stratigraphy, hull construction, artifacts observed, sediment observations, and other general observations.

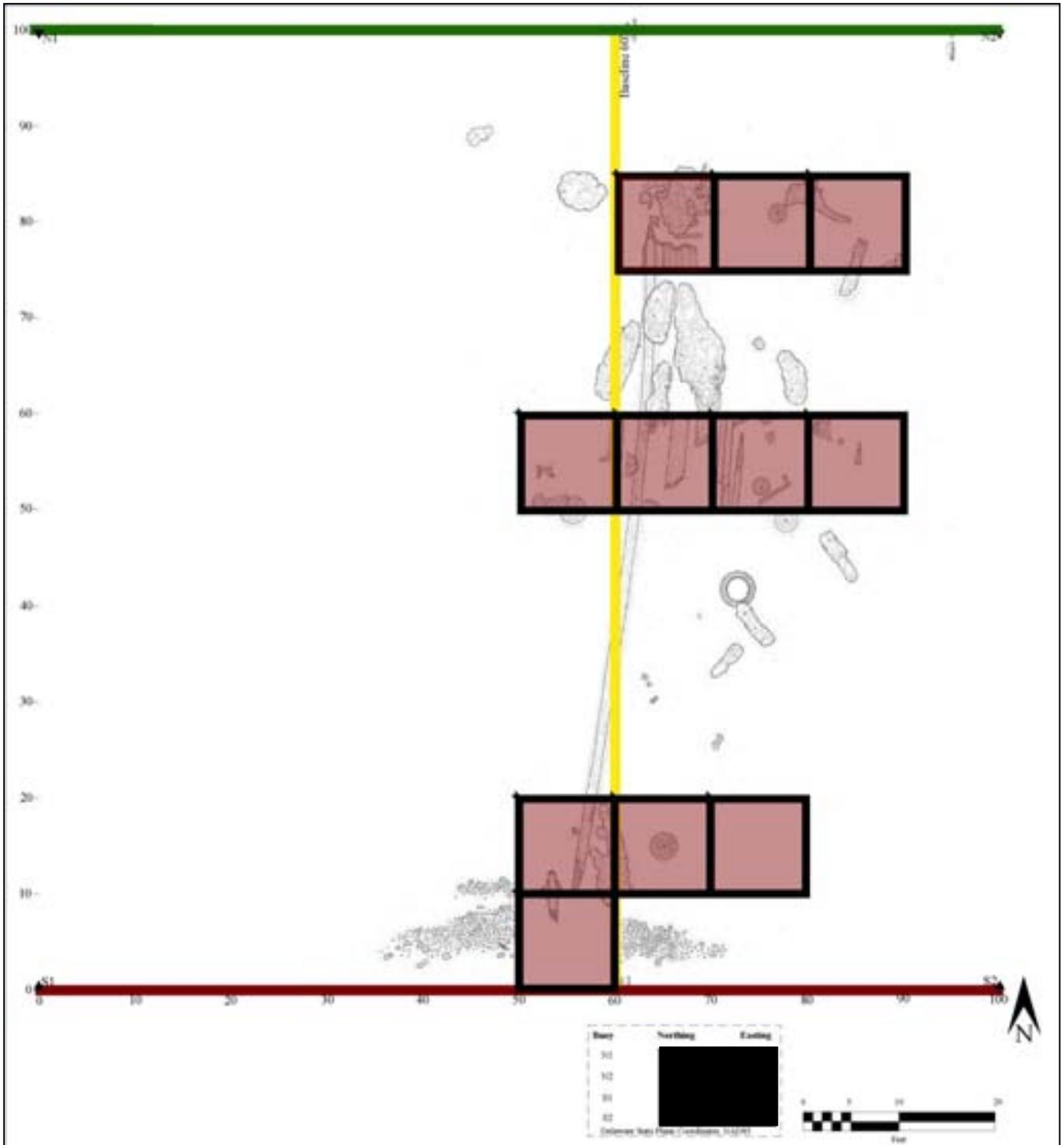


Figure 4.18. Location of all eleven 10-foot-by-10-foot grid squares excavated during SEARCH's investigation.

CHAPTER 5

FIELD INVESTIGATION RESULTS

This section of the report addresses the findings from the remote sensing survey, hydro probe survey, test unit excavations, and post remote sensing survey. Following the post-remote sensing survey are the results of the artifact analysis of recovered artifacts and analysis of the hull remains associated with the Roosevelt Inlet Shipwreck (a map of which is presented in Appendix C).

Preliminary Remote Sensing Survey

The preliminary remote sensing survey was successful in collecting both magnetic and sonar data from the Roosevelt Inlet Shipwreck Site. A total of eleven track lines, oriented north/south and three track lines, oriented east/west, were completed over the wreck site. Once complete, the magnetometer data was edited, and a series of two- and three-dimensional contour maps were produced (Figures 5.1 and 5.2).

Preliminary review of the magnetic contour maps confirms the wreck site is localized within the area surveyed. The highest magnetic readings are located at the north end of the wreck site (see Figure 5.2). Only one small anomaly, identified as a crab pot, is located east of the wreck location. Initial assessment of the magnetometer data and contour maps suggests that the wreck site is concentrated in one area and not spread out across the bay floor. Therefore, the area investigated by archaeological divers during the current project represents the entire extant wreck site.

The results of the side scan sonar survey clearly show the exposed remains of the Roosevelt Inlet Shipwreck (Figures 5.3 and 5.4). The most prominent features of the site are the large concretions at the north end of the site, a longitudinal timber running the length of the site, and the exposed artifact concentration along the south end of the wreck site.

It is believed that the concretions are likely the source of higher magnetics at the north end of the wreck site. The south end of the wreck site was impacted by dredging activities in 2004 and likely contributed to the exposure of artifacts in that area; the impact is visible on the side scan sonar record.

Review of side scan sonar records from the previous investigation (Dolan Research, Inc. 2005) indicates that there are currently more exposed features east of the longitudinal timber than in 2005 (Figure 5.3). This includes a number of isolated linear objects lying on the bay floor. This is likely due to shifting sands common in tidal areas which expose and/or cover wreck sites such as the Roosevelt Inlet Shipwreck. The site is also likely affected by its close proximity to Roosevelt Inlet itself. The inlet contributes substantially to the tidal ebb/flow of water in the area of the wreck site.

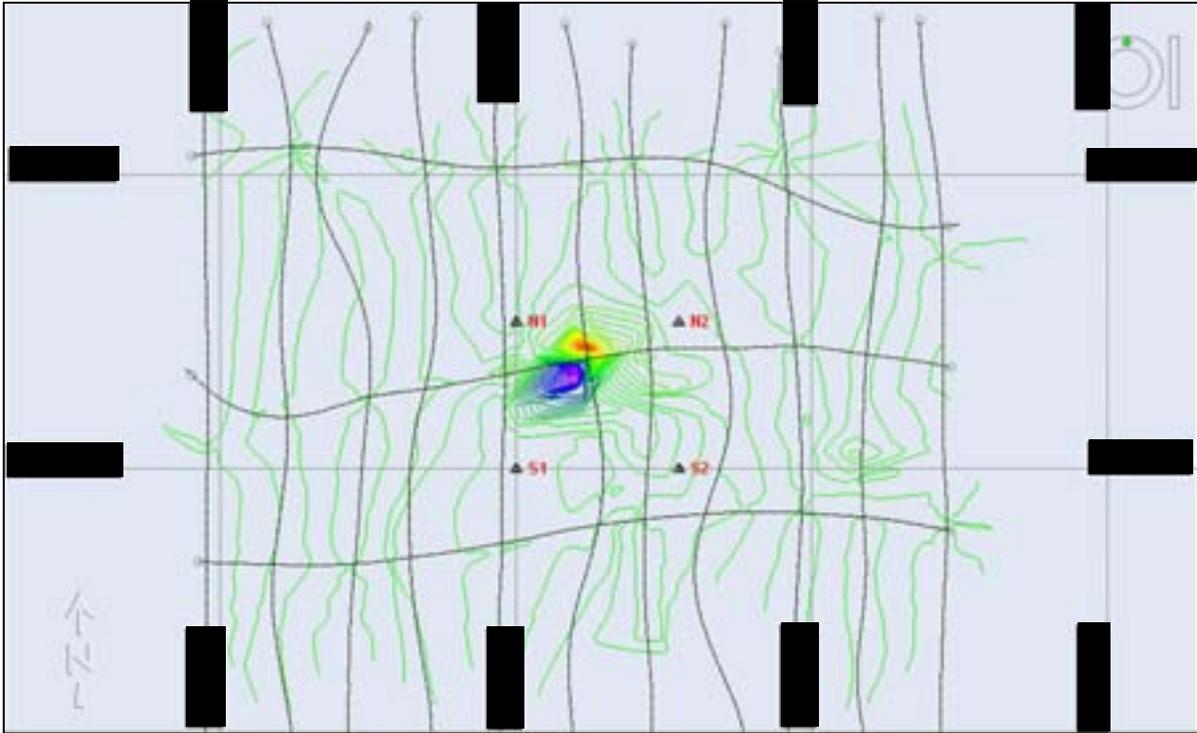


Figure 5.1. Two-dimensional magnetic contour map of the Roosevelt Inlet Shipwreck site. The survey vessel track lines are shown in black. The wreck site is localized between the four boundary marks, N1, N2, S1 and S2 (in red). Contour interval equals 5 gamma.

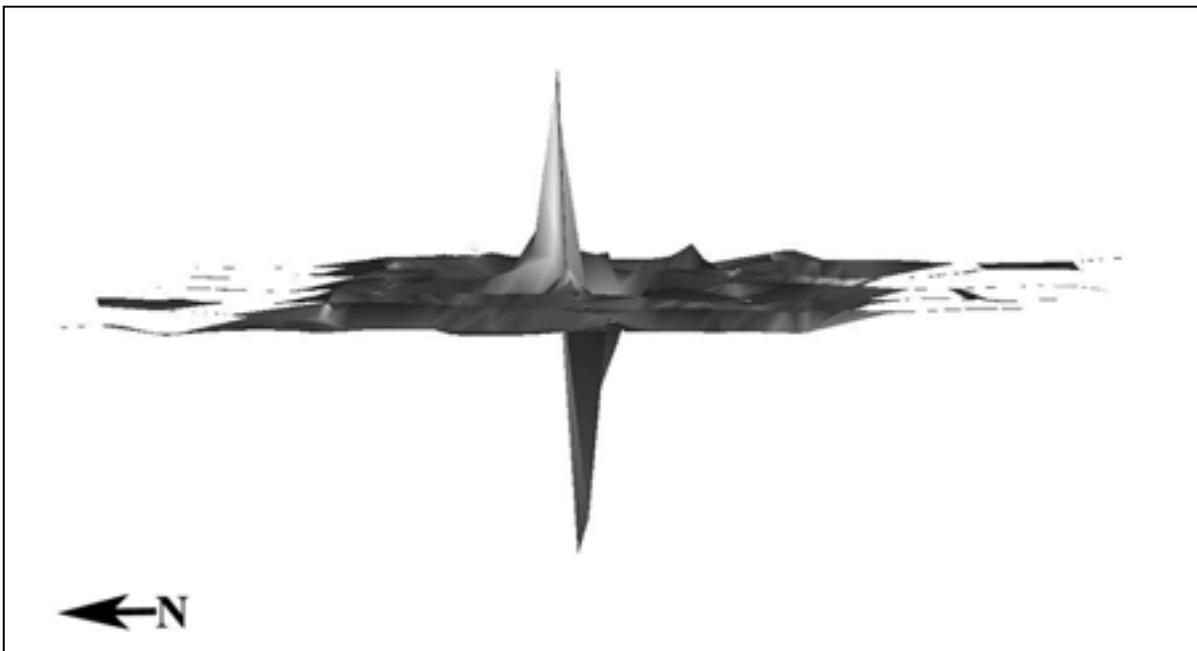


Figure 5.2. Three-dimensional contour map of the Roosevelt Inlet Shipwreck site. Note the higher magnetics at the north end (left) of the wreck site.

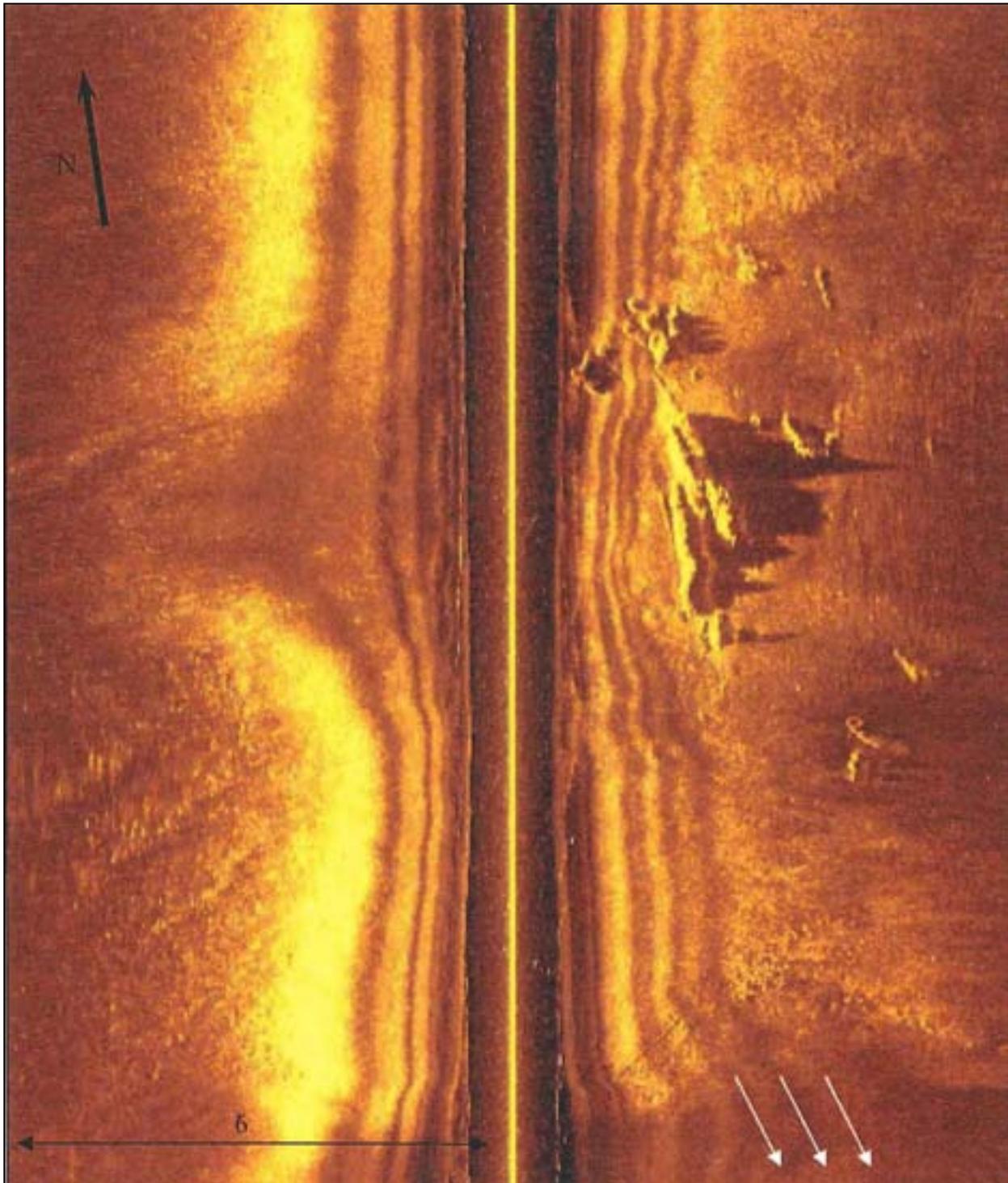


Figure 5.3 . Raw sonar image of the Roosevelt Inlet Shipwreck (7S-D-91A) collected by Dolan Research, Inc. in 2005. Note that the longitudinal timber is not exposed and there is very little exposed debris to the east (right) of the site (image modified from Dolan Research, Inc. 2005:8).

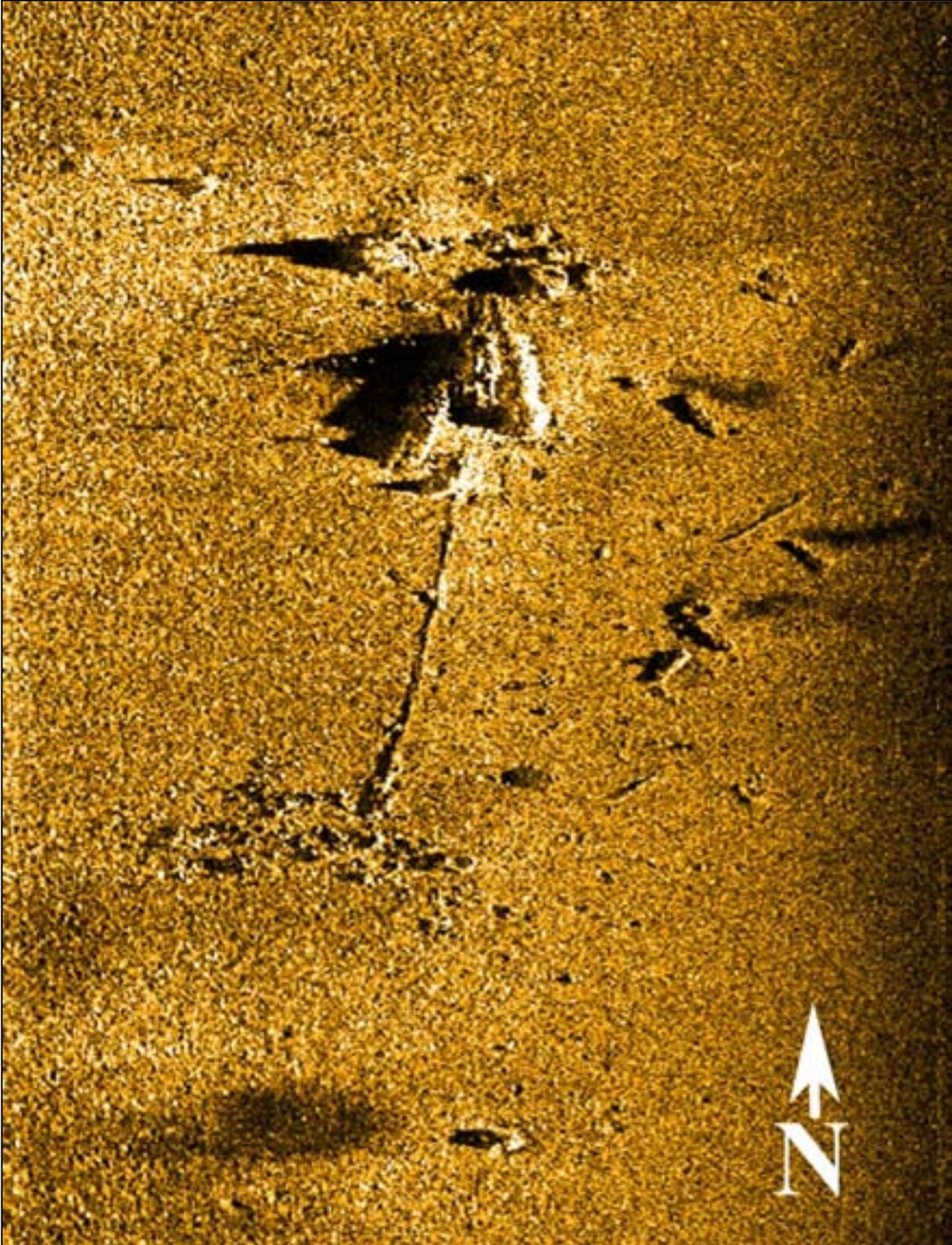


Figure 5.4. Side scan sonar image of the Roosevelt Inlet Shipwreck collected by SEARCH in 2006. Note the prominent concretions at the north end of the site as well as the large, exposed longitudinal timber extending the length of the site. The south end of the site was impacted by dredging activities in 2004.

Hydro Probe Survey

The hydro probe survey was conducted to delineate and determine the extent of hull remains associated with the Roosevelt Inlet Shipwreck. In addition, a visual and tactile surface collection of artifacts at each hydro probe location (within arm's reach) was undertaken. Artifacts were placed in pre-labeled bags and brought to the surface after each transect was completed. The hydro probe survey began on the 0 transect (west of the wreck site) and proceeded at 10-foot intervals to the East 100 transect line (east of the wreck site). A movable baseline, tagged at 10-foot intervals, was used to guide the diver along a north/south heading and control the location of each hydro probe placement. Once a transect was finished, the movable baseline was adjusted by 10 feet on each end (to the east) and the process repeated. A total of eleven transects were necessary to completely cover the area surrounding the Roosevelt Inlet Shipwreck.

A total of 121 hydro probes, not counting refinement probes, were placed during the hydro probe survey of the Roosevelt Inlet Shipwreck (see Figure 4.11). If a positive return was encountered with the 5-foot hydro probe, the area was refined to one-foot intervals to determine the extent of buried hull remains. Subsequent excavation of the test units indicates the hull remains associated with the Roosevelt Inlet Shipwreck are not buried deeper than 30 inches under the sea floor; therefore the length of the 5-foot hydro probe was sufficient to delineate the wreck site.

The following are the results of the hydro probe survey, starting at the 0-foot transect and proceeding east to the 100-foot transect. A series of tables identifies the location of the hydro probe drop, whether or not any positive returns were encountered, and what artifacts were recovered at each location.

Transect East 0

Transect East 0 is located the furthest to the west of the Roosevelt Inlet Shipwreck. The results of this transect indicate there were no positive returns for hull remains and only one piece of coal was observed on the surface at North 20/East 0. All other tests were negative. The results of the hydro probe survey are tabulated in Appendix D; see Table D-1 for the survey results from Transect East 0.

Transect East 10

Proceeding to the east at 10-foot intervals, Transect East 10 was then completed by archaeological divers. Similar to Transect East 0, no hull remains were encountered along this transect. However it is clear that near the south end of the transect (North 0/East 10) artifacts on the surface were much more prevalent, including a large brick scatter just under the sediment. A number of artifacts, including ceramics, brick, and glass were recovered. The results of the hydro probe survey are tabulated in Appendix D; see Table D-2 for the survey results from Transect East 10.

Transect East 20

Transect East 20 was also devoid of any positive returns for hull remains. One positive return at North 40/East 20 was refined and was found to be isolated. This return may be a brick or brick fragment. Regarding artifacts at the surface, only one whole brick and one concretion were recovered. The results of the hydro probe survey are tabulated in Appendix D; see Table D-3 for the survey results from Transect East 20.

Transect East 30

No hull remains were encountered along Transect East 30. A large brick scatter was encountered along the south end of the transect. A brick, a brick fragment, a ceramic sherd, and ceramic bottle base were recovered during the survey of the transect. The results of the hydro probe survey are tabulated in Appendix D; see Table D-4 for the survey results from Transect East 30.

Transect East 40

No positive returns for hull remains were encountered along this transect. This was somewhat disconcerting since the Dolan Research, Inc. report (2005) identified the centerline of the exposed wreckage along this transect. All numbers were re-checked by the diver and the transect double-checked for accuracy. Although no hull remains were identified, it is clear that artifacts were more concentrated here. Recovered artifacts include exposed ceramics, brick, glass, a pipe stem, as well as a large concretion at North 90/East 40. The results of the hydro probe survey are tabulated in Appendix D; see Table D-5 for the survey results from Transect East 40.

Transect East 50

Similar to the other transects surveyed, no hull remains were encountered along Transect East 50. However, a substantial area of layered brick (near the south end of the wreck location) was encountered at North 20/East 50. The hydro probe could not penetrate beneath the brick due to the sheer amount at this location. A variety of artifacts were recovered during the surface sweep of the hydro probe location. In addition to artifacts, a screw anchor with polypropylene was located at North 100/East 50. It is believed this is a datum left on site during the previous investigation of the site by Dolan Research, Inc. in 2005. The results of the hydro probe survey are tabulated in Appendix D; see Table D-6 for the survey results from Transect East 50.

Transect East 60

Archaeological divers began to encounter positive returns identified as hull remains along Transect East 60. The first positive return was located at North 30/East 60 and consisted of eroded wood exposed 2 feet west of the baseline. While some of the positive returns were isolated, there were some refinement probes that indicated intact hull remains extending toward the east. North 40/East 60 had one positive return for hull remains. At North 50/East 60 the hull remains under the sediment continued east for 3 feet. Hull remains at North 60/East 60 extended west for 2 feet and east for 8 feet at a depth of 3 feet. Five feet to the east was solid, clean wood. At North 70/East 60 the hull remains

also extended 8 feet to the east. North 80/East 60 was positive for hull remains, which continued for 5 feet to the east. Ceiling planking, 1½ inches thick, and additional unidentified wood scantling (possibly frame) were observed within this area.

In addition to hull remains, ballast stones (at North 80/East 60), and concretions resembling rigging elements (at North 90/East 60) were reported by divers along this transect. Relative to artifacts, a number of ceramic sherds and one pipe stem were recovered. A large amount of brick also was observed along this transect. The results of the hydro probe survey are tabulated in Appendix D; see Table D-7 for the survey results from Transect East 60.

Transect East 70

Transect East 70 was mostly devoid of hull remains except for some wood returns at North 70/East 70. These timbers appeared to be disarticulated due to the number of negative returns in the area. Numerous artifacts and concretions were observed by the diver along the transect. Recovered artifacts include decorative metal, a bottle base, and a pewter metal object. In addition, a modern crab trap with wire rope was documented in proximity to North 80/East 70. The results of the hydro probe survey are tabulated in Appendix D; see Table D-8 for the survey results from Transect East 70.

Transect East 80

All hydro probe results along the East 80 transect were negative for hull remains. A concentration of brick scatter was reported in the area of North 10/East 80. A number of concretions also was observed along this transect. A variety of artifacts, including two unidentified square objects, an unidentified round object, and two ceramic sherds were recovered along this transect. The results of the hydro probe survey are tabulated in Appendix D; see Table D-9 for the survey results from Transect East 80.

Transect East 90

All hydro probe returns along Transect East 90 were negative for hull remains. Regarding artifacts, only brick and a small number of concretions were observed. The results of the hydro probe survey are tabulated in Appendix D; see Table D-10 for the survey results from Transect East 90.

Transect East 100

No hull remains were encountered along Transect East 100. The artifacts observed on the surface included concretions and some brick scatter. This was the last transect conducted during the current investigation. The results of the hydro probe survey are tabulated in Appendix D; see Table D-11 for the survey results from Transect East 100.

A total of 121 hydro probes, not counting refinement probes, were placed during the hydro probe survey of the Roosevelt Inlet Shipwreck. Results of this survey were somewhat unanticipated. No positive hull returns were encountered west of the exposed longitudinal timber that defines the wreck site. All positive returns, identified as hull remains, were

located to the east of the longitudinal timber. These positive returns have been identified as both ceiling and outer hull planking. This indicates that much of the hull is no longer extant and that only a small portion of the hull has survived since the wreck event.

Test Unit Results

Each of the eleven 10-x-10-foot test units will be discussed individually and by specific quadrant (SW, NW, NE, and SE). Each unit summary will include a brief description of hull features (if present), sediment stratigraphy and artifacts recovered, followed by any other applicable observations made by archaeologists during the investigation. A more in-depth analysis of the artifacts recovered and their material culture is provided in the Artifact Analysis chapter.

A total of 26,345 objects were recovered from the eleven test units. Artifact density varied across the site. The lowest number of artifacts recovered from one unit was 873 (Test Unit North 50/East 50) and the highest was 4,422 (Test Unit North 10/East 50). Table 5.1 lists all units by the amount of artifacts recovered. This summary will proceed in the order the test units were excavated. The following table presents the order and the dates of excavation (Table 5.2). This and additional test unit information (stratigraphy and a full artifact assemblage inventory) is presented in Appendix E. Within this appendix the tables of artifacts for each quadrant provides the provenience number, burial depth (beneath the sea floor), material (i.e., metal, ceramic, glass), artifact description, and total count recovered from that specific quadrant.

Table 5.1. Test Units in order of artifact density.

Test Unit	Artifact Count
North 10/East 50	4,442
North 00/East 50	4,228
North 75/East 70	3,950
North 75/East 60	3,353
North 10/East 70	2,395
North 10/East 60	1,966
North 50/East 70	1,809
North 50/East 80	1,358
North 50/East 60	1,052
North 75/East 80	939
North 50/East 50	873
Total	26,365

Table 5.2. Test Units and dates of excavation.

Test Unit	Dates of Excavation
North 50/East 50	October 9, 2006
North 50/East 60	October 10-11, 2006
North 50/East 70	October 12-14, 2006
North 50/East 80	October 15, 2006
North 75/East 60	October 16-17, 2006
North 75/East 70	October 17-19, 2006
North 75/East 80	October 19-21, 2006
North 10/East 50	October 22, 2006
North 10/East 60	October 22-23, 2006
North 10/East 70	October 24, 2006
North 00/East 50	October 25, 2006
Total Test Units	11

Test Unit North 50/East 50

187	163
225	207

Test Unit North 50/East 50 (N50/E50) was the first test unit excavated during the field operations. Hull remains were documented in the Northeast Quadrant of the unit. This unit had the lowest artifact density from across the site with a total of 873 artifacts recovered (91 artifacts were recovered in general cleanup of this test unit at 0 to 12 inches). Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N50/E50 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 30 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-30 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 30 inches beneath the sea floor. Tabular data on Test Unit N50/E50, specifically stratigraphy and materials recovered, may be found in Appendix E.

187	163
225	207

Southwest Quadrant: No hull remains were observed within this quadrant. Divers

reported a large amount of artifacts within the Southwest Quadrant (total recovered = 225), which was the highest density of all four quadrants. Among the recovered artifacts are 2 brick fragments, 49 pipe stem and bowl fragments, 8 pieces of earthenware (Frankfurter ware and tin-glazed), 3 pieces of creamware, 63 sherds of stoneware (56 of which were brown salt glazed), a watch key, 35 fragments of bottle glass (some case and wine bottles), 33 pieces of window glass, tumbler glass, and a partial millstone (Figure 5.5). A portion of an additional, broken millstone (with concretions on top) was noted by the divers. A full listing of all artifacts recovered from the Southwest Quadrant of Test Unit N50/E50 may be found in Appendix E.



Figure 5.5. Partial millstone recovered from the Southwest Quadrant of N50/E50 for conservation and analysis.

187	163
225	207

Northwest Quadrant: No hull remains were encountered within this quadrant. A total of 187 artifacts were recovered during diver operations. The assemblage includes a black flint strike-a-light, 33 pipe bowl and stem fragments, 7 pieces of earthenware (Frankfurter ware and tin-glazed), 5 pieces of creamware, 51 fragments of stones (36 of which are brown salt glazed), 37 shards of window glass, 3 pewter objects (including a miniature), and fragments from various glass bottles and tumblers. The full listing of all artifacts recovered during the excavation of the Northwest Quadrant of N50/E50 is presented in Appendix E.

187	163
225	207

Northeast Quadrant: Hull remains were present along the northeast portion of this quadrant. In addition, a large concretion lay along the baseline and extended into Test Unit North 50/East 60. The concretion was 37 inches in length and 12 inches in width. The concretion had a rounded top surface. A wood timber abutted the concretion to the west. This timber was 6 inches square and was cut on the north end. This timber ran perpendicular (north/south) to the concretion and the baseline and was cut at 52 inches at the south end. The timber extended north into N60/E50.

This quadrant produced the fewest number of artifacts from this unit. Among the 163 artifacts recovered from this quadrant are an ingot fragment, 56 fragments of pipe stems and bowls, 7 sherds of tin-glazed earthenware, 5 pieces of creamware, 36 sherds of stoneware (22 of which are brown salt glazed), 22 fragments of glass bottles, and 15 shards of window glass. Appendix E is a full listing of all artifacts recovered from the Northeast Quadrant of N50/E50.

187	163
225	207

Southeast Quadrant: No hull remains were documented within this quadrant. One complete, round millstone was located in the southwest portion of the quadrant adjacent to those recorded in the Southwest Quadrant (see above). Recovered artifacts from the Southeast Quadrant of Test Unit N50/E50 total 207 (see Appendix E). This assemblage includes an ingot fragment, 76 fragments of pipe stems and bowls, 5 tin-glazed earthenware sherds, 11 pieces of creamware, 51 pieces of stoneware (42 of which are brown salt glazed), 30 fragments of bottle glass, a glass tumbler fragment, 14 shards of window glass, and a piece of slate.

Test Unit North 50/East 60

267	188
247	350

Test Unit North 50/East 60 (N50/E60) contained the ship's longitudinal timber (western quadrants) and the ship's planking (eastern quadrants). The unit also had a higher artifact density than the previous unit. A total of 1,052 artifacts were recovered from the entire unit; individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N50/E60 contained four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all

four quadrants from 2 to 30 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-30 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 30 inches beneath the sea floor. Tabular data on Test Unit N50/E60, specifically stratigraphy and materials recovered, may be found in Appendix E.

267	188
247	350

Southwest Quadrant: The main longitudinal timber, which defines the approximate center line of the shipwreck site, runs north/south through the entire Southwest Quadrant of N50/E60. Running parallel along the east side of this timber, a variety of planking, possibly outer-hull, was documented. This planking extends into the Northwest Quadrant. One broken millstone was also recorded within the Southwest Quadrant leaning against the main longitudinal timber.

A total of 247 artifacts were recovered from the Southwest Quadrant of N50/E60 during diver operations. Appendix E provides a list of all artifacts recovered. Among this assemblage are an ingot fragment, a brick fragment, 88 pieces of pipe stems and bowls, 2 lead glazed ceramic tiles, 8 fragments of earthenware (Frankfurter ware, lead- and tin-glazed), 5 pieces of creamware, 70 pieces of stoneware (48 of which are brown salt glazed), 28 fragments of bottle glass, 3 glass tumbler pieces, and 13 shards of window glass.

267	188
247	350

Northwest Quadrant: The main longitudinal timber defining the approximate center line of the shipwreck site continued through the entire Northwest Quadrant, oriented north/south. A large concretion (also reported in the Northeast Quadrant of N50/E50) extended into the east side of this quadrant. As mentioned above, the concretion was 37 inches long and 12 inches wide. Planking, oriented parallel to the main longitudinal timber, is also extant within this quadrant.

Like the Southwest Quadrant, this area produced numerous artifacts (total = 267). This vast and varied collection includes a brick fragment, 76 fragments of pipe stems and bowls, 8 pieces of earthenware (nearly all tin-glazed), a copper alloy button, a faceted clear glass stone, 80 fragments of stoneware (65 of which are brown salt glazed), 3 pieces of creamware, 41 glass bottle fragments (case, wine, and possible apothecary), and 33 shards of window glass. Refer to Appendix E for the full list of artifacts from the Northwest Quadrant.

267	188
247	350

Northeast Quadrant: This entire quadrant was comprised of planking, similar to the other examples of planking observed in the Northwest Quadrant. This quadrant produced the fewest artifacts from the unit, and although composed of buried planking, a total of 188 artifacts were recovered (Appendix E). This assemblage is similar to those of the adjacent quadrants and includes 49 fragments of pipe stems and bowls, a tin-glazed ceramic tile, 9 earthenware fragments (mostly tin-glazed), 47 stoneware fragments (31 brown salt glazed), 2 pieces of

porcelain, 3 creamware, 31 fragments of various glass bottles, and 56 shards of window glass. Of note is a pewter sleeve button also recovered from this quadrant.

267	188
247	350

Southeast Quadrant: The primary feature associated with this quadrant was planking which extended from the Northeast Quadrant. The planking was broken, heavily eroded, and disarticulated within this quadrant. The remains of a modern crab trap base were uncovered, sitting on top of the planks. This quadrant contained the highest density of artifacts from this unit (total = 350). This varied assemblage includes numerous artifacts of interest, such as a pewter miniature, a copper alloy button, four shoe buckles (also pewter), 38 copper alloy straight pins, a pewter thimble case and a possible thread case cap. The assemblage also includes 2 ingot fragments, 2 brick fragments and 2 whole bricks, 81 pipe stem and bowl pieces, 13 fragments of earthenware (all tin-glazed), 6 pieces of creamware, 90 fragments of stoneware (59 of which are brown salt glazed), 42 fragments of various glass bottles, and 31 shards of window glass. The full listing of artifacts recovered from this quadrant is presented in Appendix E.

Test Unit North 50/East 70

173	497
306	833

Test Unit North 50/East 70 (N50/E70) included planking in all four quadrants. Artifact density varied throughout the unit with a total of 1,809 artifacts recovered across the entire unit; individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately and the excavation results are presented in turn below.

The general stratigraphy of N50/E70 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 30 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-30 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 30 inches beneath the sea floor. Tabular data on Test Unit N50/E70, specifically stratigraphy and materials recovered, may be found in Appendix E.

173	497
306	833

Southwest Quadrant: Planking was uncovered in the eastern half of this quadrant. This planking was oriented north/south, and extended into the Northwest Quadrant. A small millstone was uncovered along the eastern boundary of the unit extending into the Southeast Quadrant. A lead pipe also was uncovered in this quadrant and was oriented at a 45-degree angle into the Southeast Quadrant. A small lead patch also was observed along the southern edge of the unit.

Artifacts recovered from this quadrant were numerous (total = 306) and include a variety of noteworthy items. Found in this assemblage are a black flint strike-a-light, copper alloy button and sleeve button, a pewter button and 6 shoe buckles, a candlestick holder, spigot key, a pewter miniature, spoon, teapot, and thimble case. Additional artifacts recovered

from this quadrant include a brick fragment, 62 pipe stem and bowl fragments, a lead glazed ceramic tile, 15 tin-glazed earthenware sherds, a piece of porcelain, 9 fragments of creamware, 99 pieces of stoneware (67 brown salt glazed), 52 various glass bottle fragments (case, round, possible apothecary), and 22 shards of window glass. The full artifact inventory from the Southwest Quadrant of N50/E70 is presented in Appendix E.

173	497
306	833

Northwest Quadrant: Planking (oriented north/south) comprised the eastern majority of this quadrant. In addition, a small millstone was uncovered along the northern boundary of the unit, between the Northwest and Northeast Quadrants. The majority of the millstone was located within the North 60/East70 Test Unit. This quadrant had the lightest artifact density of the entire unit with a total of 173 artifacts recovered. This assemblage, while smaller than many from the diver operations, includes a variety of notable artifact such as a black flint strike-a-light, 3 faceted glass stones (1 blue, 2 clear), 4 glass insets (1 blue, 1 clear, 1 purple), copper alloy buttons (2), sleeve button, shoe buckles (2) and straight pins (8), pewter buttons (4), sleeve buttons (2), shoe buckles (2), spoon and thimble case. Additionally, a brick fragment, 33 pipe stem and bowl fragments, 8 tin-glazed earthenware sherds, 6 pieces of creamware, 40 stoneware fragments (about half are brown salt glaze), and 24 glass bottle fragments were recovered. Appendix E is a full listing of all artifacts recovered from the Northwest Quadrant of N50/E70.

173	497
306	833

Northeast Quadrant: More planking, oriented north/south, was observed within this unit as well as an additional piece of lead sheathing. A second lead pipe, possibly associated with a pump, was also reported within this quadrant. A total of 497 artifacts were recovered during diver investigations. The assemblage is varied and includes a black flint strike-a-light, 7 clear and 1 peach faceted glass stones, 10 glass insets (9 clear, 1 green), copper alloy button and button links, a handle, a scabbard tip, 2 pewter buckles, a pewter miniature, and a pewter window came. Additionally, 54 fragments of pipe stems and bowls were recovered along with 4 tin-glazed earthenware sherds, 8 pieces of creamware, 111 fragments of stoneware (78 of which are brown salt glazed), and glass bottle and window glass fragments. The full artifact assemblage recovered during the excavation of the Northeast Quadrant of N50/E70 is presented in Appendix E.

173	497
306	833

Southeast Quadrant: Disarticulated planking, a millstone (which extended into the Southwest Quadrant), a section of lead pipe, and a very dense artifact assemblage (total recovered = 833) were the primary features uncovered within this quadrant. During the excavation the edge of an additional large millstone was uncovered. That millstone extended to the south, the majority of which was outside of Test Unit N50/E70. The vast and varied artifact assemblage is greater than the other three quadrants combined. The Southeast Quadrant's assemblage includes an ingot fragment, a black flint strike-a-light, a bone domino, 51 buttons and links of various kinds, 19 buckles, a jetton, a smoker's companion, 4 miniatures, a candlestick holder, watch pieces and a watch key, 3 lead

window comes, part of a teapot, 3 spoons, 4 thimble cases, 2 clear glass insets, 11 faceted glass stones, an ink well liner, and a multitude of unidentified objects. In addition, a whole brick and brick fragment, 132 pipe stem and bowl pieces, 24 fragments of earthenware (nearly all tin-glazed), 25 pieces of creamware, 229 fragments of stoneware (150 of which are brown salt glazed), 133 glass bottle fragments and 89 shards of window glass were recovered. The full inventory of artifacts recovered from the Southeast Quadrant of N50/E70 is presented in Appendix E.

Test Unit North 50/East 80

568	247
304	239

Test Unit North 50/East 80 (N50/E80) did not include any hull remains, other than some lead sheathing in the western quadrants, typically used for patches. A total of 1,358 artifacts were recovered from the entire unit; individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N50/E80 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 30 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-30 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 30 inches beneath the sea floor. Tabular data on Test Unit N50/E80, specifically stratigraphy and materials recovered, may be found in Appendix E.

568	247
304	239

Southwest Quadrant: No hull components were uncovered within this quadrant. The only hull components observed were fragments of lead sheathing, typically used to patch portions of a hull. This lack of hull remains within the quadrant suggests that the remaining wooden hull components associated with the wreck site are fairly localized near the exposed large timber thought to represent a longitudinal stringer. Review of the units along this trench indicated outer-hull planking (in N50/E70) extends east from the longitudinal stringer approximately 20 feet.

The artifacts recovered from the Southwest Quadrant of N50/E80 total 304. Among the assemblage are 6 ingot fragments, 2 pieces of coal, 16 buttons (of various kinds), 3 faceted glass stones and one glass inset, 2 miniatures, 3 shoe buckles, and a thimble case. The collection likewise includes 31 fragments of pipe stems and bowls, 8 tin-glazed earthenware sherds, 25 pieces of creamware, 91 stoneware fragments (56 brown salt-glazed), 59 glass bottle fragments, and 32 window glass shards. All artifacts recovered from the quadrant are presented in Appendix E.

568	247
304	239

Northwest Quadrant: No hull components were uncovered within this quadrant. The only hull components observed were fragments of lead sheathing, typically used to patch portions of a hull. Five hundred sixty-eight artifacts were recovered from the Northwest Quadrant of N50/E80, the highest density within the entire unit. Among these are 4 ingot fragments, a bell, 25 buttons (various), 5 buckles, a miniature fork, 3 straight pins, 4 thimbles and a thimble case, a watch key, 5 faceted glass stones, 7 glass insets, and pieces of stemmed glassware. The assemblage also includes 9 brick fragments, 96 pieces of pipe stems and bowls, a lead glazed ceramic tile, 32 earthenware sherds (mostly tin-glazed), 32 pieces of creamware, 148 stoneware fragments (96 of which are brown salt glazed), 86 glass bottle fragments (case, wine, and round), and 76 shards of window glass. The full inventory of the artifact assemblage recovered from this quadrant is included in Appendix E.

568	247
304	239

Northeast Quadrant: No hull remains or large artifacts were observed within this quadrant. Artifacts recovered during the excavation of the Northeast Quadrant of N50/E80 are similar to those recovered from the adjacent quadrants and are presented in Appendix E. A total of 247 artifacts were recovered which includes 6 ingot fragments, 21 buttons (various kinds), a nail, a riding stirrup, 2 faceted glass stones and one glass inset, a lead window came, a pewter miniature, a shoe buckle, a spoon, and a thimble. The bulk of the assemblage is comprised of 36 pipe stem and bowl fragments, a tin-glazed ceramic tile, 8 tin-glazed earthenware sherds, 8 pieces of creamware, 70 stoneware fragments (42 brown salt glazed), 38 glass bottle fragments (case, wine, and round), a glass tumbler piece, and 32 shards of window glass.

568	247
304	239

Southeast Quadrant: No hull remains or large artifacts were observed within this quadrant. While the lightest density within the entire unit, the artifact assemblage recovered from the Southeast Quadrant of N50/E80 is similar to those from the adjacent quadrants. A total of 239 artifacts were recovered which includes 3 ingot fragments, 7 buttons (various kinds), 5 faceted glass stones, 2 shoe buckles and a riding spur. The assemblage likewise includes 34 pipe stem and bowl fragments, 10 earthenware sherds (various types), 8 pieces of creamware, 59 fragments of stoneware (44 of which are brown salt glazed), a piece of a glass tumbler and of stemmed glassware, 63 glass bottle fragments (case and wine), and 36 shards of window glass. The full inventory of the artifact assemblage recovered from the Southeast Quadrant is presented in Appendix E.

Test Unit North 75/East 60

957	379
1,282	735

Test Unit North 75/East 60 (N75/E60) included the ship's longitudinal timber in the western quadrants, planking in the Southeast Quadrant, and a large concretion in the Northeast Quadrant. This concretion limited the amount of excavation possible and partially explains the low density of artifacts recovered within this quadrant. A total of 3,353 artifacts were

recovered from across the entire unit; individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N75/E60 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 30 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-24 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 30 inches beneath the sea floor. Tabular data on Test Unit N75/E60, specifically stratigraphy and materials recovered, may be found in Appendix E.

957	379
1,282	735

Southwest Quadrant: The prominent longitudinal timber, potentially a stringer, extended into the Southwest Quadrant from the south. There were planks along both sides of the stringer, one to the west and multiple planks to the east. The longitudinal timber measured 13 to 13½ inches sided and was beveled along the western molded edge. Comparing the measurements to the main run of this longitudinal timber, the smaller sided dimension and pronounced beveled edge indicate the timber was likely near its terminal end.

A large concretion was a prominent feature within the northeast corner of this quadrant. It is unclear exactly what the concretion was composed of; however, a number of ceramic fragments were observed within the concretion. Artifact densities were extremely high within this quadrant (total recovered = 1,282). Of particular note is the large number of ingot fragments (63) and of pipe stem and bowl fragments (831). Additional personal artifacts include 2 bone dominoes, leather shoe fragments, 2 pieces of felt, 1 button, 5 faceted glass stones, and a pewter finial and miniature. Also recovered were a brick fragment, a tin-glazed ceramic tile, lead and tin-glazed earthenware (17), one piece of porcelain, 3 pieces of creamware, 70 fragments of stoneware (over half brown salt glazed), a shot, 66 glass bottle fragments (case, wine, round), and 165 shards of window glass. The artifact inventory of the Southwest Quadrant of N75/E60 is presented in Appendix E.

957	379
1,282	735

Northwest Quadrant: The longitudinal stringer terminated within the Northwest Quadrant of Test Unit N75/E60 (at 81 feet on the baseline). However, the terminal end was eroded, which suggests it may have been longer. The large concretion (also noted in the Southwest Quadrant) extended into this quadrant from the southeast. The total number of artifacts recovered from this quadrant is 957. Similar to the Southwest Quadrant a large number of kaolin clay pipe stems and bowls (668), as well as leather shoe fragments, were observed and subsequently recovered from this quadrant. This assemblage further includes two chunks of antimony, 25 ingot fragments, a tack, a piece of felt, 2 pewter miniatures, and 2 thimble cases. The assemblage is also comprised of 19 fragments of earthenware (nearly all tin-glazed), 8 pieces of creamware, 61 fragments of stoneware (48 brown salt glazed), 81 glass bottle fragments (case, wine, possible apothecary), 43 shards of window

glass and a variety of unidentified objects. The complete artifact inventory of recovered material from this quadrant may be found in Appendix E.

957	379
1,282	735

Northeast Quadrant: No hull remains were located within this quadrant. A large concretion was the dominant feature here. Examination of the concretion identified intact stoneware jugs, bases, and other ceramics. Due to the size of the concretion, excavation was somewhat limited to only those areas not occupied by the concretion. Three hundred seventy-nine artifacts were recovered during diver operations, the lightest artifact density within the entire unit. The artifact assemblage includes 2 whole antimony and 2 whole lead ingots, 36 ingot fragments, 3 chunks of lead, a straight pin, a lead shot, 4 faceted glass stones, 4 whole and one half thimble, and 3 thimble cases. In addition, one whole brick and a brick fragment were recovered along with 148 pipe stem and bowl pieces, 4 tin-glazed earthenware sherds, 6 pieces of creamware, 73 fragments of stoneware (56 brown salt glazed), 39 glass bottle fragments (case, wine, possible apothecary), and 21 shards of window glass. A complete listing of all artifacts recovered from this quadrant is presented in Appendix E.

957	379
1,282	735

Southeast Quadrant: Planking associated with the longitudinal stringer extended into this quadrant approximately 2½ feet from the south. Four planks, all oriented north/south, were likely the remains of bilge ceiling. All artifacts recovered (total = 735) from the Southeast Quadrant of N75/E60 are presented in Appendix E. One of the more impressive artifacts recovered from this quadrant include a brass laundry iron (Figure 5.6). While the wooden handle had eroded away, the brass iron and handle supports are perfectly intact. The handle supports are in the shape of dolphins. The rear face of the iron has a small hinged door to allow hot coals to be placed within the iron. For a more complete analysis of the iron see the Artifact Analysis chapter (Chapter 6). Also of note is the large number of antimony ingot fragments (142). In addition, the artifact assemblage includes 3 whole antimony ingots, a lead ingot fragment, a glass linen smoother, a bone domino, 3 button links, a watch part, 3 rivet/eyelets, 111 straight pins, 4 thimbles, 2 thimble cases, a miniature, a fork, a tack, and 23 faceted glass stones. This quadrant's artifact collection also features a brick fragment, 207 pipe stem and bowl fragments, an unglazed ceramic tile,



Figure 5.6. Brass iron recovered from the Southeast Quadrant of N75/E60. Note the dolphin-shaped handle supports. The wood handle has since eroded away.

2 tin-glazed earthenware sherds, 3 pieces of creamware, 40 fragments of stoneware (24 brown salt glazed), 42 glass fragments of case and wine bottles, and 113 window glass shards.

Test Unit North 75/East 70

659	270
2,252	769

Test Unit North 75/East 70 (N75/E60) did not contain any of the ship's hull. The artifact recovery was the highest within this unit, particularly in the Southwest Quadrant. A total of 3,950 artifacts were recovered from this unit, nearly two-thirds of which were from that one quadrant. Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N75/E60 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 24 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-24 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 24 inches beneath the sea floor. Tabular data on Test Unit N75/E70, specifically stratigraphy and materials recovered, may be found in Appendix E.

659	270
2,252	769

Southwest Quadrant: This quadrant was devoid of any hull remains but included the highest density of artifacts (total recovered = 2,252). Of particular note is an intact stoneware jug recovered during the excavation (Figure 5.7), the large number of straight pins (614), and 419 cranberry-colored faceted glass beads. Also recovered were 47 ingot fragments and an additional 35 unidentified antimony objects, a bone domino, a bell, 7 buttons (various kinds), a curtain tie back, a nail, a rivet, 48 faceted glass stones, several pewter miniatures, a watch key and watch parts, 4 thimbles, 6 thimble cases, a spoon, a finial, 2 pieces of slate, and a shot. The extensive artifact collection also includes 295 pipe stem and bowl fragments, a whole brick, 109 tin-glazed earthenware sherds, 4 pieces of porcelain, 54 creamware sherds, 268 fragments of stoneware (188 brown salt glazed), 117 glass bottle fragments (case, wine, round), glass tumbler fragments, and 178 shards of window glass. The full inventory of all artifacts recovered from the Southwest Quadrant of N75/E70 is presented in Appendix E.



Figure 5.7. Intact stoneware jug recovered from the Southwest Quadrant of N75/E70.

659	270
2,252	769

Northwest Quadrant: No hull components were uncovered within the Northwest Quadrant of Test Unit N75/E70. The archaeologist did report a lighter artifact density, which adds to the supposition that the majority of artifacts are located closer to the remaining hull structure. A total of 659 artifacts were recovered from this quadrant, including 41 ingot fragments, a bone domino, 2 chalk fragments, a piece of coal, 14 straight pins, a fork, a pewter miniature, a shoe buckle, and a piece of slate. Also recovered were 2 brick fragments, 183 pipe stem and bowl pieces, 40 fragments of earthenware (nearly all tin-glazed), 52 pieces of creamware, 234 fragments of stoneware (198 brown stone glazed), 55 glass bottle fragments (case and wine), and 19 shards of window glass. The entire artifact assemblage from the Northwest Quadrant of N75/E70 may be found in Appendix E.

659	270
2,252	769

Northeast Quadrant: No hull components were documented within the Northeast Quadrant of Test Unit N75/E70. A large concretion was a dominant feature in the northeast corner of the quadrant. The artifact density was lightest in this quadrant with a total of 270 artifacts recovered. Among these are a complete ceramic jug, 6 ingot fragments, a sleeve button, and 3 faceted glass stones. The artifact assemblage likewise includes 74 fragments of pipe stems and bowls, 15 earthenware sherds (nearly all tin-glazed), 16 pieces of creamware, 79

fragments of stoneware (68 of which are brown salt glazed), 31 fragments of glass bottles (case, wine, round), and 38 shards of window glass. In addition, a complete millstone was observed but not recovered. All artifacts recovered from the Northeast Quadrant of N75/E70 are listed in Appendix E.

659	270
2,252	769

Southeast Quadrant: No hull components or sizeable artifacts were documented within this quadrant. The artifacts recovered total 769. Among these, similar to the Southwest Quadrant, are a large number of brass straight pins (190). Also recovered were 10 ingot fragments, a curtain ring, 3 buttons (various), an eyelet, 10 faceted glass stones, cooking kettle fragments, a spigot key, and a thimble case. The artifact assemblage is further characterized by a brick fragment, 121 pipe stem and bowl fragments, a lead glazed ceramic tile, 22 fragments of earthenware (nearly all tin-glazed), 36 pieces of creamware, 159 fragments of stoneware (119 of which are brown salt glazed), 61 glass bottle fragments (case and wine), and 120 shards of window glass. The full artifact inventory from the Southeast Quadrant of N75/E70 is presented in Appendix E. It should be noted that archaeological divers did report modern debris mixed in with historic artifacts from the surface to the sterile sand (24 inches beneath the sea floor) within this quadrant.

Test Unit North 75/East 80

127	130
438	244

Test Unit North 75/East 80 (N75/E80) did not contain any hull remains. In all quadrants except the Northeast divers noted large concretions. The artifact recovery was comparatively light within this unit. A total of 939 artifacts were recovered across the unit; individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N75/E80 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 24 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-12 inches) and shell hash/sand (12-24 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 24 inches beneath the sea floor. Tabular data on Test Unit N75/E80, specifically stratigraphy and materials recovered, may be found in Appendix E.

127	130
438	244

Southwest Quadrant: No hull remains were documented within the Southwest Quadrant of Test Unit N75/E80. A concretion extended into this quadrant from the south. This concretion extended toward the northeast for 3 feet and partially extended into the Southwest Quadrant of N75/E80. No additional features were identified within this quadrant. A total of 438 artifacts were recovered from this quadrant, the densest quadrant of the unit. Notable artifacts include a 4-holed bone button and button disc, 9 metal buttons and cufflinks, 2 glass insets, 2 faceted glass stones, 6 ingot fragments, 8 straight pins, 2 nails, a curtain ring, a knob or finial, a pewter miniature, a watch part, and a shoe buckle. Additional artifacts

recovered include a brick fragment, 52 pieces of pipe stems and bowls, 20 sherds of earthenware (mostly tin-glazed), 32 pieces of creamware, 117 fragments of stoneware (100 of which are brown salt glazed), 54 glass bottle fragments (case, wine, possible apothecary), and 68 shards of window glass. The total artifact inventory of the Southwest Quadrant of N75/E80 is presented in Appendix E.

127	130
438	244

Northwest Quadrant: Similar to the Southwest Quadrant of N75/E80, no hull remains were located within the Northwest Quadrant. However, a sizeable concretion, shaped like a knee, was located within the quadrant. It is thought the concretion may be made of iron. The artifact density was considerably lighter - only 127 artifacts were recovered. Included in the assemblage are 4 chunks of antimony, a couple of buttons, a rivet, a faceted glass stone, a thimble and a possible thread case. While lighter in density, the bulk of the assemblage is similar to those of other areas of the site. Additional artifacts recovered include 23 pipe stem and bowl fragments, 2 tin-glazed earthenware sherds, 5 pieces of creamware, 52 fragments of stoneware (38 of which are brown salt glazed), 21 fragments of glass bottles (case and wine), and 9 shards of window glass. The full artifact assemblage from the Northwest Quadrant of N75/E80 is tabulated in Appendix E.

127	130
438	244

Northeast Quadrant: The Northeast Quadrant of N75/E80 was devoid of any hull remains. Artifact density within this quadrant was similarly as light as the Northwest Quadrant; a total of 130 artifacts were recovered. This implies that the remaining wreck site and artifact concentration was fairly contained and extended to the east, from the longitudinal stringer, approximately 30 feet. The artifact assemblage includes similar types to all other areas of the site, notably a bone domino, a couple of nails, and a pewter miniature. Additionally, 11 pipe stem and bowl fragments were recovered, along with 11 earthenware sherds (nearly all tin-glazed), 9 pieces of creamware, 42 fragments of stoneware (35 brown salt glazed), 13 glass bottle fragments (case and wine), and 39 window glass shards. The full artifact inventory for the Northeast Quadrant of N75/E80 is presented in Appendix E.

127	130
438	244

Southeast Quadrant: No hull remains were identified within the Southeast Quadrant of N75/E80. A concretion extended partially into the quadrant from the Southwest Quadrant. One piece of disarticulated wood was uncovered, measuring 4 inches sided and 2 inches molded. The purpose or identity of the wood is not known. In total, 244 artifacts were recovered from this quadrant. Of note are an ingot fragment, 2 buttons, and 2 faceted glass stones. In addition, 15 pipe stem and bowl fragments, 14 tin-glazed earthenware sherds, 11 creamware pieces, 47 stoneware fragments (40 of which are brown salt glazed), 30 glass bottle fragments (case and wine), a piece of a glass tumbler, and 103 shards of window glass were recovered. The entire artifact assemblage from the Southeast Quadrant of N75/E80 is tabulated in Appendix E.

Test Unit North 10/East 50

413	2,034
545	1,430

Test Unit North 10/East 50 (N10/E50) included portions of the ship’s longitudinal stringer. The stringer was intact within the eastern half of the unit and a broken section of the stringer was located in the Southwest Quadrant. A large number of artifacts were recovered across the unit, particularly in relation to the stringer. A total of 4,422 artifacts were recovered, the highest artifact count of all units across the site. Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented below.

The general stratigraphy of N10/E50 contains four layers. The first four inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 4 to 12 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (4-6 inches) and shell hash/sand (6-12 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 12 inches beneath the sea floor. Tabular data on Test Unit N10/E50, specifically stratigraphy and materials recovered, may be found in Appendix E.

413	2,034
545	1,430

Southwest Quadrant: The most prominent feature of this quadrant was a broken section of the longitudinal stringer. Possibly the result of previous dredging activities or environmental erosion, this piece of wood is definitely associated with the longitudinal stringer. Excavation of the quadrant uncovered a sizeable concretion along the southern edge. The artifact assemblage recovered from the Southwest Quadrant of N10/E50 totals 545 objects. Large numbers of brick and brick fragments were uncovered just under the sterile overburden (0-4 inches). A total of 34 intact bricks and 5 brick fragments were removed from the quadrant and placed to the side. Eight fragments were recovered; however, due to the large number of brick already recovered from the wreck site it was decided, in consultation with the State of Delaware, to simply obtain a count of the total number of bricks in each quadrant and not recover any additional brick.

Recovered artifacts include a shoe buckle and buckle chape, a hook, 2 jettons, 32 straight pins, 2 tacks, and 2 lead window comes. Also recovered were 52 pipe stem and bowl fragments, 15 fragments of earthenware (Frankfurter ware, lead and tin-glazed varieties), 5 pieces of creamware (one is annularware), 126 fragments of stoneware (including brown salt glazed, white salt glazed, German blue and gray, and mineral water bottle types), 194 glass bottle fragments (case, wine, round), 2 glass tumbler pieces, and 82 shards of window glass. A full listing of all artifacts recovered during the excavation of the Southwest Quadrant is presented in Appendix E.

413	2,034
545	1,430

Northwest Quadrant: No hull remains were documented within the Northwest Quadrant of Test Unit N10/E50. Four hundred thirteen artifacts were recovered from this quadrant during diver investigations, which is the lightest density of the unit. Among these are 2 buckles (one shoe), 2 buttons, 9 jettons, and 28 straight pins. A total of 11 intact bricks

and 8 brick fragments were documented during the excavation of the quadrant; five brick fragments were collected. The artifact assemblage also includes 24 pipe stem and bowl fragments, 12 earthenware sherds (mostly tin-glazed), 10 pieces of creamware, 75 fragments of stoneware (about half are brown salt glazed, one white salt glazed and 2 German blue and gray), 110 glass bottle fragments (case and wine), some stemmed glassware and tumbler pieces, and 76 shards of window glass. The entire artifact assemblage recovered from this quadrant is presented in Appendix E.

413	2,034
545	1,430

Northeast Quadrant: The longitudinal stringer extended entirely through the Northeast Quadrant of N10/E50, oriented approximately north/south. The timber was 10½ inches sided, tapering to 10 inches at the south end at the quadrant boundary. The scantling continued into the Southeast Quadrant (see below). This quadrant had the highest density within this test unit, the second highest density from the entire site. The total assemblage recovered from this quadrant is 2,034 artifacts. A total of 117 brick fragments were collected, and an additional 53 intact bricks and 35 brick fragments were removed from this quadrant but not collected. The artifact assemblage also includes a polished stone mortar and pestle, a 4-hole bone button, 15 pieces of coal, an unglazed ceramic tile, 5 buckles (one knee, one shoe), eyelets, hooks, and fasteners, pieces of a pen knife scale, 7 tacks, 181 straight pins, a spring catch, 3 lead window comes, and a pewter miniature. The more common artifacts in the collection include pipe stem and bowl fragments (183), 71 fragments of earthenware (mostly tin-glazed), a piece of porcelain, 28 sherds of creamware, 401 fragments of stoneware (variety of types), 685 fragments of glass bottle fragments (mostly case, some wine), glass decanter, stemware, and tumbler pieces, 220 shards of window glass and a host of unidentified objects of various materials. A full artifact inventory is presented in Appendix E.

413	2,034
545	1,430

Southeast Quadrant: The longitudinal stringer continued through the entire quadrant, terminating in the adjacent Test Unit N0/E50. The scantling measured 10 inches sided (where it entered the north end of the quadrant) and tapered to 6½ inches sided. As mentioned previously the stringer appears to have broken, either due to damage from dredging activities or environmental erosion. The stringer was exceptionally eroded at this end of the scantling. As a general observation, the archaeologists noted that artifact density appeared to be fairly high within this entire quadrant. This was indeed true, for 1,430 artifacts were recovered from the Southeast Quadrant of N10/E50, the second densest quadrant of this unit. Among these are 106 brick fragments; the archaeologists noted an additional 29 intact bricks and 10 brick fragments from this quadrant. The assemblage also includes 2 unglazed ceramic tiles, a piece of a pen knife scale, 92 straight pins, 3 tacks, 4 lead window comes, 2 buttons, a jetton, a miniature figurine, and 6 buckles (3 shoe). In addition, 109 pipe stem and bowl fragments, 52 sherds of earthenware (various types), 12 pieces of creamware, 320 fragments of stoneware (various types), 459 glass bottle fragments (case, wine, and round), stemmed glassware and tumbler pieces, and 157 window glass shards were recovered. A complete artifact inventory for the Southeast Quadrant of N10/E50 is presented in Appendix E.

Test Unit North 10/East 60

135	744
531	556

Test Unit North 10/East 60 (N10/E60) did not contain any hull remains. The artifact density was moderate with a total of 1,966 artifacts recovered. Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N10/E60 contains five layers. The first four inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 4 to 20 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (4-6 inches), shell hash/sand (6-12 inches), and varied sediment (12-20 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 18-20 inches beneath the sea floor. Tabular data on Test Unit N10/E60, specifically stratigraphy and materials recovered, may be found in Appendix E.

135	744
531	556

Southwest Quadrant: No hull remains were encountered within this quadrant. The artifact assemblage from the Southwest Quadrant of N10/E60 is similar to the rest of the site area, although only moderately dense (531 artifacts recovered). A total of 7 brick fragments were recovered, and an additional 8 intact bricks and 10 brick fragments were recorded within this quadrant during the excavation. The assemblage also includes a lead glazed ceramic tile, an eyelet, 22 straight pins, 3 tacks, parts of a pen knife scale, a lead window came, a possible jetton, and 2 shoe buckles. The more common artifacts include pipe stem and bowl fragments (19), various types of earthenware (18 sherds recovered), 3 pieces of creamware, 174 fragments of stoneware (mostly brown salt glazed and mineral water bottle), 234 glass bottle fragments (case, wine, and round), glass decanter and tumbler pieces, and 22 shards of window glass. All artifacts recovered from this quadrant are presented in Appendix E.

135	744
531	556

Northwest Quadrant: Similar to the Southwest Quadrant, no hull remains were encountered within this quadrant. A total of 13 intact bricks and 4 brick fragments were removed from the quadrant during the excavation; none were collected. The artifact density within the Northwest Quadrant of N10/E60 was light - only 135 artifacts were recovered. Among the collection are parts of a pen knife scale, a tack, a lead window came, and a pewter lid with a hinge. The assemblage also contains 3 pipe stem fragments, 2 tin-glazed earthenware sherds, 1 piece of creamware, 44 fragments of stoneware (nearly have brown salt glazed), 41 fragments of glass bottles (case and wine), glass stemware pieces, and 13 shards of window glass. The full artifact inventory for the Northwest Quadrant of N10/E60 is presented in Appendix E.

135	744
531	556

Northeast Quadrant: No hull remains were uncovered within the Northeast Quadrant of N10/E60 during the excavation. This quadrant had the densest artifact recovery (total recovered = 744) of the entire unit. The assemblage is varied and includes numerous notable artifacts. A polished stone (agate)

snuff box lid (partial) was recovered. This mends with an additional piece recovered from the Southeast Quadrant of this test unit (see below). Also, a key, button, eyelet, parts of a pen knife scale, 5 straight pins, 11 tacks, a lead window came, a glass inset, and 4 buckles (one shoe) were recovered. Eight brick fragments and an additional 9 intact bricks and 7 brick fragments were noted and removed during the excavation. The artifact assemblage from this quadrant also includes 33 pipe stem and bowl fragments, 15 earthenware sherds (various types), 2 pieces of porcelain, 8 pieces of creamware, 175 stoneware fragments (mostly brown salt glazed and mineral water bottle), 349 pieces of bottle glass (general, case, and wine bottles), stemmed glassware pieces, and 52 shards of window glass. All artifacts recovered from the Northeast Quadrant of N10/E60 are presented in Appendix E.

135	744
531	556

Southeast Quadrant: Like the Northeast Quadrant, no hull remains were uncovered within this quadrant during the excavation. The artifact density was moderate, with a total of 556 objects recovered. A portion of an agate snuff box lid was collected, which mends to a piece recovered from the Northeast Quadrant of this test unit (see above). One brick fragment and an additional 13 intact bricks and 11 brick fragments were noted and removed from the quadrant during the excavation. One millstone, measuring 2 feet 10 inches in diameter, was uncovered in the middle of the 10-x-10-foot grid square. The intact millstone was not recovered during the current investigation.

Additional artifacts recovered include a lead glazed ceramic tile, an eyelet, part of a pen knife scale, a tack, a lead window came, a pewter miniature figurine, and a shoe buckle. The artifact assemblage likewise includes 17 pipe stem and bowl fragments, 15 sherds of earthenware (various types), one piece of porcelain and a piece of Whieldonware, 4 creamware sherds, 170 fragments of stoneware (mostly brown salt glazed and mineral water bottle), 259 glass bottle fragments (case and wine), and 43 shards of window glass. The full artifact assemblage recovered from the Southeast Quadrant of N10/E60 is presented in Appendix E.

Test Unit North 10/East 70

618	481
788	508

Test Unit North 10/East 70 (N10/E70) included no hull remains of the ship. The artifact density was comparatively moderate with a total of 2,395 artifacts recovered from across the unit. Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N10/E70 contains four layers. The first two inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 2 to 12 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (2-6 inches) and shell hash/sand (6-12 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 12 inches beneath the sea floor. Tabular data on Test Unit N10/E70, specifically stratigraphy and materials recovered, may be found in Appendix E.

618	481
788	508

Southwest Quadrant: No hull remains were reported within the Southwest Quadrant of Test Unit N10/E70. A total of 788 artifacts were recovered from this quadrant, the densest of the unit. Bricks were encountered two inches below the sand overburden. A total of 6 intact bricks and 9 brick fragments were noted and removed from the quadrant during the excavation; four brick fragments were collected. Notable artifacts recovered include a bone fan rib, a polished stone pestle, a piece of coal, a copper alloy bead, 2 buttons (one wood), a glass inset, drawer pull, eyelet and hook, 38 tacks, a thimble, 2 lead window comes, 7 buckles (3 knee), a pewter miniature figurine, and a spoon. Additional artifacts within the collection include 34 pipe stem and bowl fragments, 23 earthenware sherds (various types), a piece of porcelain, 4 creamware sherds, 219 fragments of stoneware (mostly brown salt glazed and mineral water bottle), 334 glass bottle fragments (case, wine, round), stemmed glassware, tumbler and decanter pieces, and 54 shards of window glass. The full artifact inventory of all artifacts recovered from the quadrant is presented in Appendix E.

618	481
788	508

Northwest Quadrant: Similar to the Southwest Quadrant, no hull remains were reported within the Northwest Quadrant of N10/E70. The artifact density was moderate with 618 total objects recovered. Eight intact bricks and 9 brick fragments were reported by the diver during the excavation of the quadrant; an additional 8 brick fragments were collected. The more notable artifacts include items similar to those found in the Southwest Quadrant, such as a copper alloy bead, buttons, glass insets (2), hooks, buckles (18, mostly shoe, one knee), straight pins (4), tacks (46), a polished stone pestle, lead window comes, and a pewter figurine. Additionally this quadrant included a lead glazed ceramic tile, a jetton, a neck stock clasp, and a watch key. This artifact assemblage further includes 33 pipe stem and bowl fragments, 7 earthenware sherds (mostly tin-glazed), a piece of porcelain, 3 sherds of creamware, 110 fragments of stoneware (mostly brown salt glazed and mineral water bottle), 243 glass bottle fragments (case, wine, possible apothecary), and 78 shards of window glass. Appendix E represents all artifacts recovered during the excavation of the Northwest Quadrant of N10/E70.

618	481
788	508

Northeast Quadrant: No hull remains were uncovered within this quadrant, as with the Southwest and Northwest Quadrants. The artifact density remained relatively moderate (a total of 481 objects recovered), although this quadrant was the least dense of the unit. Artifacts noted, but not collected, include 5 intact bricks and 5 brick fragments. Artifacts recovered from the Northeast Quadrant of N10/E70 include a variety of notable objects such as a turned chess piece made from a black stone and a part of the vessel hull. Additional notable artifacts include a lead glazed ceramic tile, a whole brick and brick fragment, 5 shoe buckles and a buckle chape, 6 sleeve buttons, 5 pewter buttons, 5 glass insets, and 57 tacks. The artifact assemblage from this quadrant also includes 37 pipe stem and bowl fragments, 13 earthenware sherds (Frankfurter ware and tin-glazed), 2 pieces of porcelain, 2 creamware sherds, 144 stoneware fragments (96 of which are mineral water bottle), 105 glass bottle

fragments (case, wine, round), and 47 shards of window glass. A full inventory of all artifacts recovered from the Northeast Quadrant of N10/E70 is presented in Appendix E.

618	481
788	508

Southeast Quadrant: Like the other three quadrants of Test Unit N10/E70, no hull remains were documented within the Southeast Quadrant. The artifact density was moderate with a total of 508 artifacts recovered. Four intact bricks and 8 brick fragments were documented within the quadrant during the excavation but not recovered; 6 brick fragments were recovered as part of the artifact assemblage. In addition, the assemblage includes a polished stone pestle, 11 buckles (9 shoe), 2 buttons, 21 tacks, 3 straight pins, a jetton, a lead glazed ceramic tile, and a pewter miniature. The recovered artifacts also include 22 pipe stem and bowl fragments, 9 pieces of earthenware (various types), 3 pieces of porcelain, 2 creamware, 137 stoneware sherds (mostly mineral water bottle and brown salt glazed), 197 glass bottle fragments (case and wine), part of a glass decanter, and 46 shards of window glass. The full inventory of artifacts recovered from the quadrant is presented in Appendix E.

Test Unit North 0/East 50

1,707	597
1,646	278

Test Unit North 0/East 50 (N0/E50) was the final unit excavated during the current study. Hull remains were documented in the Northwest Quadrant and numerous intact bricks were recorded throughout the unit. A total of 4,228 artifacts were recovered across the unit, the second highest artifact count overall (the highest was in N10/E50). Individual quadrant artifact counts are indicated in the icon to the left. Each quadrant was excavated separately, and the excavation results are presented in turn below.

The general stratigraphy of N0/E50 contains four layers. The first four inches of sediment consisted of sterile sand overburden whereas artifacts were encountered in all four quadrants from 4 to 20 inches beneath the sea floor. The artifacts were encountered within a layer of clay/mud (4-6 inches) and shell hash/sand (6-20 inches). Sugar-grain sand, devoid of any artifacts, was encountered at 20 inches beneath the sea floor. Tabular data on Test Unit N0/E50, specifically stratigraphy and materials recovered, may be found in Appendix E.

1,707	597
1,646	278

Southwest Quadrant: No hull remains were identified within this quadrant. However, a large amount of brick was removed during the excavation. A total of 28 intact bricks and 15 brick fragments were recorded but not collected; 87 brick fragments were collected as part of the artifact assemblage. In total 1,646 artifacts were recovered from the Southwest Quadrant of N0/E50, the second densest quadrant of the unit. The assemblage includes a variety of notable artifacts such as a polished black serpentine stone, an eyelet and hooks, jettons, part of a pen knife scale, a pewter miniature, 2 shoe buckles, 100 straight pins, a tack, and a piece of coal. In addition, the assemblage includes 113 pipe stem and bowl fragments, 58 sherds of earthenware (31 of which are Frankfurter ware), 3 pieces of porcelain, 14 sherds of creamware, 425 fragments of stoneware (mostly mineral water

bottle and brown salt glazed), 623 glass bottle fragments (case and wine), various pieces of glass stemware, decanters, and tumblers, 131 shards of window glass and a variety of unidentified objects. A full inventory of artifacts recovered during the excavation is presented in Appendix E. Sterile sand was reached between 18 and 20 inches within this quadrant.

1,707	597
1,646	278

Northwest Quadrant: The broken end of the longitudinal timber terminated 2 feet 9 inches (from the north) into the Northwest Quadrant of N0/E50. The south end of the scantling was very eroded and appeared to be broken. However, close examination of the terminal end of the eroded timber indicated it was likely not impacted by dredging activities. The erosion of the timber is probably caused from long-term exposure to environmental conditions such as wave/storm activities in the area since the initial wreck event.

This quadrant had the densest artifact recovery of the unit. Forty-six intact bricks and 19 brick fragments were noted and removed from the quadrant during the excavation; 68 brick fragments were collected as part of the artifact assemblage. The assemblage is also comprised of two polished stone artifacts (a mortar and an unidentified object), leather shoe fragments, 2 jettons, 158 straight pins, and a tack. One hundred ten (110) pipe stem and bowl fragments were also recovered, along with 59 pieces of earthenware (mostly Frankfurter ware and tin-glazed), 2 pieces of porcelain, 18 sherds of creamware, 357 fragments of stoneware (mostly mineral water bottle and brown salt glazed), 678 fragments of glass bottles (case and wine), pieces of glass stemware and tumblers, and 166 shards of window glass. These and all other artifacts were recovered from the quadrant and are presented in Appendix E. Sterile sand was reached between 18 and 20 inches within this quadrant.

1,707	597
1,646	278

Northeast Quadrant: No hull remains were documented within the Northeast Quadrant of Test Unit N0/E50. A moderate amount of artifacts were recovered (total = 597). The total number of bricks removed from the unit was less than that of the Northwest Quadrant with only 7 intact bricks and 7 brick fragments removed during the excavation; 19 brick fragments were recovered as part of the artifact assemblage. The assemblage also includes a hook, parts of a pen knife scale, 82 straight pins, 2 buckles, a spoon, and a tack. Other artifacts recovered include 29 pipe stem and bowl fragments, 14 sherds of earthenware (various types), a piece of porcelain, 3 creamware sherds, 120 fragments of stoneware (mostly mineral water bottle and brown salt glazed), 217 glass bottle fragments (case, wine, round), and 65 shards of window glass. The full inventory of artifacts recovered is presented in Appendix E. Sterile sand was reached between 18 and 20 inches within this quadrant.

1,707	597
1,646	278

Southeast Quadrant: No hull remains were documented within the Southeast Quadrant of N0/E50. A sizeable concretion was observed by archaeologists within the entire quadrant, which may account for the lower density of artifacts recovered (total = 278). A modern tire and associated rim

was identified within the quadrant. The composition of the large concretion is unknown. Artifact densities within this quadrant are the lowest for the unit. Only 2 bricks and 14 brick fragments were noted and removed during the excavation; 6 brick fragments were collected. Other notable artifacts are scant: one tack, a pewter figurine, and one buckle were recovered. The artifact assemblage is mostly composed of pipe stem and bowl fragments (21), earthenware (11, various types), 3 pieces of creamware, 88 stoneware sherds (mostly mineral water bottle and brown salt glazed), 88 glass bottle fragments (case and wine), pieces of glass stemware, and 22 shards of window glass. A full artifact inventory for the Southeast Quadrant of N0/E50 may be found in Appendix E. Sterile sand was reached between 18 and 20 inches within this quadrant.

Test Unit Conclusion

As each grid square was excavated all extant hull remains, concretions, and large artifacts were plotted and mapped on a Master Site Plan. In addition, archaeologists with SEARCH were deployed to map all exposed features associated with the Roosevelt Inlet Shipwreck. This Master Site Plan has been provided in Appendix C.

The excavation of all eleven test units was concluded on October 25, 2006. Once the last quadrant was successfully excavated, all grid squares were dismantled and recovered to the *Venture III*. The baselines were removed, in addition to the screw anchors used to secure each baseline. Lastly, the moorings and associated screw anchors were recovered and the field investigation portion of the project concluded.

Post-Remote Sensing Survey

Following the excavation of the Roosevelt Inlet Shipwreck (7S-D-91A), a remote sensing survey utilizing the side scan sonar was undertaken to examine the wreck site post-excavation. The magnetometer was not used since data gathered from the preliminary remote sensing survey was sufficient for analysis of the site.

Results of the side scan sonar survey clearly identified the three trenches excavated during the current investigation: the north, amidships, and south trenches. Weather conditions during the post-remote sensing survey were not ideal. However, the trenches are clearly visible as dark bands across the wreck site (Figure 5.8). Based on observations after a nor'easter during the current investigation, the movement of sediment suggests these three trenches will likely fill in quickly after the next major storm event.

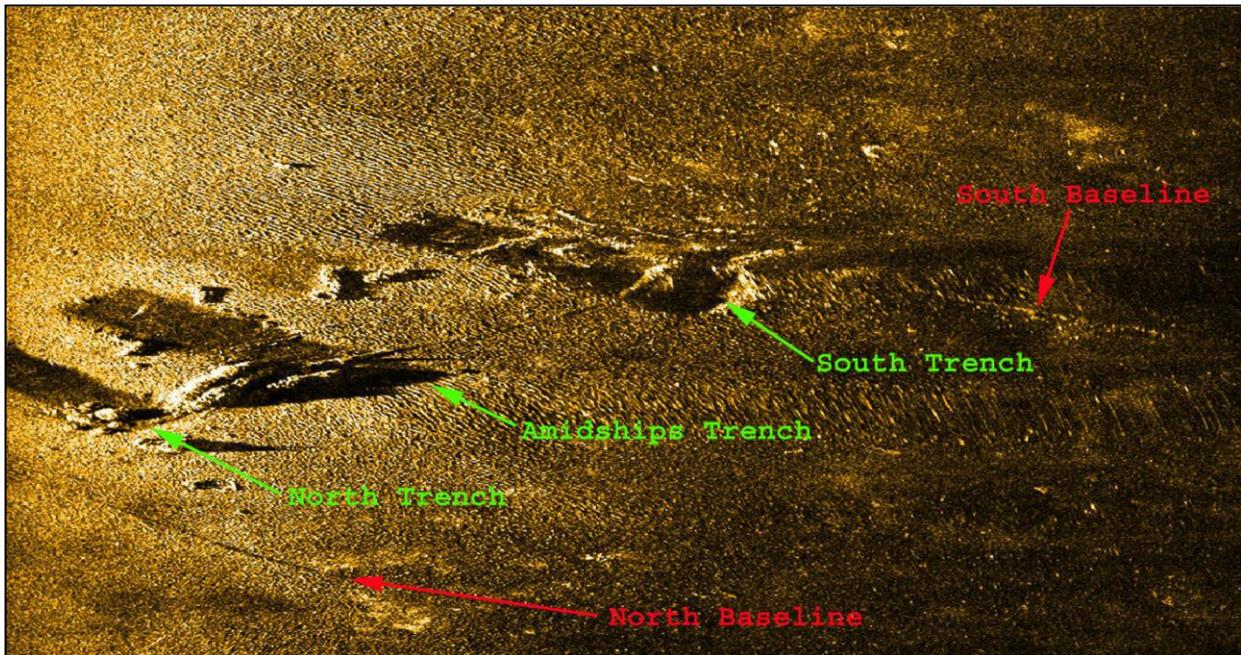


Figure 5.8. Post-side scan sonar image clearly showing the trenched areas excavated during the current investigation. Both the north and south baselines are also visible and labeled above.

CHAPTER 6

THE ARTIFACT ASSEMBLAGE AND ITS CULTURAL CONTEXT

Analysis of artifact assemblages recovered from shipwrecks offers a portal into both the trading and transportation practices of the historic period in which the vessel operated, and the daily lives of the sailors and passengers. All of this artifact discussion is based upon the identifications determined and provided by the staff of the State of Delaware Division of Historical and Cultural Affairs as of September 2008 with updates from August 2009. In an effort to better understand and interpret a comprehensive view of the materials recovered, SEARCH utilized artifact use based categories as a way of classifying data. These categories are modeled after South's (1977) use of a categorization system based on the assumed function of an artifact and are useful for approaching the analysis of historic artifacts. In this instance, this category system was used purely as a framework to aide in understanding the variety of goods carried on board, and the market into which they were being transported, as well as to rebuild site temporality and material point of origin for the Roosevelt Inlet Shipwreck. Within the merchant ship setting, the majority of items on board have the sole function of cargo. Teasing out ships fittings, tools, and personal items of the crew can often be difficult if not impossible when little is left of the superstructure, as is the case with the Roosevelt Inlet Shipwreck. Nonetheless, approaching this material from a standardized material culture point of view aids in the understanding the breadth of the wares under transport. Categories used include Architecture, Activities, Clothing, Furniture, Kitchen, Miscellaneous, Personal, Armor/Weaponry, and Tobacco. Volume 3 provides a complete inventory of analyzed materials recovered during the October 2006 excavations at the Roosevelt Inlet Shipwreck site. Maker's marks observed on artifacts in any category were recorded, and attempts were made to research them.

Examples of the Activities category include artifacts representing leisure time, such as marbles, fish hooks, gaming pieces, and children's tea sets, as well as work-related artifacts such as axes, harness parts, horseshoes, and plow parts. Architecture covers a broad range of structural items such as brick, mortar, nails, and window glass, to name a few.

Clothing artifacts consist of apparel-related items such as straight pins, irons, and smoothers. Furniture artifacts traditionally include hardware. The Miscellaneous category contains artifacts such as unidentifiable glass, rubber, or rusted iron fragments that cannot be placed in a more descriptive category, since they lack information regarding their function. The Personal category includes items used primarily by and for an individual including items of adornment such as buttons, beads, and jewelry. Artifacts in the Armor/Weaponry category include all types of weapons and ammunition. The Kitchen category contains artifacts involved in food preparation and eating and includes the most comprehensive and detailed classification of artifacts. Ceramics and bottle glass constitute two of the largest artifact types within the Kitchen category. Both of

these materials are very durable, survive long-term exposure to soil and the natural environment and, due to the breakable nature of these vessels, enter the archaeological record regularly. Few of these artifacts are routinely adapted to other uses and therefore, material from both the Ceramic and Kitchen Glass classifications can be used to help place an archaeological site temporally.

Archaeologists often use the mean date of manufacture as a way of determining relative site age. Mean dates are achieved by calculating the median of the beginning and end dates of manufacturing for each specific type and style. Site specific criteria such as the count of each type are then averaged to produce an overall date range for the assemblage.

South's (1977) classification for ceramics has been shown to work effectively on archaeological sites. Classifications are based on differences in paste texture and hardness as well as glaze color and method of decoration. Changes in these criteria can be used to date ceramic artifacts and help determine the age of the site. Changes in the pottery industry were spawned by a need to provide better, stronger, and/or fancier wares to a larger market. The driving force of this change was the desire to produce a European form of porcelain that could be produced quickly and inexpensively and therefore distributed to a mass market.

Research by Miller (1980) and others have determined that surface treatments such as slip/glaze color, hand painting, transfer printing, polychrome colors, monochrome colors, and embossed designs can be reliable indicators of ceramic types, periods of manufacture, and economic scaling. Such elements were incorporated in the analysis procedure at the lab. Ceramic analysis also included the morphological identification of sherds by rim, base, or body. Archaeologists noted vessel form whenever possible and if the sherd was from a hollowware or flatware vessel. Notes were made of any vessel that could be mended or cross mended between proveniences. Maker's marks on ceramics were recorded and researched using the internet and printed reference books in an attempt to identify manufacturer, location and date of manufacture. The following sources were consulted by SEARCH: Godden (1965 and 1991), Kovel and Kovel (1995), and Kowalsky and Kowalsky (1999).

Bottle glass artifacts within the Kitchen group are categorized whenever possible by method of manufacture, in addition to color and function. Characteristics indicative of various manufacturing methods include the presence or absence of mold seams and basal scars, various lip finishes, and embossing. Color can be diagnostic, and it can also be indicative of function and manufacturing technique and therefore was noted during analysis. Vessel shape is often a function of use and was noted to help determine site activities. Bottle function was noted when observable. The following sources were examined by SEARCH for information about bottle manufacturing and dating: Jones and Sullivan (1989), and the Bureau of Land Management's Historic Glass Bottle Identification & Information Website at http://www.blm.gov/historic_bottles/index.htm (2006).

Following is a discussion of the analyzed materials recovered from the October 2006 excavations of the site. While each artifact type is discussed, analytical constraints based on the enormity of the assemblage and the conservation process, as well as other factors, prevents a full analysis from being completed at this time. This site has provided a rich collection of material culture that should provide much fodder for future research and academic scholarship.

Architectural

Architectural materials recovered from the Roosevelt Inlet Shipwreck include artifacts such as brick, lead-glazed tile, and tin-glazed tile. Also recovered were examples of slate, nails, window glass, and lead window came.

Brick has many uses in the cultural landscape. Not only is it useful as a structural material for foundations and houses, it can also be used as pavers to line roads, sidewalks, and paths, and as insulation for chimneys and furnaces. As such, each of these uses requires bricks of various shapes and sizes suited to the application.

Ceramic tile, like brick, is very versatile in function. Often found as roofing material, it can also be utilized as facing material around fireplaces and stoves, flooring, and decorative elements in both the interior and exterior of structures. Also, as with brick, form follows function for tiles, and each use is evidenced by a variety of shapes and sizes. An analysis of intact bricks and tiles can often determine their intended functions.

In addition to function, origin of manufacture is an important aspect of brick analysis. Clays can be sourced to their area of excavation, and this can aid not only in dating the bricks (as manufacturing centers shifted to follow sources over time), but it also can help determine shipping patterns between manufacturing centers and points of purchase. While none of the bricks recovered from the wreck site has been sourced, this may be an avenue of future research to definitively identify the point of origin for these materials.

All of the brick recovered from the Roosevelt Inlet ship is handmade. This fact points to a pre-1830 date for the vessel as the earliest machine-made bricks are not found in North America until after that date (Campbell and Pryce 2003). Because bricks from the late eighteenth and early nineteenth centuries were handmade, often at small manufacturing sites, there is great variability in their characteristics, from size and shape to color and hardness. These factors contribute to the wide range of brick types that may be found within a single shipment during the colonial period. In addition to these functional uses, brick and tile fragments could also be found secondarily as ballast in vessels and may not have been part of a merchant shipment at all.

Both the bricks and ceramic tiles recovered from the Roosevelt Inlet Shipwreck were highly eroded and fragmented, a fact which makes a full scale analysis of them difficult. A total of 491 brick fragments and eight whole bricks were collected during the 2006 field season.

The majority of all recovered brick came from the southern end of the site with 92.59 percent of the total 499 brick and brick fragments coming from units south of 30N (53.7% by weight). Brick types consisted of three color groups—red, yellow, and mixed clay. Five of the whole bricks and 115 brick fragments were of mixed clay while one whole brick and 328 fragments were reported as red, and two whole bricks and 48 fragments were recorded as yellow. Although there are far fewer yellow brick fragments than either of the other two colors, yellow brick makes up 40 percent of the overall weight for brick fragments. In total, however, mixed bricks far outweigh either of the solid colors with 10,240.5 grams overall and appear to be far less fragmented than their solid color companions. Table 6.1 portrays brick color percentages and counts for the collected bricks; Figures 6.1 and 6.2 illustrate the color and size variations in the collected samples. A full inventory of bricks recovered from the site may be found in Volume 3.

Table 6.1. Recovered bricks by color.

Brick Color	Count	%	Weight (g)	%
Mixed	120	24.0%	10,240.50	42.2%
Red	329	65.9%	5,522.36	22.8%
Yellow	50	10.0%	8,504.90	35.0%
Total	499	100.0%	24,267.76	100.0%



Figure 6.1. Representative examples of bricks recovered from the Roosevelt Inlet Shipwreck site.



Figure 6.2. Side view of bricks showing the variation in thickness.

Nineteen ceramic tile fragments were recovered from the excavations. Of these, ten are lead glazed, five are tin glazed, and four are either unglazed or the glaze has spalled off. Tile fragments were spread fairly evenly across the test units with the majority of tin glazed pieces coming from the north end of the wreck. Several of the lead glazed tiles appear to have pre-drilled nail holes, suggesting that they may be roofing tiles rather than floor or fireplace tiles (Figure 6.3; compare with Figure 6.4). All of the tin glazed fragments appear to be from thin fireplace or wall skirting tiles as they are less than 15.88mm (5/8") thick, in contrast to thicker floor tiles (usually greater than 19.05mm or 3/4") (Noël Hume 1969). Samples of collected tin glazed tiles are shown in Figure 6.5. A full inventory of ceramic tiles which lists additional information such as glaze color and location of recovery may be found in Volume 3.



Figure 6.3. Lead glazed tiles with pre-drilled nail holes, suggesting possible roofing tiles.

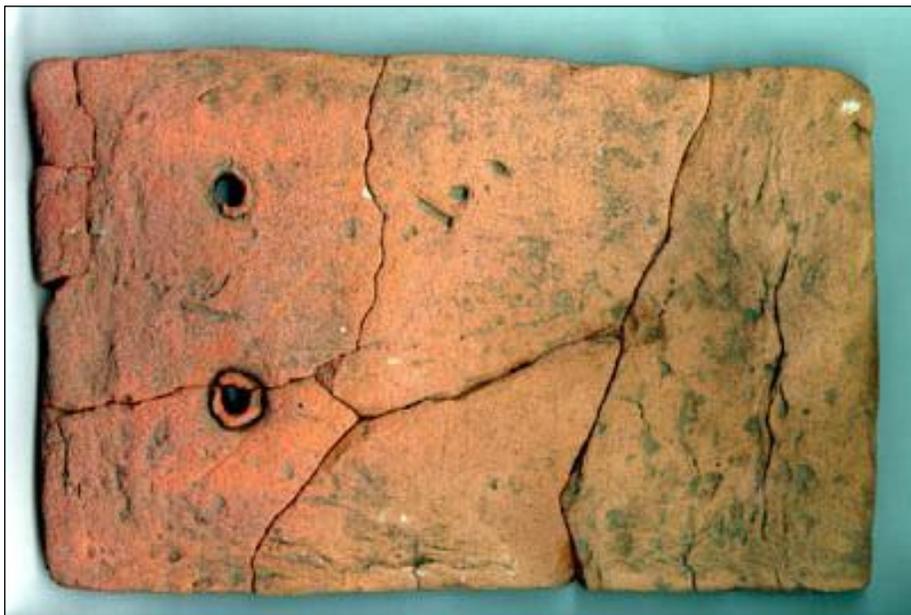


Figure 6.4. Roofing tile with pre-drilled holes from the Flowerdew Hundred.
(Source: <http://etext.virginia.edu/flowerdew/artifacts/rooftile.JPG>)



Figure 6.5. Examples of tin glazed tiles recovered from the site; side view (top) and front view (bottom).



Figure 6.6. Slate fragments recovered from the site.

Three slate fragments were collected during the October 2006 field season. These consisted of one 170g fragment from N50/E50, plus one $\frac{3}{4}$ -complete tile weighing 868g and measuring 268.97mm x 206mm x 8.9mm and one fragment weighing 4g from N75/E70. Figure 6.6 is a photograph showing these slate artifacts.

Also recovered from the Roosevelt Inlet shipwreck were nails. Prior to 1790, all nails were manufactured by hand, either wrought or cast, with iron being the most common material in use (Noël Hume 1969). More precise dating of these early fasteners is hindered by the variability inherent in the handmade process. Wrought nails can be recognized by a shaft that tapers on all four faces and iron fibers that run the length of the nail. In 1790, machine cut nails were invented, where a flattened strip of metal was cut into sections. Cut nails can be recognized by a shaft that tapers on only two faces and iron fibers that usually run across the shaft of the nail (Nelson 1968). Heading of the cut nails continued to be done by hand until approximately 1815. The cut nail shaft was placed in a heading anvil, and a head was applied and shaped in the same way that wrought nails had been headed. The nail cutting machine, first driven by hand and later by steam or water power, allowed for mass production of standard nails, thereby lowering the cost of manufacture. The origin of the first nail cutting machine is not known; however, it is believed to be an American invention and was certainly widely used after the turn of the nineteenth century (Noël Hume 1969:252-254).

The only single nails recovered from the wreck are wrought copper alloy that appear to be bent or clinched (to help fasten them into wood), indicating that they are likely from the vessel itself or perhaps for wooden shipping crates, but not a bulk shipment intended for sale in Philadelphia. These nails are discussed in the Vessel Architecture section. However, a CAT scan of a large concretion recovered during the Phase II investigation revealed what may be a cask of iron nails (Griffin personal communication 2009, see Appendix F). Molds of these nails may be cast and examined for functional criteria as part of future research on this collection. Figure 6.7 provides an illustration of wrought nails styles taken from Noël Hume (1969).

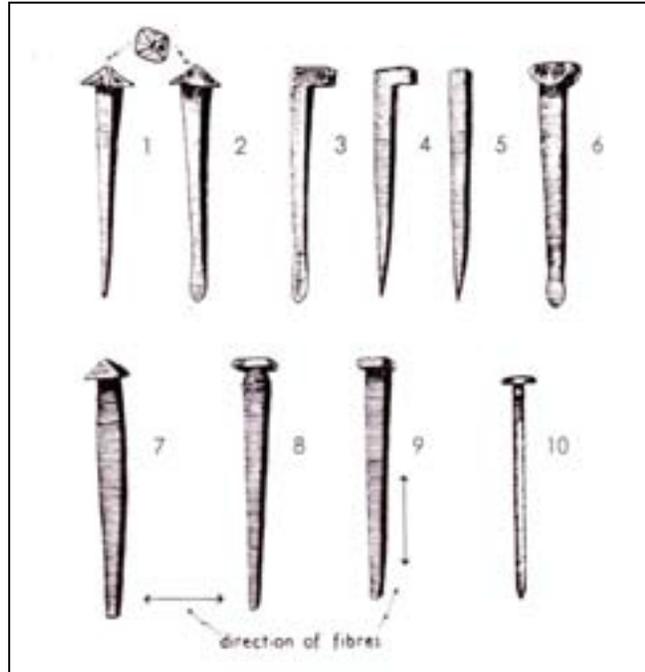


Figure 6.7. Nail types. (Noël Hume 1969:252: Fig. 81) 1-6. Wrought. 7-9. Cut. 10. Wire. Nos. 1 and 2 have rose heads, with straight and expanded (or spatula) points; 3 and 4 are L-headed; 5. Headless; 6. T-headed. Nos. 1-6 are colonial and later; 7. c.1790-1820s; 8. c. 1815-1830s; 9. c. 1820 onward; 10. Not before 1850s and probably much later.

A variety of window glass colors are represented in the collection. A total of 2,761 fragments were recovered from the October 2006 excavations. Of those 2,653 were light green (96.1%). The remainder were blue (n=69, 2.5%), colorless clear (n=28, 1.0%), medium green (n=6, 0.2%), dark blue-green (n=4, 0.1%), and pale green (n=1, >0.1%) (Table 6.2). Thickness varies greatly from 0.029mm to 3.30mm thick. Figure 6.8 contains a representative sample of window glass from the collection. A full inventory of window glass which lists additional information and location of recovery may be found in Volume 3.

Table 6.2 Recovered window glass by color.

Glass Color	Count	Percentage
Blue	69	2.5%
Colorless	28	1.0%
Light Green	2,653	96.1%
Pale Green	1	0.0%
Medium Green	6	0.2%
Dark Blue-green	4	0.1%
Total	2,761	100.0%

Twenty-three window came (metal strips used to hold multi-shaped glazed glass within a wooden casement) fragments were also recovered from the excavations. One came has been identified as being pewter while the remaining 22 are lead. Of these, five have possible maker's marks which may yield specific manufacturing location and year information with additional research. It is suggested that additional comes be unfolded and examined for maker's marks, and that research into these marks be completed as part of future study. Figure 6.9 portrays examples of flattened lead comes. A full inventory of all comes collected from the October 2006 excavations is shown in Volume 3.

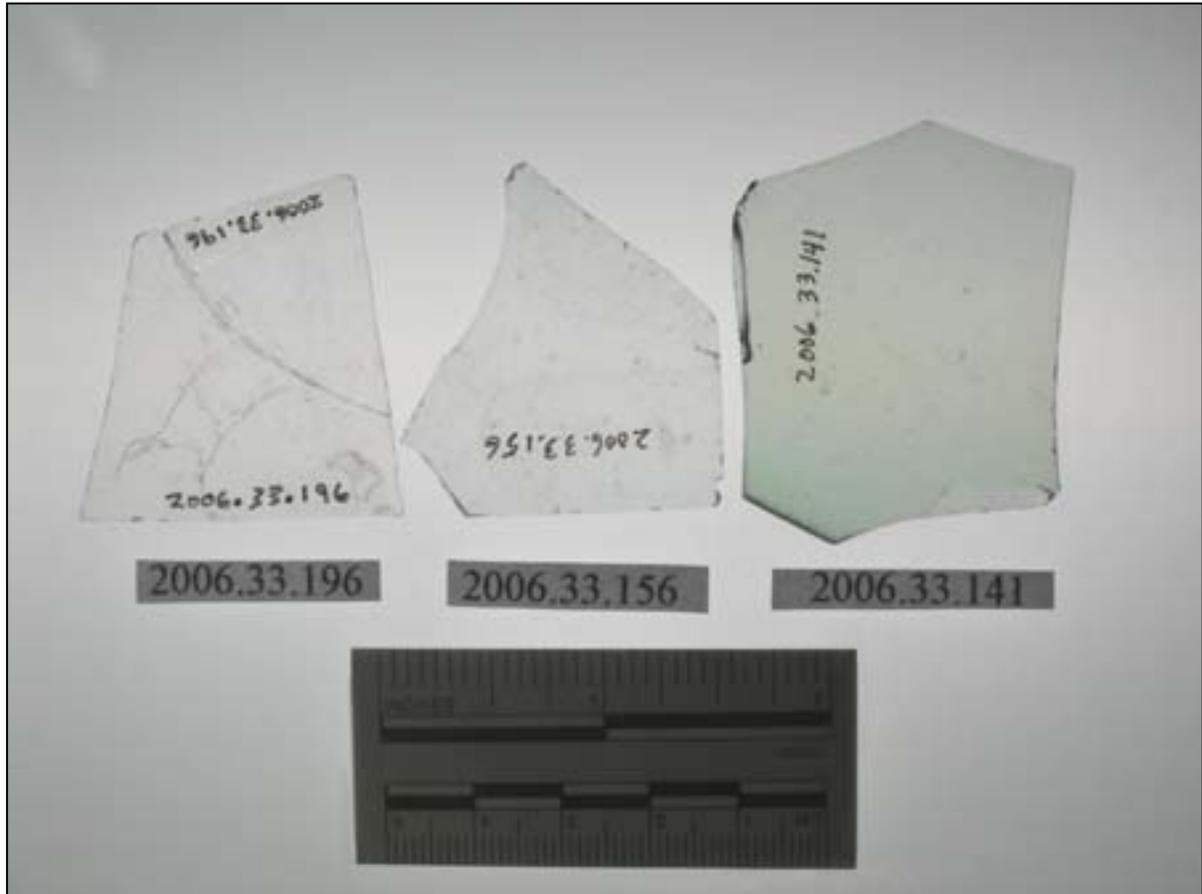


Figure 6.8. Representative sample of window glass recovered from the site.



Figure 6.9. Flattened lead comes (2006.33.222).

Clothing

Clothing and apparel-related materials collected during the October 2006 excavations include metal straight pins, as well as leather shoe fragments. In addition to worn items this category also includes those items which were used to construct and care for clothing or apparel-related materials such as thimbles, thimble cases, thread cases, thread winders, needle cases, glass linen smoothers, and metal irons.

Straight pins have always served two purposes. They were used both to fasten clothes while being worn, and they were used in the manufacturing process to hold fabric in place during sewing or hold thread during the production of bobbin lace. Sixteen hundred ninety-five (1,695) copper alloy straight pins were recovered during the October 2006 excavations (see Volume 3 for a full inventory). All of these pins were constructed of two pieces with a drawn wire shank and wire wound head (see Figure 6.10 inset, below). This style of pin manufacture is seen from the sixteenth through the early nineteenth centuries, until Lemuel L. Wright was given an English patent to manufacture solid headed pins (1824) (Beaudry 2006; Noël Hume 1969). The RIS pins appear to have evidence of tinning, a method of coating the surface in tin to impart a silver-like appearance. Tinning was carried out by “boiling the pins in a solution of potassium bitartrate containing granules of tin” (Deagan 2002:194, Tylecote 1972:184). Additional examination of photographic examples reveals that the shafts of some of the pins narrow slightly at the head, a characteristic noted by Tylecote (1972:187) in pins dating to 1778. All of the pins recovered thus far from the wreck range in size between 18.78 and 37.4 mm in length, which puts them in the range of common straight pins rather than special use pins (Beaudry 2006; Deagan 2002). Examples from the site are shown in Figure 6.10.

Other fasteners found at the site include hooks and eyes and three copper alloy rivets or eyelets. All of the hooks and eyes (n=17) recovered from the wreck are copper alloy. The hook and eye styles have changed little over time since the sixteenth century. Figure 6.11 shows a sample of hooks and eyes recovered from the Roosevelt Inlet Shipwreck site.

Other Sewing Related Items

In addition to straight pins, 16 pewter and six copper alloy thimbles were recovered from the wreck site. The adult thimbles are deep drawn (dapped) with diamond shaped waffled or knurled indentions that continue over the top and onto the dome. Some may have had the crown added separately (Stocum personal communication 2009). Figures 6.12 and 6.13 provide photographic and illustrated examples of thimbles recovered from the shipwreck. Recorded heights range from 1.6 to 2.37 cm with diameters that range from 1.48 to 1.86 cm. Thimbles of these sizes are typical of adult sizes. Both profile and knurled waffle pattern decoration point to either a German, Dutch, or English origin of manufacture. Also recovered were child-sized thimbles sand cast with non-spiraling indentations, which is most likely of Dutch or British manufacture. Prior to the eighteenth century, Nuremburg, Germany was the major production center for brass thimbles. Nuremburg had the advantage of begin able to stamp sheets of brass using the



Figure 6.10. Straight pins from the Roosevelt Inlet Shipwreck site. Inset shows pin detail of pin heads.

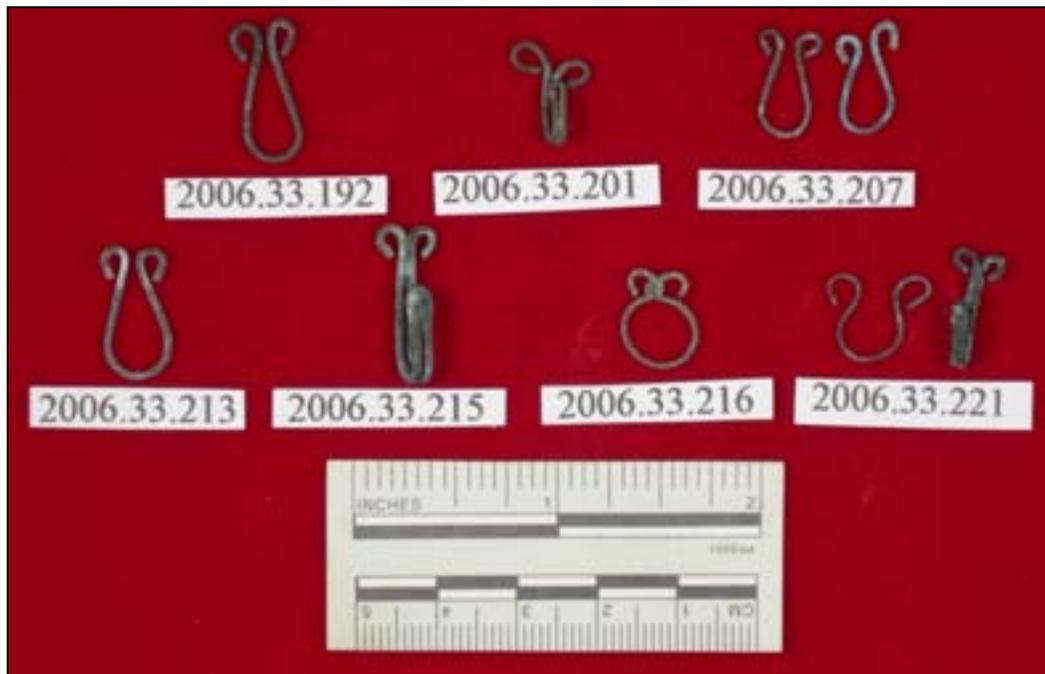


Figure 6.11. Examples of hooks and eyes recovered from the Roosevelt Inlet Shipwreck site.

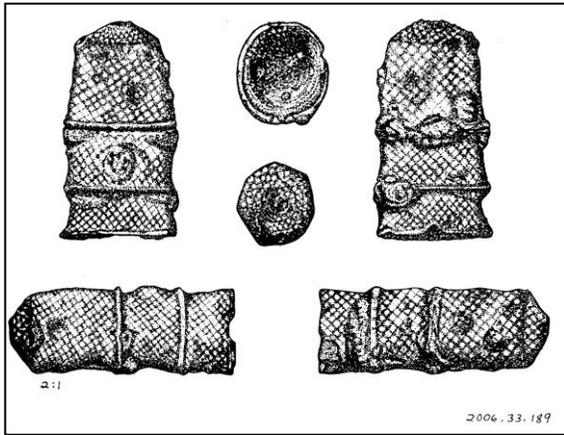


Figure 6.12. Detail illustration of thimbles recovered from the site (by Sharyn Murray).

deep drawn or dapping method which enabled more rapid production. The technology was based on their having mastered the processing of a more malleable sheet brass using zinc rather than raw calamine. Dutch and English thimbles continued to be sand cast until the secret for this brass was disseminated across the region. Production spread to the Netherlands, and on to England (primarily Birmingham) at the end of the seventeenth century with Dutch production predominating until around 1730; German and English manufacturing centers became predominant after that date (Beaudry 2006; Deagan 2002).

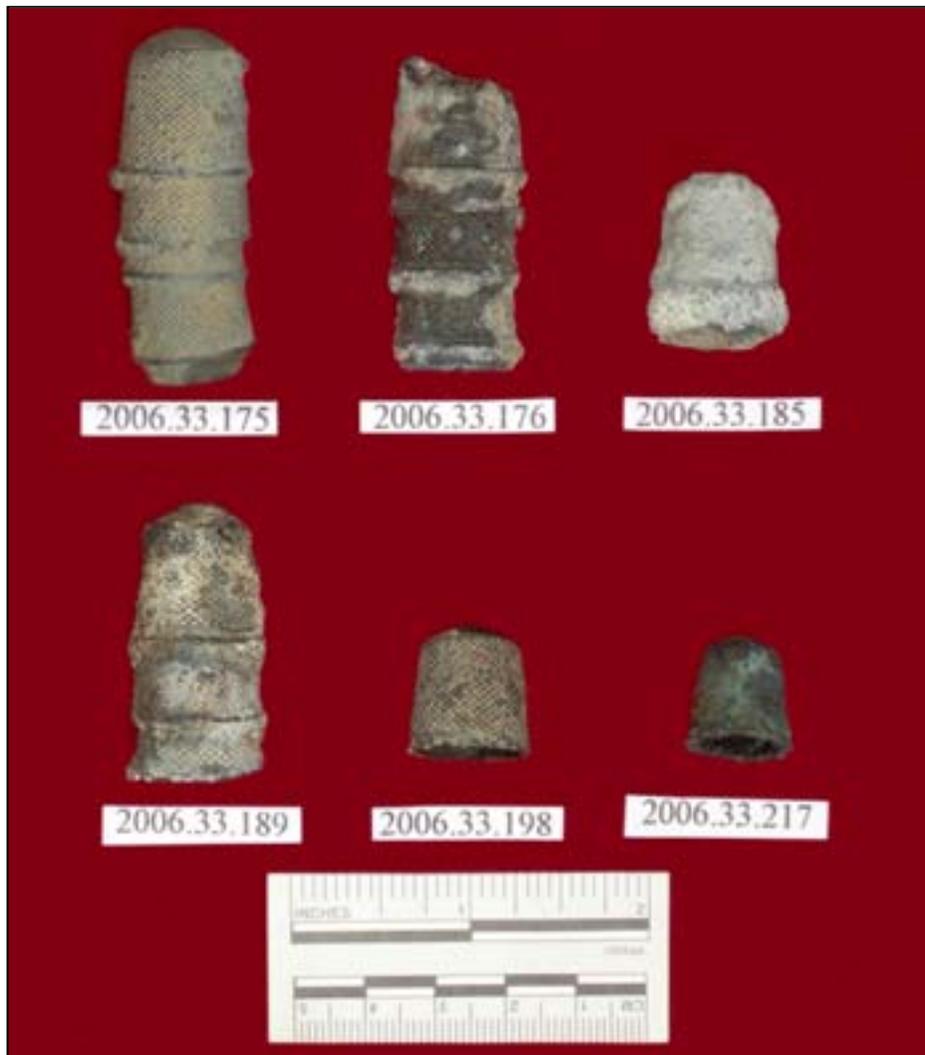


Figure 6.13. Thimbles recovered from the Roosevelt Inlet Shipwreck site.

Also recovered were 26 egg- or acorn-shaped metal containers with threaded caps that have been tentatively identified by State of Delaware researchers as thimble cases (Faye Stocum personal communication with Mary Beaudry 2008, see Appendix F). All but two of these objects are of pewter construction with one identified as copper alloy and one as lead (or probably poorly made pewter). Some of these cases have molded decorations such as ribbing or concentric rings, leaf, or other designs. Seven have stamped double eagle-with-sword-and-orb designs on the cap that are similar to the insignia of those found in the Byzantine, Holy-Roman (prior to 1803) and Russian Empires (Figures 6.14 and 6.15) (Victoria and Albert Museum 2010). In the nineteenth century this heraldic design continued to be associated with the Austrian Empire prior to the forming of the Austro-Hungarian Empire in 1867 (Embassy of Austria 2010). Further research needs to be completed before the exact nature of these objects can be fully understood. Volume 3 is an inventory detailing these items.

Four bone objects have been identified as thread cases or bobbins. Figures 6.16 and 6.17 are examples of these items. One other bone object has been identified as a needle case (Figure 6.18). All of these items are constructed of polished bone.



Figure 6.14. Thimble case with eagle insignia (2006.33.185); side view (left) and detail of insignia (right). Note the sword and orb clasped in the talons.



Figure 6.15. Thimble cases from the Roosevelt Inlet Shipwreck site.



Figure 6.16. Thread case made of bone (2006.33.198).



Figure 6.17. Bone bobbin (2006.33.143).



Figure 6.18. Bone needle case (2006.33.177).

Footwear

Thirty-four shoe fragments have been identified from the October 2006 materials. Figures 6.19 and 6.20 are examples of shoe soles recovered from the Roosevelt Inlet Shipwreck site. Of the recovered shoe fragments, eighteen are leather fragments, six are felt, and the remainder is unidentified as to material type. An artifact inventory of shoe items recovered from the site is presented in Volume 3. This table details the shoe analysis completed thus far.



Figure 6.19. Shoe sole recovered from the Roosevelt Inlet Shipwreck site (2006.33.181).



Figure 6.20. Shoe sole recovered from the Roosevelt Inlet Shipwreck site (2006.33.230).

Clothing Equipment

Two plano-convex dark green glass linen smoothers (Figure 6.21) were recovered from the wreck along with one ornate copper alloy pressing box type iron. Figure 6.22 is a composite of two views of this iron along with a line drawing by Sharyn Murray. These glass knobs would have been used to smooth out thin garments or to press fabrics in folds and pleats and would have been used with a small wooden smoothing board. Glass smoothers have been found in archaeological contexts dating from the Viking period in Europe and into the nineteenth century (University of Glasgow 2010). The iron has cast dolphin handle supports, and a compartment with a locking door in the body to house a



Figure 6.21. Dark green glass linen smoothers; convex view (top), concave view (bottom).



Figure 6.22. Illustration, rear and side views of brass pressing iron with dolphin-shaped handle supports (drawing by Sharyn Murray).

heating element. A similar iron from the period is shown in a copy of the circa 1765-82 portrait of a maid doing laundry (Figure 6.23), painted by Henry Morland (1716-1797) from the Tate Museum collection (Tate Museum 2010). Similar irons utilized loose charcoal as a heating element but irons of this type would have had vent holes to allow the coals to “breathe” and therefore continue to combust. The probable wooden handle from the box iron was not recovered during excavations.



Figure 6.23. Circa 1765-82 portrait of a maid using an iron similar to the one recovered from the site (painted by Henry Morland).

Furnishings

Objects from this category include those things that were used to furnish a home such as candlesticks, clocks (and clock parts), curtain ties and rings, drawer pulls and knobs, feet and finials from furniture or accessories, hinges, lock parts, and upholstery tacks.

Candlesticks developed in the mid-seventeenth century and evolved rapidly into an elaborate part of household furnishings. By the late seventeenth century, two-piece molds were introduced. With this method, the central stem was produced as two vertical halves that were seamed together. Most eighteenth century candlesticks were produced using this method. By the end of the eighteenth century, single-piece molds became standard. English, Dutch, and Flemish styles were fairly homogeneous during this period. One element previously thought to be indicative of Dutch or Flemish manufacture is a drilled “clean-out” hole in the socket of the candlestick holder (Noël Hume 1969:94). More recent research suggests that this feature was common to the period and should not be used to attribute origin of manufacture (Stocum personal communication 2010, Will 1974:22). This hole enabled the gutted candle to be removed by prying it out with a sharp object.

Two candlesticks and one candlestick holder were recovered from the October 2006 excavations. The first is an incomplete copper alloy candlestick consisting of mainly the center section, with the very top and outer edges of the base missing (Figure 6.24). It appears to be of a multi-piece construction formed with two balusters joined horizontally in the center of the stem. Next is a complete, two-piece mold design with a central baluster stem and tulip shaped holder. The base of this copper alloy candlestick is square with clipped corners (Figure 6.25). Last is a copper alloy, tulip-shaped holder with a drilled clean-out hole. This holder has evidence of having been broken away from a stem (Figure 6.26).

Additionally, one cast copper alloy arm from either a sconce or a chandelier was also recovered from the wreck. This curved fragment is cast in the Rococo style made popular in France during the eighteenth century. Figure 6.27 is a photograph of this item.

Other furnishing pieces recovered include one cast copper alloy bracket or faceplate with three small holes and three glass wall sconce or chandelier fragments. Other copper alloy items include two curtain rings, three curtain tie backs, one drawer pull, and one finial. Also collected were three pewter finials. One possible clock foot (copper alloy) with a foliate pattern, and several other plain feet were also recovered. Figures 6.28-6.36 illustrate examples of the above items.



Figure 6.24. Candlestick holder; multi-piece design similar to Dutch styles of the seventeenth century (Schiffer 1978:148-149) (2006.33.149).



Figure 6.25. Candlestick holder; two piece mold design with tulip shaped holder and square base similar to English style of the early eighteenth century (Shiffer 1978:195B) (2006.33.153).



Figure 6.26. Tulip-shaped candle holder with a drilled clean-out hole (2006.33.155).



Figure 6.27. Copper alloy Rococo style arm from either a sconce or a chandelier (2006.33.152).



Figure 6.28. Curtain tie back with crest (2006.33.078).



Figure 6.29. Side view of curtain tie back.



Figure 6.30. Copper alloy finial (2006.33.159).



Figure 6.31. Shell shaped curtain tie back (2006.33.185).



Figure 6.32. Copper alloy drawer pull and pewter finials.

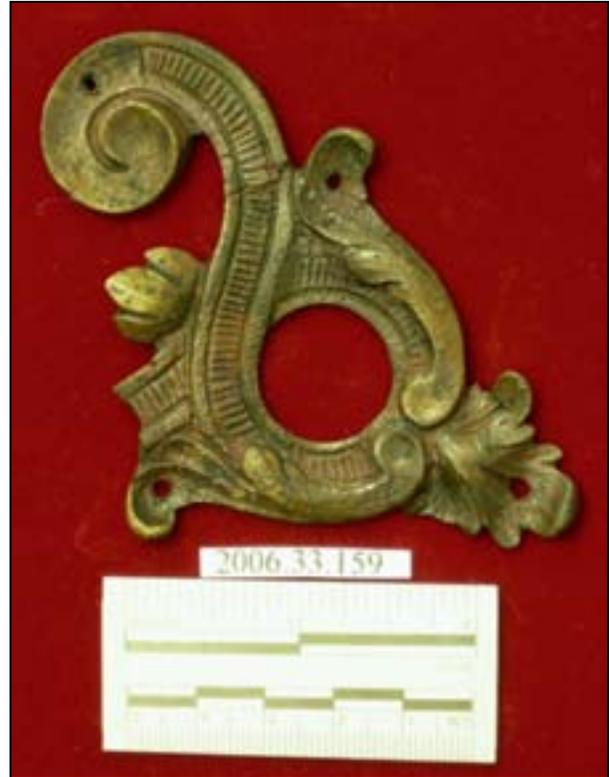


Figure 6.33. Possible bracket or faceplate (2006.33.159).



Figure 6.34. Possible clock foot with foliate pattern (2006.33.148).



Figure 6.35. Plain foot from a decorative object (2006.33.158).



Figure 6.36. Feet from a clock or decorative object (2006.33.148).

In addition, one furniture chest or clock hinge (Figure 6.37) and one escutcheon plate or lock part was found, also of copper alloy (Figure 6.38). Finally, one spring catch and 197 copper alloy upholstery tacks were identified (Figure 6.39). Upholstery tacks are common from the seventeenth century onwards and consist of hollow domed heads with welded shanks. None of these items, however, are diagnostic for either origin of manufacture or temporal placement.



Figure 6.37. Small furniture parts (2006.33.219).



Figure 6.38. Escutcheon plate (2006.33.215).



Figure 6.39. Copper alloy upholstery tacks.

Kitchen

A wide variety of kitchen-related materials were recovered from the Roosevelt Inlet Shipwreck including ceramics such as tin glazed earthenware, creamware, porcelain, and an assortment of stonewares. Also collected were kitchen-related glass artifacts such as tumblers, stemware, decanters/pitchers, and both round and case style bottles. An array of metal artifacts consisting of kettle/pot fragments, plate warmers, cutlery, teapots, lids, and vessel hinges were also recovered.

Many of the ceramics recovered at this site have discrete dates of manufacture which can help to place this shipwreck in time. Analysis of motif and color were used to refine general ceramic ware manufacture dates in an effort to further narrow down the window of possible dates for this vessel's loss. Following is a discussion of each ceramic type collected from the October 2006 excavations at the Roosevelt Inlet Shipwreck. Some reference is made to items collected from the beach but only as specific motif or ceramic element examples. Data from previous surface collections or fieldwork are not included in any tabular form in this discussion.

Earthenwares

Four types of earthenware pottery were recovered from the Roosevelt Inlet Shipwreck: lead glazed plain, slip decorated coarse earthenwares, tin glazed earthenware, and refined earthenware. All of these ware types are commonly found on eighteenth century terrestrial and shipwreck sites and an examination of their characteristics can often shed light on the cultural origins of the inhabitants of the site. There are 215 sherds of coarse earthenware in the October 2006 excavation collection. Of these 40 have been recognized as lead glazed coarse earthenware, 166 have been identified as Frankfurter ware, seven are slip decorated, one is most likely a Buckley (black lead glazed on red and yellow body), and one is a unidentified unglazed sherd. Also recovered were 655 tin glazed earthenware fragments, and 523 fragments of refined earthenware. Following is a brief discussion of each ware type and those artifacts which were recovered from the wreck.

Lead glazed

A wide variety of utilitarian ceramics fall into this broad category. Ranging from storage jars such as the Spanish olive jars which are descended from the Mediterranean amphora to the German and Dutch cooking vessels, these wares come in a plethora of shapes and colors. All consist of a coarse paste body, often with mica or quartz inclusions, overtopped with a lead glaze. Varieties of these wares date from medieval times to the nineteenth century.

Examples of lead glazed coarse earthenware found at the Roosevelt Inlet Shipwreck include red-bodied variants along with white-to-yellow-buff bodied. Figure 6.40 is an example of the red-bodied variant recovered from the wreck. Glazes on these sherds are often clear but can also be yellow-green, yellow-brown, or green in color. Sherds from each of these color ranges have been recovered from the wreck. One very distinctive, bright apple green perforated vessel sherd (Figure 6.41) recovered from the beach surface collection is very



Figure 6.40. Red bodied, lead glazed coarse earthenware fragments from a large vessel.

similar in color and paste to French pottery from the southwest area of Saintonge, examples of which were recovered from the vessel *Machault* which sank in Chaleur Bay inbound for Montreal in 1760 (Bartels 1998; Sullivan 1986:98).

Sherds of probable Frankfurter ware have also been recovered from the wreck (n=166). This ceramic type was manufactured in Germany for the Dutch market and is rarely seen in extra-European contexts. Manufacturing centers for this ware were located in Friesland and Gouda in Holland, and in Frechen and Siegburg in the Rhine Valley region of Germany. These wares are most often clear glazed with brown lines on the exterior just under the rim. Vessels of this type, which were first manufactured in the Rhine region of Germany, were copied by Dutch potters (a Dutch patent for Frankfurter Ware was applied for in 1778), a fact which makes determining origin of production difficult (State of Delaware March 2010). According to Bartels (1998) this pink-to-red or white-to-pale-yellow paste utilitarian pottery is frequently covered in a clear lead glaze. Dutch variants tend toward a redder paste than do the German ones. Vessel types consist mainly of food preparation pans, and pots, and are flat bottomed after 1750 (Bartels 1998:167).

Analysis to determine minimum number of individual (MNI) vessels based on singular attributes estimated that at least 21 separate vessels are represented in the data. (Appendix G, Table G-1 tabulates this analysis.) Forty-two of the 166 Frankfurter ware sherds recovered from the excavation are base fragments. Of the remainder, 73 are body sherds, two are from handles (Figure 6.42), two are handle/rim, 36 are rim, and 11 are undetermined fragments. All of the yellow/white Frankfurter ware recovered from the shipwreck has been identified as being of German manufacture by Michiel Bartels (State of Delaware March 2010). The ceramics shown in Figure 6.43 have also been identified as Frankfurter ware. Figures 6.44 and 6.45 are examples of Frankfurter ware from the Netherlands (Bartels 1998).



Figure 6.41. Distinctive bright apple green perforated vessel sherd from the beach surface collection.



Figure 6.42. Yellow bodied German Frankfurter ware handle fragments (2006.33.229 and 2006.33.204).



Figure 6.43. Assortment of Frankfurter ware vessel fragments.



Figure 6.44. Examples of Frankfurter ware from the Netherlands. (Bartels 1998)



Figure 6.45. Example of red bodied Frankfurter ware from the Netherlands. (Bartels 1998)

Slip Decorated

Popular in Europe from the early sixteenth century onwards, slip decorated coarse earthenware consists of a buff-to-red rough paste that is covered with a thin slip overtopped with a clear lead glaze and fired to a glossy sheen. Manufacturing locations for this ware range from Italy, France, Germany, and Holland on the continent to several of the pottery centers in England, including Staffordshire and parts of southwest England. Mass produced and, mostly inexpensively made, this pottery was highly decorated and very widely distributed. Vessel forms include wheel thrown bowls, bottles, and jugs as well as press-molded plates and containers.

Decorative techniques varied across the manufacturing regions. In England, slipwares were often white slipped on the interior of plates and platters, on both the interior and exterior for open containers such as bowls and mugs or porringers, and on the exterior for jugs and bottles with the addition of combed, dotted, or slip painted decoration in a contrasting color. A clear lead glaze was then applied over the air dried decoration, and then fired. Traditional patterns include combed and trailed, dotted and combed, and sgraffito (tool etched) decorated. Continental traditions varied somewhat and tended toward the abstract rather than formal motifs. German wares often consisted of wavy lines drizzled over the surface of a plate rim with concentric circles in the center. The addition of copper oxide powder to the vessel body before firing created a distinctive green blotching that is a common feature on German slipware and its descendants, including the wares from the low countries and England. American slipware from the North Carolina and mid-Atlantic regions of Philadelphia and Virginia, which have been attributed to Moravians, evidence this decorative technique and provide a cultural link to the Old World pottery traditions (Grigsby 1993; Hunter 2003; Noël Hume 1969). Figure 6.46 illustrates two red-bodied slip decorated earthenwares from the October 2006 excavations.

Figures 6.47 and 6.48 show examples of a white bodied variant that have been tentatively identified as most likely Dutch, French, or German in origin. Figure 6.47 is an example of the white bodied slip decorated sherds recovered from the site, and Figure 6.48 is an example from the beach surface collection. From an examination of photographs of the slipware and red-bodied sherds, British archaeologist Peter Davey suggests that the arcaded slipwares are from the Low County of Europe while the red-bodied examples are most likely “Low County or from neighboring parts of north Germany” (Davey personal communication 2010, see Appendix F). Further research on Dr. Davey’s part along with examination of the photographs by ceramic researchers Duncan Brown (Southampton), Derek Hall (Perth, Scotland), David Gaimster (Society of Antiquities in London), Hugo Blake, and Andre Leclaire, (France) suggests that the slipwares thus far recovered from the vessel itself and the associated items recovered from the beach collection represent Weser/Werra and Low Countries material. Leclaire posits that some of the material may be *pa de Calais* or Low County French in origin (Davey personal communication 2010, see Appendix F). French slipwares differ in decoration from both English and German styles in both color and motif. Often whole slipped with a white slurry, decoration consists mainly of abstract lines and naturalistic interpretations of birds, or leaves. Blue, green and

manganese are the predominant colors used for embellishments with regional preferences exhibited between these choices (Boston University 2010; Sullivan 1986). Much research is yet to be completed before these items can be definitively identified.



Figure 6.46. Red bodied slip decorated vessel fragments (2006.33.203).



Figure 6.47. White bodied slip decorated sherds recovered from the Roosevelt Inlet Shipwreck.



Figure 6.48. White bodied slip decorated sherds from the beach surface collection.

Tin-Glazed Earthenware

The tin-glazed earthenware tradition has beginnings that date back to the ninth century in Moorish Spain. Tin oxide was first added to lead glazes in the ninth century as a method of whitening ceramics to allow for better decorative surfaces (Noël Hume 2001). This tradition quickly spread to other areas of the Mediterranean as Italian *Maiolica* and Spanish *Majolica* and was exported to northern Europe by the sixteenth century. Although the basic technique remained consistent, decorative styles were heavily influenced by cultural regionalism and are marked by differences in clay sources and therefore clay color, as well as motif and color preferences.

In an effort to interpret these regional differences, archaeologists have commonly assigned ware type names to track these differences. Thus, tin-glazed wares from France are known by most archaeologists as *Faience* and consist of a buff-to-salmon or pink paste with a thick bluish-to-cream tin glaze and, most commonly, blue decoration. Polychrome versions tend toward the subdued earth tones. Iberian wares from Spain, Portugal, Mexico, and the Caribbean basin are known as *Majolica*. These buff-to-tan bodied vessels are characterized by a thick tin glaze often with bright polychrome decorations. Those *Majolicas* of Iberian origin portray a distinct Moorish or Arabic influence, often with Arabic lettering as a central motif. *Majolica* of Caribbean or Central American manufacture exhibits a very clear shift in decorative style to include Aztec and other regional variations. Tin-glazed earthenwares from Holland and England are today known colloquially as *Delftware* based on the Dutch city in which they were traditionally manufactured. Although there has been a move away from this regional naming typology, many analytical sources still reference the data in this fashion. All of the tin-glazed earthenwares recovered from the Roosevelt Inlet Shipwreck site fall into the Northern European or English categories.

Determining origin of manufacture for *Delftware* is problematic due to a number of factors. Primarily, Dutch potters migrated to England in the sixteenth century, many in an attempt to escape religious persecution, bringing with them their pottery traditions (Noël Hume 2001). Both decorative motifs and the bright Dutch color palette became part of the English *Delftware* manufacturing technique. During the Commonwealth period, *Delftware* was produced with little or no decoration as a reflection of the austere Cromwellian tastes. Following the restoration of the monarchy in 1660, bright polychrome enamels and cheerful blue and white patterns once again adorned this ware. While similarities in decoration as well as contemporaneous manufacture centers in both Holland and England can make it very difficult to determine point of origin without resorting to clay sourcing through chemical analysis, changes in motif as well as use of color can be used as attributes to refine date ranges for *Delftware* of the post-Restoration period. For the purposes of this study, decorative motif and color was used as the primary temporal markers as outlined in the work of Mary Shlasko (1989) and the Diagnostic Artifacts in Maryland webpage of the Jefferson Patterson Museum's Archaeological Conservation Lab (http://www.jefpat.org/diagnostic/Historic_Ceramic_Web_Page/Historic%20Ware%20Descriptions/tin_glazed.htm).

Delftware potters established themselves at manufacturing centers in England, Scotland, and Ireland. These centers were in Lambeth (London), Bristol, and Liverpool in England, Glasgow, Scotland and in Dublin, Ireland (Maryland Archaeological Conservation Lab 2002a). The majority of Delftware manufacture ended circa 1800 with the exception of drug or apothecary jars. These thick-walled, cylindrical vessels continued to be made well into the nineteenth century (South 1977).

Of the 655 sherds identified as tin-glazed, all appear to be either Delftware or Faience. Definitive origin of manufacture cannot be ascertained without further study; however, photographic analysis by subject matter experts in England suggest that many of the vessels are of Low Country French or Netherlands production (Davey personal communication 2010, see Appendix F). The vase and flowers motif seen in Figure 6.49 appears very similar to pieces shown in *Nederlandse Majolica* by Dingeman Korf (Haarlem 1981, Davy personal communication 2010, see Appendix F). Further scholastic research is encouraged as this collection provides an excellent closed context for study. Analysis to determine MNI based on vessel bases has recognized at least 95 separate vessels (see Appendix G, Table G-2 for the inventory of this analysis). Seventy-one of these are plates, 22 are bowls, and two are pharmaceutical jars. Seventy-four vessels are blue-painted, three are polychrome-painted, and 14 are purple. The remaining four are plain. Design motif varies. Twenty-four have been identified as Chinoiserie or Chinese-like. Of these, seven have been identified as Oriental landscape which has a date range of manufacture of 1671-1788. Twelve have been identified as Chinese Floral which has a manufacture range of 1669-1793. Fourteen non-Chinoiserie vessels have been identified as plain bordered or rim lined which dates from 1729 to 1793.

Analysis to determine MNI based on rim styles and decorations indicate at least 180 individual vessels are present in the collection (see Appendix G, Table G-3 for the inventory of this analysis). Forty vessels with rims are bowls, 135 are plates, and 5 are shallow bowls or saucers. Colors are varied. Of the 180 vessels, 140 are blue painted, eight are blue and yellow polychrome, seven are polychrome, and 20 are purple. Five rims are plain. Motifs on the rim fragments were similar to the vessel base fragments. Two are identified as Oriental landscape (1671-1788) and 28 have been identified as Chinese Floral (1669-1793) out of the total of 51 Chinoiserie decorated vessels. Fifty-three vessels are plain line bordered (1729-1793). The remainder contains variations of trellis-and-dot, trellis-and-fruit, fern, and flowers-in-urn. The known date ranges place the assemblage firmly in the eighteenth century for range of manufacture. *Terminus post quem* (TPQ), or date after which the deposition must have occurred, is 1729 based solely on tin glazed earthenware. Figure 6.49 is a photograph and Figure 6.50 is a detailed drawing of an intact tin-glazed plate with a blue painted flower in urn pattern. Figure 6.51 is a purple floral-painted sherd, and Figure 6.52 is a polychrome-painted bowl fragment. Figures 6.53-6.71 are examples of individual motifs from the Roosevelt Inlet Shipwreck site collection. Tin-glazed sherds seen in Figures 6.58, 6.68 and 6.69 are very similar to vessel sherds recovered from the Convento Dominicos site in San Juan, Puerto Rico. These sherds are identified as being Blue on White Delftware of English or Dutch origin and date between 1630 and

1790 (Type 2528 and 2529, FLMNH Digital Type Collection 2010). Figure 6.63 is very similar to Plate #120 in the Florida Museum of Natural History Collection. This sherd is identified as a Brittany Blue on White Faience vessel recovered from the Santa Rosa Pensacola site in Escambia County, Florida. This type dates between 1750 and 1765 and is of French manufacture. Further research should be carried out to study the motifs thus far identified in an effort to more conclusively determine the origin of manufacture for this ware type.



Figure 6.49. Intact tin-glazed earthenware plate with blue painted flower-in-urn pattern (2006.33.162).



**Figure 6.50. Detail illustration of tin-glazed earthenware plate (2006.33.162)
(by Sharyn Murray).**



Figure 6.51. Purple Floral motif tin-glazed earthenware (2006.33.168).



Figure 6.52. Polychrome-painted tin-glazed earthenware bowl fragment (2006.33.149).



Figure 6.53. Blue Fern motif tin-glazed earthenware (2006.33.139).



Figure 6.54. Blue Fern and Flowers in Urn motif tin-glazed earthenware (2006.33.155).



Figure 6.55. Blue Fern and Flowers motif with Scallop border tin-glazed earthenware (2006.33.197).



Figure 6.56. Blue Floral motif tin-glazed earthenware (2006.33.149).



Figure 6.57. Blue Flower and Fern motif tin-glazed earthenware (2006.33.208 and 2006.33.221).



Figure 6.58. Blue Flowers with Foliage and Stars motif tin-glazed earthenware (2006.33.223).



Figure 6.59. Oriental Landscape motif tin-glazed earthenware (2006.33.207).



Figure 6.60. Landscape with Figure motif tin-glazed earthenware (2006.33.220).



Figure 6.61. Oval Border and Floral motif tin-glazed earthenware (2006.33.146).



Figure 6.62. Plain Border and Circular motif tin-glazed earthenware (2006.33.134).



Figure 6.63. Plain Border with Blue Line motif tin-glazed earthenware (2006.33.156 and 2006.33.162).



Figure 6.64. Plain Border and Floral motif tin-glazed earthenware (2006.33.210).



Figure 6.65. Oriental Scroll and Flower motif tin-glazed earthenware (2006.33.196).



Figure 6.66. Scroll, Fern, and Flower motif tin-glazed earthenware (2006.33.189).



Figure 6.67. Squiggled Lines motif tin-glazed earthenware (2006.33.167).



Figure 6.68. Trellis-and-Dot Border motif tin-glazed earthenware (2006.33.199).



Figure 6.69. Trellis-and-Dot with Floral Border motif tin-glazed earthenware (2006.33.200).



Figure 6.70. Trellis with Dot, Scroll, Fern, and Flower motif tin-glazed earthenware (2006.33.190).



Figure 6.71. Trellis and Floral Border motif tin-glazed earthenware (2006.33.192 and 2006.33.198).

Refined Earthenware

Few varieties of refined earthenware vessels have been recovered from the October 2006 excavations at the Roosevelt Inlet Shipwreck. Josiah Wedgwood, working with Thomas Whieldon, produced a ceramic with a cream colored, finely ground and mixed paste as early as 1759. This ware, sometimes called Whieldonware and often covered with a mottled or tortoiseshell glaze, is only represented at the site by a single utensil handle which is shown in the cutlery section below. Creamware, first patented in 1762 by Wedgwood at Burslem, Staffordshire, England and manufactured until approximately 1820, was the culmination of the attempt to mimic Chinese porcelain and therefore expand the marketability of English made ceramics (Noël Hume 1969, 2001). Five hundred twenty-three (523) examples of this ware were identified by the State of Delaware analyst from the October 2006 collection. All but one sherd is plain. This press molded fragment has been identified as the Royal pattern (1762-1820) and is shown in Figure 6.72 below (Maryland Archaeological Conservation Lab 2002b; South 1977).

Later evolutions of this ware include Pearlware, a cream-colored body with cobalt added to the glaze to create a more white appearance; ironstone, a more dense and thicker variant of refined earthenware first patented in 1813; and Whiteware, (not to be confused with the coarse earthenware of the same name) the first truly white bodied refined earthenware. Whiteware overtook the mainstream ceramic market after 1830 and continues to be produced today. No examples of Pearlware, Whiteware, or ironstone have been identified in the Roosevelt Inlet Shipwreck 2006 excavation assemblage.



Figure 6.72. Royal pattern creamware rim fragment (2006.33.204).



Figure 6.73. Vessel base with foot ring (2006.33.220).

Vessel base analysis was used to determine MNI for this ware type. This analysis indicates that at least 44 vessels are present in the data (see Appendix G, Table G-4 for the inventory of this analysis). Of these, 22 are bowls, 10 are cups, and one has been identified as a saucer. The remainder of fragments in the collection is not identifiable as to form. One vessel foot ring has a beaded decoration on the exterior. Figure 6.73 is a vessel base sherd with a foot ring.

Stonewares

Several types of stoneware vessels have been recovered from the October 2006 excavations at the Roosevelt Inlet Shipwreck. This dense and high-temperature fired ceramic was first produced in the late thirteenth or early fourteenth century in the Rhine Valley area between the Meuse and Rhine Rivers (Noël Hume 2001). Sometime in the fifteenth century, salt-glazed stoneware was invented or discovered. This process, in which salt is added to the kiln during the firing process, creates a harder, shinier glaze. Distinctively and finely pitted to the consistency of an orange peel, this sturdy ceramic became the work horse of the pottery world. Thrown into a variety of utilitarian forms (jug, jar, pot, bowl, plate, cup, and mug shapes), stoneware quickly spread across the European landscape.

Naturally gray in color, further changes in technology led to the addition of an iron-oxide slip at the end of the fifteenth century which created a uniform brown color. Following the Thirty Years' War (1618-1648), stoneware potters in the Rhenish tradition had relocated to the Westerwald region of Germany, bringing their technological advances with them. As a result, the distinctive gray bodied, cobalt blue decorated stoneware, first created in Raeren, has today become known to archaeologists as Westerwald and can be found in archaeological contexts throughout Europe and across the world at colonial sites. Figure 6.74 is an example of this style of German stoneware. In addition to the Westerwald ceramics, Rhenish potters were also famous for their so called Bartmann bottles (also known as Beardman or Bellarmine), which were decorated with a bearded face sprig-molded onto a narrow neck, opposite to a handle. Coated with an iron-oxide slip, salt-glazed, and mottled brown in color, these bottles were first manufactured in the Frechen region. The earliest example is dated 1550. Rhenish potters continued to hold the monopoly on stoneware until the late seventeenth century. British bans on importation of "painted earthenwares" in 1672 excluded German stoneware. At that point in time England did not have a stoneware production industry (Noël Hume 1969, 2001).

In 1671, John Dwight began producing stoneware in England. Working in Fulham, Dwight produced a range of stonewares from crude to fine. Fulham became synonymous with English stoneware, to the point that many collectors still refer to the wares by that name. Typically mottled brown, this stoneware is common on American archaeological sites from 1690 to 1775. In addition to the mottled brown "Fulham" style stoneware, other English types are the smooth, almost leather-like satin finish Nottingham brown, gray bodied white slipped, salt-glazed wares, and finally, the totally white bodied, salt-glazed stoneware that stole the tableware market from the more fragile and bulky Delft tin glazed earthenwares discussed earlier.

White salt-glazed stoneware could be block pressed into very thin walled, delicate tea cups, teapots, saucers, bowls, plates, chargers, and all other forms of tableware, as well as more sturdy forms such as jugs and chamber pots. Elaborately decorated basket-weave, pierced, and painted examples can be found in museums today. Block pressing also allowed for uniformity in design and edge-molded patterns began to appear. Dot, diaper-and-basket, barley, feather edged, and bead and reel are just a few of the patterns that developed. These molds carried over into the production of cream colored wares such as creamware and Pearlware and were immensely popular in both Europe and the colonies. Figure 6.75 is an illustration of these press molded designs (Noël Hume 1969:116).



**Figure 6.74. Examples of Westerwald stoneware tankards with copper alloy lids.
(Source: Noël Hume 2001)**

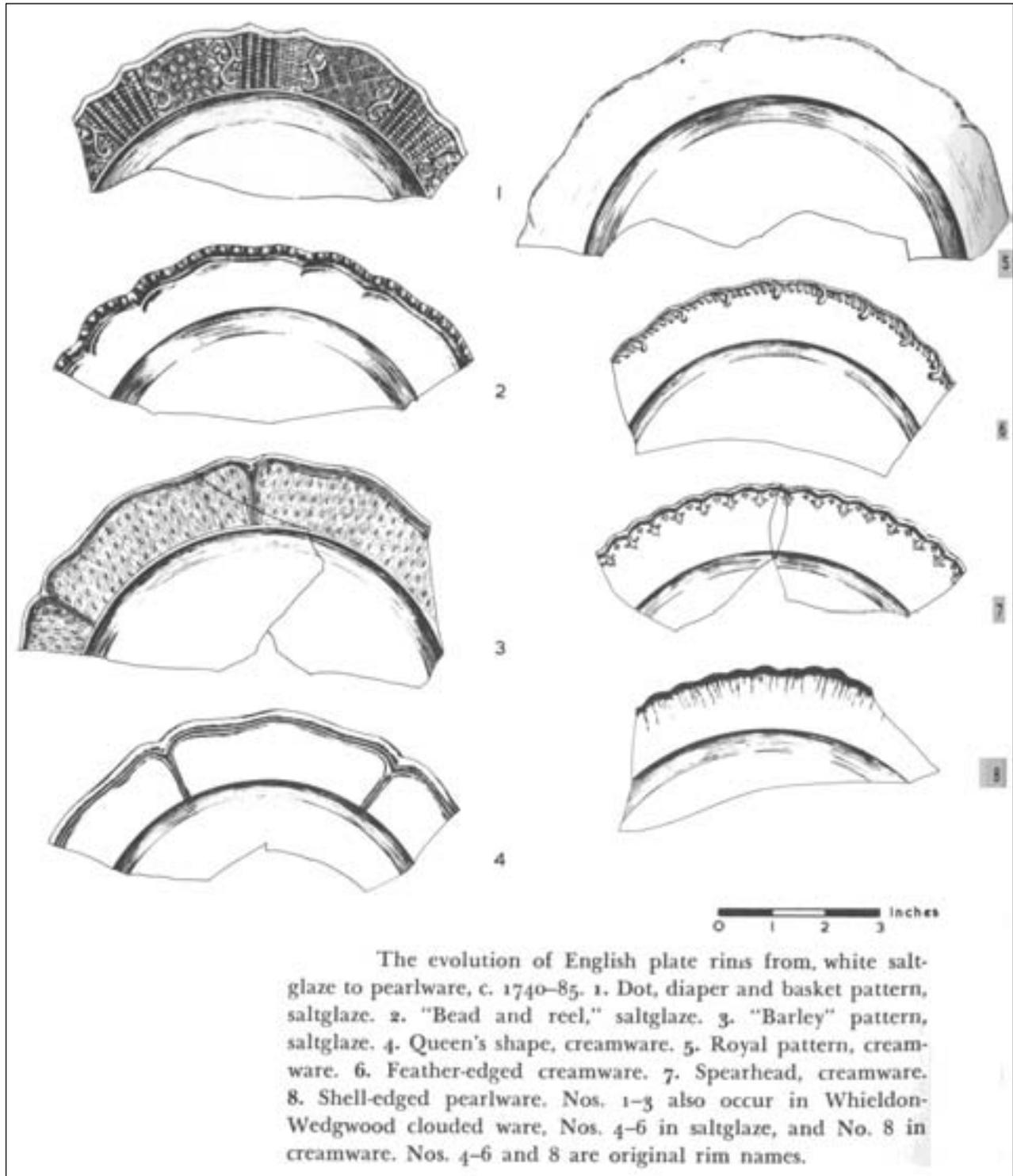


Figure 6.75. Examples of press molded plate rims through time.
 (Source: Noël Hume 1969:116)

Five thousand seven hundred eighty-six (5,786) pieces of stoneware were recovered from the Roosevelt Inlet Shipwreck in the October 2006 excavations. Of these 2,713 were brown salt-glazed bottles or bottle fragments, 376 were sections of brown salt-glazed stoneware storage jars, and three were dry-bodied pieces weighing 4.64 g. Also recovered were 119 blue and gray fragments of the Westerwald tradition as well as 2,500 sherds of stoneware mineral water bottles. In addition, there were 63 sherds of an unidentified stoneware type and 10 fragments of white salt-glazed stoneware.

Brown Salt-glazed

Brown salt-glazed vessels were recovered in both bottle form and wide-mouth storage jars. Fragments were identified as to vessel section. There were 145 bottle base fragments, and 2,384 body, 26 handle, 10 handle/neck/finish, 45 neck/finish, 22 neck/handle, and 77 undetermined form sherds recovered. After minimum number of individual (MNI) analysis had been carried out on the bottle bases, it was determined that at least 125 separate bottles are represented in the collection, including four complete bottles. Figure 6.76 illustrates one of the complete bottles. Appendix G, Table G-6 is an inventory list of the vessel base MNI analysis.

Similar examination of the necks/finish fragments revealed 38 individual bottle finishes were present. The full analysis inventory for the MNI by vessel neck is presented in Appendix G, Table G-7. The MNI analysis inventory tables also include information regarding interior glaze/slip attributes and location of recovery.

The brown salt-glazed bottles may be of Rhenish or English origin. They have a globular body, handle, and incised lines around the neck and on the handle (Figure 6.77). Two of the bottles have partial Bartmann faces on them (2006.33.139 and .229, Figures 6.78 and 6.79) which, according to Gaimster (1997) were not a continued part of the English brown bottle tradition after the beginning of the eighteenth century (Glenn 2002; Maryland Archaeological Conservation Lab 2002c). Bartmann jugs were produced between the mid-sixteenth and mid-eighteenth centuries (Thwaite n.d.). These jugs were produced in Germanic areas of Europe and were widely distributed; similar jugs to those recovered from the Roosevelt Inlet site were also found at the *Avondster* site, wrecked in 1659 in Sri Lanka (Maritime Lanka 2003) and the *Vergulde Draeck*, wrecked in 1656 on the Western Australian coast (WAMM n.d.). In addition to the Bartmann faces, several of the bottles were marked with what has been identified as capacity marks. One is marked with a “2”, four are stamped with the number “3” (including two of the intact bottles), and six display the number “4”. Figure 6.80 illustrates an example of one capacity mark. It should be noted that none of the brown stoneware bottles had corks *in situ* and they may represent provisions for the crew aboard the vessel or empty containers being carried as cargo. A full inventory of all identified marks on brown salt-glazed stoneware bottle fragments is tabulated in Appendix G, Table G-5.



Figure 6.76. Complete brown salt-glazed stoneware bottle (2006.33.187).



Figure 6.77. Brown salt-glazed stoneware bottle fragment with handle and incised lines (2006.33.226).



Figure 6.78. Brown salt-glazed stoneware bottle fragment with partial Bartmann face (2006.33.139).



Figure 6.79. Brown salt-glazed stoneware bottle fragment with partial Bartmann face (2006.33.229).



Figure 6.80. Capacity mark (2006.33.185).

A total of 364 brown salt-glazed stoneware wide-mouth storage jar vessel fragments were recovered during the October 2006 excavations. There were 38 bases, and 283 body, eight handle/neck/rim, and 35 neck/rim fragments recovered. Analysis to determine MNI was based on rim and base morphology, color attributes, and refitting/mending of vessels. A total of 68 vessels were revealed by this study. The inventory of MNI vessels with details of this analysis is presented in Appendix G, Table G-9.

These wide-mouth jars are slightly ovoid with a constricting or narrowing of the orifice directly below the rim. Laterally attached handles were applied to the neck immediately below the rim. As with the bottles, incised bands or lines were noted under the rim. One jar bears a “1½” mark that may be a capacity stamp. Others have floral stamps, rouletted stamps, or stars. Figures 6.81-6.85 detail features of these artifacts. See Appendix G, Table G-8 for a full listing of these marks.



Figure 6.81. Brown salt-glazed stoneware wide-mouth jar with handle and incised lines (2006.33.183).



Figure 6.82. Incised lines and shield-like stamp (2006.33.204).



Figure 6.83. "1½" Capacity mark and incised lines (2006.33.166).



Figure 6.84. Rouletted stamps and incised lines (2006.33.187).



Figure 6.85. Stars and incised lines (2006.33.126).

Rhenish Blue and Gray

German (Westerwald) blue and gray stoneware represents only 2.1 percent of the overall stoneware assemblage recovered during the October 2006 excavations. The collection consists of 11 basal fragments, and 87 body, five handle, nine rim, and eight undetermined sherds. One of the sherds has a spout and may represent a pitcher. Vessel shapes have only minimally been determined within this collection. Further research may provide additional information regarding this ceramic type in the collection. At least two chamber pots, two storage jars, two salt pots, and one jug rim have been identified thus far.

Decorative motifs on the Westerwald stoneware are varied within the collection. Cobalt blue is common, with horizontal bands, geometric designs, or floral patterns. One sherd is gray and manganese purple decorated rather than cobalt blue (Figure 6.86). The use of manganese purple on these vessels dates from 1650-1775 (FLMNH Digital Type Collection 2010). Figures 6.87-6.89 offer views of recovered German blue and gray pottery from the Roosevelt Inlet Shipwreck site. Incised designs include rosettes, flowers, a partial stag leg, and geometric patterns, lines, checkerboard, and circular patterns. Stamped floral and other indiscernible designs are also found in the collection. Analysis for MNI concluded that at least 20 separate vessels are represented by the collection (see Appendix G, Table G-10 for a full inventory and details of this analysis).



Figure 6.86. Gray and manganese purple decorated Westerwald stoneware (2006.33.195).



Figure 6.87. Gray and cobalt blue Westerwald stoneware with incised decoration (2006.33.215).



Figure 6.88. Gray and cobalt blue Westerwald stoneware with incised and painted floral motif (2006.33.215).



Figure 6.89. Gray and cobalt blue Westerwald stoneware with incised decoration (2006.33.218).

Mineral Water Bottles

Mineral water bottles from at least two bottling companies in Germany were recovered from the wreck site. Numerous bottles marked “Tolles” or “Selters” on cartouches just below the neck were collected throughout all phases of work at the site (Figures 6.90 and 6.91). Selters is the dominate mark on these bottles (See Table G-11 for a detailed list). German mineral water was thought to possess therapeutic properties and to aid in digestion. The acidic water was popular throughout Europe and the colonies and saw a thriving trade. Packaged in salt-glazed stoneware handled jugs or bottles, whole cases were loaded for shipment. One cache of bottles found during the October 2006 excavations seemed to still be arranged in a case-shaped pile.

In addition to having the name of the bottling company stamped on the seal, these bottles also were stamped with the well number from which they were filled and the town from which they were shipped. Additional research in Germany may reveal much more information regarding this collection of material. Figure 6.92 is a detail of two “Selters” marks with the letters “HS” stamped underneath. Details on the 104 marks noted in this collection as well as attributes such as interior and exterior glaze colors and paste colors, and the presence or absence of a painted ring around the seal are tabulated in Appendix G, Table G-11.



Figure 6.90. Mineral water bottle with "Selters" mark (2006.33.216).



Figure 6.91. Mineral water bottle fragments with "Tolles" mark (2006.33.139 and 2006.33.149).



Figure 6.92. Mineral water bottle fragments with "Selters" mark and "HS" stamp (2006.33.215 and 2006.33.205).

Research into diagnostic characteristics of German mineral water bottles reveals that both vessel shape and glaze characteristics changed over time. According to Dutch archaeologist Michiel Bartels, with the State Service for Archaeology in Amersfoort, The Netherlands, the mid-eighteenth century saw changes in both for these bottles. His research indicates that around 1750 these bottles became more bullet-shaped and saw a decrease in strap handle size. The overall size of the bottles also changed from 30-35 cm in height to 25-30 cm in height. The exterior glaze color was buff-to-white. Only one intact bottle has been identified from this collection. It has a height of 26.93cm and therefore falls comfortably into the post-1750 size range.

After 1780, brown bottles become predominant, and the seals have a cobalt blue or manganese purple ring around them. These bottles have typically have wire marks on the base from the clay being cut off the wheel (Bartels 1998). Figure 6.93 shows the base of a brown mineral water bottle recovered from the wreck. Note the wire cut marks in the clay and the presence of a foot ring which, according to Bartels (1998), are no longer extant on mineral water bottles after 1780. After 1800 the bottles are almost cylindrical, and by the second quarter of the nineteenth century their sides are vertical.

Another change was a requirement in 1780 that all jug bakers mark their wares with not only their city designation but also their assigned manufacturer number (Nienhaus n.d.:54). Bartels (1998) suggests that while the jug baker's mark was required after 1780, examination of bottles from the Saucerborn source (circa 1770-1780) reveal that maker's marks were in use prior to that date. Several of the bottle fragments recovered from the Roosevelt Inlet Shipwreck appear to have this mark, inscribed in wet clay below the city letter designation. Figures 6.94 and 6.95 are photographs of the intact water bottle and its mark; note the inscribed "R" and below it, "126". "R" is for Ransback/Westerwald and the "126" should be the jug baker's number. Additional research into these marks and their temporal connection should allow for a tighter date range to be established for the vessel.

Two-hundred twenty (220) base, 2,044 body, 93 handle, 49 neck/finish, 67 neck/handle, and 26 undetermined mineral water bottle sherds were collected in addition to the single complete bottle. Analysis to determine MNI by examining base fragments revealed that at least 169 vessels are represented in the collection. An analysis of neck/rims indicated that at least 62 bottles are represented by their finishes. Appendix G, Tables G-12 and G-13 details this analysis with a full inventory of the mineral water bottle bases and necks present in the collection.

Of the ten white salt-glazed stoneware sherds recovered, four were base fragments. The collection also includes one body and five rim sherds. All appear to be fragments of flatware: saucers, plates, or chargers. Six of the 10 were edge-molded. Decorations include combinations of lattice-with-star, wicker, floral, and dot-and-diaper. Figure 6.96 provides examples of the artifacts in this group. A full inventory of the white salt-glazed stoneware recovered is presented in Appendix G, Table G-14.



Figure 6.93. Base of a mineral water bottle recovered from the Roosevelt Inlet Shipwreck showing wire cut-off marks.



Figure 6.94. Whole mineral water bottle (2006.33.097).



Figure 6.95. Mineral water bottle with Selters mark, "R" and "126"; front view detail of marks (2006.33.097).



Figure 6.96. Examples of white salt-glazed stoneware sherds.

Porcelain

Originally of Oriental manufacture, this highly vitrified ceramic was found to be hard to duplicate by European potters throughout the seventeenth and early eighteenth centuries. Attempts to mimic the qualities of fine, ultra-white porcelain drove the tin-glazed, white salt-glaze stoneware, and refined earthenware technologies forward. Porcelain found in early eighteenth-century archaeological contexts in America is typically of Chinese or Japanese manufacture. In 1709, the formula for feldspar-based porcelain was discovered by potters in Meissen, Germany (Rijksmuseum Amsterdam 2010). After that date, hard-paste porcelains from Germany and France began to appear. Hard-paste porcelains were not manufactured successfully in England until around 1770.

English soft-paste or false porcelain began to be manufactured early in the eighteenth century. Not as vitrified or glass-like as true porcelain, the English-made ceramic tends to degrade in the ground and is often found to be chalky and brittle. English porcelains are classified based upon their mineral constituents. These include bone-ash, soapstone, glassy (lead), and hybrid mixtures. Different pottery houses used these minerals in varying proportions, and recipes changed through time. Through X-ray diffraction and chemical analysis, it may be possible to determine conclusively the factory from which the pottery came, and possibly the general period in which it was manufactured. Worcester porcelain from the 1750s, for example, contains a lead-free soapstone mixture (Owen 2007:121-138).

The British attempt to mimic Oriental porcelain was not limited to the paste, however. Design motifs were often directly lifted from Chinese or Imari (Japanese) styles. Often, late eighteenth-century English porcelain, which would have come from either the Bow, Caughley, Liverpool or Worcester potteries, is blue-painted or printed underglaze and then red-painted overglaze and is very similar in a cursory glance to Chinese pottery produced for the export market (Deagan 1987; Noël Hume 1969, 2001).

Twenty-four fragments of porcelain were recovered at the Roosevelt Inlet Shipwreck during the October 2006 excavations. Of these, seven are vessel base sherds, eight are body, seven are rim, and three are undetermined as to vessel section. Forms present include teacups, baskets, bowls, and saucers or plates in a variety of motifs. Ten fragments are identified as having a floral motif while one has an oriental figure in blue. Appendix G, Table G-15 details the analysis for this material.

Research into one maker's mark, a blue crescent moon, found it to be most likely either from the Worcester Porcelains Factory, post-1751 or the Caughley Works, circa 1775-1799 (Godden 1991). Both companies used the crescent symbol. Further examination of the mark may determine if it is a hand painted mark or a transfer printed one. Figure 6.97 is an example of red-painted overglaze porcelain. Figure 6.98 is of an Oriental figure hand painted in blue on one fragment, and Figure 6.99 is a view of the single maker's mark found. Figure 6.100 is an example of brown-painted and molded porcelain and Figure 6.101 shows the open fret work basket recovered from the 2006 excavations.

Comparatively, porcelain from the *Machault* (1760) appears to be of solely Chinese exports while the porcelain recovered during excavations at the *General Carleton* (1785) were most likely of English manufacture. Definitive identification of the porcelain from the Roosevelt Inlet Shipwreck would help narrow down the probable date range of when the vessel sank (Ossowski 2008; Sullivan 1986).



Figure 6.97. Examples of red-painted overglaze porcelain (2006.33.185 and 2006.33.229).

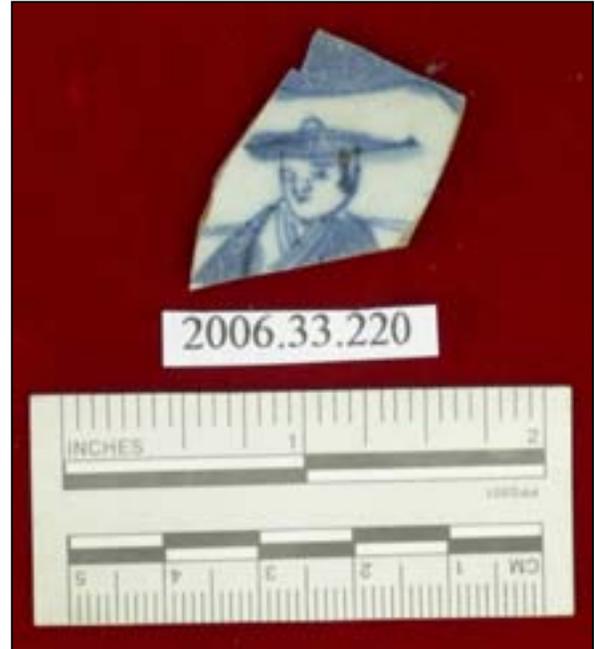


Figure 6.98. Hand painted Oriental figure on porcelain (2006.33.220).



Figure 6.99. Crescent shaped maker's mark on porcelain.



Figure 6.100. Brown-painted and molded porcelain fragments.



Figure 6.101. Open fret work basket (2006.33.219).

Glassware

Large-scale commercial production of glass began in Europe during the fifteenth century. Glass quickly became popular for storage, food service, and decoration. Several types of container glass, as well as a variety of table and service wares were recovered during the excavations at the Roosevelt Inlet Shipwreck, and discussions about the various types of glasswares follow.

Wine/Spirit Bottles

The primary change in European bottle glass was that of form. Bottle shapes have evolved from the bulbous “onion” bottle of the sixteenth and seventeenth centuries to the cylindrical shapes of the mid-eighteenth century and later. Cylindrical bottles tend to have long narrow necks above round shoulders and usually have an applied string finish during this time period. Once the bottle neck was formed, a lip or rim was created using a string of molten glass. This lip allowed the cork or other closure to be firmly attached to the bottle by use of wire or string. These bottles were used as containers for a variety of beverages, not just wine. Beers (including ales and porters), distilled alcohols such as whiskey, rum, and gin, and non-alcoholic liquids such as vinegar, and mineral water were also shipped, stored, and often aged in these vessels (Jones 1986:17; Jones and Smith 1985).

Evolution in shape has been led mainly by changes in manufacturing technique. Early mouth-blown bottles were shaped purely by hand tooling and rolling on a marver. Single-piece dip molds began to be used in the early eighteenth century and were common by 1730. Bottles made in this style were by nature either straight or narrower at the bottom than the top so that they would slip free of the mold. Thus, cylindrical bottles became the norm. Figure 6.102 shows cylindrical wine and beer bottles of the eighteenth century (Jones and Smith 1985:17).



Figure 6.102. Cylindrical beer (a and b) and wine (c and d) bottles of the eighteenth century. (Source: Jones and Smith 1985:17)

English, Dutch, and French bottle forms evolved from these technological changes, but the English led the industry. This fact, coupled with the reuse of bottles over time, can make determining the date of use difficult. Figure 6.103 shows a schematic of a bottle and corresponding anatomical names. Careful study of the basal profiles, height ratios, and lip characteristics help determine a date range of manufacture for the cylindrical bottles recovered from this site.

Bottle finish characteristics such as lip style, applied string rim shape, and bore profile change over time with technological advancements. Olive R. Jones' (1986) exhaustive study of cylindrical bottles, *Cylindrical English Wine and Beer Bottles 1735-1850*, provides a typological framework for establishing temporal placement based on finish and lip morphology. Additional study of the finish and lip morphology on the bottles recovered from this wreck may yield significant information as to the date of manufacture.

One thousand six hundred ninety-six (1,696) cylindrical or round olive green bottles glass fragments were recovered from the October 2006 excavations. Of these, 1,396 are body fragments, 191 are base fragments, 99 are neck or finish fragments, and 10 are undetermined. A minimum number of individual (MNI) vessels has been calculated by mending bases where possible and then counting the remaining reconstructed vessel bases with the knowledge that all bottles have a base and no bottle has two. Appendix G, Table G-16 details this analysis. A total of 101 vessels are represented by this assemblage, with a range in color from olive green (n=35), amber-olive (n=35), blue-green (n=9), and dark olive green (n=21). Bottle finish MNI analysis revealed that at least 32 bottles are represented in the collection (by neck and rims). Appendix G, Table G-17 details this analysis and provides additional attribute information such as bore diameter and color. Based solely on color, one may infer that both Dutch and English vessels are represented, but further study is recommended before any determinations can be made. Figures 6.104 and 6.105 show examples of bottle fragments from this category.

In addition to round or cylindrical bottles, case (or square) glass bottles, are common to the seventeenth and eighteenth centuries (Figure 6.106). Often referred to as "gin" bottles, these large square bottles were originally manufactured by blowing glass gobs into a square box or case shaped by nailing boards together. This method of manufacture was superseded by the early eighteenth-century invention of the dip mold discussed earlier. Case bottles generally have rounded shoulders and a squat neck with an applied lip. As with cylindrical bottles, style differs between manufacturing centers, but the differences are subtle. Dutch bottles generally are larger at the top and narrower at the bottom and range more toward the amber-olive/yellow-olive color than do English case bottles. Eighteenth-century case bottles tend to be fairly straight in profile with only a slight taper and have arched basal profiles which create a four-point resting surface. Later bottles (post-1860) exhibit a more distinctive tapered shape and flat basal profile (Noël Hume 1969; Jones and Smith 1985).

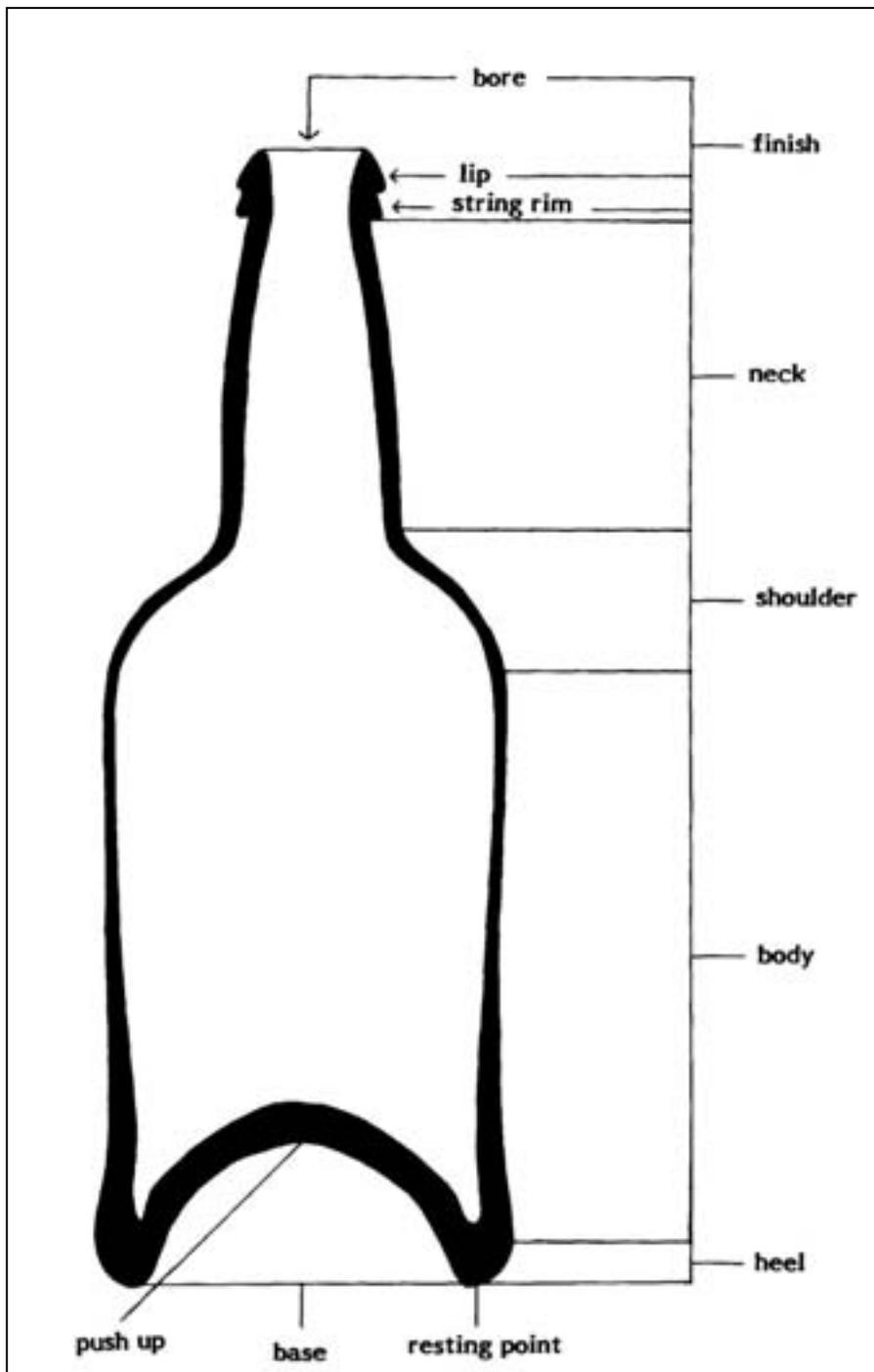


Figure 6.103. Schematic showing the anatomy of a cylindrical wine/beer bottle. (Source: Jones and Sullivan 1989:77)



Figure 6.104. Olive green bottle bases.



Figure 6.105. Olive green bottle neck and lip (2006.33.155).



Figure 6.106. Case of square bottles.
(Source: Neumann and Kravic 1989:49)

Four thousand four hundred and fifty-one (4,451) case bottle fragments have been recovered from the October 2006 excavations. Of these, 3,870 are body fragments, 202 are base fragments, 38 are neck/finish fragments, 190 are shoulder fragments, and 151 are undetermined. Analysis to determine MNI for case bottles revealed that at least 81 bottles are represented by this collection (Appendix G, Table G-18). Bottle finish MNI analysis revealed that at least 27 bottles are represented in the collection (by neck and rims). Table G-19 in Appendix G details this analysis and provides additional attribute information such as bore diameter and color. The color range is similar to the cylindrical bottles with blue-green (n=5), blue green-dark olive green (n=2), dark olive green (n=9), olive green (n=17), and olive-yellow (n=48). In addition to color, vessel shape was considered to be diagnostic. Of the 81 bottles identified, only 41 could be determined as to profile. All of these bottles were determined to be tapered and more narrow at the bottom. Both color and shape seem to indicate a possible Dutch origin for the case bottles from this site (Bureau of Land Management 2010; Noël Hume 1969). Figures 6.107-6.109 show examples of case bottles recovered from the Roosevelt Inlet Shipwreck.



Figure 6.107. Case bottle base, bottom view (2006.33.227).



Figure 6.108. Case bottle base, side view (2006.33.145).



Figure 6.109. Case bottle shoulder, neck, and lip, side view (2006.33.189).

Other Bottles

Bottles were used for more than wine or spirit storage, however. Many things were stored in bottles from condiments and sauces to medicines and pharmaceuticals such as elixirs. The great upswing in patent medicines came during the nineteenth century and brought with it an explosion in bottle form and number. Other bottle fragments recovered from the wreck site are few (n=87) and non-diagnostic with 13 aqua-colored body fragments, four dark green fragments (all are neck/finish pieces), three light green body fragments, one olive green very thin fragment, and two clear basal fragments. Also recovered but not determined to be round were one light green curved glass fragment, four light blue curved fragments, and six clear flat bottle fragments. Figure 6.110 shows examples of light blue glass recovered from the wreck; Figure 6.111 illustrates the very thin olive green glass.



Figure 6.110. Light blue glass (2006.33.178).



Figure 6.111. Very thin olive green glass (2006.33.177).

Tableware

In addition to container glass, a variety of table and service wares were recovered as well. As with other forms of glass manufacture tablewares came out of the furnaces of Venice. By the seventeenth century, centers for table glass production had sprung up in the Rhine Valley and later in England, France, Holland, Bohemia, and Antwerp. Revolutions in the glass industry, specifically the introduction of lead into the glass mix by Englishman George Ravenscroft in 1676, created a new alternative to the standard glass. This new and brilliantly clear glass served as a foundation for new styles and forms in glass tableware.

Stemware

Eighteenth-century stemware evolved out of the Venetian and Rhenish styles. Bowls were most often trumpet-shaped and the foot, which had been made of folded glass in the seventeenth century, became a single molded piece. Stems themselves provide the glass researcher with the most effective method of determining the age of the vessel. At the beginning of the eighteenth century glass tableware reflected the elaborate and heavy baroque designs that were popular in furniture and architecture. Stems were constructed of hollow knobs and balusters with buttons and collars. This transitioned into cleaner balusters and into airy, Rococo-inspired designs as the century progressed. By the mid-eighteenth century stems had evolved into clean, single solid baluster designs. Decoration of these simpler stems became more elaborate with an air twist (by 1745), cut pattern (by 1760), and single or double tear drops (by 1745). Etched or wheel-engraved designs on the bowls began to appear by mid-century and are found with increasing prevalence after 1740 in archaeological contexts within the United States (Noël Hume 1969:194, Jones and Sullivan 1989).

A variety of stemware styles are represented in the assemblage from the Roosevelt Inlet Shipwreck. One hundred twenty-three (123) fragments representing an MNI of 73 vessels were identified as stemware in the October 2006 collection. All are colorless glass, and 30 have decorated bowls. Twenty of these are wheel-engraved with a range of motifs; six are molded, three with Wrythen ribbing (a fine molded rib creating a spiral design); one was identified as a Lynn glass (Figure 6.112); and three are etched and molded. Thirteen stems were identified in the collection. Of these ten are



Figure 6.112. Left: Example of a “Wrythen” ribbed goblet. This goblet dates to c. 1760. (Source: <http://www.trocadero.com/stores/scottishantiquesinc/items/925101/item925101.html>) Right: Example of a “Lynn” glass. (Source: <http://www.museumoflongdon.org.uk>)

decorated. Nine of these are cut with hexagonal facets (Figure 6.113) and one has a single angular knop and an opaque twist (Figure 6.114). Table G-20 in Appendix G details the stemware analysis for this site. Figure 6.115 is an example of plain stems from the collection. Figures 6.116 shows examples of wheel-engraved stemware recovered from the Roosevelt Inlet Shipwreck. Figure 6.117 illustrates chronological changes of drinking glass stem styles. Consultation with Dr. Hugh Willmott, a scholar from the University of Sheffield, England, was undertaken to try and more narrowly date the glass from this wreck. Based on photographic analysis, he came up with a date of 1775 based upon the inclusion of what he determined to be an air twist stem (2006.33.229), which dates from 1750-1775, and on the faceted cut stems which were most popular from 1775-1780 (Willmott personal communication September 2009, see Appendix F). DH&CA analyst Faye Stocum suggests that this is not an air twist but rather an opaque twist which dates from 1750-1780. Included in Appendix F is a catalogue created by Dr. Willmott which lists his analysis of both the stemware and tumbler fragments recovered from the wreck. Included in this list are several glass fragments which are listed, perhaps erroneously, under furniture in the data inventory. According to Dr. Willmott's analysis these items, identified as chandelier parts in the inventory, are actually the bases of stemmed jelly glasses. Certainly additional scholarly research will shed more light on this topic (Jones and Sullivan 1989; Noël Hume 1969; Ossowski 2008; Sullivan 1986).

Tumblers

Size and shape vary, but these drinking vessels are usually stemless with a flat or slightly concave base. Sixty-one (61) fragments of tumbler glass were recovered from the wreck, representing an MNI of 48. Thirty-six of these fragments are from the body of the vessel; nine are base fragments; and 15 are rim fragments. Tumbler shape changed through time. According to Jones and Smith (1985:35) mid-eighteenth century forms were most commonly conical in shape with cylindrical and barrel shaped variants in place by the nineteenth century. One fragment is a body shard with a handle fragment attached. Three



Figure 6.113. Cut stemware fragments with hexagonal facets.



Figure 6.114. Angular knop and opaque twist (2006.33.229).



Figure 6.115. Plain stemware (2006.33.217 and 2006.33.218).

tumblers are barrel-shaped, 9 are cylindrical, two are either barrel or cylindrical, one is flared, and one is tapered. Forty-two fragments, representing 33 individual vessels, are decorated. This decoration consists of applied glass string (n=10), cutting (n=3), etching (n=3), etching and molding (n=2), and molding (n=15). Decoration is similar in motif to the stemware designs. Figures 6.118-6.120 are examples of tumblers in this collection. Tumbler fragments recovered from the shipwreck include two bases with roughly ground

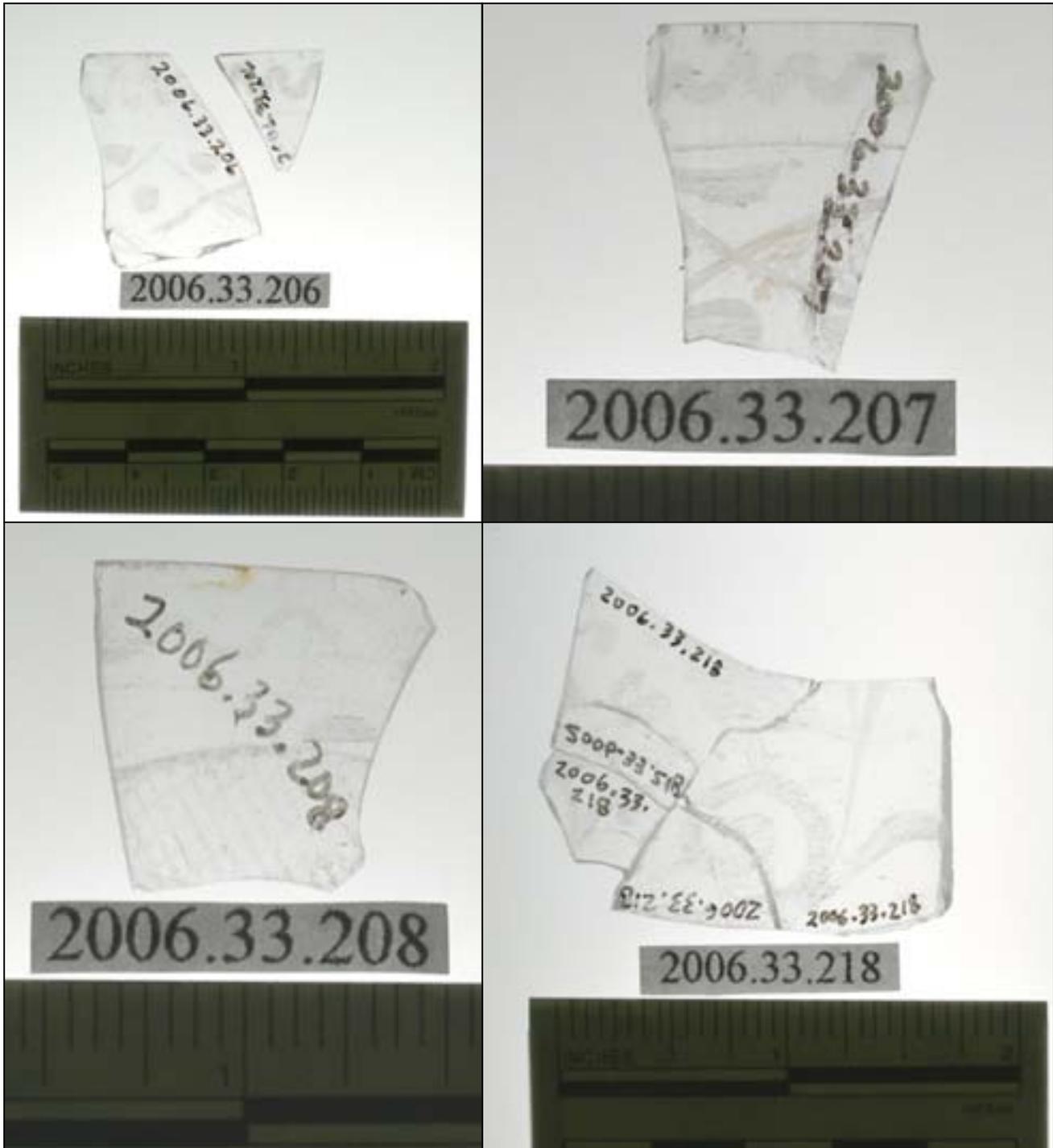


Figure 6.116. Wheel-engraved stemware from the Roosevelt Inlet Shipwreck.



Figure 6.117. Chronological changes in drinking glass stem styles.
(Source: Noël Hume 1969:191)

pontils evident in the “grayish-white and scratched” surface with” bits of the pontil mark still remain(ing)” (Figures 6.119 and 6.120). According to Jones and Sullivan (1989:129) this attribute usually is attributed to a Continental manufacturing origin. Figure 6.121 shows a glass handle fragment and a close-up of the same. Appendix G, Table G-21 details the tumbler analysis for the Roosevelt Inlet Shipwreck (Jones and Sullivan 1989).



Figure 6.118. Applied glass string decorated tumbler fragments.

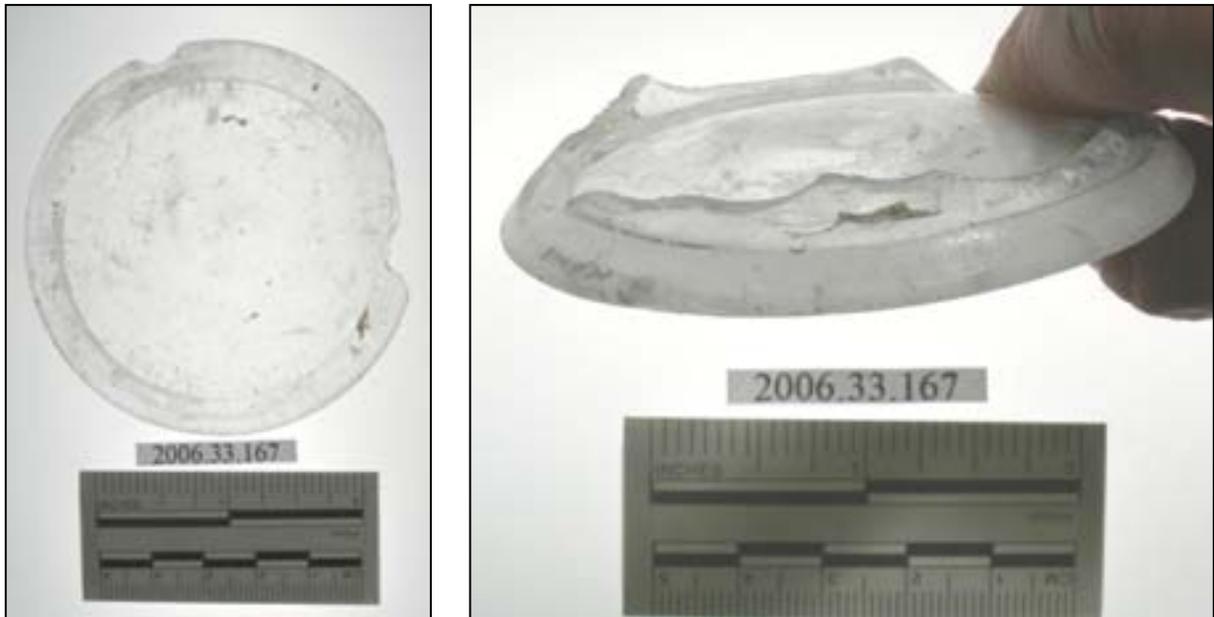


Figure 6.119. Tumbler base, bottom and side views (2006.33.167).

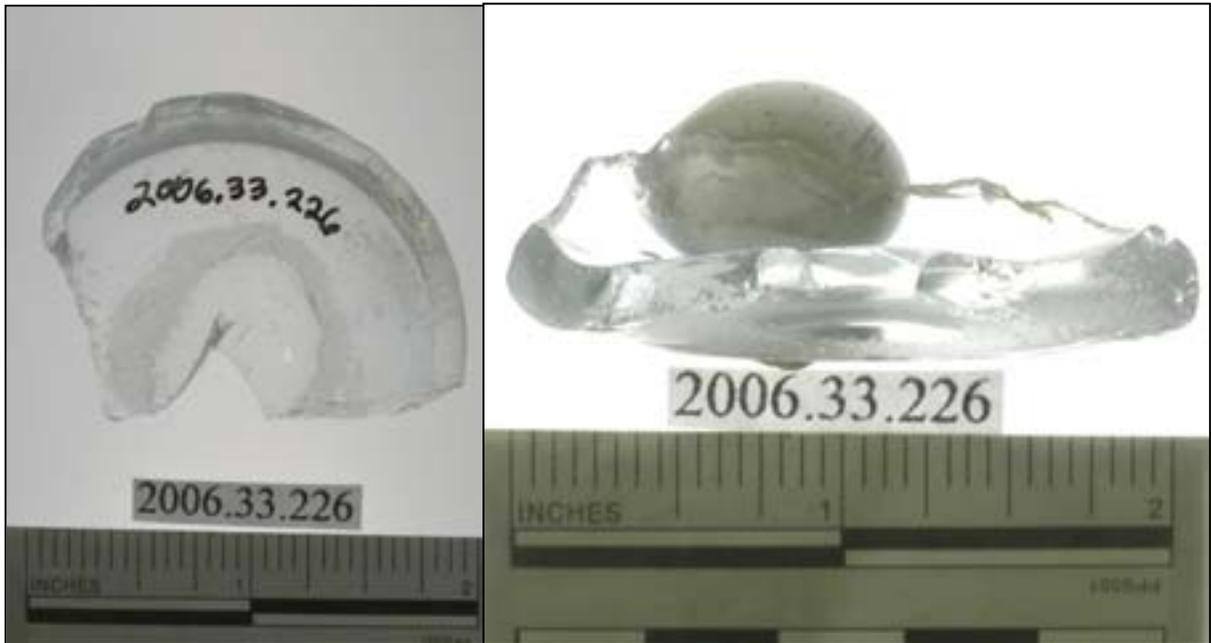


Figure 6.120. Tumbler base, side view (2006.33.226).



Figure 6.121. Left: Glass cup or mug handle fragment.
Right: Detail view (29006.33.229).

Decanters

Glass serving pieces recovered from the shipwreck have been limited to decanters. These elegant liquor containers evolved out of the wine/spirit tradition and originally were basically olive green wine bottles with handles attached. By 1720, however, these crude forms had been replaced with clear lead glass forms. Both the body shape and the glass stopper closure styles changed over time. Only two confirmed decanter fragments have been recovered from the site. Both are spire-shaped glass stoppers and are faceted in the mid-eighteenth century style (Figure 6.122). Figure 6.123 shows decanter forms throughout the eighteenth century (taken from Noël Hume 1969:196-7).

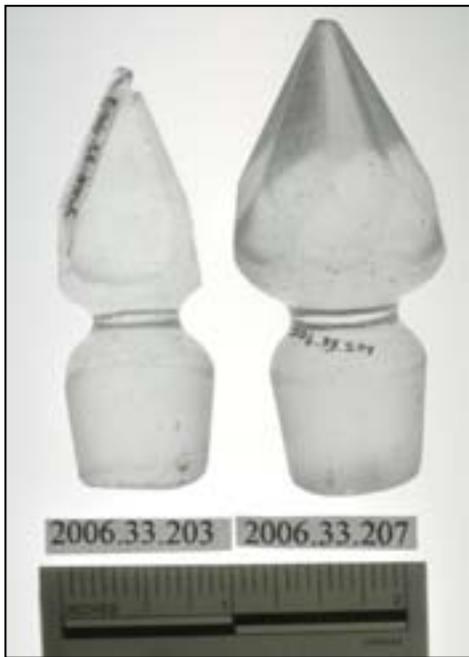


Figure 6.122. Spire-shaped glass stoppers faceted in the mid-eighteenth century style, 1745-1770.



Figure 6.123. Chronological changes in eighteenth-century lead glass decanter styles. (Source: Noël Hume 1969:196-7)

Metal Objects

Also in the kitchen category are metal objects used for preparing, serving, and eating food. Sixteen food preparation/serving/storage items were recovered from the wreck. These consist of a teapot and spout, two teapot base rings, two mug or tankard lids with hinges, two vessel hinges, three plate warmers (one whole and pictured in Figure 6.129 and two fragments), one bottle closure (that attaches a cap for glass container), and one jug lid, all made of pewter. One vessel hinge of indeterminate metal and six copper alloy objects (two U-shaped pot handles, one ornamented handle with an anthropomorphic head at the top, two U-formed handles, and one knob), were also recovered. Additionally, small rivets were recovered from various portions of the wreck which may be associated with kitchen metal wares such as kettles or pots. Figures 6.124-6.129 are photographs of examples of these objects.

Two solid copper alloy metal forks, both four-tined in the mid- to late-eighteenth century fashion (Figure 6.130); six pewter spoons, one of which is a serving spoon (Figures 6.131 and 6.132); five standard tableware spoons (Figure 6.133); and four probable spoon handles, all pewter (Figure 6.134), were also recovered. One probable knife handle constructed of either maple (*Acer sp.*) or birch (*Betula sp.*) wood and decorated with an elaborate pewter cage (Figures 6.135 and 6.136), and one Whieldon ware ceramic knife handle made in the mid-eighteenth-century pistol grip style (Figure 6.137) were also found in the wreck (Noël Hume 1969; University of Delaware 2008).



Figure 6.124. Pewter teapot spout (2006.33.159).



Figure 6.125. Pewter teapot (2006.33.152).



Figure 6.126. Fragment of a jug or ewer lid, hinge, and blue and gray stoneware handle (2006.33.214).



Figure 6.127. Lid hinge on gray stoneware handle (2006.33.203).



Figure 6.128. U-shaped metal handle (2006.33.192).



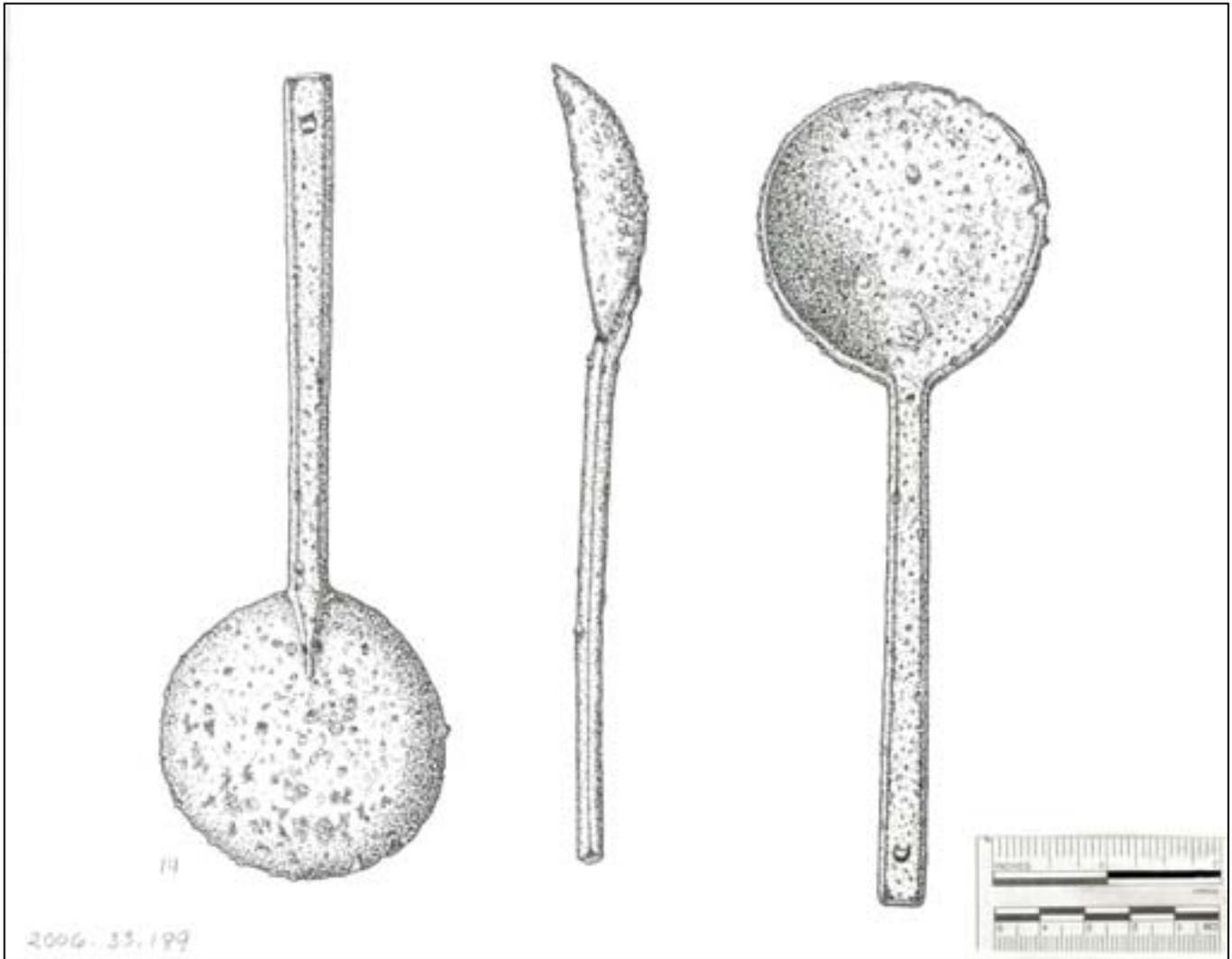
Figure 6.129. Pewter plate warmer (2006.33.081).



Figure 6.130. Solid copper alloy four-tined fork (2006.33.190).



Figure 6.131. Pewter serving spoon (2006.33.189).



**Figure 6.132. Detail illustration of pewter serving spoon (2006.33.189)
(by Sharyn Murray).**



Figure 6.133. Pewter tableware spoon (2006.33.148).



Figure 6.134. Detail illustration of pewter spoon handle (2006.33.148) (by Sharyn Murray).



Figure 6.135. Wooden knife handle with pewter cage (2006.33.212).

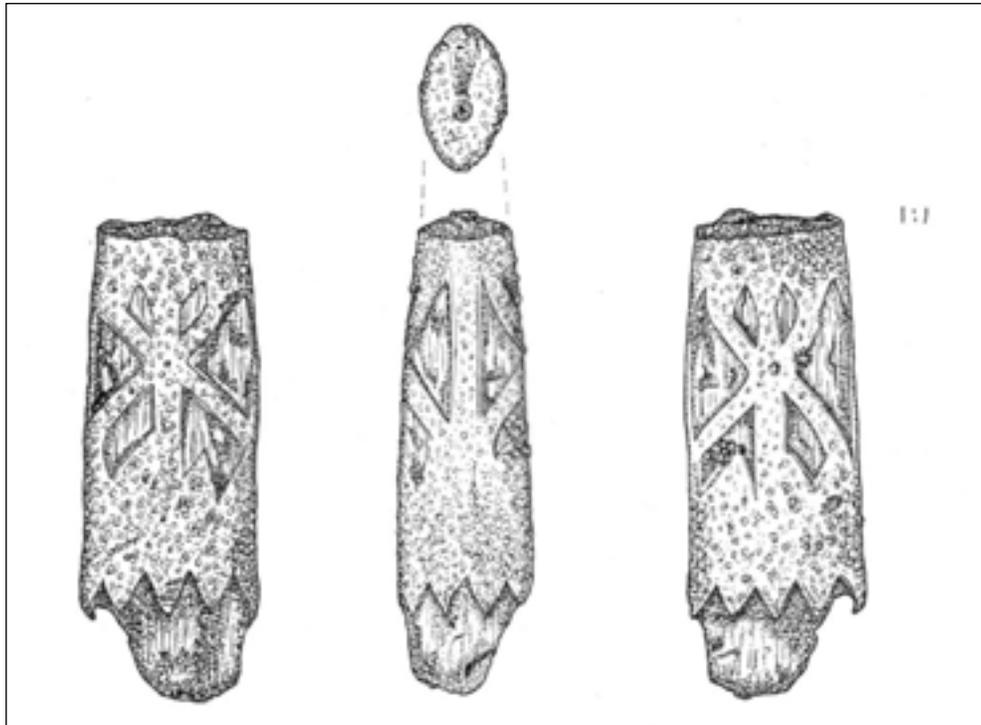


Figure 6.136. Detail illustration of a bone knife handle with pewter cage (2006.33.212) (by Sharyn Murray).



Figure 6.137. Mid-eighteenth-century Whieldon ware ceramic knife handle (2006.33.212).

Personal

Items in this category include those objects that are used on the person. Pieces of adornment such as bells, beads, glass button/cuff link inserts, bone, and metal buttons/cuff links, a variety of buckles, and jewelry; or utility items such as coins, fans, glasses lens, keys, and pen or pocket knives are all part of this category. Most of these items are common to the eighteenth century, and styles have changed little over time.

Bells

A common find on archaeological sites, bells served a myriad of functions in the eighteenth century. Bells were used as personal adornment, as noisemakers on baby rattles, adornment for harnesses or tack on horses and other animals, as well as for sounding alarms and calls for communication (church bells, field bells, etc). These artifacts come in a variety of sizes and shapes. One of the most frequently found type is the rumbler or sleigh bell. This bell is spherical in shape with a loop on one side and a slit punctuated



Figure 6.138. Copper alloy rumbler bell (2006.33.162).

with circular punches on the other side, with a pea or iron pellet/ball on the inside. These bells can be cast or made of sheet metal. Sheet metal rumpers are distinguished by the method in which they were constructed. This construction method changed over time and can serve as a tool for helping date a site. Lapped edge (1492-1575), flanged edge (1650-1850), or flush edge (1600-1850) are the terms used to describe the seams where the two halves join (Brown 1979; Deagan 2002:140-147; Noël Hume 1969:58-59).

Two copper alloy bells were recovered during the October 2006 excavations. One, a two-piece spherical copper alloy rumbler or sleigh bell, measures .47" in diameter at the seam and appears to be of the flush edge variety (Figure 6.138). The second, also described as a spherical bell with a slot opening, is also of copper alloy but the variety is indeterminate as it has not been photographed.

Beads

Beads are a cultural phenomenon found in the remains of every civilization. Whether made of stone, shell, clay, or other metal, beads are ubiquitous. That being said, they are also very small and often fall through the cracks of archaeological collection strategies. Beads are often found in burial contexts and features due to the nature of these excavations, but they also occur randomly across many archaeological sites, both prehistoric and historic. Glass beads are one of the most common finds on seventeenth-through

nineteenth-century historic sites in North America and were first brought to the New World as trade items by sixteenth-century Spaniards. Shipped in the thousands into every colony, these small bits of material culture were traded to Native Americans for commodities such as furs and were often given as gestures of goodwill. Blue glass beads are also found very frequently on African-American historic sites due to their special significance in the religious and spiritual beliefs within that community (Blair et al. 2009; Brain 1979; Noël Hume 1969; White 2005).

Glass beads were first mass produced in Europe in eleventh-century Venice. The Venetian glass industry, centered on the island of Murano after 1292, became world-renowned and became the birthplace of new and inventive techniques of production. Murano had a monopoly on glass bead production until the seventeenth century when artisans from that area immigrated to Amsterdam. Production soon spread to England, France, and other parts of Eastern Europe. Both Bohemia and Moravia, in the modern Czech Republic, became centers of bead production. The majority of beads from this region were molded rather than blown and are distinctive for their circumferential seam. Glass beadmakers in Bohemia/Moravia often attempted to mimic beads made of other materials such as stone or pearls (Dubin 1979:102-114). From circa 1775 to 1800 this region was known for producing red/wine colored beads made to mimic garnets (Dubin 1979:335). Bohemia also became a production center of other glass items such as paste inlays. Dubin (1979:103) suggests that the majority of the beads imported into the mid-Atlantic region during the eighteenth century came from the factories at Murano (Venice) Jablonec (Bohemia), or Amsterdam (The Netherlands). Most of the beads imported to the New World during the sixteenth through the nineteenth centuries were being manufactured in the Venetian method (drawn or wire wound), either in Murano, Jablonec, or Amsterdam, or were molded in Bohemia or Moravia. Given the common origin, it is not surprising that the same beads are found in archaeological contexts throughout the United States. These items were traded and transported by all of the colonial powers with interests in North America. Both the English and the Dutch trade routes carried these items to the eastern seaboard of Delaware.

Beads can be used in jewelry, and as decoration for garments and other personal adornment (Brain 1979; White 2005). Evidence of the desirability of these beads is seen in the August 1761 advertisement in the *New Hampshire Gazette* which lists “Bugle earrings” for sale. Affordable jewelry could be set with “mock garnets” and beads (White 2005 88-89). Further reading on beads and their history can be found in the sources referenced here.

Bead researchers have struggled with naming criteria and origin issues for the last one hundred years of investigation. Kidd and Kidd (1970) created a typology based on manufacture method while other researchers have attempted to focus on function. The problem with the latter is that function is almost always undetermined for loose beads not found in a burial context. The very nature of beads makes them easily lost once loosened from their string, and it is difficult to conclusively determine the purpose of loose beads.



Figure 6.140. Cranberry red/dark purple beads (close-up) (2006.33.185).

Buckles

Buckles, along with buttons, became a prominent status symbol during the seventeenth and eighteenth centuries and were an indicator of one's social standing. Apparel buckles were used to fasten and decorate shoes, knee breeches, stockings, belts, and hats and both size and style varied accordingly. Shoe buckles often consisted of open frames, frequently ornate for both men and women's styles, with iron or brass chapes for holding the leather strap. Status was reflected by the type of metal used in the manufacture of these frames. Gold or silver were high-status; brass or copper alloy, less so. Pewter and iron frames spoke of a lower status. Both copper alloy and pewter could be cast with the ornate rosettes, bows, and other decoration popular in the day so that even the less wealthy could remain in style (Noël Hume 1969; Ossowski 2008; White 2005).

As with buttons, shoe buckles became larger as time progressed until they were more of a fashion statement than a functional necessity. By 1775 shoe buckles reached up to 4 inches (101.6mm) in length. Shoe buckles were often sold in a set with matching knee buckles as well (Ossowski 2008:206). Ornate clothing buckles fell out of favor following the French Revolution in 1789 and were no longer fashionable at the end of the eighteenth century. White (2005) states that buckle sizes were at their largest between 1775 and 1790 and that they decreased in size again during the late 1770-1790 period. Decoration in the 1770s-1780s included "large faceted embossments encircled with smaller ones" as well as "lines of tiny facets and gemstones or pastes" (White 2005:41). Shoe buckles similar to these are seen in the present collection. Noël Hume (1969) suggests that shoe buckles would be very rarely found on a site which dates later than 1815.

One hundred and forty-four (144) buckles and buckle fragments, along with two copper alloy chape fragments were recovered from the wreck. Of these, 107 were identified as shoe buckles (pewter n=94, copper alloy n=8, uid metal n=5), ten were identified as knee buckles (pewter n=9, copper alloy n=1) and the remainder were fragments or unidentified as to type. Undoubtedly, some of these buckles may be identified with further analysis. The full inventory of buckles and buckle fragments recovered from the site, including additional details and location of recovery may be found in Volume 3. Figures 6.141 and 6.142 show photographic examples of buckles recovered from the Roosevelt Inlet Shipwreck. Figure 6.143 is a detailed line drawing of knee buckles from the October 2006 excavations. Similar and well-preserved examples of knee and shoe buckles have been recovered from the 1785 wreck of the British merchant vessel *General Carleton*, in Poland; some examples are provided below for comparison with buckles recovered from the Roosevelt Inlet site. Figure 6.144 is an example of knee buckles recovered from that 1785 wreck, and Figures 6.145-6.147 are detailed line drawings of shoe buckles recovered from the Roosevelt Inlet site. Figure 6.148 shows examples of shoe buckles in the Artois style from the British merchant vessel *General Carleton*. Figure 6.149 is an example of probable hat buckles, while Figure 6.150 shows examples of other base metal buckles recovered from the merchant vessel *General Carleton*.

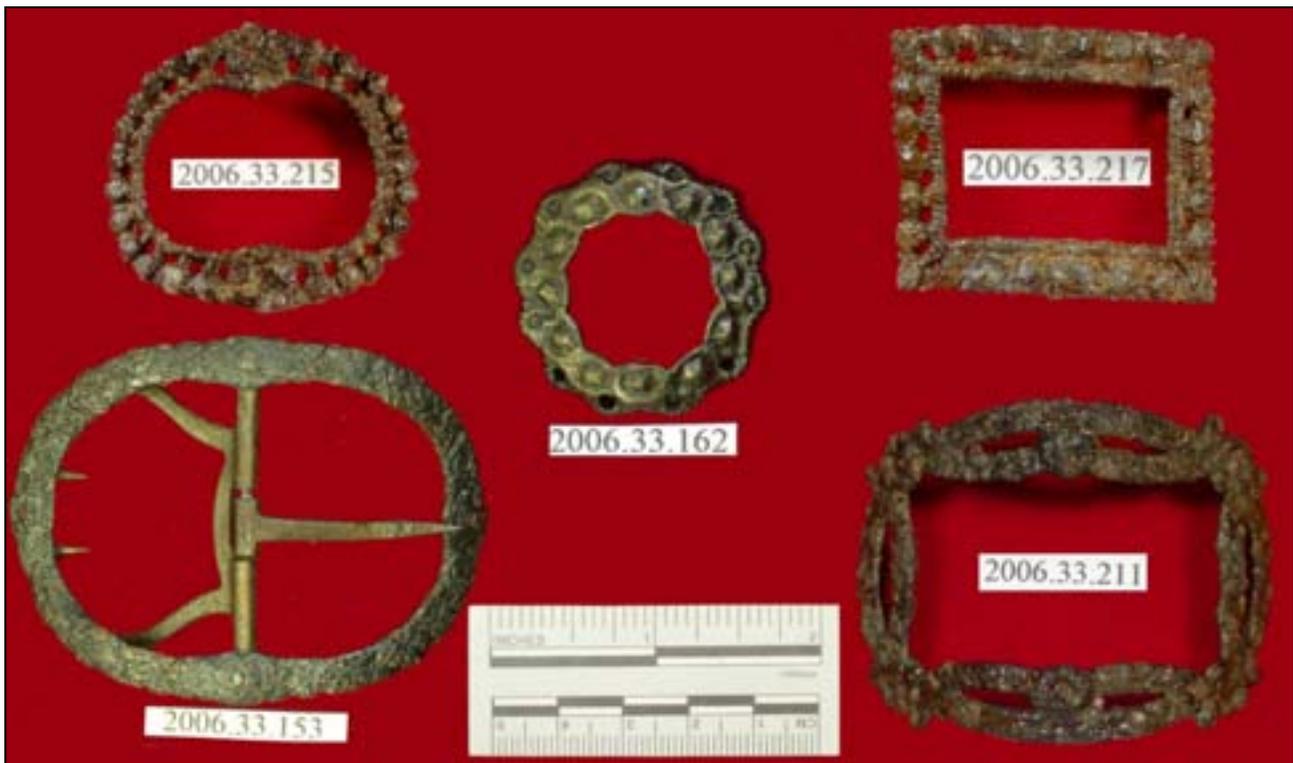


Figure 6.141. Examples of buckles recovered from the Roosevelt Inlet Shipwreck site.



Figure 6.142. Buckles recovered from the Roosevelt Inlet Shipwreck site (2006.33.153).

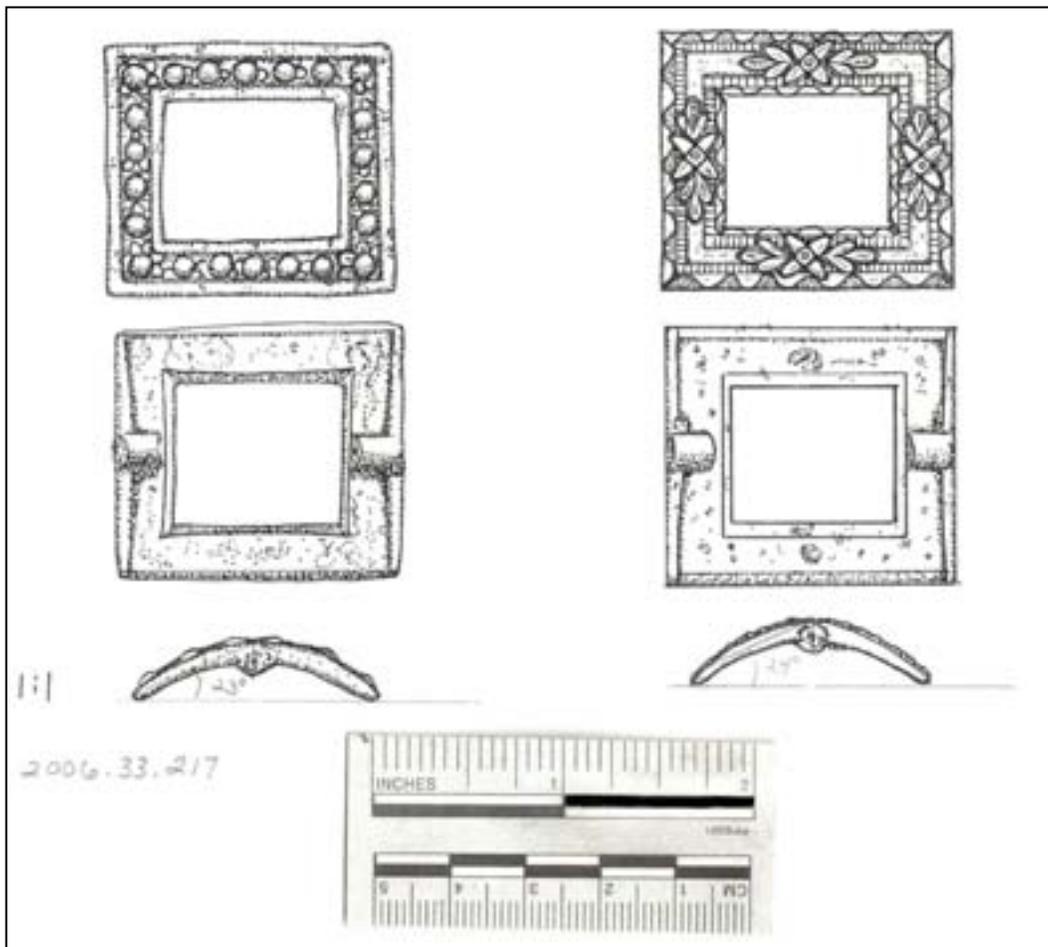


Figure 6.143. Detail illustration of knee buckles recovered from the site (2006.33.217) (by Sharyn Murray).



Fig. 9. Buckle and frames used to fasten breeches at the knee (photo by B. Galus).

Figure 6.144. Knee buckles recovered from the 1785 shipwreck of the British merchant vessel General Carlton in Poland. (Ossowski 2008)

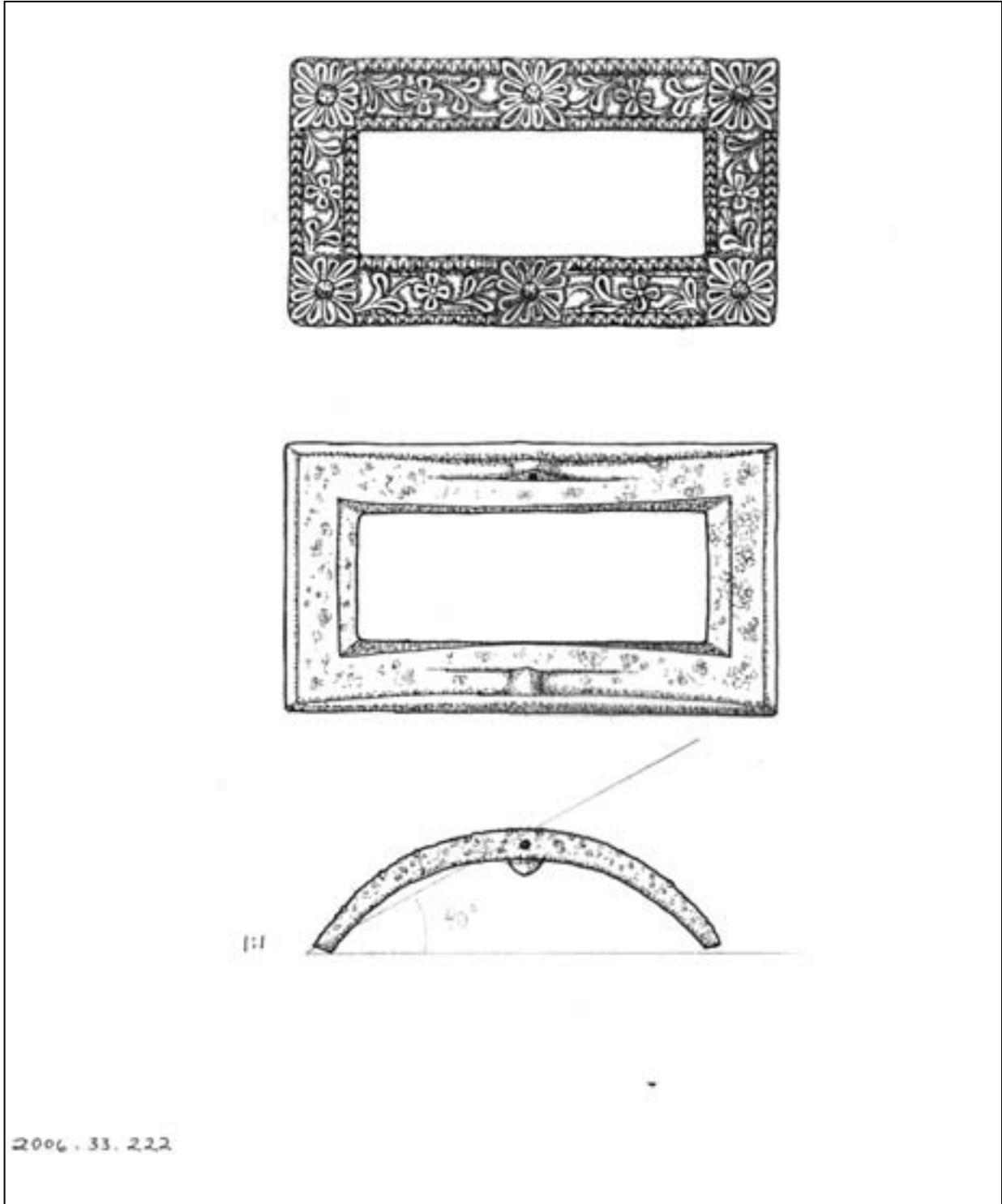


Figure 6.145. Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site (2006.33.222) (by Sharyn Murray).

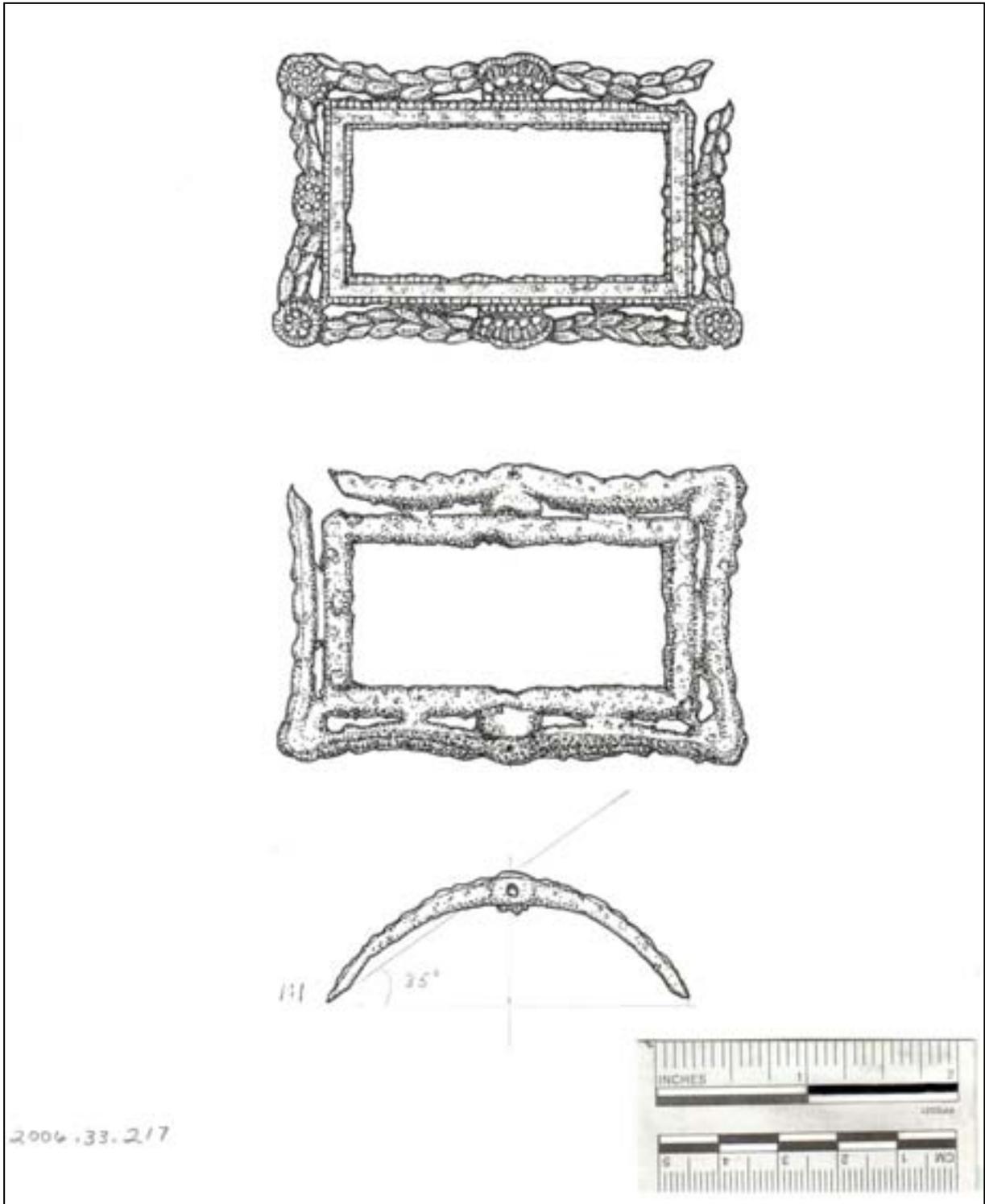


Figure 6.146. Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site (2006.33.217) (by Sharyn Murray).

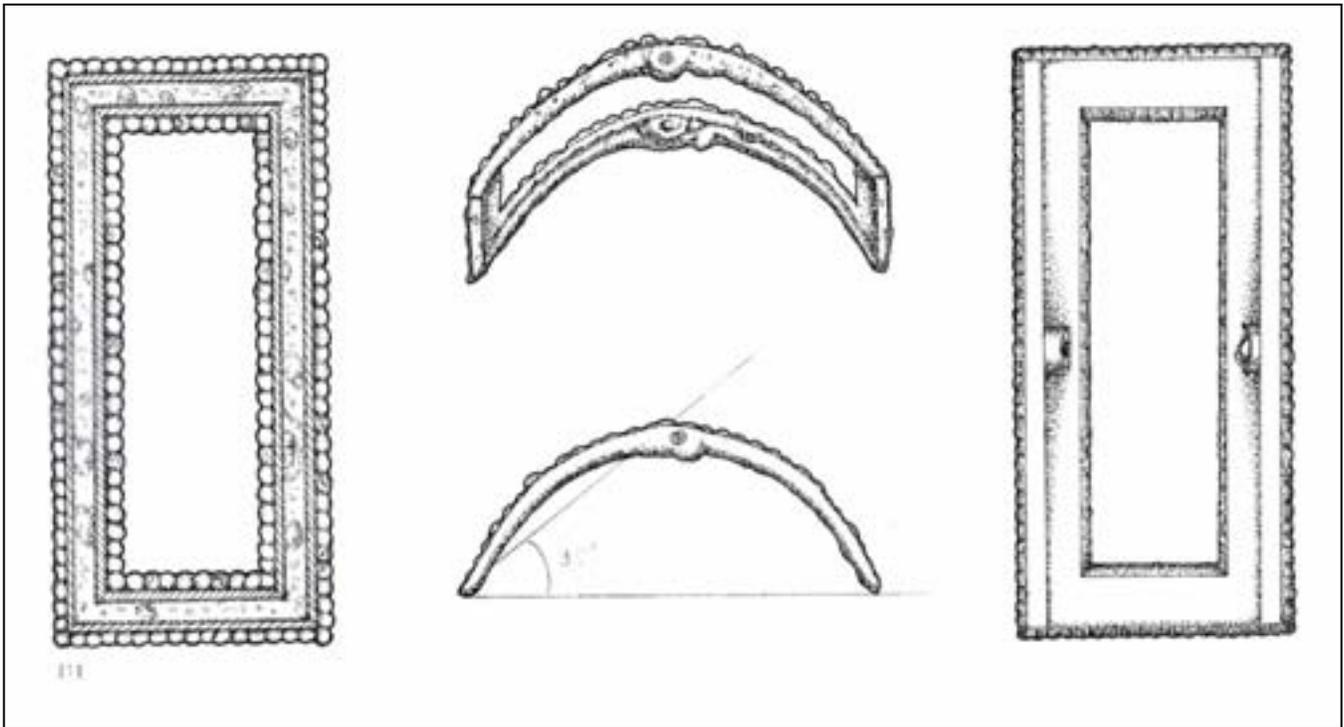


Figure 6.147. Detail illustration of a shoe buckle recovered from the Roosevelt Inlet Shipwreck site (by Sharyn Murray).



Fig. 8. Rectangular and oval buckles and buckle frames in the Artois style (photo by B. Galus).

Figure 6.148. Artois style shoe buckles from the *General Carleton* shipwreck.

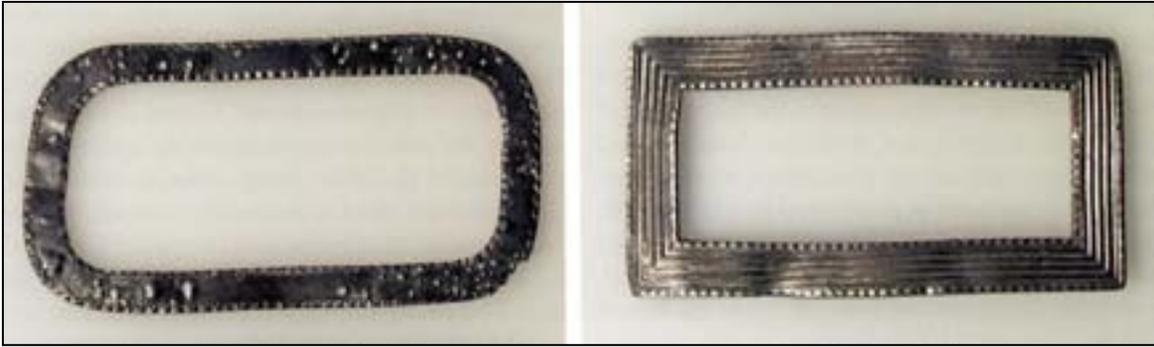


Figure 6.149. Possible hat buckles from the *General Carleton* shipwreck.



Figure 6.150. Additional buckles from the *General Carleton* shipwreck.

Buttons

Clothing fasteners have evolved along with fashion through time, and some of these changes are readily apparent in the form and material of buttons. Sixteenth and seventeenth-century jerkin and doublet buttons tended to be small and ball-shaped with an eye loop. As clothing styles became more elaborate with inner and outer layers, buttons were transformed into sturdier styles that were more efficient at holding garments together.

In the eighteenth century buttons were primarily used on clothing for men and was a popular form of embellishment. It was not uncommon to find upwards of twenty buttons on a single piece of outerwear (White 2005). Typical men's clothing consisted of breeches, long sleeved shirt, waistcoat, and coat (Figure 6.151). As the century progressed, the breeches became longer (thus eliminating the need for knee buckles or buttons), while the waistcoat and coat became shorter. Buttons continued to be an important form of decoration however. As with buckles, pewter, or "hard-white" metal as it came to be known, was the material most often used for the common classes. The elite used more expensive metals such as brass, silver, and gold. Coat buttons tended to be large (18-35 mm or larger) and were often very decorative. Waistcoat buttons were smaller than coat buttons in size but were often made of the same design or material to coordinate with the outerwear fasteners. Until 1780, double-breasted waistcoats with two rows of buttons down the front were the style in colonial America. Breeches were buttoned at the waist and often at the knee (or buckles were used for this application), and buttons could be coordinated ones that matched the waistcoat and coat or could be made of organic materials such as wood or bone. Waistcoat and breeches buttons are roughly the same diameter (14.5-19.5 mm) so distinguishing between the two is problematic in archaeological contexts. Shirt sleeve buttons were also often highly decorative. Sleeve buttons consisted of matching small buttons connected with an S or rectangular shaped link and ranged from 13 to 17 mm in diameter. A set of sleeve buttons were most often connected using two links that fastened to each button eye and then to a quatrefoil link. Oval loops were also utilized. Early in the eighteenth century octagonal sleeve buttons were in style with oval or round buttons becoming predominant by the end of the century. In addition to the often ornate buttons seen on outerwear, these fasteners were also used on innerwear such as underpants and undershirts. Innerwear buttons are frequently flat sew-through disks constructed of bone, wood and other lightweight materials. This style continued throughout the century and can be seen with single or multiple holes for sewing (White 2005:50-60).

Button manufacturing techniques also changed over the course of the eighteenth century. From a simple flat disk cast with a tabbed eye which was drilled through to accept thread, buttons progressed to elaborate pieces of decorative art. Later in the century eyes became a separate part of the button and were often pieces of wire either soldered or braised in place on the back of the button. In addition to being cast or stamped of metal, buttons could be carved of bone, horn, or wood, or covered in thread or fabric. Domed-shaped buttons became popular and could be stamped out of brass using a two-die system which both shaped the front and imparted the engine-turned design. Two-piece composite buttons filled with fiber or clay and backed with bone and wood was also common for the second



Figure 6.151. Typical men's clothing from the latter half of the eighteenth century. (Source: www.thequartermastergeneral.com January 2010)

half of the eighteenth century. These buttons are often found archaeologically as empty domes, the organic material having decayed. Decoration for the late eighteenth-century outerwear buttons typically consists of engine-turned engraving, glass insets, tinning, gilding, or silver plating. Copper alloys such as brass, pinchbeck, or tombac were often used in manufacturing. Pewter was also commonly used but developed a stigma as being of the lower classes so was sometimes referred to in advertising as “hard-white” metal buttons (White 2005:50-60).

Paste or glass “jewel” buttons were also popular in the eighteenth century (Figure 6.152). Glass insets were set in frames of copper alloy, gold, silver, or pewter in imitation of earlier gemstone buttons. Measureable jeweled round buttons from the Roosevelt Inlet Shipwreck (n=38) range from 5.842 to 17.2 mm in diameter with a mean of 12.72 mm. Also recovered were 38 loose flat pressed glass button insets (Figures 6.153-6.155 and Appendix G, Table G-22) and twelve copper alloy settings with evidence of foil backing for the glass inset. These foils were used to create a range of variability in the color of jeweled buttons (White 2005). For example, artificial opals were created using a pink foil under a milky or cloudy glass inset (Evans 1998). There are three blue, 31 clear, two green, and one purple inset in the assemblage.

Attempts at establishing button typologies have been made; see for example, South’s (1977) work at Brunswick Town, North Carolina. South has established a typing system based on his work there that could be implemented in the study of the buttons from the Roosevelt Inlet Shipwreck. Further study of the buttons recovered from the wreck will no doubt yield additional information and should provide the potential to further narrow down the provenance of manufacture and, potentially, vessel origin (Noël Hume 1969).

One hundred and thirty-nine (139) buttons and 74 sleeve button links were recovered during the October 2006 excavations (Figure 6.156, 6.157, and 6.158). Of these, 53 are of pewter, 33 of which have glass insets; 82 are copper alloy, nine of which have glass jewel insets, and one possesses a mother-of-pearl inset. Fourteen copper alloy sleeve button links, four “S” shaped, and the remainder link type, were also recovered. Only three bone and one wooden button were recovered (Figures 6.157 and 6.158). The full button inventory which lists all buttons, sleeve buttons, and button links recovered from the shipwreck and details decorative motif, size, and shape is presented in Volume 3.

Of particular interest are two very distinctive copper alloy buttons from the collection. One, a one-piece cast button with a drilled shank, has an inscription that reads “PASEO DEL RETIRO - ANO - 1772” on the face and has the grotesque profile of a man with a long beard. The Paseo del Retiro is a section of the Jardines del Buen Retiro, a prominent park and promenade in Madrid, Spain. Whether this button was a memento from a European tour or some type of souvenir is not known; however, it is one of the few artifacts which are dated. Figure 6.159 is a photograph of the button while Figure 6.160 is a line drawing illustration which shows greater detail.



Figure 6.152. Jewel buttons from the Roosevelt Inlet Shipwreck site.



Figure 6.153. Assortment of pressed glass button insets.

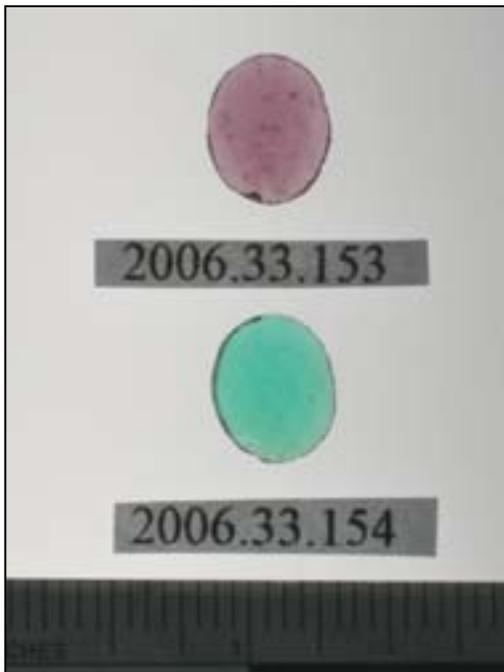


Figure 6.154. Colored pressed glass insets.



Figure 6.155. Decorative clear pressed glass button insets (2006.33.155).



Figure 6.156. Representative examples of sleeve button links recovered from the site. Note quatrefoil design of link in 2006.33.180.



Figure 6.157. Partial bone button (2006.33.217).



Figure 6.158. Four-holed wooden button (2006.33.203).



Figure 6.159. Photograph of the cast button with the caricatured profile of a man.

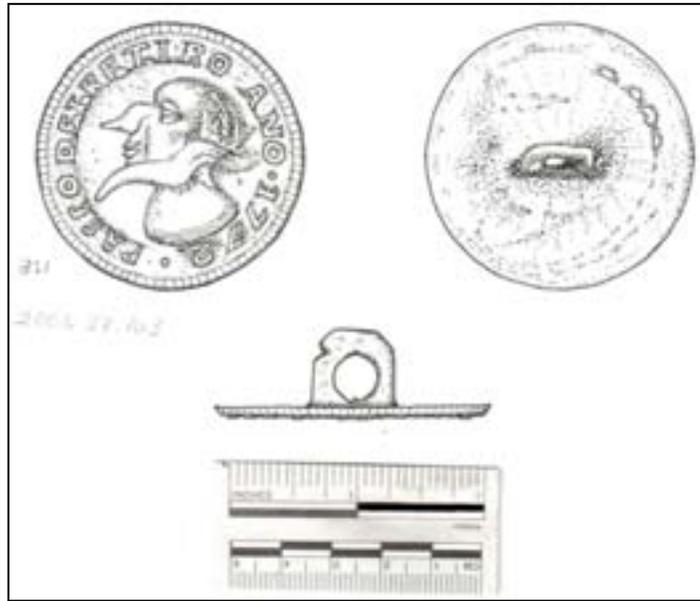


Figure 6.160. Illustration of the cast button with the caricatured profile of a man (by Sharyn Murray).

The second button of particular note, also a cast disk, has a fouled anchor as the motif (Figure 6.161). The fouled anchor insignia is a common motif used on navy and maritime uniforms from 1774 (Burt 2009; Troiani 2001). Bingemann and Mack (1997) report that seven fouled anchor buttons were recovered from the wreck of the HMS *Invincible*, which sank in 1758. The examples from the *Invincible* have a roped edge. Stocum (2009) states that upon reexamination of the fouled anchor button from Roosevelt Inlet, remnants of rope trim can be made out. The reporting of these buttons from the *Invincible* is evidence that the fouled anchor motif was in use prior to the standard published date range. In addition to having a fouled anchor design, one of these buttons also is back-stamped with the name “I Nutting & Son, Kings St, Covent Garden.” This is a problematic association as records show that John George Nutting registered the I Nutting & Son mark in 1803 (Bingeman and Mack, 1997:49). Burt (2009) indicates that this fouled anchor design on a plain background dates between 1774 and 1787 with later examples having a wreath or raised edge addition to the face. There are many variations on the theme – with the rope or chain in curving around the shaft in different configurations, the arms being curved or straight, the shank represented at a right angle or not, and the eye varying in size. Examples of British Navy (1774-1860) and French Navy buttons with this motif can be seen in Figures 6.163-6.165. A similar button recovered in Burial 6 of the African-American Burial Ground in New York City is shown in Figure 6.162. Burial 6 is that of an African-American male interred after 1776 (Perry, et al. 2006).

Figure 6.166 is a salesman’s sample card from the 1780s which illustrates examples of button styles current to that era. Figures 6.167 and 6.168 are examples of similar buttons recovered during the October 2006 excavations at Roosevelt Inlet. Figures 6.169 and 6.170 are examples of sleeve buttons or links also recovered from the wreck.



Figure 6.161. Fouled Anchor button from the Roosevelt Inlet Shipwreck site.



Figure 6.162. Fouled Anchor button from Burial 6 of the African-American Burial Ground in NYC. (Source: Perry, Howson, and Bianco 2006)

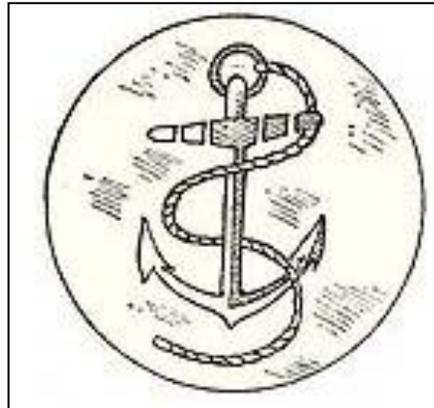


Figure 6.163. British Royal Navy Fouled Anchor button circa 1774-1860 similar to one recovered from the Roosevelt Inlet Shipwreck site. (Source: Burt 2009)



Figure 6.164. Fouled Anchor button of the French Navy. (Source:

<http://foundintheground.com/photos/navybut/tags/French+Navy+button/default.aspx>)



Figure 6.165. Fouled Anchor button of the British Navy circa 1780. (Source: Neumann and Kravic 1975:56)



Figure 6.166. Salesman's button sample card from circa 1780. (Source: Perry et al. 2006:317)



Figure 6.167. Buttons from the Roosevelt Inlet Shipwreck site (2006.33.162).



Figure 6.168. Buttons from the Roosevelt Inlet Shipwreck site (2006.33.155).



Figure 6.169. A variety of sleeve buttons from the Roosevelt Inlet Shipwreck site. See Figure 6.170 for scale.



Figure 6.170. Sleeve buttons, or links, from the Roosevelt Inlet Shipwreck site.

Glass Gemstones or Pastes

In addition to buttons, jewelry was also a very popular means of personal adornment in the eighteenth century. Earrings, bracelets, brooches, and necklaces in elaborate settings are seen in this period. Although diamonds and other precious and semi-precious stones were the most desired, imitation stones or “pastes” were often substituted.

These faux gems were first manufactured in England in 1676 by George Ravenscroft, the inventor of English Flint glass. Flint glass could be polished and faceted and had a high refractive quality that made them a good replacement for more expensive diamonds. Further modification to Ravenscroft’s technique was made in the 1730s by Georges-Frederic Strass in Paris. In addition to this harder and more scratch-proof stone, Strass also perfected a method for placing colored foils behind the paste in the setting to give the appearance of other precious gems such as emeralds, rubies, and sapphires.

Paste gems were not the only way in which glass was being used in jewelry. James Tassie was a Scotsman who, along with Dr. Henry Quin of Dublin, created a method for both hollow relief or intaglio, and relief or cameo, casts of glass for portraiture. In addition to his thriving glass cameo and intaglio business, Tassie also produced paste gemstones, often replicas of famous royal sets. In 1780 he was commissioned to produce a complete set of his work for Catherine the Great of Russia which are now on display at the Hermitage. (Gray 1894:4-9; Encyclopedia Britannica 2009). Tassie’s work became so well-known and common, his work could be ordered from a catalog (Tassie 1775), and the term “Tassies” became a synonym for glass intaglios and pastes.

In addition to those faux gemstones being produced in England, France, Bohemia, and the Netherlands were also production centers for these items. Evidence for pastes being shipped unmounted as raw material for North American jewelers is seen in a 1771 advertisement in the Pennsylvania Journal which states that one lapidary in Philadelphia “cut all sorts of Stones for Jewelry work, viz. Rubies, Topaz, Emeralds, Garnets, Crystals, Paist, &c...”(White 2005:100).

One hundred thirty-six (136) faceted glass or paste “gemstones” were recovered from the Roosevelt Inlet wreck site (Appendix G, Table G-23). Of these, six are blue, two are pink, three are red, and there is one each of green, peach, and purple. The remainder are clear (n=122). Figure 6.171) provides examples of the glass pastes recovered from the RIS.

Both the gemstones and the button insets may be better suited to the Activities, Industry and Transportation categories as they are most likely raw material being sent to local manufacturers. However, as they are also items of adornment, they have been placed in the “Personal” category. Also in the adornment group is one copper alloy neck stock clasp with a scrolled floral motif over fine cross hatchings (Figure 6.172).

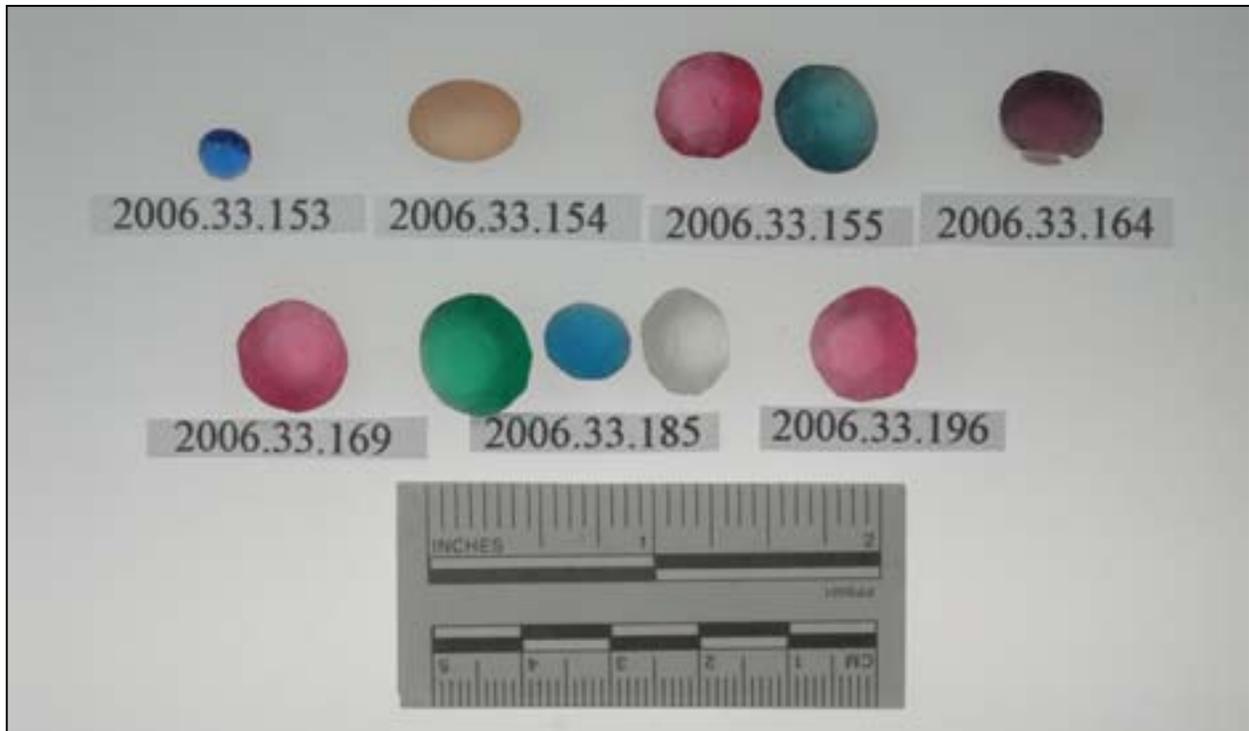


Figure 6.171. Examples of colored and clear glass pastes recovered from the Roosevelt Inlet Shipwreck.



Figure 6.172. Neck stock clasp with scrolled floral motif (2006.33.218).

False Watches

Late in the eighteenth century watches became a popular status symbol, to the point that it became the fashion to wear two at once. Both men and women followed this fashion trend with the second watch often being a “fausse montre” or false watch. Very realistically cast with hands and a glass cover, these watches were worn on chains with fobs and placed in the vest pockets of men and on the chatelaine or waist chains of women. Ten pewter false or toy watches were recovered from the RIS. These items may represent toys, but given the trend toward the wearing of false watches in the last quarter of the eighteenth century, it is probable that these represent “fausse montre” (Evans 1970:161-162; White 2005:132). Figure 6.173 shows examples of these items recovered from the October 2006 excavations at the Roosevelt Inlet Shipwreck.



Figure 6.173. Pewter false watches.



Figure 6.174. Photograph of the 1768 Zelandia province coin (2006.33.218).

Personal Utility

Coins are one of the most ubiquitous personal utility objects in everyday life. Small and easily lost, these artifacts often help provide a *terminus post quem*, or date after which, a site has been formed. Jettons, or counting casters used in accounting and mathematical calculations, often have a similar appearance to coins as they feature the profile of ruling monarchs and dates. Close examination can differentiate these objects from coins. After the mid-sixteenth century Nuremberg Germany was the center for jetton manufacture for Europe (Noël Hume 1969; UK Detector Finds 2005).

Nine jettons and one coin were recovered from the RIS site.

Uniformly, the jettons are stamped, badly worn metal (n=10), and all are copper alloy with the exception one which is identified as pewter. The coin recovered from the wreck site is stamped Zelandia 1768 and is from the Netherlands province Zelandia. Figure 6.174 is a photograph of the coin while Figure 6.175 is an illustration which shows the coin in detail. Figure 6.176 is an example of jettons recovered from the site, many of which bear the likeness of Britain's King George II (1727-1760) (Griffith 2009). Figure 6.177 is an example of a Louis XV jetton with a lion and the words "RECHEN PFENING" ("reckoning penny" in German) on the reverse side (UK Detector Finds 2005). This example was recovered from the beach prior to the excavation of the wreck but is identical to one recovered from the wreck which has not been photographed as of this date (Stocum personal communication 2010). According to Stocum all of the jettons have the initials "JAD" or "IAD" on the reverse side (Stocum personal communication 2010). Research into this mark reveals two Nuremberg jetton manufacturers with the initials JAD: Johann Adam Dietzel and Johann (Hans) Albrecht Dorn, both guild masters in the eighteenth century. Dietzel was made master in 1746 and died between 1762 and 1768; Dorn was made master in 1732 and died in 1789 (UK Detector Finds 2005). Table 6.3 details the information that can be gleaned from these items.



Figure 6.175. Illustration of a 1768 coin from the Zelandia province of the Netherlands (2006.33.218) (by Sharyn Murray).



Figure 6.176. Jettons recovered from the Roosevelt Inlet Shipwreck (2006.33.229).



Figure 6.177. Illustration of a Louis XV jetton (by Sharyn Murray).

Table 6.3. Coins recovered from the Roosevelt Inlet Shipwreck.

Provenience	Material	Description	Count	Diameter (mm)
Coin				
2006.33.218	Copper alloy	Design consists of name and date "Zelandia 1768", above text are 2 six-pointed stars and a castle, mark is surrounded by a floral / Rococo ring / wreath	1	18.86
Jettons				
2006.33.225	Copper alloy	Appears to be a George II type, majority of original edge missing, some stamped design visible on both sides	1	
2006.33.206	Copper alloy	Complete stamped	1	
2006.33.220	Copper alloy	Highly corroded	1	16.35
2006.33.201	Copper alloy	Incomplete, stamped decoration; decoration is largely unclear but appears to be associated w/ George II	1	17.04
2006.33.205	Copper alloy	Mostly intact w/ some edge missing, royal seal of Britain present & fragments of George II's bust	1	
2006.33.230	Copper alloy	Nearly complete, obverse stamped w/ George II bust, reverse stamped w/ shield	1	19.32
2006.33.229	Copper alloy	Nearly complete, stamp appears the George II type, though reverse has a lion instead of a shield	1	15.74
2006.33.155	Copper alloy	No discernable cipher due to corrosion	1	18.2
2006.33.226	Copper alloy	Royal cypher of Britain, damaged	1	18.5
2006.33.208	Pewter	Incomplete, indistinct decoration, crown and partial shield visible, similar to George II	1	

Also recovered were 43 glass lens fragments. These items appear to be optic glass and are either meant for use in eyeglasses, microscopes, or telescopes (Figure 6.178). One lens in particular (Figure 6.179) appears to have a convex shape that strongly suggests it was ground for extreme magnification purposes. Lacking any frames or mounting hardware, it is not possible to distinguish exact style or usage. Table G-24 in Appendix G details the glass lenses in the Roosevelt Inlet Shipwreck collection.

One cut and polished bone fragment, which is believed to be part of a hand fan rib, was recovered from the Roosevelt Inlet Shipwreck (Figure 6.180). Also recovered were two small keys and five keys that have been identified as watch keys but may also be clock keys. Figure 6.181 is an example of these keys. In addition, 25 pen knife scales have been recovered. These are of the pistol grip style popular in the last half of the eighteenth century and are uniformly made of copper alloy. Most have floral decoration and can be seen in Figures 6.182 and 6.183. One slate pencil fragment was also recovered from the wreck (Figure 6.184). A slate tile was also recovered, but it may be of an architectural nature rather than a writing slate (this slate is shown in the Architectural section above).



Figure 6.178. Examples of glass lenses recovered from the Roosevelt Inlet Shipwreck.



Figure 6.179. Side view of a glass lens illustrating the convex shape (2006.33.204).



Figure 6.180. Cut and polished bone fragment, possibly from a hand fan (2006.33.217).



Figure 6.182. Pistol grip style pen knife scales with floral design (2006.33.215).



Figure 6.181. Watch or clock key (2006.33.218).



Figure 6.183. Pistol grip style pen knife scales with floral design (2006.33.231 and 2006.33.227).



Figure 6.184. Slate pencil (2006.33.177).

Tobacco

Tobacco Pipes

Archaeologists have Sir Walter Raleigh to thank for providing one of the best tools for dating a site. The advent of tobacco to Europe started a flood of technological changes that can be tracked with careful attention to detail. Although all tobacco pipes were originally manufactured in England, the production of clay pipes spread to the Netherlands by the early seventeenth century. Clay tobacco pipes changed in form rapidly, were not used for long at a time, and were not conserved for long periods. Dutch pipes quickly differentiated stylistically from the English versions. English styles are well-documented and are usually the type of pipe found on North American archaeological sites. Because of the Navigation Acts and protective tariffs, pipes of English origin were the most common to be being shipped into the English colonies. Dutch pipe bowls are more egg-shaped and smooth than their English cousins, and great pain was taken to standardize the bore size and decorate the rim. Figure 6.185 is an example of pipe bowls recovered from this project. By the mid-seventeenth century both Amsterdam and Gouda were large-scale production centers for the new industry. Guilds sprang up in support of this new industry, and licenses were issued along with registration marks for pipe makers. By 1739, not only were maker's marks being placed on the heel of the pipe, but quality marks were being placed on the side of the heel. The Gouda coat of arms was stamped as a sign of best workmanship for high quality pipes manufactured in that city. In 1740 an "S" was added for second best workmanship.



Figure 6.185. Dutch kaolin pipe bowls recovered from the Roosevelt Inlet Shipwreck.

In addition to maker's and quality marks, Gouda pipe makers began to decorate the stem. By the second quarter of the seventeenth century stem stamps consisted of various linear designs. Beading or circles, zig-zags, stripes and lines were used in addition to the maker's name and the words "IN GOUDA" (Figure 6.186). Often set in two groups of four lines, these motifs could be used together or alone. This style continued to the nineteenth century. Figure 6.187 provides a schematic of common pipe styles for the eighteenth century (van der Meulen 2003). The majority of pipes recovered from the site appear to be of the #25 type, which was common from 1750 to the end of that century. After 1750 stems are seen with flower-and vine-decoration beginning immediately after the more ovoid bowl (Figures 6.188 and 6.189). Pipe bowls continued to get larger until the 1850s. By 1900 few pipe makers remained in Gouda and the industry collapsed.

Dutch craftsmen were not the only pipe makers to use marks; English manufacturers did as well. Usually signed with just their initials rather than the sometimes-elaborate insignia issued to the pipe makers of Gouda, these hallmarks prove very useful to researchers. Not only do we know where an artifact is being made with little uncertainty but, thanks to guild records and registration marks, we can match pipe makers to specific products (Noël Hume 1969; van der Meulen 2003). Noël Hume (1969) states that pipes of other nationalities are only found in North America in Florida and the Gulf Coast because of Spanish and French influence there and in Canada due to the French connection there. English immigrants brought their pipe making skills with them and set up shop. Additional research suggests that this matter was not clear cut and that non-British goods could be



Figure 6.186. Linear decorated and stamped pipe stems.

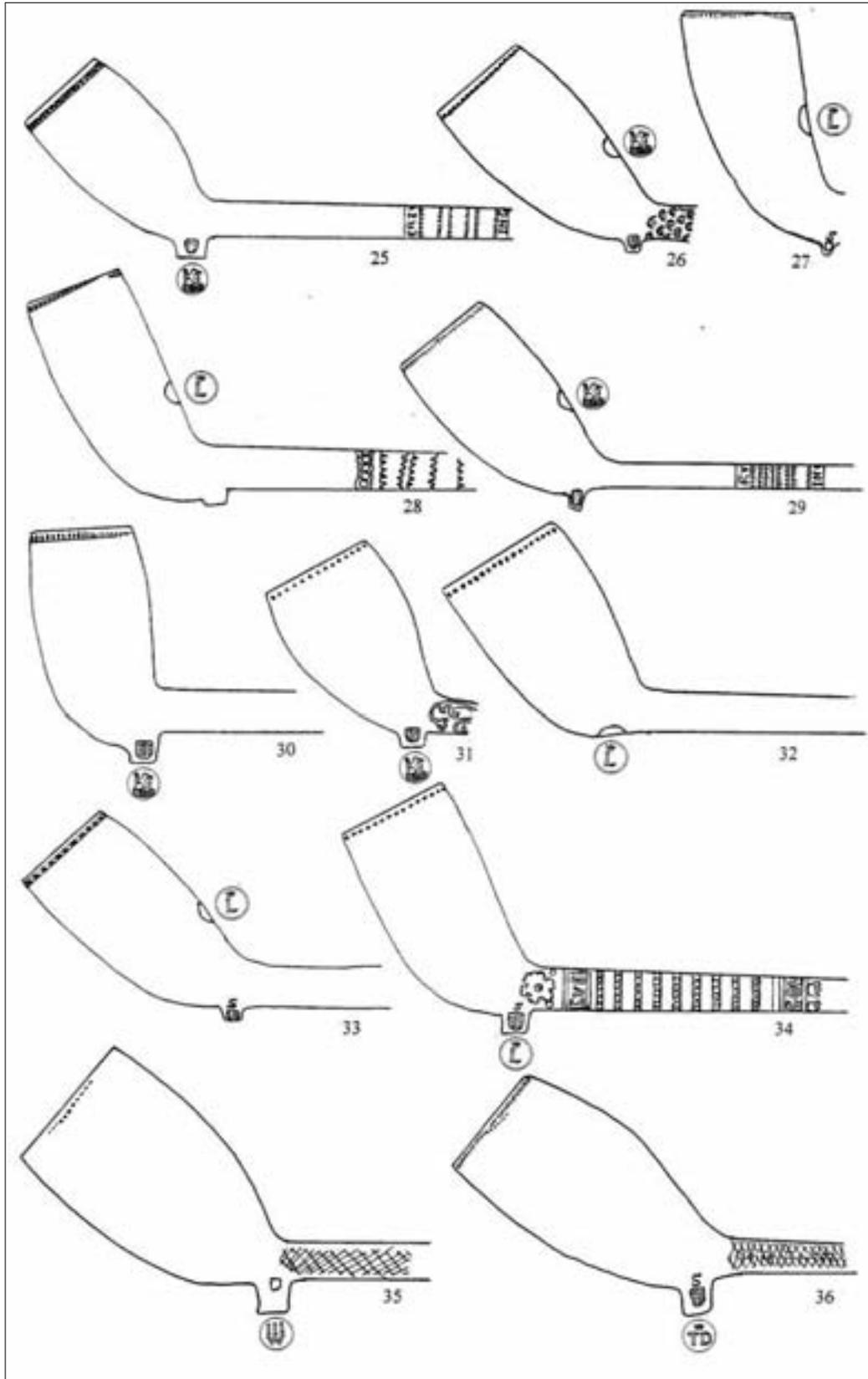


Figure 6.187. Examples of changes in Dutch pipe bowl profiles during the eighteenth century. (Source: van der Meulen 2003:17)



Figure 6.188. Floral decorated pipe stems from the Roosevelt Inlet Shipwreck.

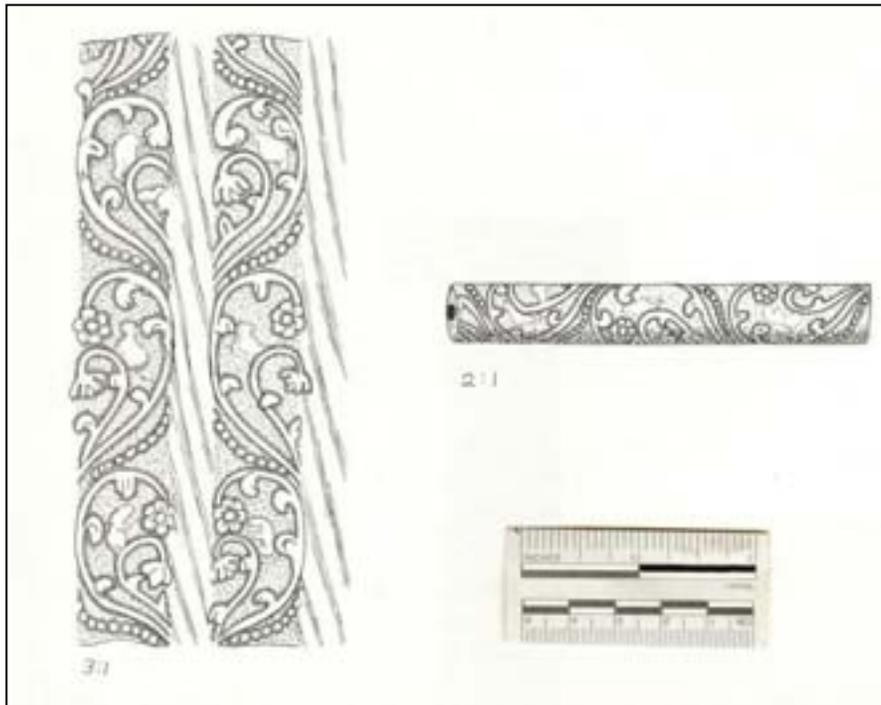


Figure 6.189. Detail illustration of a floral decorated pipe stem (by Sharyn Murray).

found in late Colonial contexts through illicit trade or a willingness to meet the demand for particular products on the part of the British (Stocum personal communication 2009, see Appendix F). Dr. Peter Davey, an Honorary Senior Fellow at the University of Liverpool, England, has published extensively on the topic of tobacco pipes and was consulted regarding the pipes from the RIS site. Dr. Davey suggests that four of the tobacco pipes recovered from the wreck (Catalog #s 2006.33.154, 178, 185, 201) are most likely of French origin. Further, it is his opinion that given the number of Dutch pipes found on the wreck, it is very likely that the vessel originates from a Continental port rather than a British one (Davey personal communication 2010, see Appendix F)

Dutch Makers Marks

Four thousand, five hundred and seventy three (4,573) pipe bowls, stems, and fragments were recovered during the October 2006 excavations. One hundred and eighty-one (181) of the bowl fragments (n=870) had maker's marks. These marks were cross-checked with the online database at <http://www.goudapipes.nl/>. This invaluable site has digitized and fully searchable marks published by J. van der Meulen in his *Goudse Pippenmakers en hun merken* (Gouda Pipemakers and their Marks) (2003). Although this excellent source is in Dutch, online technology allowed for a translation of the text. Table 6.4 details this research while Figure 6.190 illustrates the marks identified by this study. Marks were re-licensed when no longer used by their original owner. This fact can lead to two or more licensees being listed for a mark. In an attempt to not bias the data, bracketed mark holders are referenced. One example of this is with the "BS" mark. Originally licensed to Benjamin Schoute from 1733 - 1746, this mark was vacant until Adrianus Spernaay took it in 1782. Only four pipes with this mark were recovered but a pipe stem with rouletted lines and "SPERNAAY" stamped on it indicates that this pipe was indeed one from his factory. The only other Spernaay licensed near that time is Hendrik Spernaay, who was making pipes from 1774-1787 but with the "Crown 95" mark. None of the marks recovered from the site, either during the October 2006 excavations or earlier collections from the site, are of that type. This pipe may serve as a TPQ of 1783 for the site. Figure 6.191 shows a plot of the date ranges for all marks recovered from the Roosevelt Inlet Shipwreck. The majority of marks overlap between 1770 and 1785. Additional research in the Pipe Makers Guild records in the Netherlands may shed further light on the marks identified from the wreck. Further research into the pipe makers and the transportation and marketing of Dutch pipes may also help to definitively identify the Roosevelt Inlet Shipwreck.



Figure 6.190. Maker's marks from Dutch pipe bowls. Drawings by Sharyn Murray.

Table 6.4. Licensee information for pipe maker's marks recovered at the site.

Mark	Licensee	# Recovered
BS	Benjamin Schoute 1733-1746; Adrianus Spernaay 1783-1819	4
BWB	Bartholomeus de Pier-1772-1834	1
Chicken left	Leendert Slobbe-1766-1823	2
Crown 23	Hendrik Groenendaal 1730-1772, Abraham Carelsz, voor den Wind 1779-1790	1
Crown 33	Jan Nieuwland-1766-1792	1
Crown 5	Jacob Scholten-1764-1795	37
Crown 64	Maartin Monk-1771-1776; Arij Monk, 1776-1803	57
Crown 84	Willem Muijs, 1766-1779, Matthijs van Rijswijk, 1782-1790; Barend van der Heijden, 1790-1807	19
Crown Boar	Pieter Slingerland in hire to Cornelis Cornelisz, Slingerland-1770-1780	2
Crown KP	Pieter Slingerland-1745-1782; Jacobus de Ronde, 1782-1819	2
Crown S	Jan van der Wies-1741-1776; Pieter de Jong, 1779-1821	31
Double Clover	Joost Bloed, sr, 1749-1782; Joost Bloed, Jr, 1782-1842	5
Flounder	Pieter Lens - de jonge, 1747-1781; Christiaan Smit, 1781-1819	2
GLM	Gerrit Maarling-1769-1796	14
Roemer	Bartholomeus de Pier-1772-1774, Dirk Goedewagen 1779-1811	2
Stork w/snake	Abraham Eling-1746-1774; Christiaan Eling, 1782-1794	1

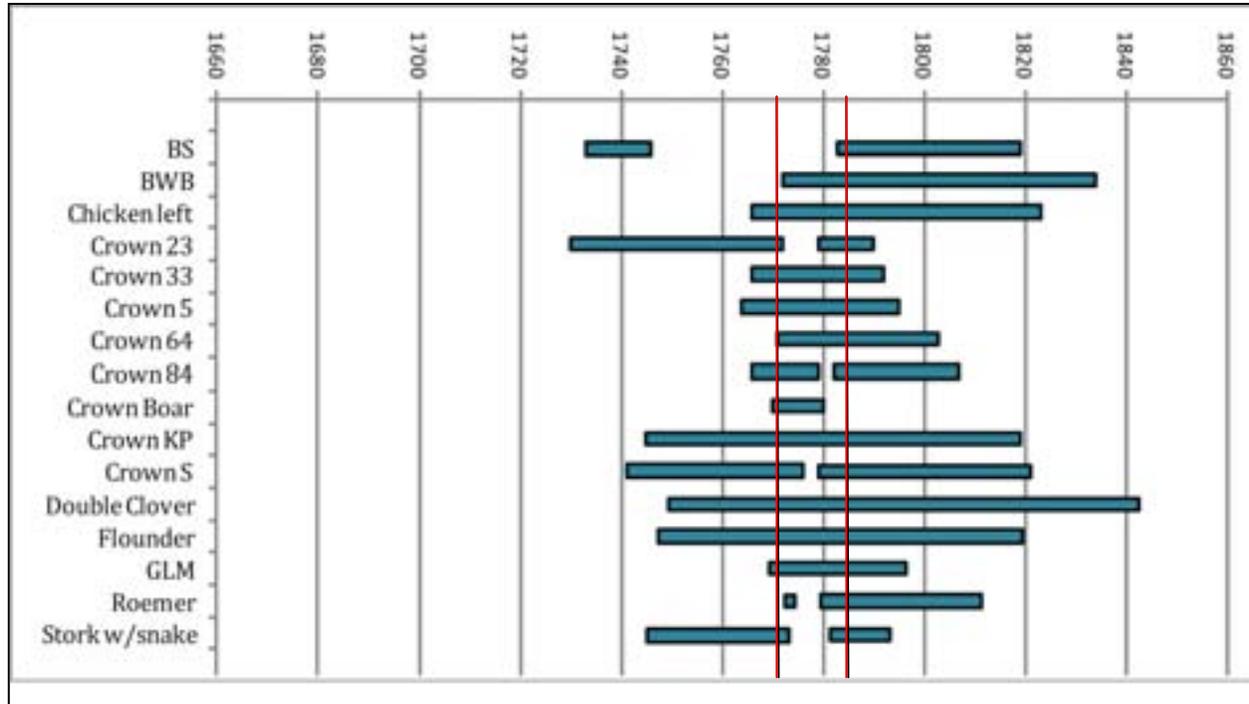


Figure 6.191. Date ranges for pipe makers' marks recovered from the Roosevelt Inlet Shipwreck site.

The two most plentiful marks, “Crown 64” (n=57) and “Crown 5” (n=37) date to the last quarter of the eighteenth century as well. Jacob Scholten (1764-1795) also has a pipe stem with his name stamped on it. There are 430 decorated or rouletted stems in the 3,700 collected as part of the 2006 excavation material. In addition to the marks and decorated pipe stems, there are four examples of molded decorations on in the collection. Figure 6.192 is a photograph of these bowls which may be of French manufacture (Davey personal communication 2010, see Appendix F). Additional research may provide further information regarding this material. This collection is a wealth of research potential and will hopefully provide topics for academic study or scholarship for years to come.

Tobacco Related Items

In addition to the pipes themselves, two other tobacco-related artifacts were recovered from the excavations. The first, a copper alloy smoker's companion or pipe tool is shaped like an adze and has a sharp pointed handle for breaking up charred tobacco. The head end would be used to tamp down fresh tobacco for steady burning. Also recovered was a polished agate snuff box lid. This flat rectangular artifact has a beveled edge and was found in two pieces in adjoining quadrants at Test Unit N10/E60 (NE and SE Quads) and has been reconstructed. Figures 6.193 and 6.194 display these items.



Figure 6.192. Examples of molded pipe bowls recovered from the Roosevelt Inlet Shipwreck. Inset is a circa 1750 molded pipe bowl from Gouda with a similar shield design to 2006.33.185.



Figure 6.193. Copper alloy smoker's companion (2006.33.155).



Figure 6.194. Polished agate snuff box lid, recovered in two sections and reconstructed.

Armaments

A total of four armament artifacts have been recovered from the Roosevelt Inlet Shipwreck, including three individual pieces of shot and one scabbard tip. These artifacts were classified by material and function into the armament category according to the historic artifact guidelines mentioned above. Each of these artifacts is discussed in greater detail as follows.

Shot

Three pieces of shot have been recovered, two of these having been manufactured out of ferrous metal and the third from lead. The two ferrous pieces of shot were both recovered from the SW quadrant of the shipwreck, one at N75/E60 from 24 inches below depth to sterile soil, and the other from 0 to 12 inches below depth at N75/E70. Neither of these ferrous pieces of shot have any striking characteristics, beyond the fact that they are both very small, less than 3 mm in diameter, and one appears to still have a sprue intact (2006.33.185).

The third piece of shot found at the site has been identified as a lead cast ball, 8.12 mm in diameter, with a slightly off-set mold seam and sprue still visible. Analysis of the lead ball determined that this is probably buckshot, due to its small size and material (Figure 6.195). As to the origins of the artifact, it has been noted that, among the variety of shot and ball munitions recovered from colonial sites in the U.S.:

If the ball is perfectly round with faint mold lines, it was made in a production mold and, if in an early or mid-18th Century context, was most likely cast in Europe and shipped over in kegs. [Hamilton 1980:128]



Figure 6.195. Examples of shot recovered during the October 2006 excavations.

Scabbard Tip

One metal scabbard tip was also recovered at the Roosevelt Inlet Shipwreck. Manufactured from a copper alloy, probably pinchbeck or brass, this tip was engraved with a floral or scroll design, and the shape of the scabbard incorporates the rounded edges of a leaflet at its base as well as a rounded, bead/ball addition on the tip. The general shape of the scabbard and the ball at its tip bears great similarity to known examples of French and German scabbards being manufactured during the late eighteenth century (Neumann & Kravic. 1975:39). Figure 6.196 shows a hand-drawn illustration of the scabbard tip showing the decoration in detail, as well as a photograph of the artifact (note the reddish color of the material, which is indicative of a high copper content in the alloy).



Figure 6.196. Illustration and photograph of copper alloy sword scabbard tip (2006.33.154). Drawing by Sharyn Murray.

Activities

There are two categories under the Activities group-Recreation and Transportation/Industry. The Recreation category includes those objects that would be used in play or games such as game pieces, die, marbles, jacks, and other toys. Transportation/Industry is a two-part category. The Transportation aspect includes items used specifically to move people or things such as car parts, wagon parts, equestrian equipment, cooperage-related items, and ship-related items. The Industry aspect includes specific items used to perform an industrious task (wrenches, screw drivers, and hammers) and objects used in work such as for the milling of grain. Following is a discussion of all the material recovered from the Roosevelt Inlet Shipwreck that fit into these categories.

Recreation

There are 43 recreation-related items in the data. They range from seven bone dominoes (Figure 6.197), one bone or wooden turned possible chess or game piece, and one black stone, possibly serpentine, turned chess piece (Figure 6.198). Also recovered were 34 pewter and one copper alloy miniature toys. Volume 3 details the recreation material recovered from the wreck.

Pewter miniatures were very popular in the seventeenth and eighteenth centuries in Europe and the colonies. Nuremburg craftsmen started manufacturing two main types of miniatures by the sixteenth century. Miniature domestic wares such as cups, bowls, saucers, plates, chargers, jugs, and cookware (what we would now refer to as a child's tea set) were very popular but were not just for children. Baby cabinets or dollhouses outfitted with everything to be found in a real house were considered to be status symbols during the eighteenth century. Figures 6.199-6.202 show examples of miniature domestic items.

In addition to the domestic wares, miniaturists also created military pieces. Whole squadrons, with mounted cavalry and grenadiers in the wings, charged across the tables of Europe. Napoleon used miniatures to strategize his battles in the nineteenth century, just as William of Orange had done a century and a half before. They were also made as toys. Known as Zinnsoldaten or Zinnfiguren (tin soldiers or figures), these items were cast in hand-carved slate molds out of molten pewter. Hand painted and ready for battle, these items were shipped around the world. Noël Hume (1969) lists these types of items as being German circa 1760-1780. Craig Lukezic, archaeologist with the Delaware Division of Historical and Cultural Affairs, has extensively researched the topic of pewter miniatures. In his research he made contact with Dr. Helmut Schwarz of the Spielseugmuseum (Toy Museum) in Nuremburg. Dr. Schwartz, after viewing digital images of the miniatures, believes that they date to circa 1780 and were of a style known as Nuremburg Flats (Lukezic 2007 and Appendix H). However, just as with most commercial products, once they were made popular and heavily traded, manufacturing of miniatures spread from Nuremburg to the Netherlands and England. Birmingham, England became known as a production center for metal miniature works as well. The miniature soldiers recovered from the wreck are in the Hessian style of uniform which seems to reinforce their being of German origin (Figure 6.203) (Lefferts 1926).

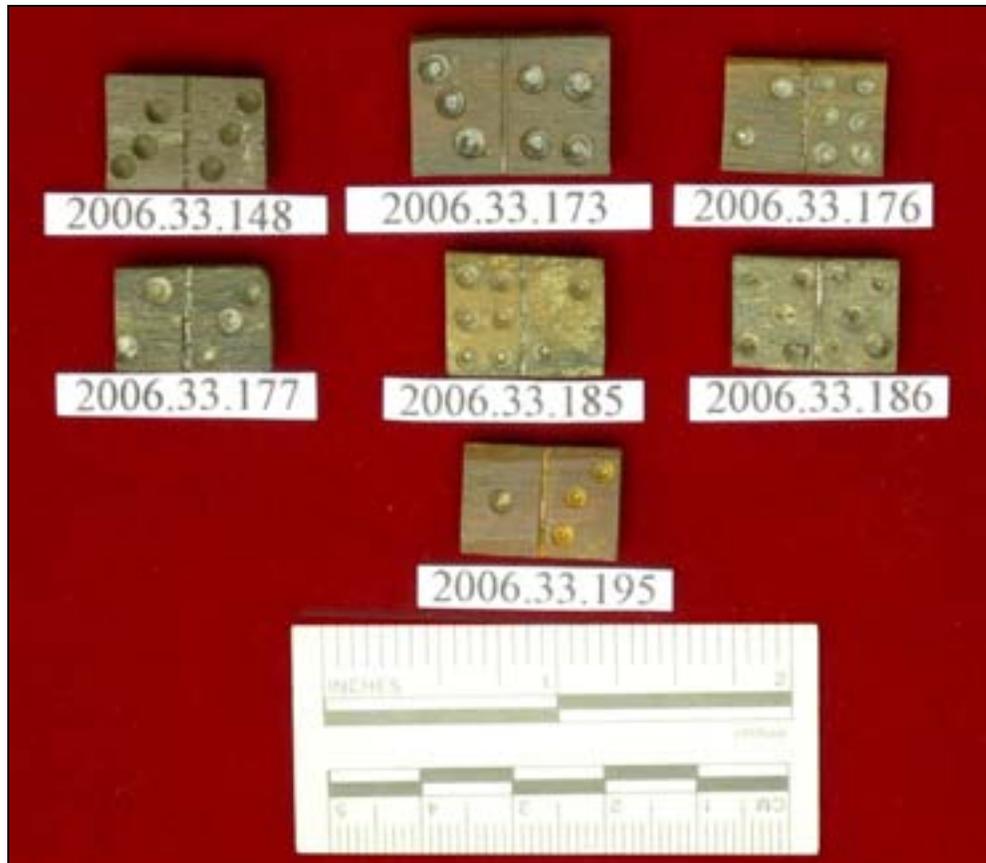


Figure 6.197. Bone dominoes with drilled pips.



Figure 6.198. Turned bone or wood (left) and stone (right) gaming pieces, possibly from chess sets.



Figure 6.199. Pewter miniature plates or chargers (2006.33.178 and 2006.33.185).

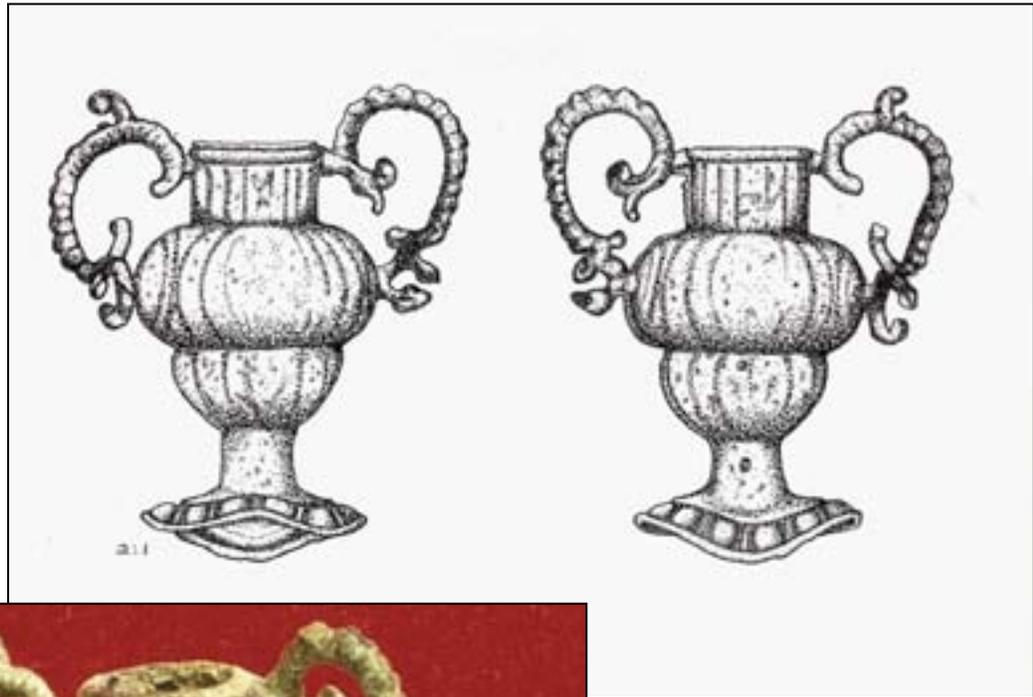


Figure 6.200. Pewter miniature urn (2006.33.185); photograph and detailed illustration. Drawings by Sharyn Murray.

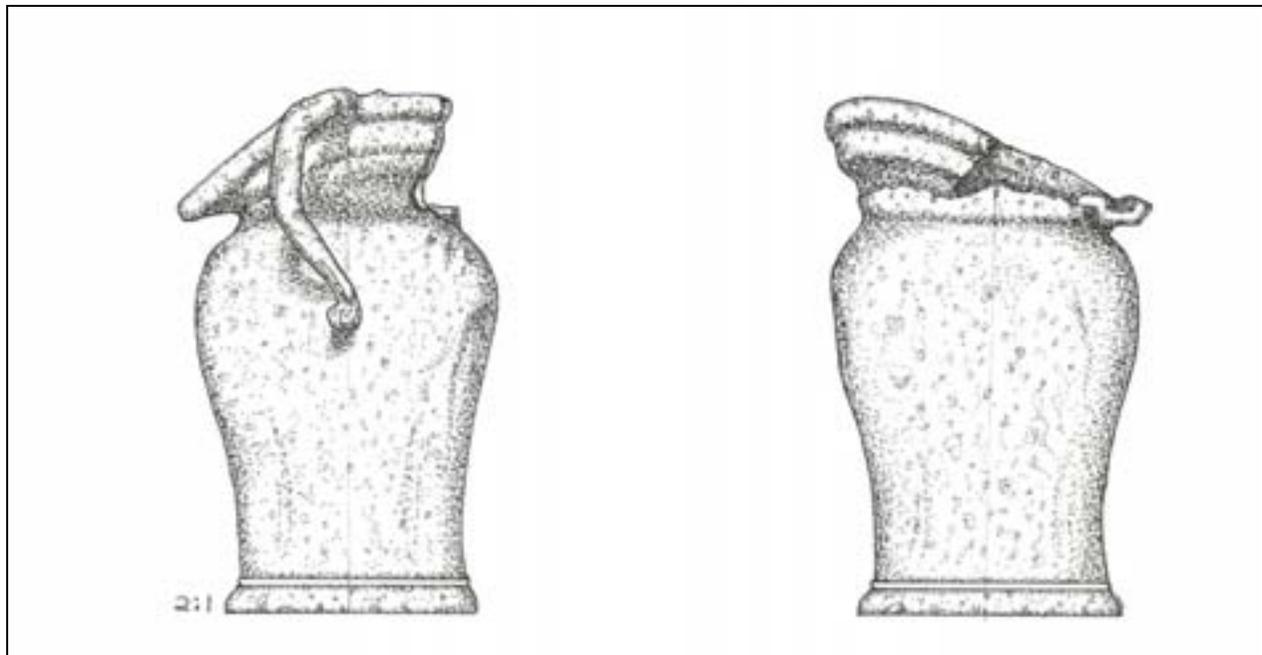


Figure 6.201. Pewter miniature pitchers; detailed illustration (2006.33.220).
Drawings by Sharyn Murray.



Figure 6.202. Pewter miniature pitcher
(2006.33.186).



Figure 6.203. Pewter miniature
German Grenadier soldier, circa 1740-
1790 (2006.33.232) (see Lefferts
1926).

Transportation and Industry

Four hundred and eighty-seven (487) artifacts were classified in the Transportation and Industry category. The following discussion details the collection, but the assemblage is also presented in Volume 3.

Stirrup

Stirrups are primarily utilitarian in that they are meant to provide support for the weight of the rider and typically have a loop in which the foot rests and a swivel or fixed loop at the top to connect them to the saddle. Stirrup design changes with function; for example, versions intended for use by the regimental cavalry are often made of iron and very simple in shape. Seventeenth and eighteenth-century stirrups exhibit a wide range of variation, ranging from simply utilitarian to ornate based upon not only their intended function but also their intended user. The copper alloy stirrup recovered from N50/E80 is very ornate, with a cast basket and flowers at the fastener end and leaf work descending down each side, and a solid foot platform (Figure 6.204). Research has not revealed the origin of this piece; it is similar in elaborate decoration to one identified as circa 1770-1810 by Neumann and Kravic (1989). Given the decorative motif of basket and flowers, and its small size, however, it is highly likely that this stirrup was intended for use by a female.



**Figure 6.204. Cast copper alloy stirrup (2006.33.163); photograph and detailed illustration.
Drawing by Sharyn Murray.**

Spur

Spurs from the seventeenth and eighteenth centuries were generally made of iron, brass, silver, tinned iron, or tinned brass, and fashioned so that buckles and straps could be attached by straps or rivets (Noël Hume 1969:243). The spur recovered from N50/E70 is of the stud-and-buckle type and lacks the typical figure-8 loops at the end that would be used to fasten it to the foot. This style has small drilled holes that attach to metal studs with buckles. These buckles then attach to the foot via a strap, chain, or tie. The heel of the spur is a short shank that is split in the center in order to receive a rowel (Figure 6.205) (Neumann and Kravic 1989; Noël Hume 1969).

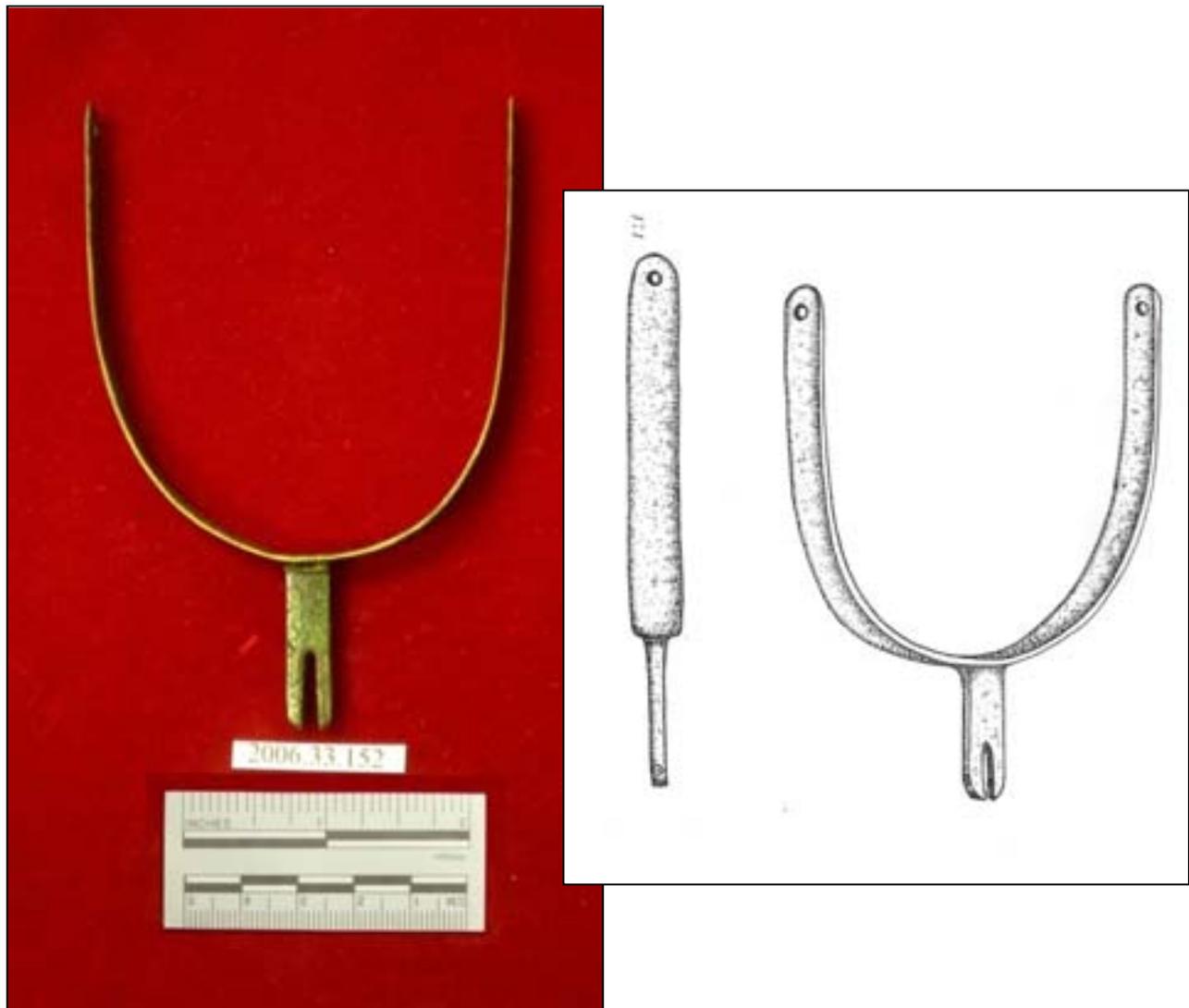


Figure 6.205. Copper alloy stud and buckle spur (2006.33.152); photograph and detailed illustration. Drawings by Sharyn Murray.

Seal

A single lead seal was recovered from the site. Often associated with textile shipments, these seals were used to tie up bundles of fabric and to close bags and bales. Two types are commonly found: seals from the manufacturer used for sealing the objects themselves, and seals from governing bodies which were proof of payment of excise or duty taxes or to attest to quality control standards. Seals were usually made up of lead disks attached to one another with a thin strip. They were simply folded over and clamped by using a pair of pincers or pliers which had a stamp in the head. This effectively sealed whatever was being shipped as the seal could not be removed without damaging or destroying it. Merchants often had their own seal made, and they varied widely in style from region to region; government seals often look similar to coinage with monarchal profiles and text on the face (Noël Hume 1969).

The seal recovered from the October 2006 excavations is stamped “No 1030 Elle 33 $\frac{3}{4}$ ” on one side with the letters “..MCETEN DOO..” and on the other side, “ ..ONIOYE MATHIAS SCH..” surrounding a central anchor with “M S & S” in the middle of it (Figure 6.206). An “ell” is a former unit of measurement for cloth. An English ell equals 45 inches (114 cm); exact measurements varied by country. Probably a merchant or manufacturer seal of the cloth, it is folded in the middle at the strap and does not seem to be have been opened as it is not warped or torn. The nearly 42.2 yards of cloth this seal demarcated has long since disintegrated.



**Figure 6.206. Lead bale seal (2006.33.185); detailed illustration and photograph.
Drawings by Sharyn Murray.**

Navigation or Drafting Equipment

Several items were recovered that fall into this category. Drafting points and dividers, a pewter ink well liner, and perforated stone quill rest were all collected during the 2006 excavations. Figures 6.207-6.210 show examples of a navigation set and similar items found on the vessel. Figure 6.211 is a photograph of the ink well. Figures 6.212 and 6.213 include the quill rest recovered from the site and examples of intact versions of this object.



Figure 6.207. Drafting set. (Source: Neumann and Kravis 1989:251)



Figure 6.208. Divider from the drafting elements recovered from the site.



Figure 6.209. Pen tips.

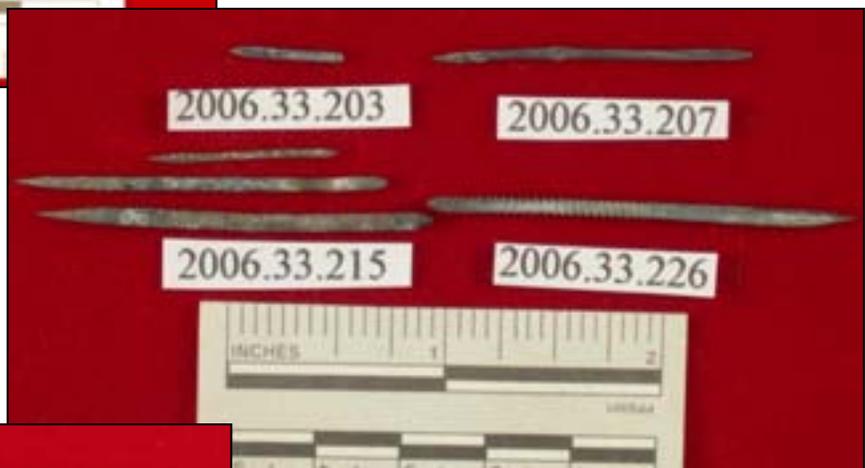


Figure 6.210. Metal points.



Figure 6.211. Pewter ink well liner
(2006.33.159).

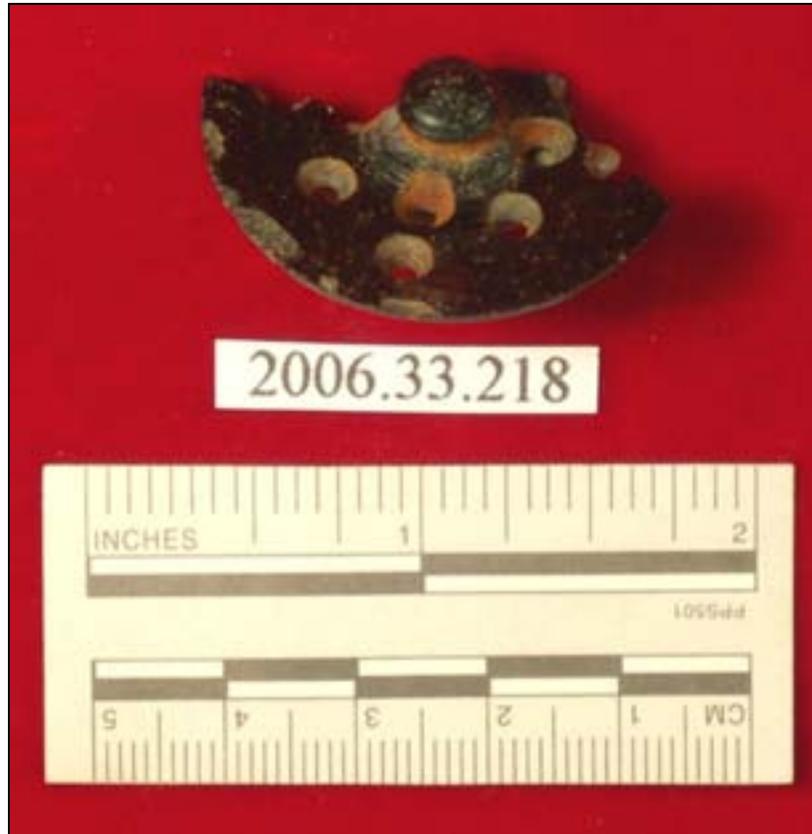


Figure 6.212. Polished and drilled stone quill stand (2006.33.218).



Figure 6.213. Illustration of similar quill stands and writing sets. (Source: Neumann and Kravic 1989:274)



Figure 6.214. Example of serpentine mortar, interior base (2006.33.226).

2005:2-3) Examination of the thin section revealed that the majority of the rock was a serpentinite or rock made up primarily of serpentine. XRD analysis proved that the mineral composition of the tested mortars and pestles consisted of “lizardite, clinochrysotile, orthochrysotile,” which are all types of serpentine, with crystalline mineral inclusions made up of “clinocllore, and forsterite.” Serpentinities are one of the most common of metamorphic rocks and occur throughout the world. European outcrops of serpentine are located in Ireland, England, Italy, France, Germany, Sweden, Norway, Poland, and Austria. One significant outcrop of lizardite is at Lizard Point, Cornwall, England; chlorite-rich jades and serpentines are found in Austria; and clinocllore and lizardite are commonly found in much of Europe (Kennedy 2005:6-7; <http://www.mindat.org/min-1071.html>; <http://www.mindat.org/min-1584.html>). Given the widespread availability of this material, a determination of source has not been definitively made although Kennedy states that “given these objects found on the ship were probably being imported from England, a likely place for the serpentine source mine would be Cornwall, England...” while “jade type localities, such as in Austria or China...would be a second place to look for the source rock” (Kennedy 2005:7). Further study of these artifacts may be a topic for future research. Figure 6.214 is an example of the mortars recovered while Figure 6.215 shows the pestles.

Stone Artifacts

Mortars and Pestles

Four stone mortars and six pestles were collected during the October 2006 excavations. The mortars are of a large straight-sided open form with evidence of lathing still extant; the pestles have flared ends rather than a knob for grinding. A geological study consisting of X-ray diffraction analysis (XRD) and lithic thin sections was undertaken for these artifacts to determine the type of stone from which they were carved and possible source material locations (Appendix I). Stone characteristics include a greasy or waxy luster, color ranging from light green to dark gray, a soft consistency that is easily scratched with a knife, and the inclusion of marble-like veins or platy crystal clumps (Kennedy



Figure 6.215. Serpentine pestles; note the waxy luster.

Strike-a-lights

Five dark gray flint or chert strike-a-lights, lithic chunks and spalls that may have been used to create a spark for flame, were recovered at the site as well (Figure 6.216). Some of these items may have been raw material for the production of gunflints as well. Whether these were for use on the vessel or as cargo cannot be determined.



Figure 6.216. Strike-a-lights; dark gray chert or flint.

Millstones

A task that has changed little since the day the Roosevelt Inlet Shipwreck sank is the milling of grain. Even with the industrialization of much of the modern world, one can still find artisan millers who operate just as their ancestors did two hundred years ago. Millstones are perhaps the most important piece of the process after power. Several millstones were identified during fieldwork at the Roosevelt Inlet Shipwreck. These fell into two distinct types: monolithic or traditional, and composite stones. Arguably the most popular type of millstone in the eighteenth century was the composite stone. This type of millstones is easily distinguished from traditional monolithic millstones because they were made from several smaller pieces banded together with iron straps to form a wheel and are thus easier to transport and replace when needed (http://gsa.confex.com/gsa/2009NC/finalprogram/abstract_154478.htm). Traditional millstones were fashioned into the shape of a wheel from a single stone. As a result, they are considerably heavier and difficult to transport and harder to replace. When new, a millstone is smooth and it must have furrows cut into it in order for it to have a grinding surface. The stones must be periodically sharpened or “dressed” to keep it grinding efficiently. The average millstone is about 4 feet across. Figure 6.217 shows both a composite and a monolithic millstone recovered from the shipwreck. Note how much larger the diameter of the composite stone would be if completed. Both stones are gray sandstone and is possibly of English origin. Note also that both stones are smooth and were lost prior to their being dressed for use.



Figure 6.217. Composite millstone, left; and monolithic millstone, right. These are two of several millstones that were identified from the wreck. Others were not collected but remain stable at the site.

Cooperage

Iron hoops (n=2) as well as two sections of wood that may be cant or head pieces for a cask or barrel were identified during data analysis (Figure 6.218). In addition, one copper alloy spigot was recovered from the excavations in 2006. Used to dispense beverages from kegs and small casks, spigots were typically made of brass or iron (Neumann and Kravic 1989:249). The overall design of spigots in the eighteenth century remained the same; there was a handle which held the stopcock and a rear extension used to penetrate the keg (Figure 6.219). Figure 6.219 includes a photograph of a similar spigot from the *Machault*, which sank in 1760 (Sullivan 1986:60). There does appear to be some variation in stopcock design in this time period. The spigot recovered from the 2006 field investigations retained its stopcock. Two other stopcocks were also recovered. One has a large loop handle and the other is a flat leaf design (see Figure 6.219).



Figure 6.218. Barrel hoops recovered from the excavation.



Figure 6.219. Cast copper alloy spigot and two stopcocks recovered from the wreck; photographic example of a similar spigot from the *Machault*, lower right (Sullivan 1986:60).

Antimony and Lead Ingots

Four hundred and seventeen (417) antimony ingots and ingot fragments weighing more than 66.38 kg were collected during the October 2006 excavations at Roosevelt Inlet (Figure 6.220). In addition, seven lead ingots weighing 2.135 kg (Figure 6.221) were recovered. These two raw materials have many uses, both together and singularly. Both can be used in the production of pewter. High-quality pewter is 85-95% tin mixed with copper or antimony. Antimony can also be used in the manufacture of paint as well as glass and ceramic. Low-quality, bluish pewter has lead mixed in along with the other ingredients. Lead and antimony alloys are stronger than lead but more flexible than antimony alone. This shipment may have been intended to go to pewtersmiths in the mid-Atlantic regions. Antimony is found natively in many areas but also occurs in Bohemia, as well as other locations in central Europe and in Cornwall, England (Wang 1919).



Figure 6.220. Antimony ingots (2006.33.174).



Figure 6.221. Lead ingots (2006.33.183).

Vessel Architecture

Vessel architecture in the late eighteenth century is very well understood. Plans and schematics of these ships and boats still exist, along with records from the shipwrights who built them. The difficulty in examining a shipwreck where there is little hull integrity left, as with this vessel, is in determining which of the artifacts recovered represent portions of the wreck itself as opposed to cargo or personal possessions of the crew or passengers. A few key portions of a ship are easily determined however. Exterior metal sheathing became prevalent as way of retarding the predation of worms on the wooden hulls of vessels since the fourth century BC (Bingemann et al 2000). Lead appears to be the sheathing metal of choice for the Roosevelt Inlet vessel. Four sections of lead sheathing, complete with nail holes, were recovered (see Figure 6.222). One sheath of an unidentified material was also recovered. Additionally, four lead patches and one unidentified patch were also recovered.

Given that vessels were prone to needing these aforementioned patches, one of the most important part of any seagoing vessel is a bilge pump. Bilge pumps can be all that stands between the sailors on board and certain death. Although pumps of one sort or another have been used on watercraft since the force pump of the Greeks, by the eighteenth century bilge pumps were constructed of wood or metal and included the use of valves and pistons. Regardless of how they were constructed they all had a single mission: get the water out the hold. This was accomplished by pushing or pulling the water up a piston tube either of wood, copper, or lead. Once the water was brought above the waterline the important job was to direct it overboard. This task was carried out by bilge tubes or dales. A dale could be as simple as a canvas or plank sheath that could be removed when not in use. A more permanent solution was the use of lead tubes. Two lead tubes with flanged collars were recovered from the wreck. Another feature common to bilge pumps was the addition of a metal sieve or screen at the bottom of the pump system. This sieve helped to ensure that no foreign bodies such as floating debris or organic material got into the mechanism and clogged it (Oertling 1996). One section of a copper sieve was recovered in the same test unit as a piece of the ship's planking, lending credence to the idea that it may represent a portion of a bilge screen. Figures 6.223 and 6.224 show bilge related artifacts.

In total, twenty-three fragments of various materials were recovered from test units and identified as being related to ship architecture or fittings. Among these are three wrought copper alloy nails that appear to be bent or clinched, indicating that they are likely from the vessel itself or perhaps wooden shipping crates but not a bulk shipment intended for sale in Philadelphia. Figure 6.225 shows examples of the copper alloy nails recovered from the Roosevelt Inlet Shipwreck. Copper alloy nails were used to attach sheathing to the vessel hull and in various other applications throughout the vessel. Copper nails, not corroded by salt water as easily as other metals, were favored by shipwrights by the late eighteenth century.

Also recovered from the excavations were one copper alloy rivet, and two sections of wood hull fabric. Several of the wooden fragments currently listed as undetermined may well represent trunnels and portions of the ship's fittings or fasteners. See Volume 3 for an inventory of vessel architecture items recovered.



Figure 6.222. Lead sheathing recovered from the Roosevelt Inlet Shipwreck.



Figure 6.223. Lead bilge pump tube recovered from the wreck.



Figure 6.224. Section of copper sieve recovered from the wreck (2006.33.223).



Figure 6.225. Rose head copper alloy wrought nails.

Undetermined

Of the 26,494 artifacts recovered at the Roosevelt Inlet Shipwreck site, a total of 1,131 items could not be identified as to function but may be identifiable with further study. Additional research to identify these items is ongoing by the DH&CA staff; further information is not available as of the writing of this document, however. These undetermined artifacts are discussed below according to material type and artifact description. Each section shall be separated first by material type, and selected artifacts within each of these categories shall be further detailed. Volume 3 details the material in this group.

Metals

Copper Alloy

A total of 87 unidentified copper alloy artifacts were recovered from the site, including one each of a copper alloy and pewter, and a copper alloy and ferrous metal item. Among these artifacts, one copper or brass item of note is a possible brass finial; it appears as if this was once attached to wood and may even be part of a clock hood or base or a curtain tie back base (Figure 6.226).



Figure 6.226. Copper alloy finial, possibly from a clock hood; tip is broken off (2006.33.178).

Ferrous

Thirteen undetermined artifacts have been determined to be of ferrous material. Further analysis of these items may reveal the function of these artifacts.

Lead

A total of 24 lead objects were recovered from the site. Many of the lead items were described as unidentified objects, varying in identifications from a collar or a spout with flanged rings, to a 2.5" convex disc with a 1.09" diameter hole, to a possible sheeting fragment.

Pewter

One hundred and twelve (112) undetermined pewter items were found at the Roosevelt Inlet Shipwreck, comprising one of the larger categories of undetermined materials recovered from the site. One pewter artifact of particular note is a vessel or possible small cabinet foot in the form of a claw grasping a ball (Figure 6.227). This item is reminiscent of the English Chippendale-style claw and ball foot typical of furniture found in the second half of eighteenth-century America from the time period of about 1750-80 (Buffalo Architecture and History 2005).



Figure 6.227. Pewter object similar in style to the Chippendale claw and ball often found on Federal period furniture (2006.33.126). It is possibly the foot to a clock or small chest.

Figures 6.228 and 6.229 show three views of an object that requires further identification, for the material type and function of this object is as of yet undetermined. The object appears to be manufactured out of possible lead or pewter, and closely resembles a clyster pump in form. Clyster pumps were in common use in the eighteenth century as it was believed that frequent enemas helped to purify the body and maintain good health. Figure 6.230 is a photograph of an eighteenth-century clyster pump; note the similarity between it and the item recovered from the Roosevelt Inlet Shipwreck (Collect Medical Antiques 2010). Future research may shed greater light upon the proper identification of these and several other indeterminate artifacts.



Figure 6.228. Two views of an unidentified pewter artifact similar to a clyster pump.



Figure 6.229. Unidentified pewter artifact similar in shape to the clyster pump pictured below.



Figure 6.230. Eighteenth-century clyster pump. (Source: <http://www.collectmedicalantiques.com/potpourri2.html> January 30 2010)

Glass

A total of 431 undetermined glass artifacts were found at the shipwreck, representing the largest collection of undetermined materials recovered from the site. A wide spectrum of glass artifact types and colors are represented in this group. Glass colors recorded for the undetermined pieces include clear, frosted, amber, aqua, blue, light green, olive green and blue, to name a few. Artifact descriptions included an extremely large variety of object types, including possible small case bottles, lantern lenses, applied glass strings on table glass, pharmaceutical bottles, window glass fragments, modern glass, and even possible very small eyeglass lens fragments.

One of the more unusual objects recovered from the Roosevelt Inlet Shipwreck is a flat chipped glass heart. Badly fragmented, this piece has been refitted and forms a perfect heart (Figure 6.231). This may have served as the cover for a locket or may have served as a decorative insert in furniture. Further analysis is recommended into the history of the time to better identify this object as to function and date.



Figure 6.231. Clear glass heart, possibly from a locket (2006.33.165).

Lithics

One slate fragment, two fragments of serpentine, and one quartz crystal were also recovered from the wreck during the 2006 excavations. The slate may be architectural or kitchen-related but is too fragmented to determine function. Serpentine mortars and pestles were recovered from this vessel and the serpentine fragments found may be part of one of these items; this cannot be determined without further research to possibly refit these pieces. The quartz crystal may be non-cultural as lithics of this type are not uncommon in the region and may have been deposited in the vessel remains by natural phenomena.

Organics

Bone

Four animal bone fragments (2006.33.153, 2006.33.177, 2006.33.216, 2006.33.226, Figure 6.232) were recovered during operations at Roosevelt Inlet in October of 2006. Two of the bones (177 and 226) were positively identified as the remains of domestic cow (*Bos taurus*). Specimen 177 is a left innominate fragment consisting of the ischium and pubis portions. This fragment measures approximately 17 cm long and shows possible indications of butchering on the ischium. Specimen 226 is a fragment of a right scapula measuring just over 23 cm long. The scapula fragment consists of the portions of the posterior and dorsal borders and a small part of the infraspinous fossa. No clear evidence of butchering is present from this bone. The third (216) fragment is too small and lacks any diagnostic points; it could only be identified as coming from a large mammal while the fourth fragment was identified in the data as a possible modern fish mandible and as such is non-cultural.



Figure 6.232. Animal bone fragments recovered from the Roosevelt Inlet Shipwreck site.

Chalk

Two fragments of chalk were recovered at 0-12 inches below surface. While the function of these fragments is indeterminate, there were many uses for chalk on board a vessel and these may be remnant of life on board the ship.

Coal

Twenty fragments of coal were recovered from the wreck, fifteen of which came from TU N10/E50 NE Quad. This material may represent fuel for the stove on board the vessel or part of the cargo.

Seeds

One sunflower seed husk and one UID seed were recovered from the wreck. While the sunflower seed husk may be intrusive and modern, it is not improbable that organic material would be preserved in an anaerobic environment such as is often found in sealed shipwrecks. The UID seed was recovered from 0-12 cmbs while the sunflower husk was recovered from below 24 inches.

Wood

Representing the second largest collection of undetermined material type recovered from the shipwreck, a total of 385 wood items were found. Most of the wooden objects retrieved could not be described further than their material type. Those that could be described, however, include items such as: one piece of molding with a squared section that may be furniture or ship-related; one section of a tapered wooden pin; one furniture or door part with a possible keyhole-shaped cutout and a possible inscribed line on one end; a perfectly preserved oak bottle stopper, and several other amorphous, worked, or undetermined pieces of timber. The wooden stopper is 31.83 mm high with a shaft diameter of 19.98 mm and a head diameter of 34.20 mm. Figures 6.233 and 6.234 show profile and bottom views of this object.

Indeterminate

A total of 105 objects recovered from the shipwreck could not be identified by functional category, material or artifact type. These objects were either so badly eroded, degraded or corroded that analysis of these items could yield no definitive identification beyond such observations as “amorphous in shape,” “disc-like or coin shaped,” or “very fragmented and corroded.” No further analysis of these objects is merited.

In addition to the above-listed material categories of artifacts found, a small number of additional indeterminate artifacts were recovered which did not fit into one of these larger subsets. These include: two lumps of possible lime, 17 items of undetermined material, one clay object, 5 lithics, and 79 concretions (70 ferrous and 9 non-ferrous). The concretions require no further discussion as they cannot be identified by the information available in the present dataset. At some point in future, either through X-ray analysis or mechanical means, more information may become available. The clay object appears to be

either a ceramic tile that has been over-fired, or is a possible cinder. See Volume 3 for the inventory of indeterminate material from this project.

Modern/Intrusive Material

One hundred and ninety-six (196) objects have been recovered that have been identified as modern or potentially modern materials. Included in this collection are aluminum, steel, and bimetal cans, a steel Heineken crown cap lid, lead, copper, steel, and plastic fishing tackle or weights, one piece of modern plywood, and a plastic bottle fragment. Sixty-four (64) modern brown beer bottles and thirteen modern green beer bottles were recovered along with kerosene lamp lenses and chimney parts, sunglass lens fragments, and various other modern glass fragments. This material was recovered from 0 to 30 inches in depth and horizontally across the site. Volume 3 details the modern/intrusive materials recovered from the wreck site.



Figure 6.233. Profile of wooden stopper recovered from the Roosevelt Inlet Shipwreck site (2006.33.152).



Figure 6.234. Bottom view of wooden stopper recovered from the Roosevelt Inlet Shipwreck site (2006.33.152).

CHAPTER 7

SPATIAL ANALYSIS

Spatial distribution is one of the first aspects examined when looking at the artifacts recovered from a shipwreck assemblage. Spatial analysis can reveal information on several lines of inquiry, including:

- 1) Site integrity - analyzing spatial distribution, vertically and horizontally can help determine whether or not an assemblage is part of a cohesive whole or just a randomly scattered collection of material culture and can help determine whether or not the site has been heavily impacted by previous salvage operations, or storms;
- 2) Cargo patterning - examining horizontal distribution patterns can help determine how the vessel was packed for shipment;
- 3) Artifact function - vertical distribution along with horizontal clustering can help determine whether artifacts are part of the cargo or part of the ship's furniture/crew possessions.

In the case of the Roosevelt Inlet Shipwreck, the horizontal distribution has been analyzed using artifact density by functional classification and, in examining certain components, artifact category.

Following the artifact functional classification established by Stanley South (1977) as a means of grouping the artifacts for quantification, basic sets of data were produced for Architectural, Clothing, Furniture, Kitchen/Food-Related, Personal Adornment, Armament, Tobacco Use, Recreation, Transportation/Industry, Ship's Architecture, Indeterminate Materials, and Modern/Intrusive Materials. Distribution was plotted for these classes in each of the eleven 10-x-10-foot excavation units.

Architecture

Artifacts from this class consist of bricks, ceramic tile, slate, window glass, nails, and lead window comes. Results of the distributional analysis may be skewed by the fact that the majority of bricks located on the wreck were not collected and therefore cannot be adequately plotted. In general, however, density is greatest in the northeast and southeast quadrants of Unit N10/E50. Figure 7.1 displays the distribution across the horizontal grid. Concentrations are also higher in the southwest quadrants of units N75/E60 and N75/E70, although recovery of artifacts from this category were made through the excavation units.

Clothing

This category consists of only those things used in the construction and maintenance of clothing (thimbles, thimble cases, needle cases, linen smoothers, and an iron), with the addition of fasteners which are functional but not decorative (e.g. straight pins, and hooks and eyes). The southwest quadrant of Unit N75/E70 has the highest distribution of materials from this category while the lowest concentration is in the southeast quadrant of

N0/E50. Generally, distribution across the units is consistently within the 15-40 item range with higher concentrations located on the south side of units N75/E60-N75/E80 bracketing the highest concentration. Units N0/E50 and E10/E50 also show higher areas of concentration (see Figure 7.2).

Furniture

Artifacts in this category include candleholders, chandelier parts, curtain tie backs, clock parts, and furniture fragments. A clear concentration is evident in all of Unit N10/E70 as shown in Figure 7.3. Distribution across all units is fairly homogeneous with the exception of that unit and, to lesser degree, those directly west of its location.

Kitchen/Food-Related

While the highest concentrations of artifacts from this category are west of the center line for the wreck in units N0/E10 (NW and SW quadrants) and N10/E50 (NE and SE quadrants), overall distribution is still high east of that point. Concentrations are higher on the south end of the wreck excavation but fairly consistent across the areas with lighter concentration in Unit N50/E50. Given the range of artifacts in this classification, density maps for data subsets were also created. Figure 7.4 is the overall classification map while Figures 7.5-7.12 display the density for food-related vs. tableware, ceramic vs. glass, and various groups within those categories.

Food-related items (those pertaining to the preparation/serving/or storage of consumables) are most highly concentrated in the units N0/E50 (NW), N10/E50 (SW, SE, and NE quadrants) with decreasing concentrations in the surrounding quadrants. A second concentration is located in the southeast and northeast quadrants of Unit N50/E70, and in the northwest quadrant of N50/E80. Consumption-related artifacts are concentrated in the southwest quadrant of Unit N75/E70 but with levels decreasing slightly in the surrounding quadrants. This artifact category is distributed fairly evenly across the exposed excavation areas.

When the distributions of ceramics are broken down by type, it becomes apparent that the utilitarian wares are concentrated in the south while the tablewares are in the north (Figures 7.7-7.10). This is not the case with glass, however. Both container bottles and stemware and tumblers are concentrated in the southern portion of the excavated areas (Figures 7.11 and 7.12).

Personal

This category contains all items that might be used for self-decoration such as beads, buckles, buttons, and jewelry or as personal items such as coins, jettons, eyeglasses, pen knives, and watches. Artifacts from this category are most heavily concentrated in units N50/E70 and N50/E80 with the greatest density located in the southeast quadrant of N50/E70. These materials are fairly evenly distributed across the southern four test units and have a smaller concentration across the southern halves of the northern units as well. Figure 7.13 details the distribution of these materials.

Tobacco

As with the ceramic tableware, this artifact classification is mostly concentrated in the northern three units, with the greatest concentration located at the centerline in Unit N75/E60 (NW and SW quadrants). A considerable number (30-148) is also distributed fairly evenly in the mid-site excavation units between N50/E50 and N50/E80 (see Figure 7.14).

Armament

This classification includes militaristic items such as shot, and sword scabbard parts. Items from this group were found in four isolated locations at N75/E60 (SW and NE quadrants), N75/E70 (SW quadrant), and N50/E70 (NE quadrant). Figure 7.15 illustrates this distribution.

Activity

The Activities classification consists of two categories, Recreation and Transportation/Industry. The first groups those items whose function was entertainment or amusement. The second groups those artifacts used in transportation or industry/work. In both of these categories the highest concentration of individual items are in the northernmost units (see Figures 7.16 and 7.17). These categories are discussed individually below.

Recreation

Consisting of items used for amusement or entertainment, this classification includes toys such as tin soldiers (not necessarily meant for the amusement of children), and games such as dominoes, and chess. The highest concentrations of this category are in N75/E70 (SW) and N50/E60 (SE) with a greater density in the western end of the northern units.

Transportation/Industry

Items such as stirrups, spurs, bale seals, drafting points, dividers, and writing equipment such as a quill or sander lid, and an ink well liner are in this category. Also included are industrial items such as cooperage parts including hoops, bung spigots and stopcocks, mortars and pestles, millstones, and strike-a-lights (or gunflints) along with antimony and lead ingots. As shown in Figure 7.17 the northern units possess by far the greatest density of these artifacts. However, as with the bricks from the architectural class, not all of the known artifacts from this category were collected. Millstones were recorded at both the mid-range and southern units (see Figure 7.17). Also, the majority of artifacts from this category consist of the lead and antimony ingots which are concentrated in the northern units and skew the data greatly.

Vessel Architecture

Lead patches, bilge tubes, and sheathing make up the majority of materials from this classification. Items which may represent portions of the vessel but could not be definitely identified at this time are quantified in the Undetermined category. Therefore only eighteen items are reflected in this density map (Figure 7.18). As one would expect the

highest concentration of items from this classification were located alongside fragments of hull and ships timber near the longitudinal stringer and scattered hull remains.

Undetermined

This category contains those items which cannot be identified at this point in time. As expected, artifacts from this category are uniformly spread across the site with concentrations following the pattern of general artifact concentration. Figure 7.19 shows the Undetermined material.

Artifact density overall clusters along the central extant timber of the vessel, and tapers off on both the eastern and western excavation units the farther the test units move away from the vessel remains (see Chapter 9, Conclusions, for a detailed view of this trend). Although the clustering of some of the functional categories is suggestive, this assemblage requires more research and analysis to better determine whether this patterning is indicative of cargo placement, the result of previous salvage operations, or natural actions on the remains.

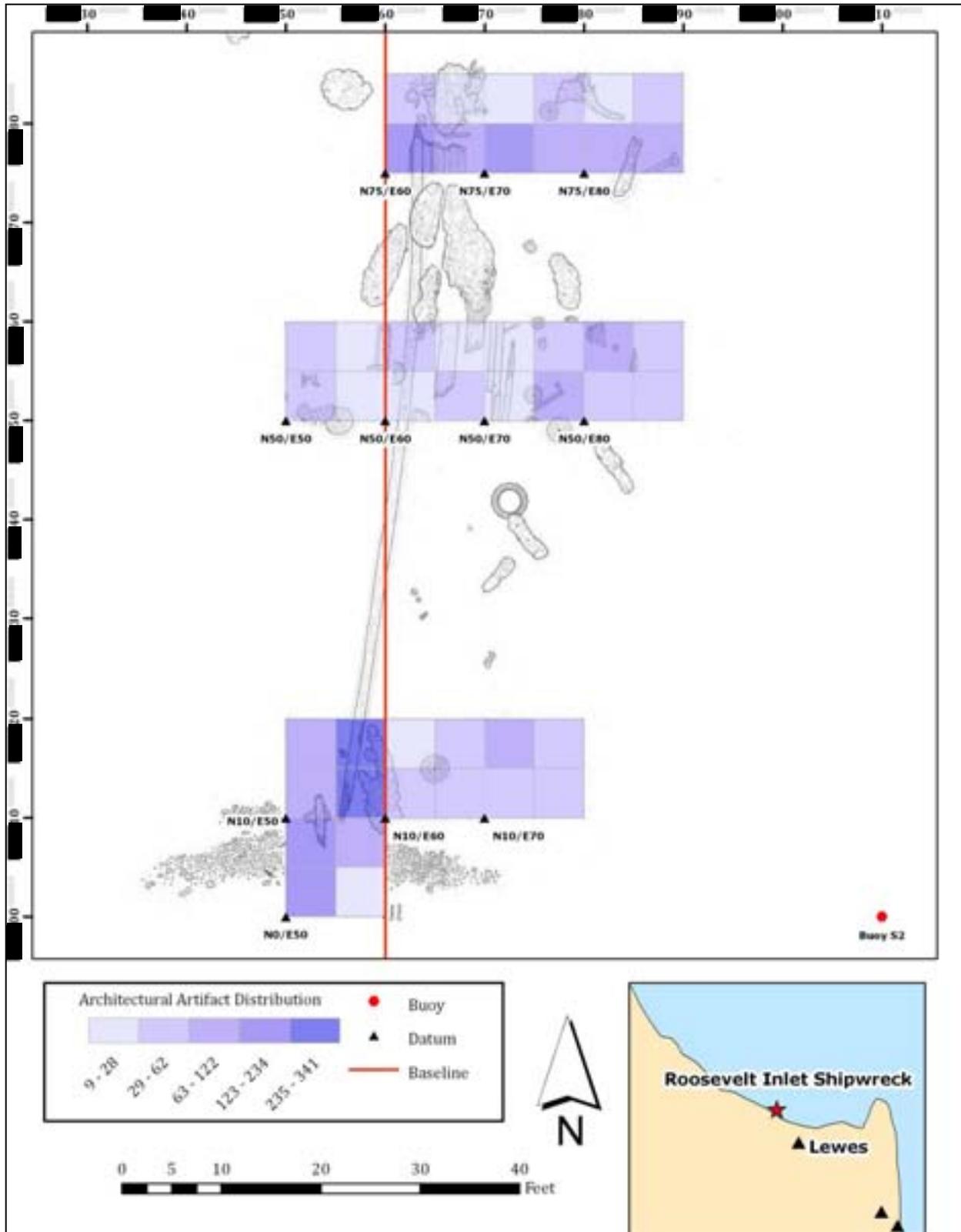


Figure 7.1. Architectural Artifact Distribution across the Roosevelt Inlet Shipwreck site.

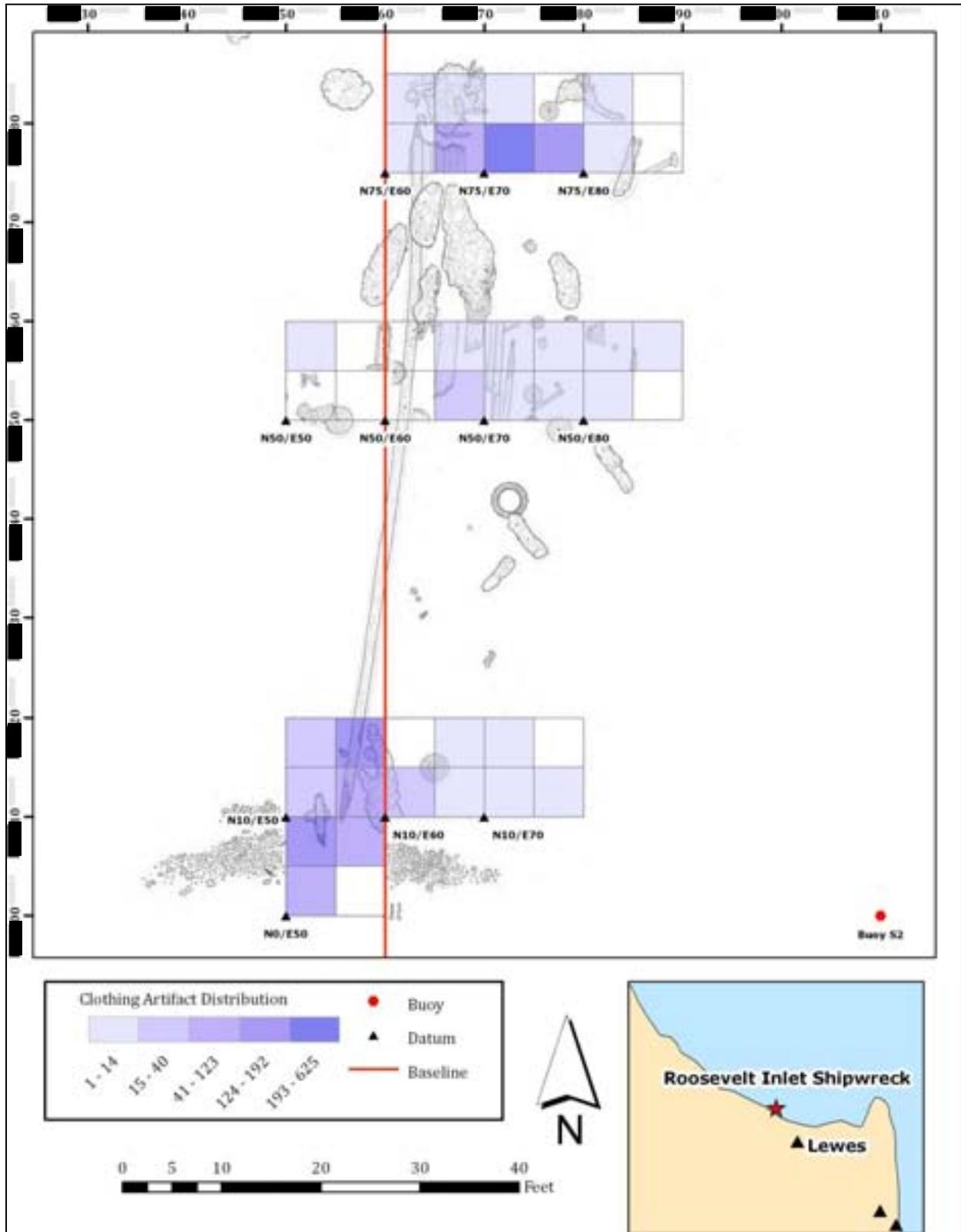


Figure 7.2. Clothing Artifact Distribution across the Roosevelt Inlet Shipwreck site.

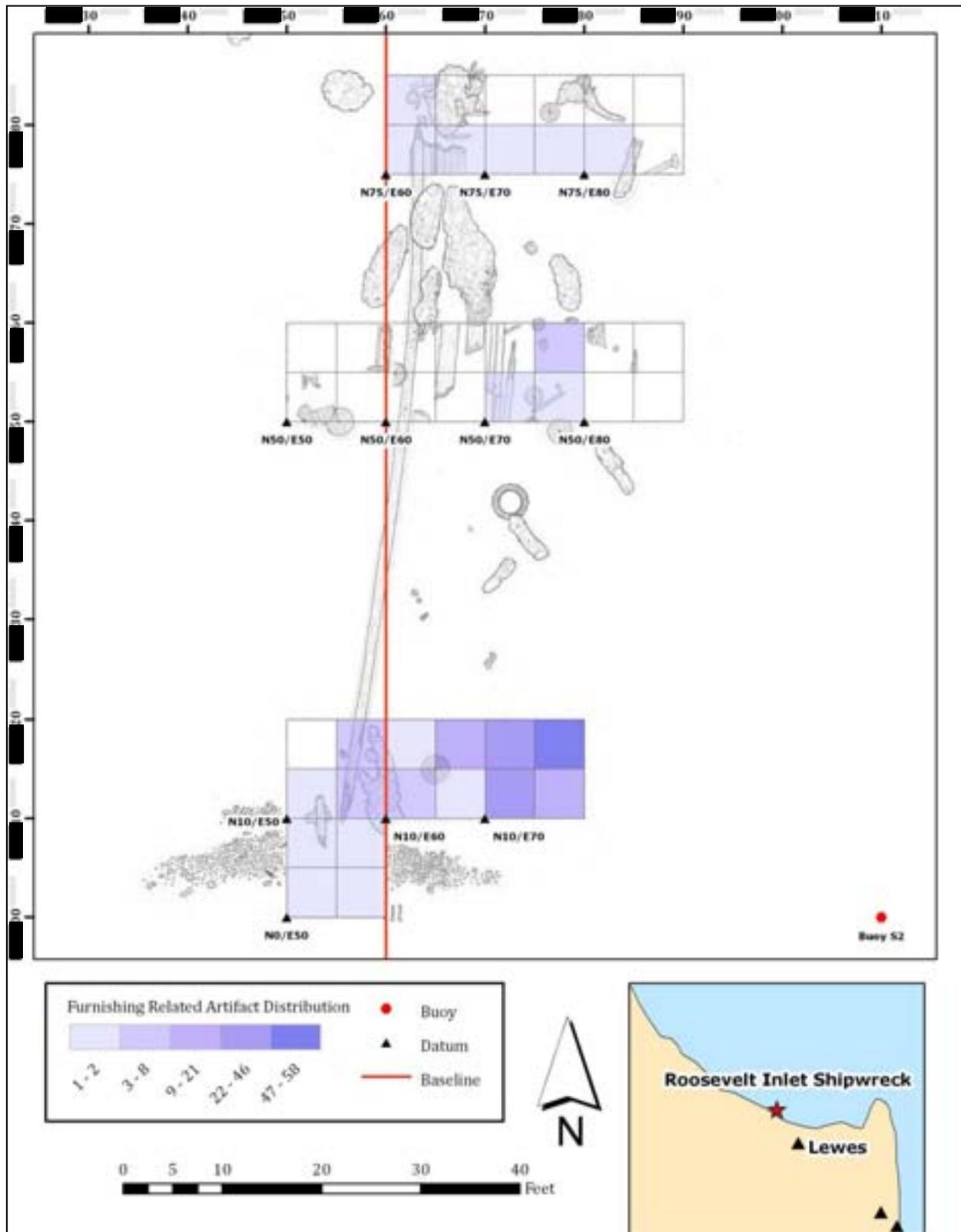


Figure 7.3. Furnishing-Related Artifact Distribution across the Roosevelt Inlet Shipwreck site.

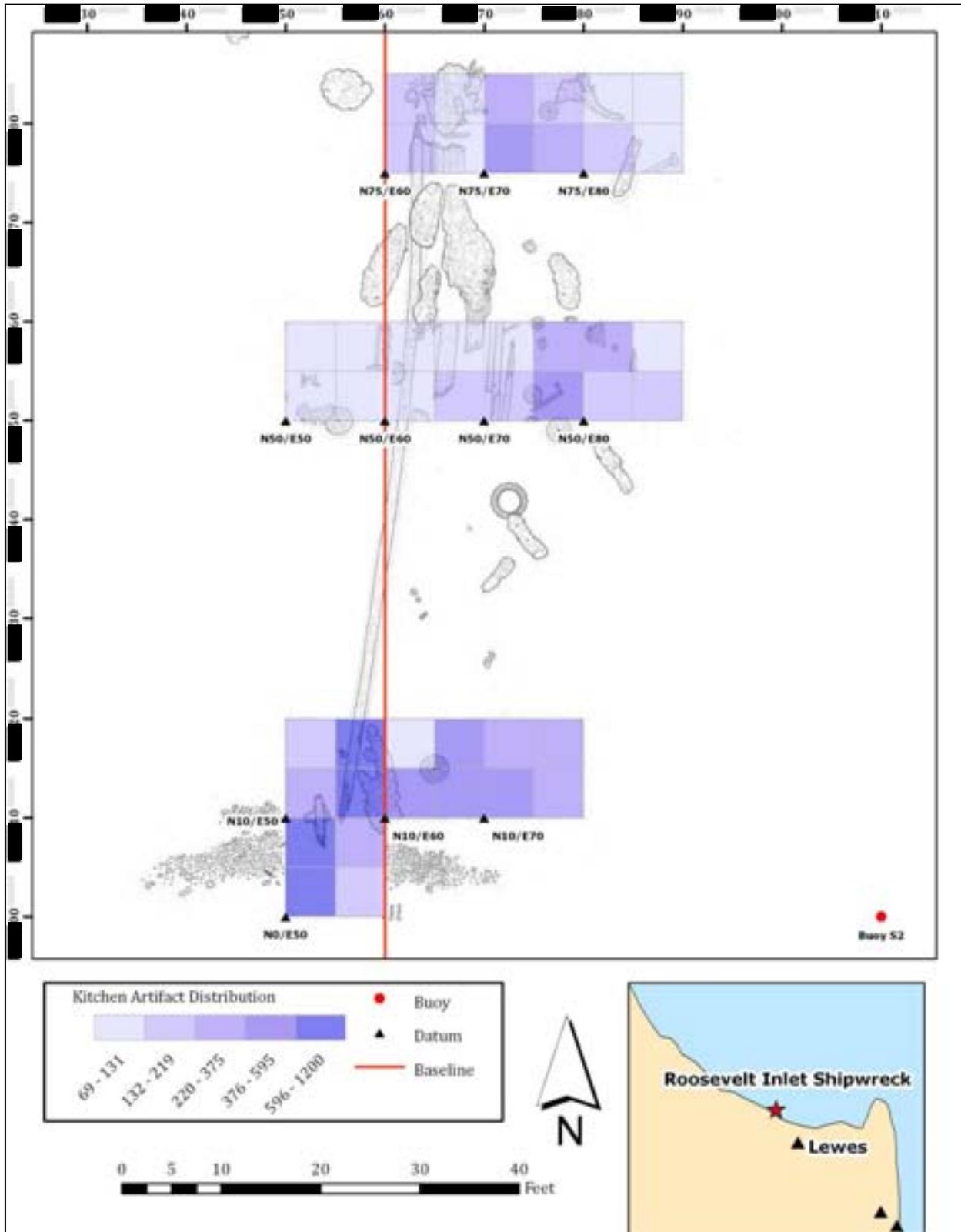


Figure 7.4. Kitchen Artifact Distribution across the Roosevelt Inlet Shipwreck site.

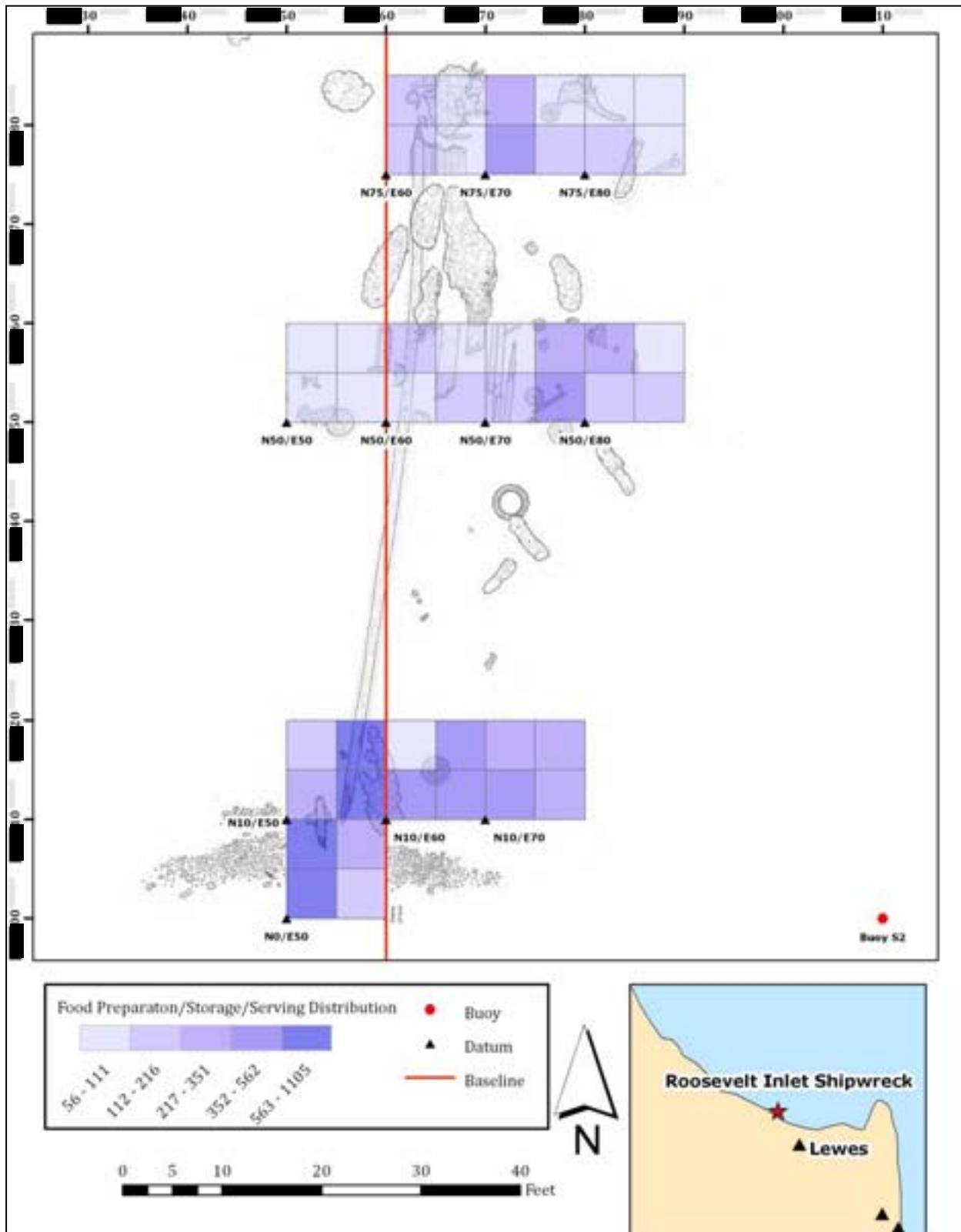


Figure 7.5. Food Prep/Storage/Serving Artifact Distribution across the Roosevelt Inlet Shipwreck site.

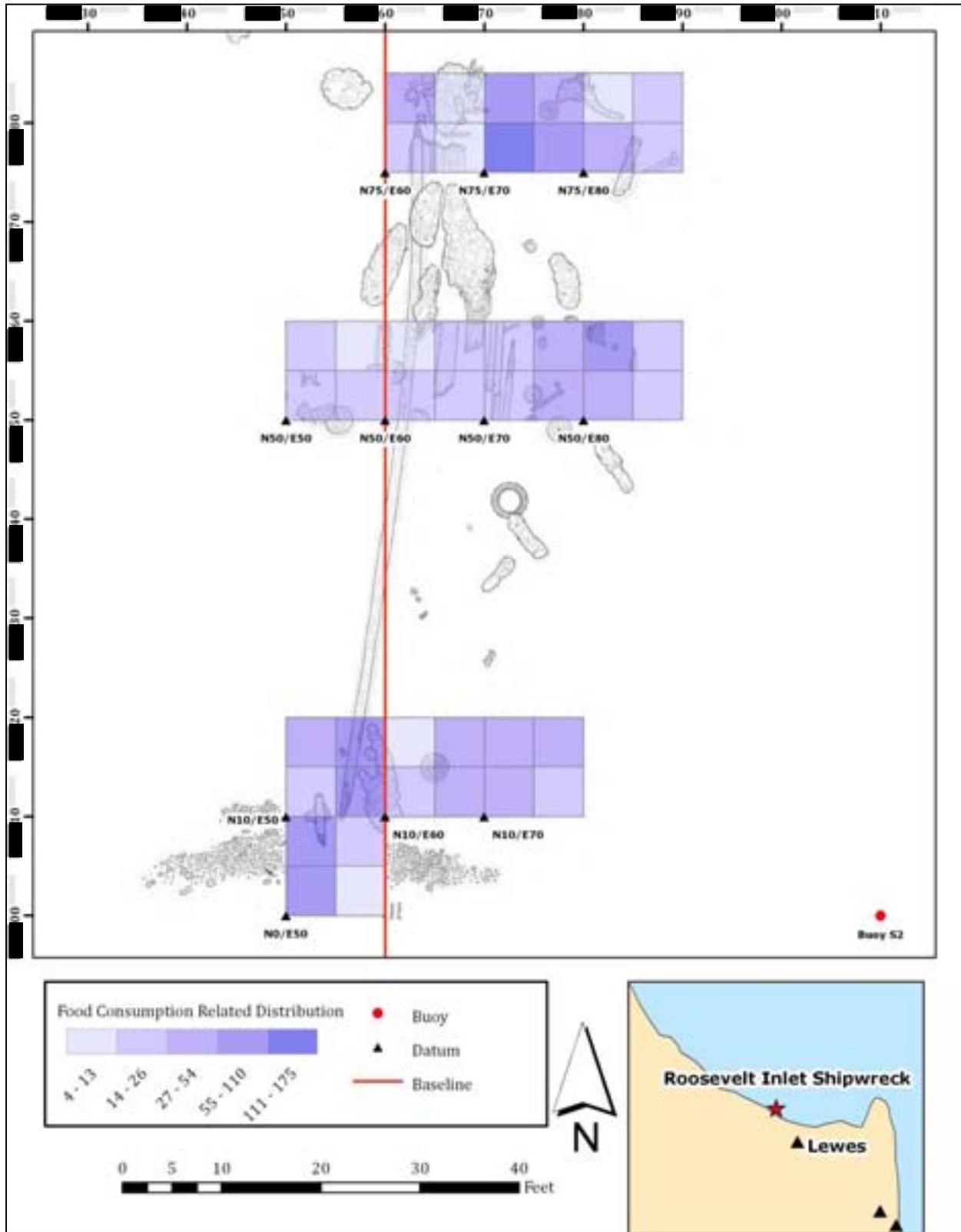


Figure 7.6. Food Consumption Artifact Distribution across the Roosevelt Inlet Shipwreck site.

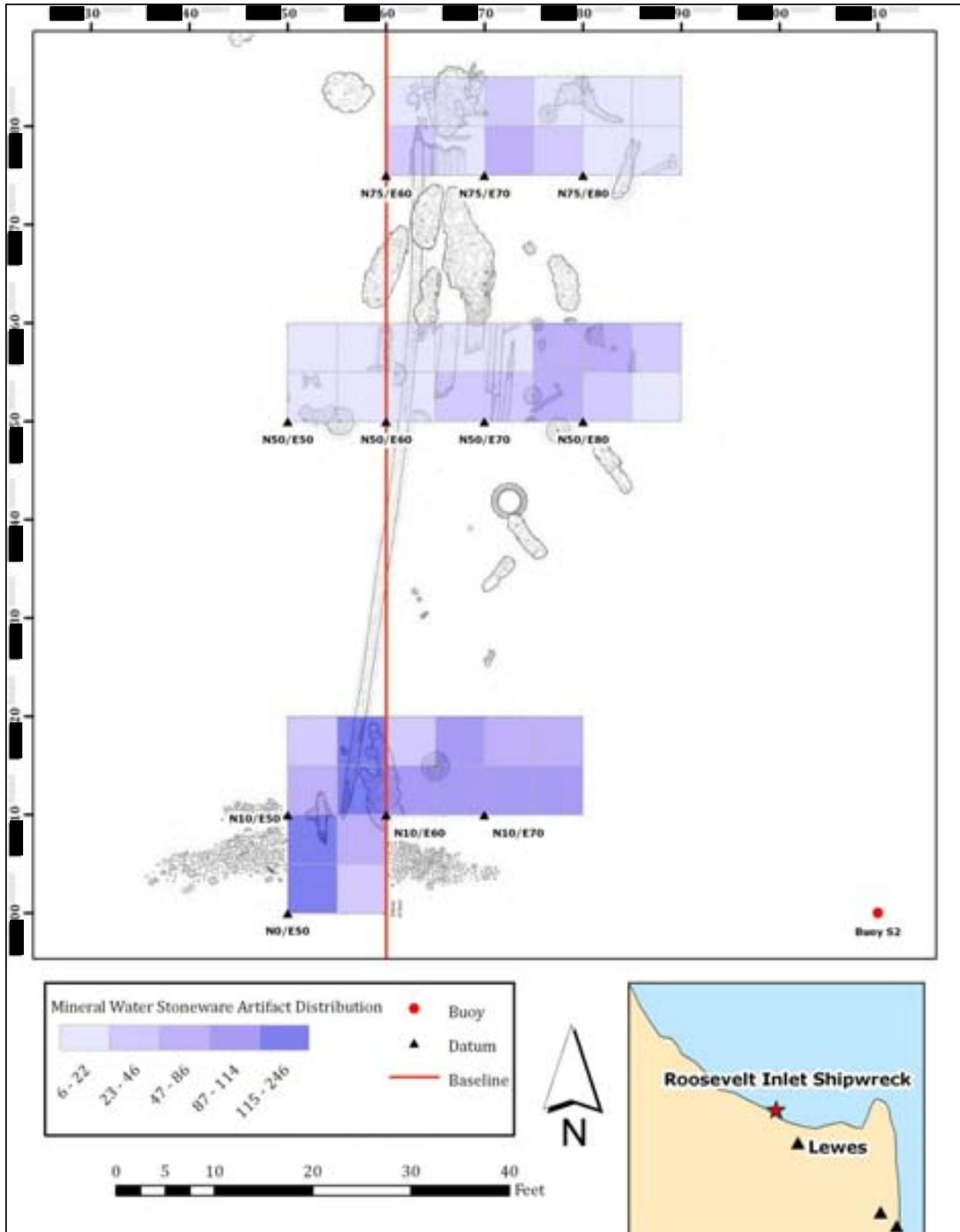


Figure 7.7. Mineral Water Stoneware Artifact Distribution across the Roosevelt Inlet Shipwreck site.

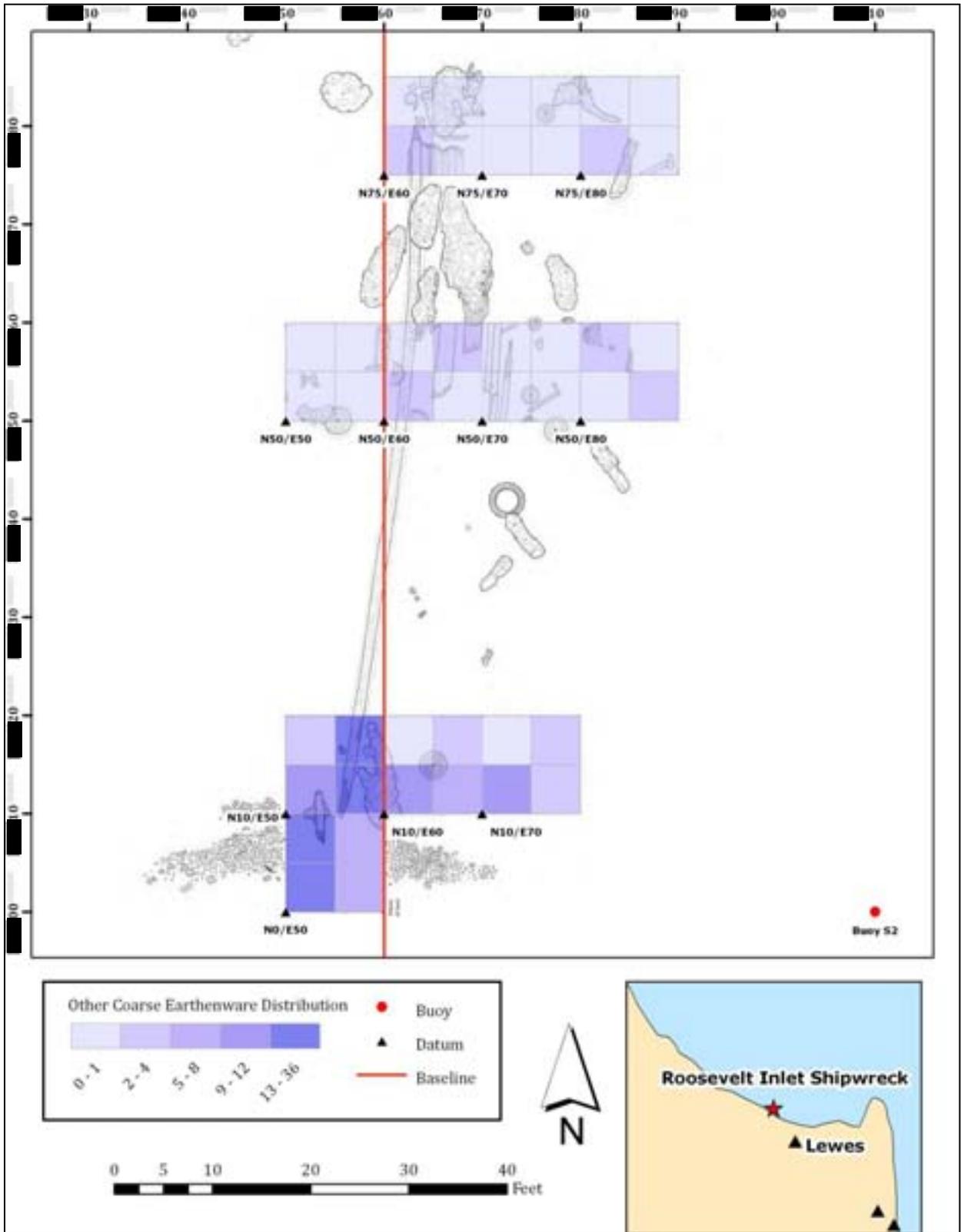


Figure 7.8. Other Coarse Earthenware Artifact Distribution across the Roosevelt Inlet Shipwreck site.

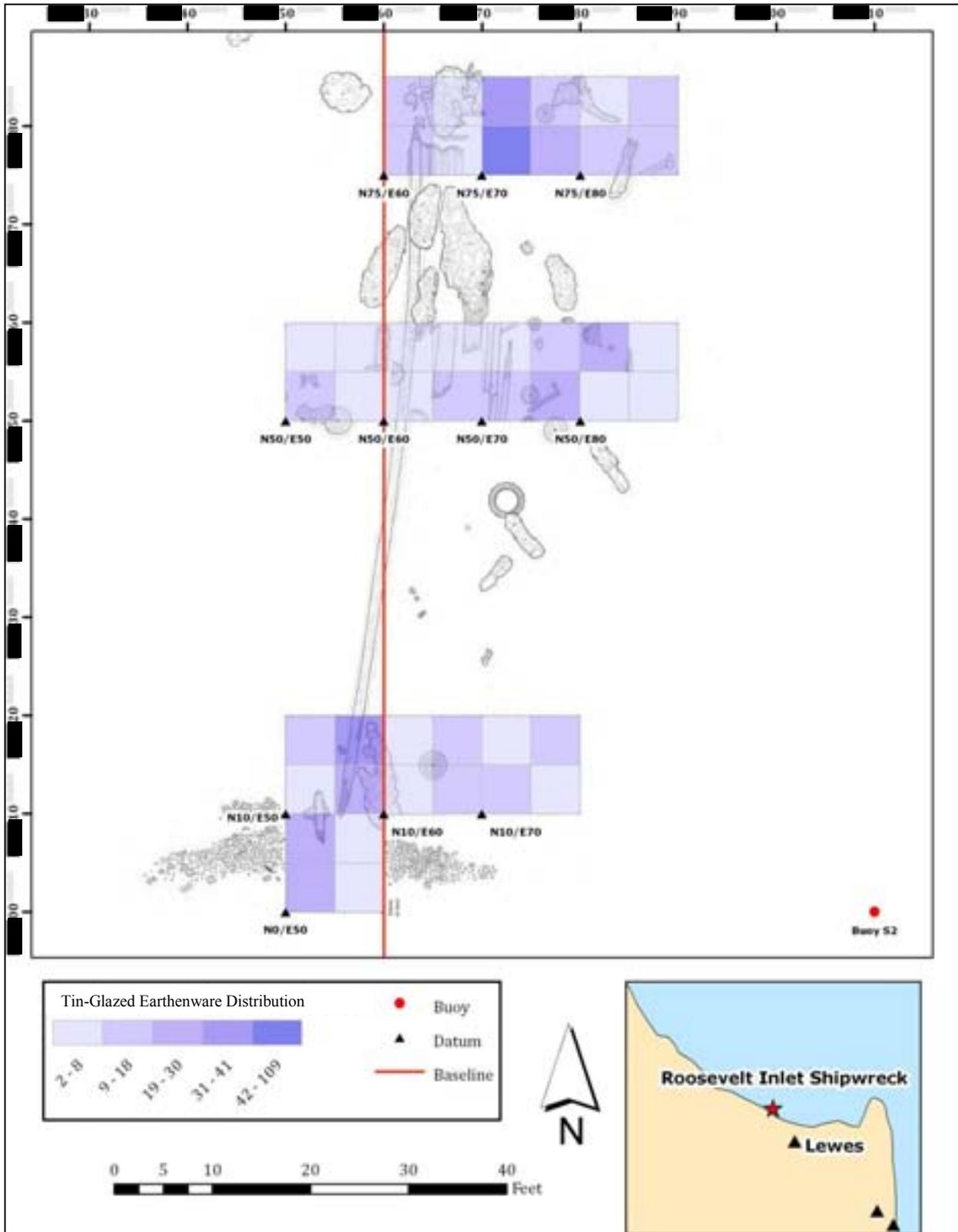


Figure 7.9. Tin-Glazed Earthenware Artifact Distribution across the Roosevelt Inlet Shipwreck site.

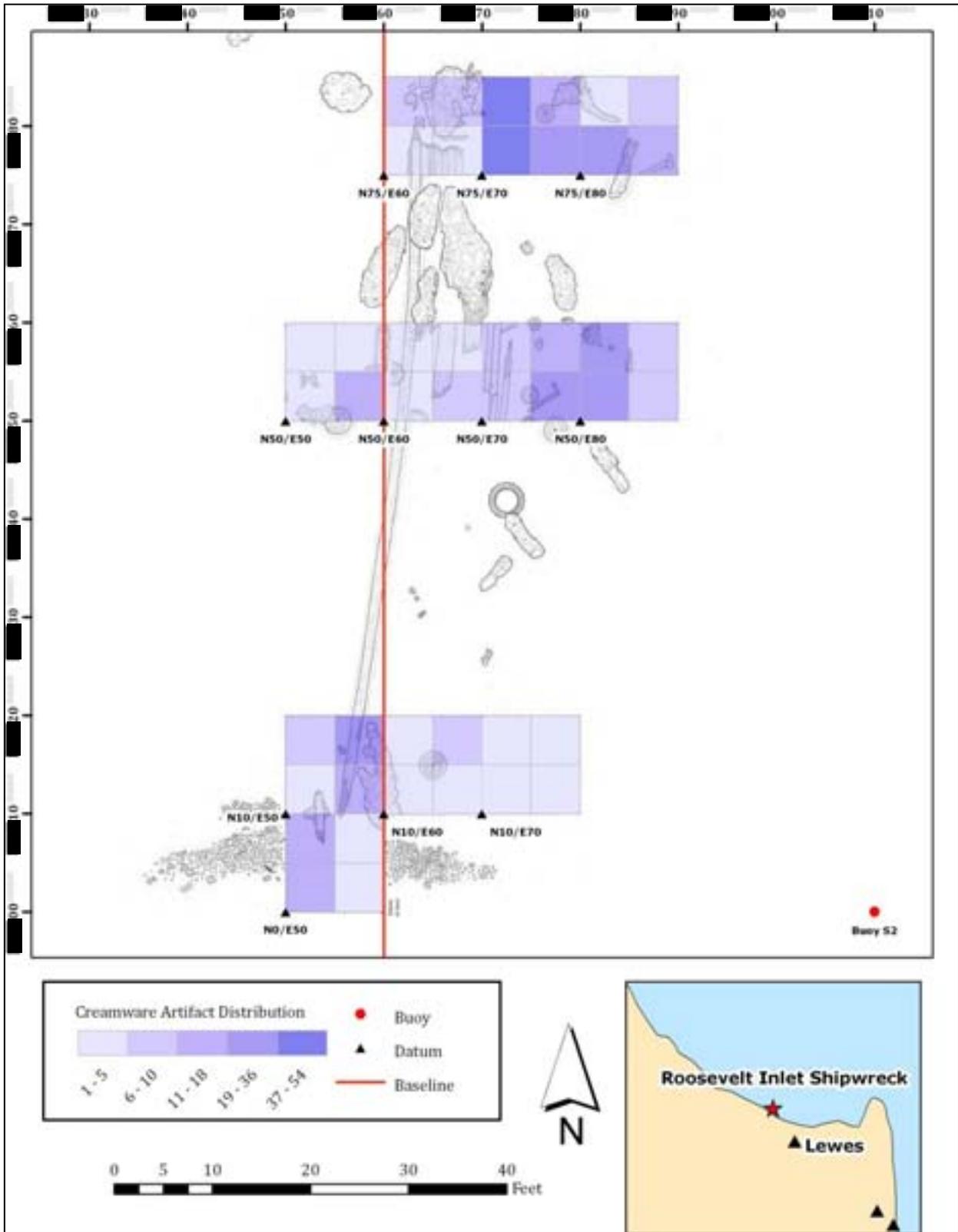


Figure 7.10. Creamware Artifact Distribution across the Roosevelt Inlet Shipwreck site.

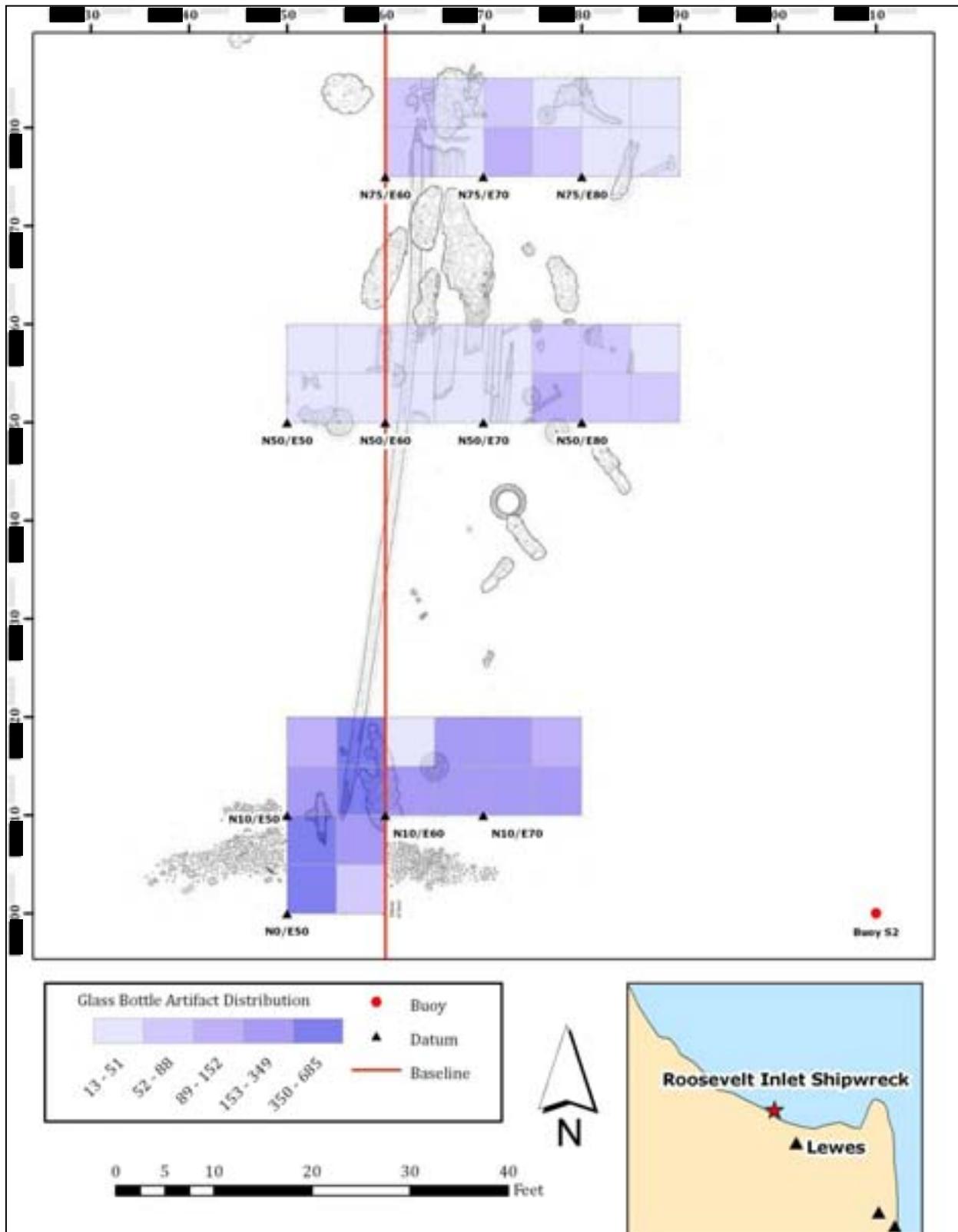


Figure 7.11. Glass Bottle Artifact Distribution across the Roosevelt Inlet Shipwreck site.

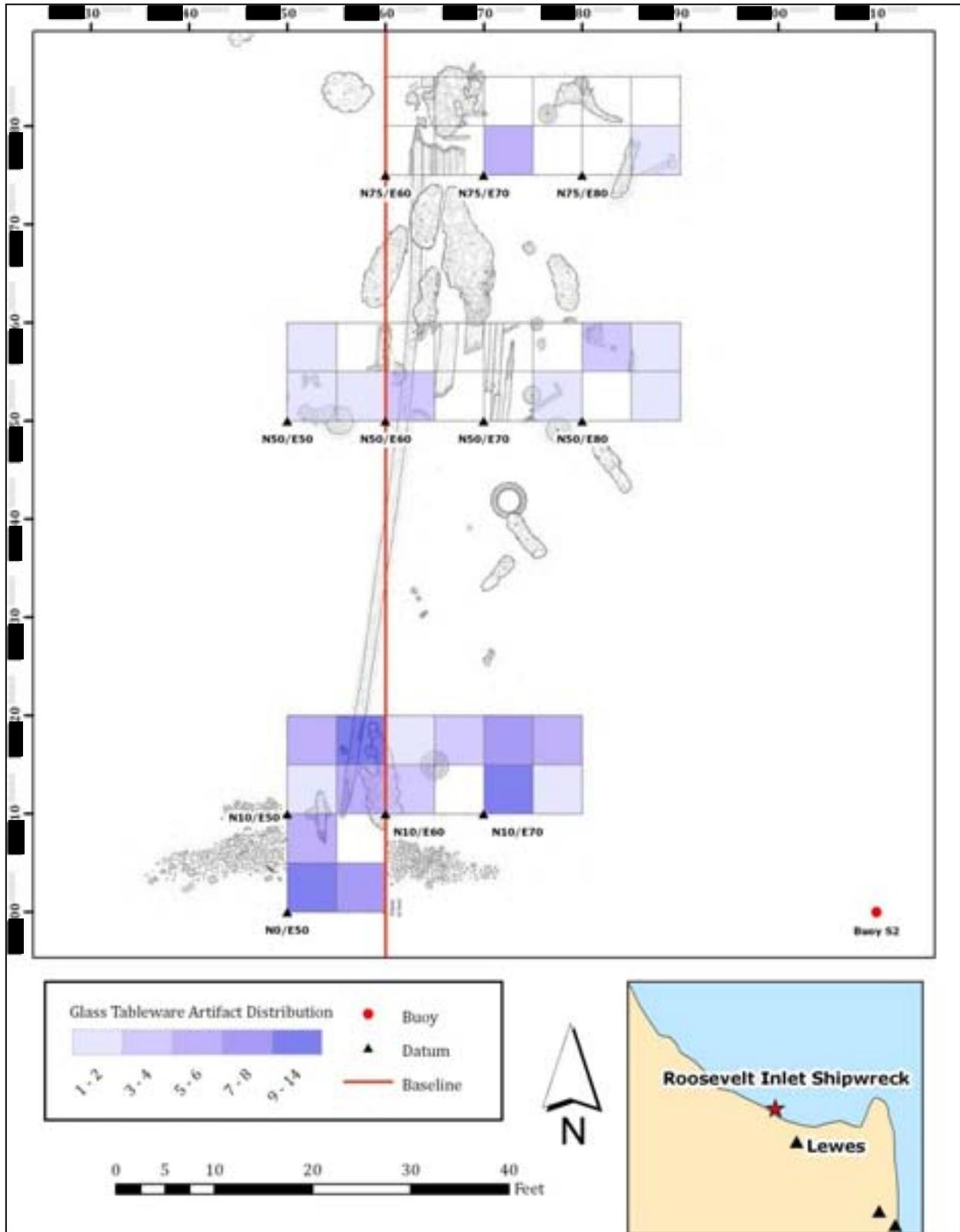


Figure 7.12. Glass Tableware Artifact Distribution across the Roosevelt Inlet Shipwreck site.

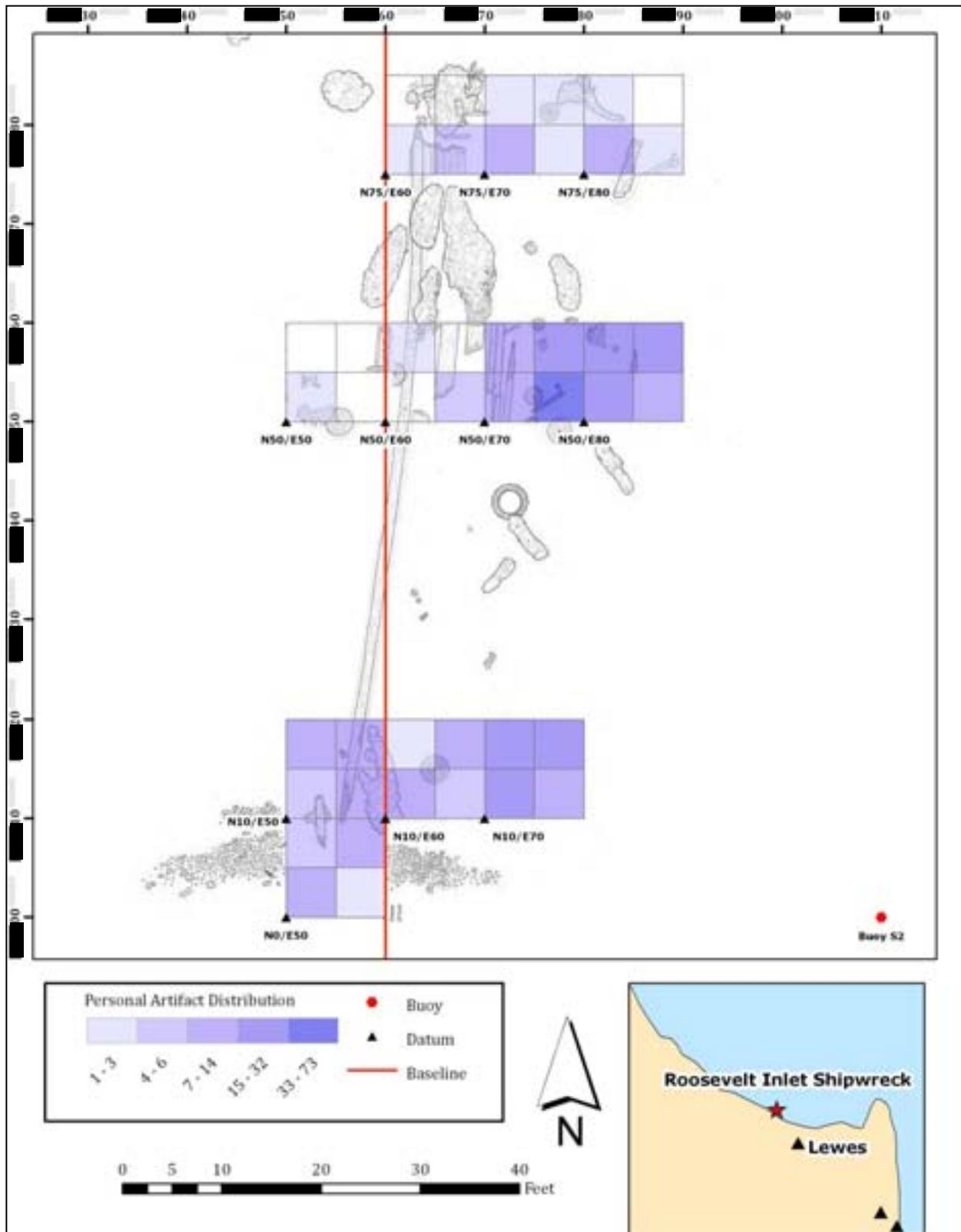


Figure 7.13. Personal Artifact Distribution across the Roosevelt Inlet Shipwreck site.

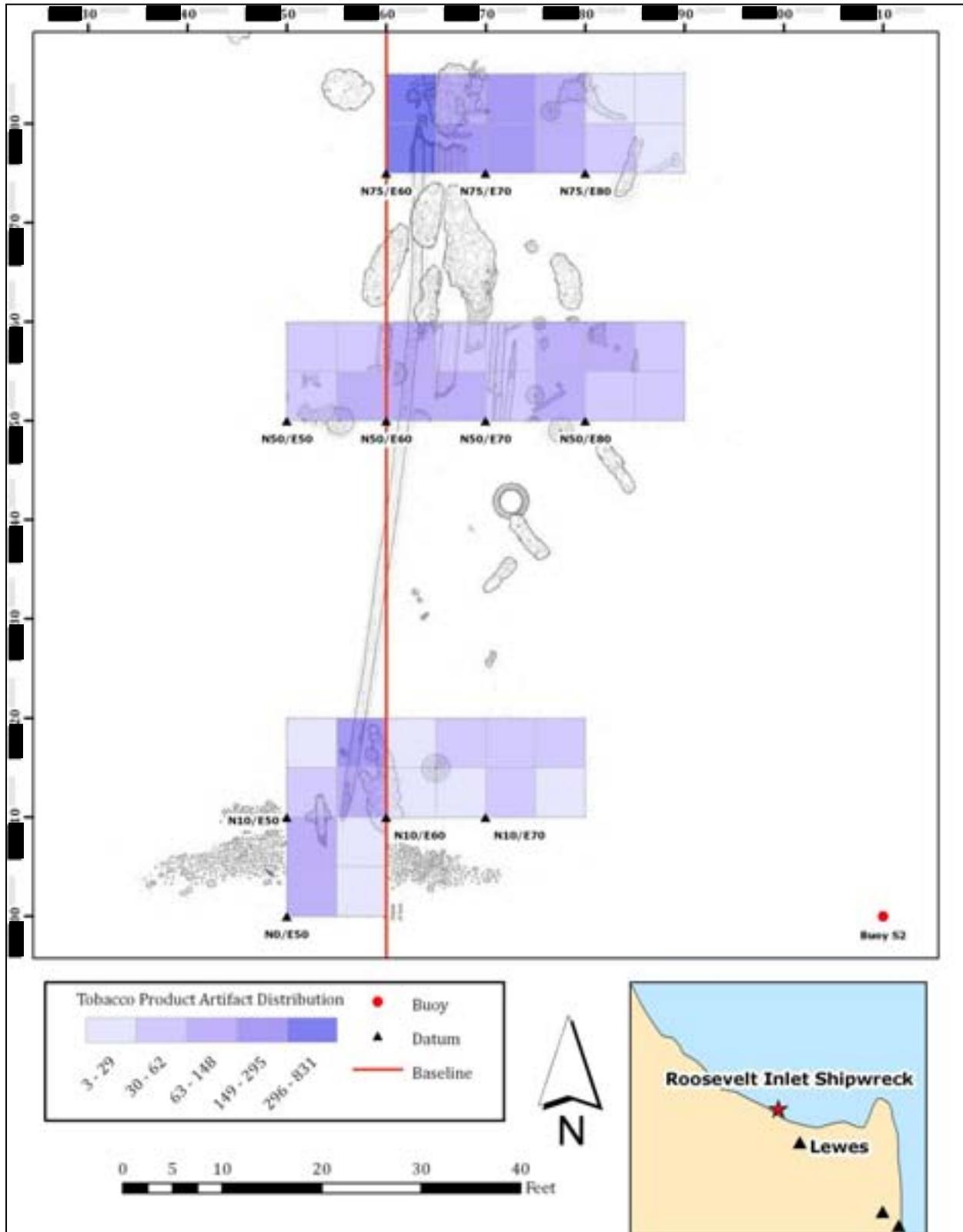


Figure 7.14. Tobacco Product Artifact Distribution across the Roosevelt Inlet Shipwreck site.

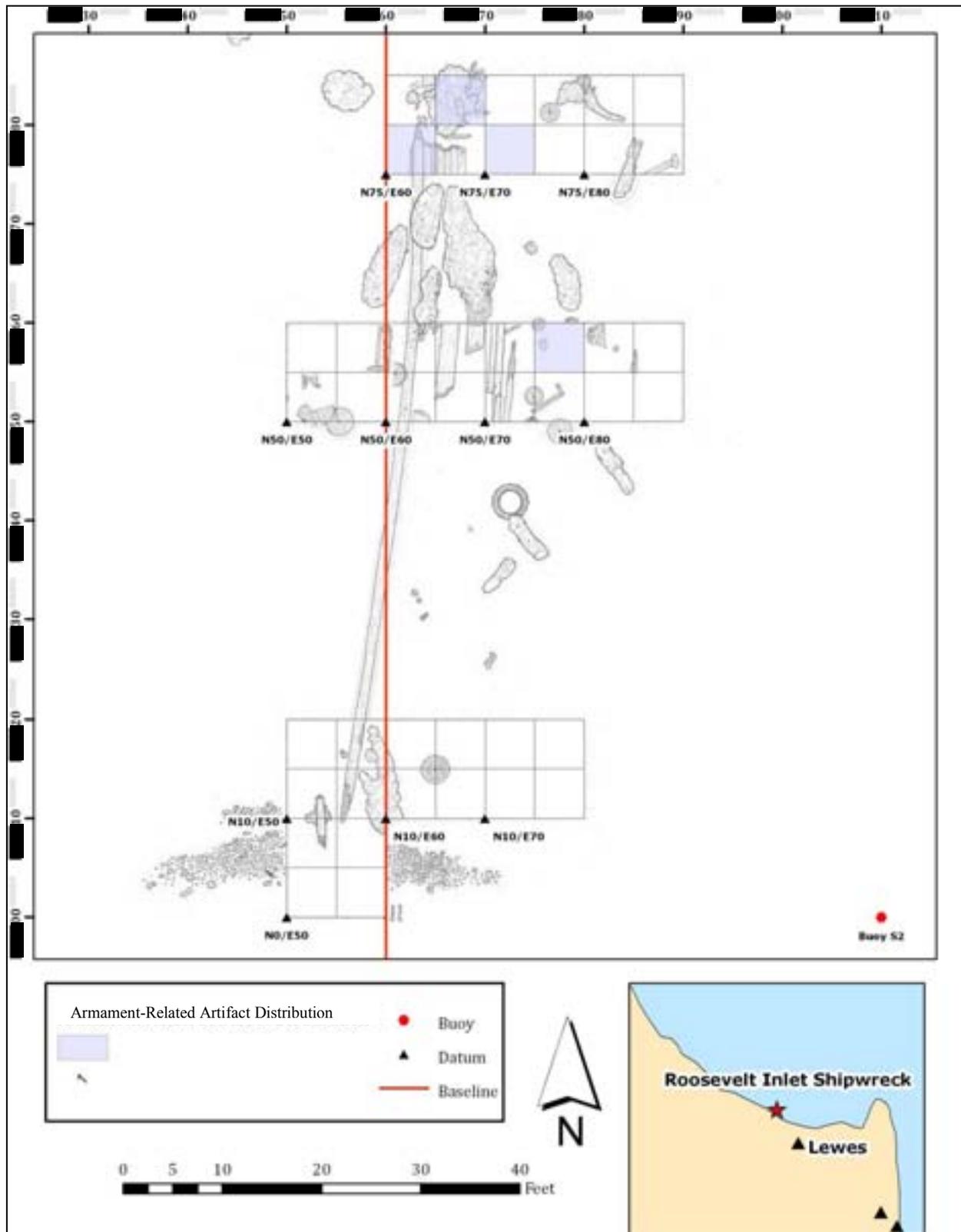


Figure 7.15. Armament-Related Artifact Distribution across the Roosevelt Inlet Shipwreck site.

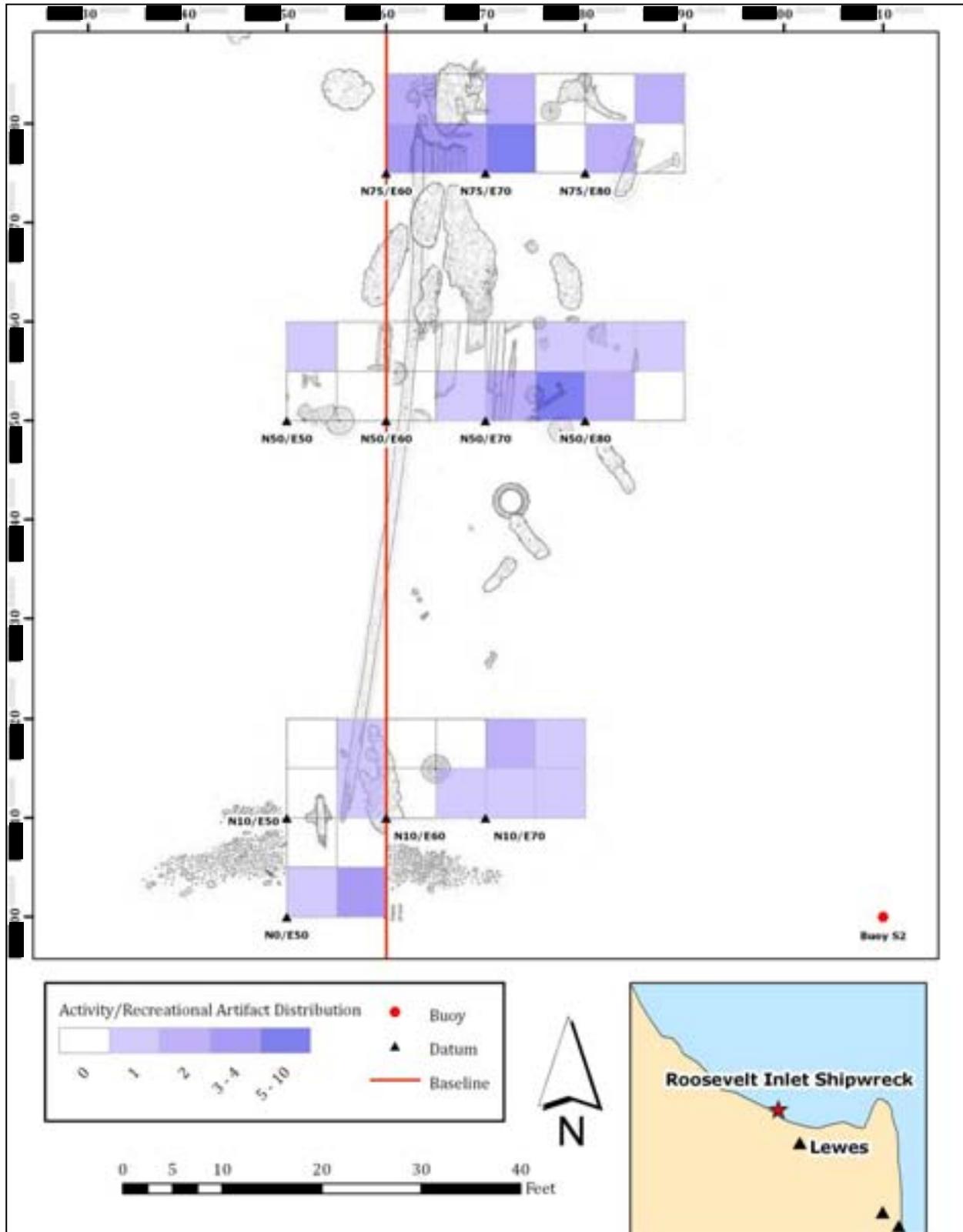


Figure 7.16. Activity/Recreational Artifact Distribution across the Roosevelt Inlet Shipwreck site.

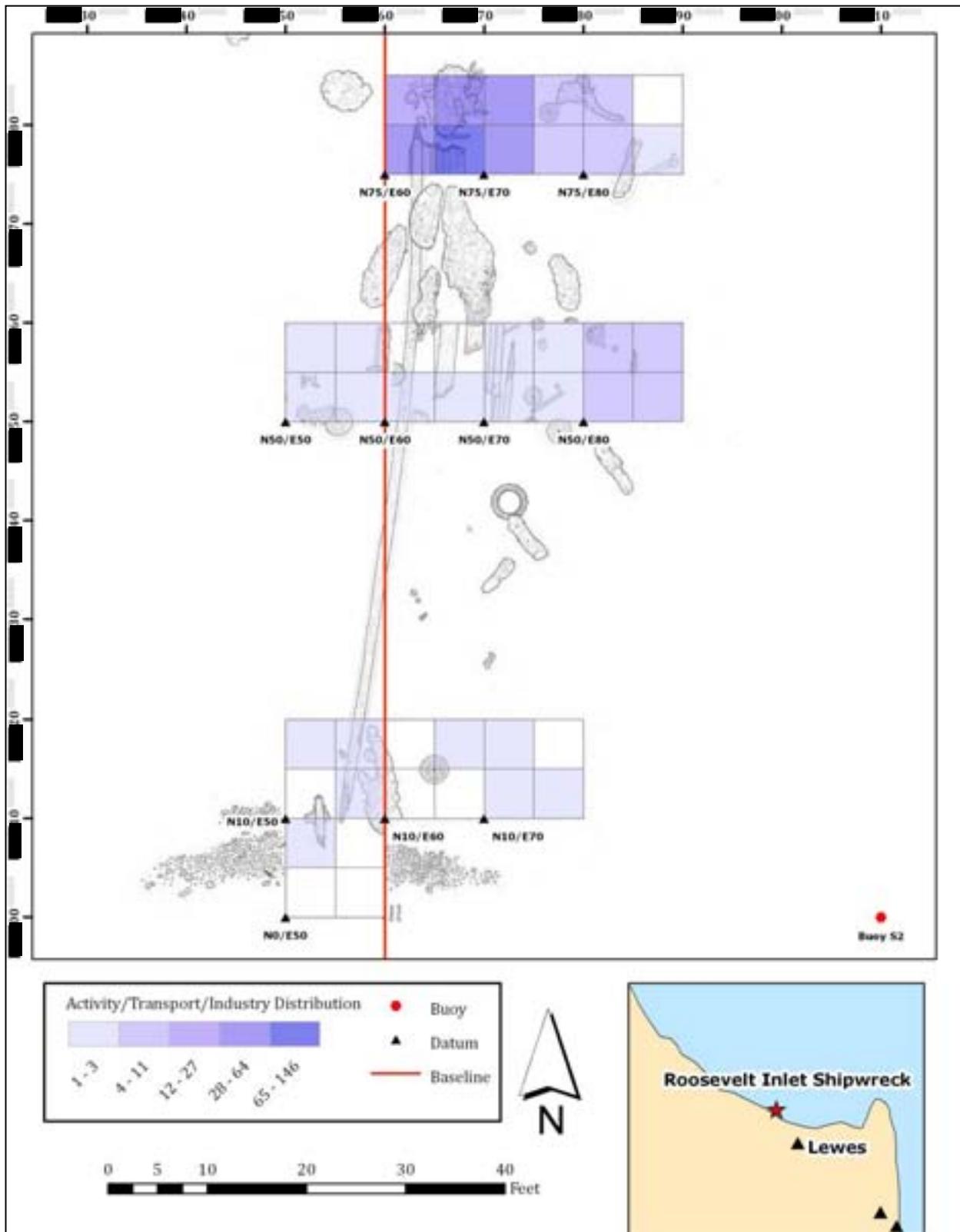


Figure 7.17. Activity/Transport/Industry Artifact Distribution across the Roosevelt Inlet Shipwreck site.

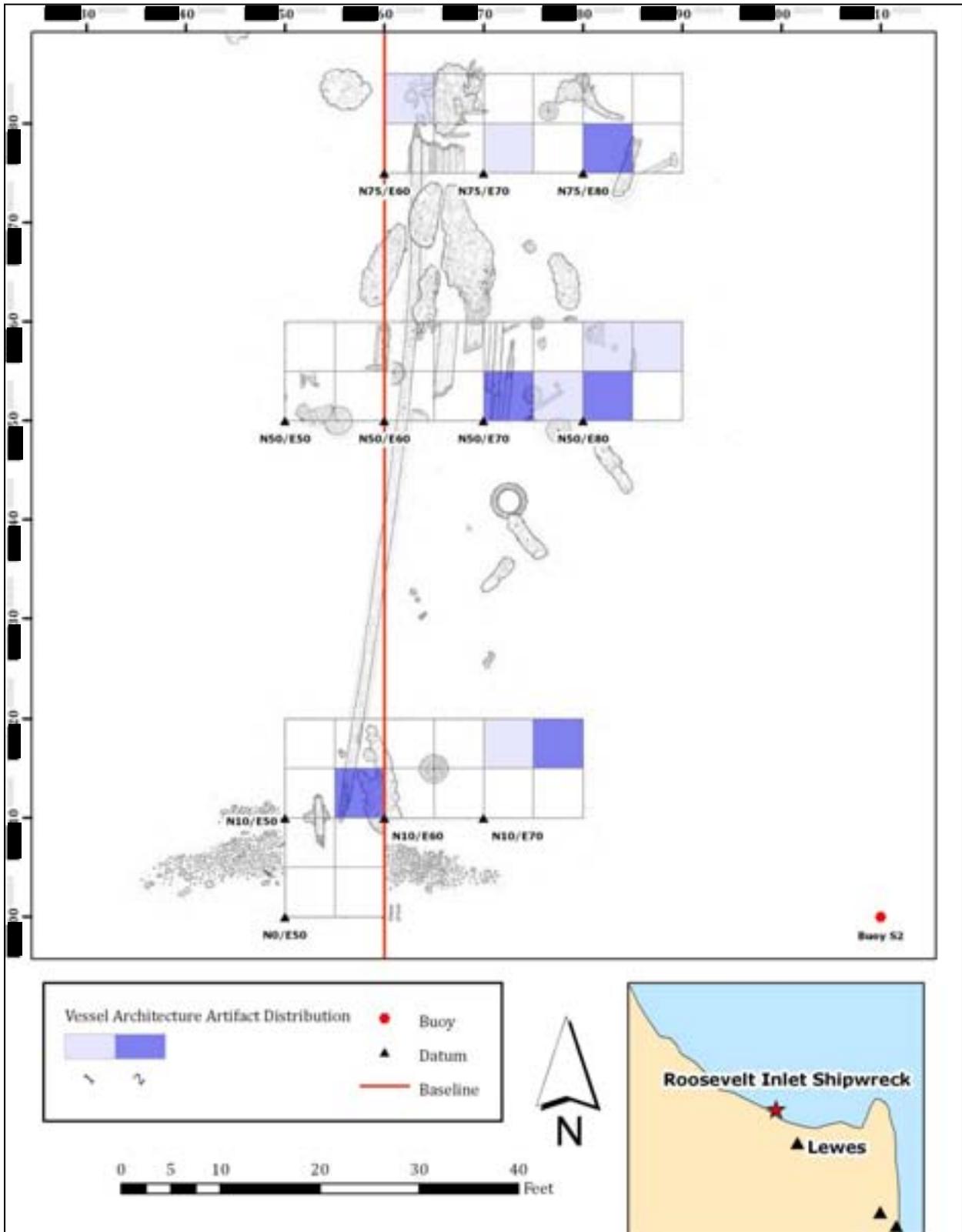


Figure 7.18. Vessel Architecture Artifact Distribution across the Roosevelt Inlet Shipwreck site.

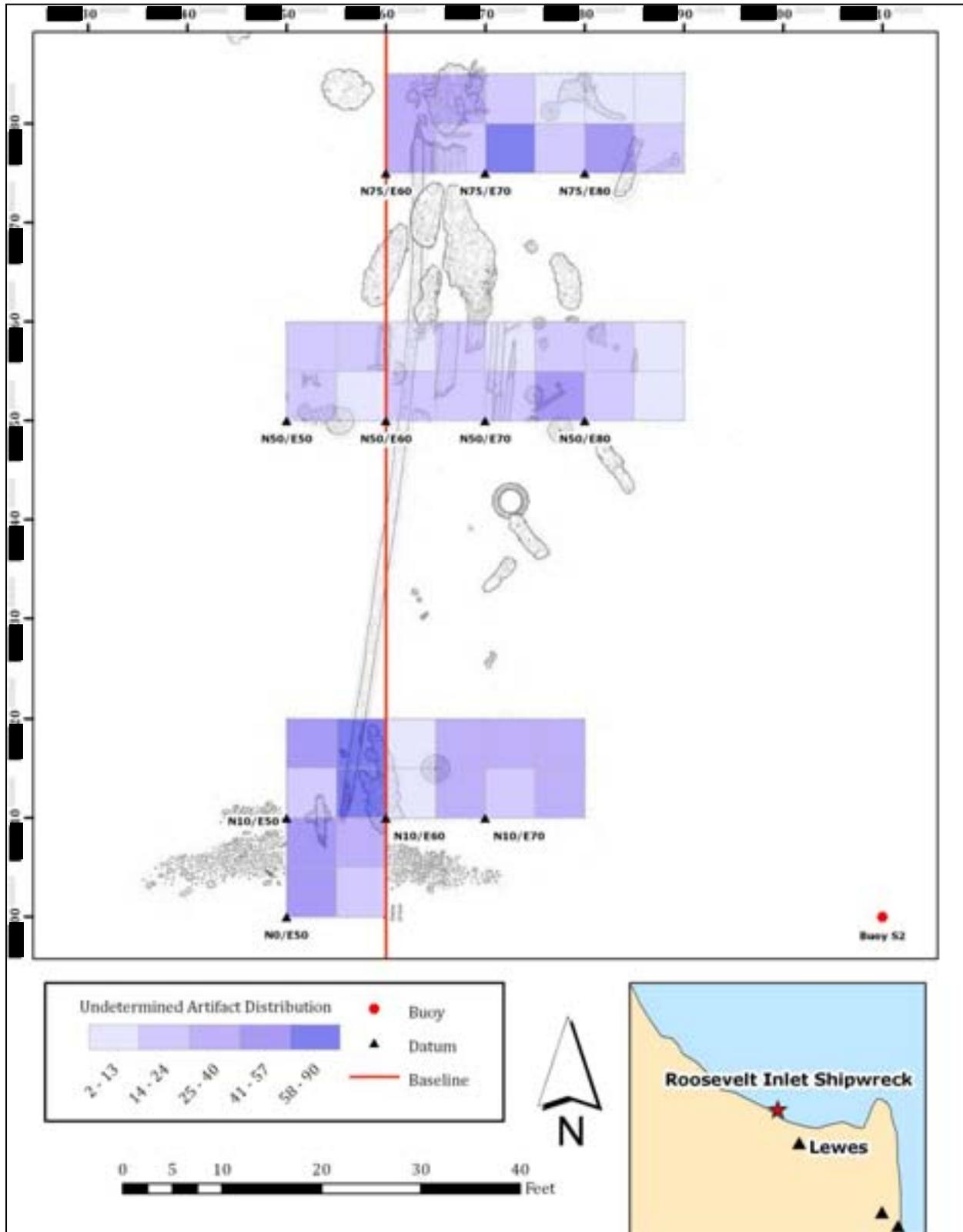


Figure 7.19. Undetermined Artifact Distribution across the Roosevelt Inlet Shipwreck site.

This Page Intentionally Left Blank

CHAPTER 8

HULL REMAINS

The Roosevelt Inlet Shipwreck's alignment, or longitudinal axis, lies north/south. The surviving portion of the wreck structure covers approximately 75 feet in length and 40 feet in width and is comprised of one longitudinal timber and several sections of planking. No framing, keel, keelson, or posts were documented during the current investigation. Therefore, very little is understood about the construction, orientation (i.e., bow versus stern), and overall dimensions of the wreck site. The following represents the scantling and hull components identified during the current investigation, including the longitudinal timber, planking, fasteners, and lead sheathing. A wood analysis of various components was also conducted during the investigation and is provided below. Lastly, a brief comparative analysis of the identified elements is provided.

Longitudinal Timber

One longitudinal timber runs the length of the site. The timber is 72 feet 3 inches in length and is eroded on both ends. No scarf joint was observed during the current investigation or the previous investigation (Dolan Research, Inc. 2005:56). The timber is 13½ inches sided and 11½ inches molded and tapers down to 10 inches sided on the southern end of the site. The timber appears to have a beveled edge on the western molded face. Botanical analysis of wood samples recovered from this timber in 2005 and 2006 revealed a white oak species (*Quercus spp. Leucobalanus*).

Planking

Two *in situ* sections and one recovered section of planking were recorded. The first *in situ* section of planking is located in North 50/East 60 and continues into North 50/East 70, and the second section *in situ* of planking is located in North 75/East 60. Three planks were recorded in North 50/East 60. These planks measure 22 inches wide and average 1½ to 2 inches thick. Five planks continue into North 50/East 70 and measure (west to east) 8, 7½, 9, 7½, and 8 inches wide and average 2½ to 3 inches thick. No fastener patterns were discernable on any of the planks.

Six planks were recorded in North 75/East 60. These planks measure (west to east) 10, 7, 9, 8, 9, and 10 inches wide and average 1½ to 2 inches thick. This section of planking was previously recorded and described as such: "The planks, although eroded, measure nine- and 10- inches wide and two inches thick" (Dolan Research, Inc. 2005:56). Botanical analysis of wood samples recovered from the *in situ* planking revealed a white oak species (*Quercus spp. Leucobalanus*).

One section of planking (2006.33.223) was recovered in the Northeast Quadrant of North 10/East 70. This piece measures 28 inches long by $9\frac{3}{8}$ inches wide and averages $2\frac{1}{2}$ inches in thickness.

Fasteners

Fasteners consist of iron bolts/drift pins (cylindrical metal pins used to fasten ships' timbers together) and wooden treenails. No copper/alloy bolts/pins were observed on the remains. Sheathing tacks were also recovered. Bolts measure 1 inch in diameter on the longitudinal timber and on the recovered plank (2006.33.223). Treenails measuring 1 inch and $1\frac{1}{8}$ inches were recorded on the longitudinal timber while the treenails on the recovered plank measure $1\frac{1}{4}$ inches. One treenail (2006.33.210) recovered from North 10/East 60 measures $1\frac{1}{4}$ inches in diameter and may be associated with the recovered plank found in the adjacent unit (North 10/East 70).

In addition, three sheathing tacks/nails (a small nail or tack used to attach sheathing to a hull) were recorded (2006.33.167, 2006.33.193, and 2006.33.199). Each of the three tacks is $1\frac{1}{8}$ inches in length with a maximum shaft diameter of $\frac{3}{20}$ inch. One tack (2006.33.199) exhibits a typical rose head pattern while the other two heads (2006.33.167 and 2006.33.193) are flat.

Lead Sheathing

Nine pieces of lead sheathing/patches were documented throughout the site (2006.33.155, 2006.33.156, 2006.33.161, 2006.33.162, 2006.33.165, 2006.33.171, 2006.33.182, 2006.33.193, and 2006.33.218). The patches were either square/rectangular shaped or occurred in strips. One lead strip (2006.33.162) was 6 inches long and $2\frac{1}{2}$ inches wide and was probably utilized along a seam between planking.

Wood Species

Wood samples were collected from the various ship elements during both the 2005 and 2006 wreck site investigations (Appendix J). Justine Woodard McKnight conducted the analysis of the samples using the following methodology:

Small samples were excised from larger water-saturated wooden elements. In the case of small artifacts (i.e. handles and stoppers), the entire artifact was submitted for identification. All remains were kept saturated and packaged in vinyl bags and polyethelene containers for transport and short-term storage.

Taxonomic identification was accomplished under low magnification (10X to 40X) with the aide of standard texts (Edlin 1969; Panshin and deZeeuw 1980; Hoadley 1990). Identifications were secured by

comparison to modern plant specimens from an extensive reference collection. The samples were examined in their saturated state and specimens were weighed. Cross-sections were obtained using a scalpel. Portions of each sample were partially air-dried to further illuminate minute features.

Wood analysis indicates the use of the White Oak group for all elements of the ship's construction and the use of a variety of coniferous species for treenails (Table 8.1).

Table 8.1. Wood sample analysis.

Sample Year	Vessel Component	Analysis
2005	Longitudinal timber (north end)	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)
2005	Unidentified timber (2 samples)	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)
2005	Treenail on unidentified timber	Hard Pine (<i>Pinus</i> spp.)
2005	Unidentified timber	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)
2006	Planking (2 samples) possible exterior planking	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)
2006	Treenails (3 samples from planking)	Tight grained coniferous wood lacking resin canals. Possible species include Hemlock, True Fir, Cedar, Bald Cypress, Redwood, or Yew
2006	Longitudinal timber (2 samples)	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)
2006	Planking (2 samples) possible interior ceiling planking	White Oak (<i>Quercus</i> spp. <i>Leucobalanus</i>)

Wreck Analysis

As noted from the scantlings described above, the dimensions of critical architectural components of the Roosevelt Inlet shipwreck are not known. Due to the lack of information it would be unwise to speculate on certain aspects of the Roosevelt Inlet shipwreck like tonnage and vessel size. What follows is a preliminary analysis based on contemporary eighteenth-century shipbuilding treatises and maritime dictionaries including Chapman 1768; Hutchinson 1794; Murray 1765; Roberts 1992; Stalkartt 1787; Steele 1805; and Sutherland 1711, as well as archaeological examples of other eighteenth-century ships and shipwrecks.

The longitudinal timber runs the entire length of the remains and begins to taper on the southern end of the site. The longitudinal timber was thought to be the keel during previous investigations, but it does not retain characteristics of a keel, e.g., notched to

accept a garboard strake or large keel bolts (Dolan Research, Inc. 2005:56). This timber is speculated to be a stringer, also known as a hold stringer, wale, or “thick stuff.” The diminishing end of the stringer on the southern end of the site may indicate a rising and narrowing of the hull near either the bow or a stern (Goodwin 1987:40). The primary function of this timber was to add longitudinal strength to the vessel.

Similar shaped and sized hold stringers were documented on the Spanish merchant vessel *El Nuevo Constante* (12 inch sided and 12 inch molded) (Pearson and Hoffman 1995:126). *El Nuevo Constante* first appears in Spanish records in 1764 but was previously known as the *Duke of York*, a British-built merchant vessel of 475 tons (Pearson and Hoffman 1995:16-17). The size of the stringer on the Roosevelt Inlet Shipwreck is suggestive of a larger ocean-going trading vessel similar to the *Duke of York*.

The 2½ inch thickness on the recovered plank (2006.33.223), coupled with the presence of iron fasteners/concretion stains and wooden treenails, suggest that this piece is outer-hull planking. The *in-situ* run of planking in North 50/East 70 also averages 2½ to 3 inches thick, suggesting outer-hull planking, while the planking recorded in North 50/East 60 and North 75/East 60 all measure 1½ to 2 inches in thickness, suggesting inner-ceiling planking.

Contemporary shipbuilding treatises varied in their hull planking recommendations. Mungo Murray suggests hull planking should be 3-inches thick on a 100-ton merchant vessel, 3½ inches thick on a 200-ton merchant vessel and 4 inches thick on larger vessels (Murray 1765:187). While both Sutherland and Steele suggested a thickness of 2½ inches for a 250-ton vessel (1711:71 and 1805: folio VII), hull planking on the 475-ton *El Nuevo Constante* measured 4 inches thick and 13 inches wide, falling in line with the Murray suggestion, while hull planking measurements on the Ronson ship, a 260-ton eighteenth-century British merchant vessel, measured 2 to 2¼ inches thick (Rosloff 1986:61).

Planking thickness measurements can be misleading when trying to determine the size of a vessel. Thickness can vary on the same ship depending on where the plank is located. Generally speaking hull planks start out thicker on the bottom of the ship and gradually thin as they got closer to the top timbers. Therefore, based on the paucity of remains, it would be pure speculation to try and determine vessel size based on plank thickness for the Roosevelt Inlet Shipwreck.

Treenail diameter can also be utilized to estimate vessel size. Recorded treenails measure between 1 and 1¼ inches in diameter. Writing in the eighteenth century, William Falconer noted about treenails:

They have usually one inch in thickness to 100 feet in the vessel's length, so that the tree-nails of a ship 100 feet long, are one inch in diameter, and one inch and a half for a ship of 150 feet (1780 [1970]:298).

This statement suggests that the Roosevelt Inlet Shipwreck could have varied from 100-125 feet in length. Due to the small sample size however, this analysis must be considered preliminary.

The Royal Navy's first introduction to copper sheathing or fasteners was in 1761 on the frigate *Alarm* (McCarthy 2005:102.) It wasn't until August of 1783 that, "all ships from 44s down were ordered to be fastened with mixed metal" (Fincham 1851 in McCarthy 2005:106). The use of alloy fastenings slowly trickled into the merchant fleet after 1783. The lack of copper/alloy metal bolts/pins on the remains of the Roosevelt Inlet Shipwreck supports the notion that the vessel was built prior to the last quarter of the eighteenth century.

White oak (*Quercus spp.*) was found throughout the remains recorded in 2005 and 2006. White oak was a predominant shipbuilding timber in North America and throughout Europe. The use of white oak is consistent with British and British colonial shipbuilding traditions (Mitchell 1994:120). White oak is generally hard, heavy, stiff and strong and is particularly resistant to water and decay. The lack of New World woods like live oak or southern yellow pine provides further evidence that the vessel was not built in the southern colonies but was likely built in the Old World or the northern colonies.

This Page Intentionally Left Blank

CHAPTER 9

CONCLUSIONS

The phased investigation conducted by SEARCH, in cooperation with the State of Delaware, was successful in better defining the nature and elements of the Roosevelt Inlet Shipwreck. As summarized in this conclusion, this phased approach included a preliminary remote sensing survey, a non-intrusive hydro probe survey, a controlled surface collection of artifacts across the wreck site (during the hydro probe survey), diver investigation and excavation of eleven 10-x-10-foot grid blocks, followed by a post-remote sensing survey. Research objectives, posited by the State prior to the 2006 field investigations, are also addressed within these conclusions. Finally, it is the intention of these conclusions to draw from the current results to interpret the Roosevelt Inlet Shipwreck, and provide recommendations relative to the continued protection of the site as well as other submerged cultural resources located within the State of Delaware.

Preliminary Remote Sensing Survey

Results of the preliminary remote sensing survey, utilizing a magnetometer and side scan sonar integrated with a DGPS, were successful in providing data critical to understanding the condition and extent of the Roosevelt Inlet Shipwreck prior to diver investigations. Examination of the magnetometer contour data suggests the site is isolated and is not spread out over a large area. Therefore, the remains examined during the current investigation represent the entire shipwreck, within the area surveyed. This may indicate the wreck event was not necessarily violent (i.e., the vessel did not break apart and become strewn across a large area, leaving a “trail” of wreck debris). Contour maps suggest the heaviest concentration of ferrous material is located at the north end of the wreck, near the large concretions.

The side scan sonar records identified a number of exposed features east of the centerline which were not visible during the previous survey completed by Dolan Research, Inc. in 2005. This suggests sediment has mobilized away from the site since May 2005. The side scan sonar survey clearly identified the exposed concretions at the north end of the site, the longitudinal timber extending north/south along the length of the site, and an area of exposed artifacts near the dredge pit at the southern extent of the site.

Hydro Probe Survey

The hydro probe survey proved beneficial in determining the extent of buried hull remains in a non-intrusive manner. In addition, the surface collection of artifacts assisted in gathering data relative to the distribution of exposed artifacts across the entire site. Overall, a total of 121 hydro probes (not counting refinement probes) were placed during the hydro probe survey. The most fascinating result from the hydro probe survey was the lack of extant hull structure associated with the Roosevelt Inlet Shipwreck. The hydro probe survey successfully located a number of positive returns east of the centerline of the

vessel immediately under the sediment, but the lack of positive returns overall suggests much of the hull no longer remains *in situ*. It is suggested that the wreck event, after occurring in relatively shallow water, afforded the near-complete salvage of the wreck site except for only a small section of the hull and a portion of cargo.

The lack of intact hull structure was confirmed after the excavation of the eleven grid squares, suggesting the vessel was probably extensively salvaged after the wreck event and has been subject to severe environmental exposure over time. It is widely known that salvage efforts were relatively common and thorough if a vessel had wrecked in an area where it was accessible to wreckers as well as local residents. The Roosevelt Inlet Shipwreck foundered in shallow water, in a relatively protected area of Delaware Bay, and was in close proximity to the established town of Lewes. This made the vessel an ideal candidate for salvage efforts which may have continued for years after the wreck event. Besides cargo, the removal of ship timbers, fasteners, and other ship-related items was a common occurrence throughout the eighteenth century. A more comprehensive review of eighteenth-century salvage practices is presented below.

Results from the surface collection reinforce the findings from the preliminary remote sensing survey that the site is relatively localized and not spread across a large area. The majority of artifacts were recovered between East 10 to East 80 and North 0 to North 90 with no artifacts recovered outside these locations. The collection of artifacts suggest a larger amount of exposed artifacts east of the exposed longitudinal timber, as well as to the south, near the area of the 2004 dredge impact area. Artifact types collected east of the exposed timber include ceramics, iron rigging elements, mineral bottles, bottle bases, and a large number of concretions. Exposed artifacts at the south end of the wreck site include a substantial amount of brick and brick fragments. To the west of the exposed timber only a small number of artifacts were collected including ceramic sherds, brick fragments, and small concretions. Surface artifacts tended to be concentrated along the longitudinal north/south centerline of the site.

Excavation of the Roosevelt Inlet Shipwreck

Excavation of the Roosevelt Inlet Shipwreck, utilizing eleven 10-x-10-foot grid squares, a 3-inch venturi dredge, and a variety of measuring devices was successful in mapping extant hull remains, identifying hull construction features, and recording the provenience and recovery of artifacts. Four grid squares were excavated near the amidships area (North 50/East 50 east to North 50/East 80), three grid squares at the north end of the site (North 75/East 60 to North 75/East 80), and four grid squares at the south end of the wreck site (North 10/East 50 east to North 10/East 70, and North 0/East 50). Each grid square was excavated in 12-inch levels to maximize provenience control, and to minimize damage to artifacts and associated materials. Small artifacts were recovered with the venturi-style dredge whereas larger artifacts were recovered by hand by maritime archaeologists.

All exposed hull features, concretions, and large artifacts were recorded on gridded mylar to scale and have been presented on a master site plan (Appendix C). All grid squares were excavated until sterile sediment was reached. Overall, SEARCH completed a total of 90 dives on the Roosevelt Inlet Shipwreck for a total of 155.5 hours of logged bottom time during the current investigation.

Artifact Analysis

A total of 26,494 artifacts, recovered during the 2006 investigations, have been identified to date from the Roosevelt Inlet Shipwreck. The State took custody of all recovered artifacts after each day of dive operations and was responsible for the immediate care, maintenance of provenience/contextual data, stabilization, curation, and conservation of all artifacts. The State conducted the analysis and compiled a catalogue of analyzed artifacts as of August 2008. This catalogue was provided to SEARCH for additional analysis. All recovered artifacts have undergone or are still currently undergoing conservation.

These artifacts represent an important collection of material culture remains preserved as a snapshot of a specific point in time. Overall, the artifacts represent a vast assembly of goods from mainly Northern Europe. With mineral water bottles and Rhenish salt-glazed stoneware from Germany, Frankfurter ware from Germany; toys from Nuremberg, tin-glazed earthenware and slipware from the Netherlands, or England and possibly France; tobacco pipes from the Netherlands and possibly France; glass pressed button insets, beads, paste gemstones, glass stemware and tableware and pewter buttons and buckles, and copper alloy and pewter goods from Germany, Bohemia, the Netherlands, or England; refined earthenwares, and white, salt-glazed stoneware from England; as well as millstones, and serpentine mortars and pestles from England or sources found throughout the region, this cargo was decidedly pan-European in origin.

Attempts to ascertain a date range for the probable sinking of this vessel have been made from the analysis of the material goods. There are only a few items with dates directly associated with them, including a coin from Zelandia (a province of the Netherlands) dated 1768, and a button with the year 1772 stamped on the face. The recovery of the 1772 button can provide us with a *terminus ante quem* for the Roosevelt Inlet Shipwreck as the wreck could not have occurred before that date. The presence of tin-glazed earthenware (Delft or Faience), which, for the most part was no longer manufactured after 1800, suggests that the vessel does not post-date the eighteenth century. Other examples of datable items recovered from the site include flat bottomed Frankfurter ware which was not manufactured until after 1750; wheel-engraved tableware, which is not commonly seen in the U.S. until post-1740; Dutch tobacco pipes, which are not common in the mid-Atlantic region except for during, and immediately after, the American Revolution; as well as a maker's mark and stem stamp that mostly range in date from 1770-1780. The most prevalent three maker's marks ("Crown 5", "Crown 64", and "Crown S") overlap in manufacturing periods from 1771-1795. Given the nature of the assemblage, and date

ranges of manufacture for the materials, it is most likely that this vessel hailed from a Northern European port sometime in the last quarter of the eighteenth century, possibly post-1780. However, given the lack of later refined earthenwares such as Pearlware, a pre-1780 date is also likely.

The question of the vessel's port of origin, based on the artifact assemblage, remains uncertain. While it is clear the vessel originated from Northern Europe, attempting to discern which port the vessel departed from is complex. With the English Navigation Acts and bans on the importation of painted ceramics, it is questionable that the Roosevelt Inlet Shipwreck, carrying a varied assemblage of arguably non-English painted wares, would have originated from Britain although given the British mercantile system, it is possible. Although this has not been definitively proven, based on the current analysis it is possible that the Roosevelt Inlet Shipwreck was a Dutch vessel since the Netherlands was an active trading power with the North American colonies during the last quarter of the eighteenth century. It is well known that the "Dutch had become a very powerful seafaring nation and the number, size, and efficiency of their ships backed by elaborate commercial organization had made Holland a center for the re-distribution of commodities brought from all over the world" (Armstrong 1969:13). A more detailed analysis of the artifact assemblage may assist in identifying the port of origin of the Roosevelt Inlet Shipwreck.

Comparison with shipwrecks, and their associated artifact assemblages, from the same general time period may offer some insight into the country of origin. Specifically, the *Machault*, a French-supply vessel that was sunk by the British in 1760 and the *General Carleton*, an English vessel which sank in 1785, reveal similar groups of artifacts (to those recovered from the Roosevelt Inlet Shipwreck) with interesting differences. The *Machault*, although carrying predominately French material goods, also had English ceramics on board as cargo. Both the *Machault* and *General Carleton* had only English-manufactured tobacco pipes on board. The British mercantile system was very effective at spreading English-made goods on foreign vessels even during times of war, as with the *Machault*. This fact makes a case for the Roosevelt Inlet Shipwreck to be possibly a Dutch vessel carrying a variety of European wares as well as some English-made goods as cargo or for use by the crew. Given the tightening of the noose around the Colonial American ports due to the enforcement of the Townsend Act, this scenario would have been likely during the American Revolution when trade relationships between the colonies and Great Britain had been severed.

Spatial Analysis

Overall artifact concentrations cluster along the longitudinal timber at the southern and northern ends of the excavation units. As can be seen upon examining the All Artifacts Distribution map (Figure 9.1), the majority of all recovered materials co-occur with sections of planking and longitudinal ship's timber. There were no sterile units excavated across the site, however, artifact density falls off in the southern excavations the further away the

unit is from vessel elements. Northern units display this same tendency with N75/E80 (NE and NW quadrants) having the least amount of material for those units.

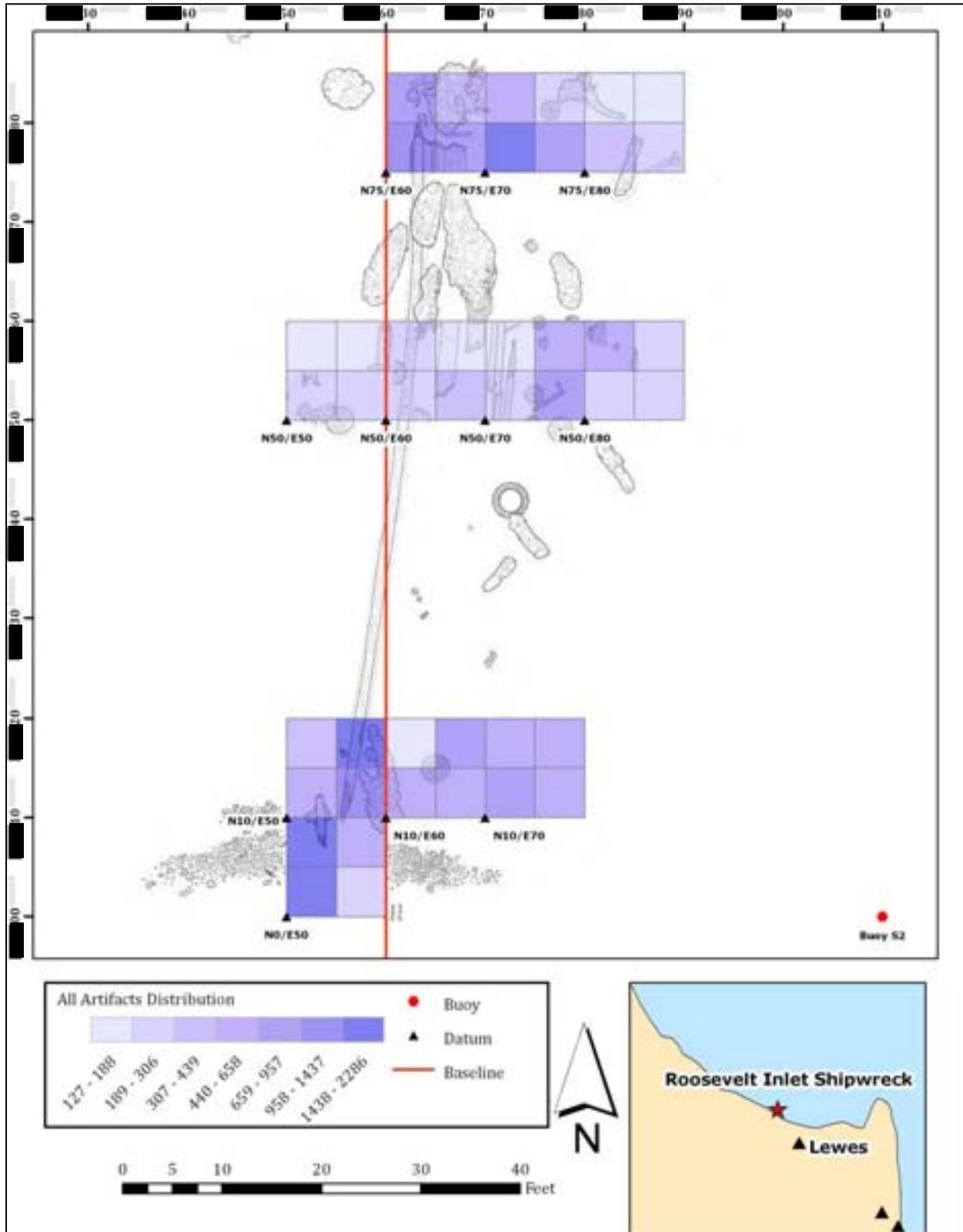


Figure 9.1. All Artifacts Distribution across the Roosevelt Inlet Shipwreck site.

Definite functional category patterning is evident between those utilitarian ceramics and tablewares, a fact which may be evidence of a cargo pattern or actual use of materials by the crew. Given the numbers of artifact recovered however, the former seems more likely. This extensive artifact assemblage warrants further study to examine more closely the material as to origins and dates of manufacture.

Hull Analysis

The hull analysis conducted by SEARCH, although somewhat limited due to relative lack of hull remains, suggests that the Roosevelt Inlet Shipwreck represents an ocean-going merchant vessel. Limited excavation of the site supports the findings from the hydro probe survey that only a small portion of the hull associated with the Roosevelt Inlet Shipwreck remains intact. The exposed longitudinal timber, initially thought to be a keel or keelson (Dolan Research, Inc. 2005), appears to actually represent a stringer or wale. This scantling lacks substantial metal fasteners (i.e., drift pins) typically associated with a centerline timber of a vessel. In addition, a lack of floor or frame timbers associated with this scantling (in the areas excavated) also suggests this timber is not a keel or keelson. Although heavily eroded on its top face, the timber also appears to be too small to be a keel or keelson, but likely represents a fairly large stringer or wale. While this timber is eroded on both ends, beveling on the north end and a narrowing of the sided dimension at the south end suggest this scantling is likely close to its original length (75 feet 3 inches).

Additional hull timbers recorded during the current investigation include interior planks and outer-hull planking. It is interesting to note that although interior planks and outer hull planks were found in close association (along the centerline timber), there were no floors, frames, or futtocks observed in conjunction with these planks. While floors and or frames may still exist at the wreck site, none were encountered in those areas excavated by SEARCH. This reinforces the likelihood that the extent of salvage and the environmental deterioration of the vessel have been substantial. Probably conducted by owners/insurers of the vessel, wreckers, and residents of Lewes, the salvage of the Roosevelt Inlet Shipwreck appears to have been extensive and thorough. The salvage of the wreck site may have taken place over years until only a fraction of the hull and cargo remained.

No clear evidence designating which end of the site represents the bow and which represents the stern was identified during the investigation, as no surviving elements of either were located. The centerline timber (stringer or wale), the inner planking, and outer hull planking are all oriented north/south, perpendicular to the existing shoreline. This orientation suggests the vessel likely ran ashore into shallow water with its bow toward the shore (south). There is not enough information at this time to determine whether the hull remains are associated with the port or starboard side of the Roosevelt Inlet Shipwreck.

Determining where the Roosevelt Inlet Shipwreck was actually built is uncertain. By the mid- to late eighteenth century, merchant vessels were being built throughout North America as well as Northern Europe. It has been estimated that in 1774 “nearly one-third

of British ships had been built in America or 2,342 ships out of a total 7,694” (Macgregor 1980:6). However, assuming that the Roosevelt Inlet Shipwreck represents the remains of a large, merchant vessel, it was more likely built in Europe as North American shipwrights were not yet producing larger merchant vessels.

Wood samples taken from the Roosevelt Inlet Shipwreck in 2005 and 2006 were collected to aid in establishing where the vessel may have been constructed. Results from the analysis indicate the use of white oak (*Quercus spp.*) in the majority of scantling tested (see Appendix J). The use of white oak in shipbuilding was common during the eighteenth century on both sides of the Atlantic. Therefore, the results of the analysis cannot determine a geographical source of the wood used in the construction of the Roosevelt Inlet Shipwreck. In addition, an assessment of where the vessel may have been built, based on ship construction characteristics, is also problematic due to a lack of diagnostic hull remains.

Assessment of the remaining scantling also indicates the Roosevelt Inlet Shipwreck was an ocean-going merchant vessel. Comparison of scantling recorded during the current investigation with other examples of late-eighteenth century merchant vessels suggests the ship was possibly 100 to 125 feet in length. Due to a lack of hull remains, an assessment of the vessel’s tonnage would be speculative.

Post-Remote Sensing Survey

The post-remote sensing survey, utilizing side scan sonar (integrated with a DGPS), was conducted after the excavation. This survey was useful in providing a visual image of the site, post-excavation. The three trenches excavated by SEARCH, as well as two baselines, were clearly visible on the sonar records. The sonar also indicated that unconsolidated sediments were rapidly infilling the test units excavated by SEARCH soon after the partial excavation of the site during the fall of 2006. This rapid infilling will ensure the future protection of the Roosevelt Inlet Shipwreck from environmental degradation.

Research Objectives

Prior to the current investigation, the State proposed a number of research objectives relative to the Roosevelt Inlet Shipwreck. These research objectives were then applied to the findings from the analysis of the hull remains, artifact assemblage, and material culture of the site. The objectives in question, and the subsequent discussion, in order, include:

- What type of vessel foundered on the shoals of Lewes Beach?
- Why did the vessel sink?
- When precisely did the vessel sink?
- What were the origin and destination of the vessel?
- Were any lives lost during the sinking and are the remains of seamen and passengers still at the wreck site?
- What was the precise nature of the cargo?

- How was the vessel cargo hold loaded?
- Was the vessel salvaged in part after the sinking by Lewes residents or others?
- What do the vessel and its cargo tell us about political, social, and economic life in Great Britain's Middle Atlantic colonies?
- What does the vessel reveal about regional and coastal trade and its link with the wider Atlantic world?
- What are the best archaeological techniques and historical research to answer these questions?
- How can we learn from this project to identify and protect other historic shipwrecks in Delaware waters?

A review of the remaining hull components, artifact assemblage, and lack of ballast material suggest the vessel was an inbound merchant vessel laden with material goods to the American colonies, most likely Philadelphia. The artifact assemblage infers the vessel was involved in trade between Northern Europe and North America, and it is evident that the vessel was inbound to North America when it wrecked. An outbound vessel would have likely been transporting raw goods versus the refined wares that were recovered during the current investigation. It is not possible to determine what type (i.e., brig, ship) of vessel the Roosevelt Inlet Shipwreck represents due to the lack of hull remains. Additional archival research may help shed light on the identity of the vessel, which may in turn determine the type of vessel.

With regards to what may have caused the vessel to sink, it appears the Roosevelt Inlet Shipwreck foundered off Lewes, most likely during a storm event. The vessel probably grounded in the shallows off Lewes and became stranded. The orientation of the scantling, perpendicular to the shoreline, suggests the vessel ran aground versus drifting to its present location. A vessel that was adrift, and then sinking, would have likely ended up oriented parallel to the shore line, due to wave action. A hypothesis proposed after the excavation of the *General Carleton* (wrecked in 1785) discusses the orientation of a near shore wreck (similar to the Roosevelt Inlet Shipwreck) and whether the vessel grounded or drifted into place:

The wreck's position - almost perpendicular to the shoreline - evidences that the ship was not drifting at the moment when she hit the seabed, as, had this been the case, the hull would have lain parallel to the coastline. The alignment of the vessel indicates that when disaster struck she must have been positioned with her bow to the waves. In the coastal zone, regardless of the wind direction, waves begin to swell parallel to the shoreline as they come up against the underwater sandbanks. [Ossowski 2008:57]

During the current investigation it was established that all scantling, including the longitudinal stringer/wale and planking, are oriented north/south, perpendicular to Lewes

Beach. Applied to Ossowski's model above this would suggest the vessel did in fact wreck in the shallows off Lewes and did not drift into its current location. A more in-depth analysis of the actual wreck event is difficult due to the lack of lower hull remains.

The artifact assemblage recovered from the site can help provide us with *terminus ante quem* and *terminus post quem*, of the wreck event. The presence of the "PASEO DE RETIRO" button, dated 1772, provides us with a solid date before which the vessel could not have sunk. The seeming lack of late-eighteenth century ceramics points to a pre-1780 date, but it is always problematic to date an archaeological site based on what it not found rather than what is found. Current research by Miller and Hunter (2001) and others points to a more subtle evolution between creamware and Pearlware with China glaze and blue-painted creamware coming into the market around 1775. These wares have often been identified as Pearlwares based upon their bluish China glaze, but they are indeed a form of creamware. This new research suggests that creamware did not get replaced by Pearlware but rather was replaced by decorated wares (http://www.jefpat.org/diagnostic/Post-Colonial%20Ceramics/PaintedWares/index_paintedwares.htm; Miller and Hunter 2001). While no painted creamwares were found in the 2006 collection (other than one fragment with a brown line), there were two blue-painted fragments recovered from the beach collection which may suggest a post-1775 date. If this vessel is indeed a Revolutionary War-era vessel, it could provide a fascinating look at how the new nation was being supplied during the war years.

Due to the paucity of ballast on the Roosevelt Inlet Shipwreck site, as well as the large variety and type of artifacts recovered during the current investigation, we can conjecture the vessel was inbound from Northern Europe to North America. As stated above, the artifact assemblage indicates the vessel was a merchant vessel carrying primarily utilitarian goods, most likely bound for Philadelphia. As stated by Dolan Research, Inc., "Philadelphia was one of several American ports that served as a hub in the network of trade routes within the colonies" (2005:11). The vessel likely encountered storm conditions at or near Delaware Bay and was either trying to seek protection from the storm at Lewes, or the crew became disoriented during foul weather conditions and unintentionally grounded the vessel. It is interesting to note, however, that:

As the Delaware Bay affords the only suitable deepwater inlet along the 295-mile stretch of the Atlantic Coast between Chesapeake Bay and New York Bay, mariners frequently sought refuge in the mouth of the bay during periods of inclement weather. Lewes became a harbor of refuge for ships heading along the Atlantic coast and Delaware Bay alike. [Dolan Research, Inc. 2005:20]

With this in mind, it is possible that the vessel was not headed to Philadelphia at all but rather sought refuge in Delaware Bay from inclement weather and subsequently wrecked off Lewes. While this is a possibility, it is more probable that the vessel was indeed bound

for Philadelphia as by 1772, “Philadelphia was indisputably the most active port in North America” (Dolan Research, Inc. 2005:12).

There is no archaeological evidence suggesting that there was loss of life associated with the Roosevelt Inlet Shipwreck. No human remains were identified during the current investigation. If the vessel foundered off Lewes during a storm event, grounding in the shallows in approximately 12 feet of water (with no other obstructions in the area), the physical wreck event itself may have been minimized, resulting in a minimal, if any, loss of life. Although the wreck event may have been violent, it occurred very close to shore and close to Lewes. It is likely that help for those on board was relatively expedient. If there was loss of life, it is plausible the human remains were washed to shore and were subsequently buried on land. It must be stated, however, that only a portion of the Roosevelt Inlet Shipwreck was excavated during the current investigation, and unidentified human remains may be still be associated with the wreck site.

The nature of the cargo appears to have been a diversity of goods being shipped from Northern Europe to the American colonies around the last quarter of the eighteenth century. Utilitarian items include raw goods, clothing pieces, domestic furnishings, kitchen wares, as well as a variety of miscellaneous items. It is also evident from the artifact assemblage that the non-utilitarian items such as gaming pieces, pewter miniatures, copper alloy stirrups and spurs, as well as German mineral water (to name a few) were being shipped to North America. This broad array of goods suggests the North American society was developed and established.

It is difficult to discern how the cargo associated with the Roosevelt Inlet Shipwreck may have been loaded due to the lack of hull remains and site integrity. It may be conjectured that the vessel likely ran aground with its bow toward shore therefore making the south end of the vessel the bow and the north end the stern. However, with little to support this premise, no determination of the vessel’s orientation with regards to bow versus stern can be made at this time. Therefore, it is impractical to derive any internal configuration of the vessel, including how the cargo was loaded. It is clear that the wreck event, subsequent salvage, and exposure to the environment over the years have severely affected the site’s integrity. For more information relative to the distribution of cargo please refer to the Spatial Analysis Summary above.

The exact nature of the initial wreck event is unknown with regards to the Roosevelt Inlet Shipwreck. Due to the relatively protected waters within Delaware Bay, the lack of obstructions (e.g., reef, rock outcroppings), and the relatively shallow waters off Lewes, Delaware it may be inferred that the vessel grounded in the shallows during a storm event. The upper works of the vessel would have been exposed to rough waves as soon as the vessel grounded. While it would be difficult to assess how much damage was incurred during the initial wreck event, it is likely that the hull and superstructure did receive damage. Substantial impact to the Roosevelt Inlet Shipwreck also likely occurred during

subsequent storms. Over time, water, currents, storm events, ice, and tidal action probably assisted in displacing ship timbers beyond the current limits of the site.

It is likely the Roosevelt Inlet Shipwreck was salvaged by commercial salvors as well as local residents after the wreck event. The current investigation discovered that very little of the hull remains *in situ*. The near-shore location of the wreck, its close proximity to Lewes and its residents, and relatively shallow water would have made the Roosevelt Inlet Shipwreck an ideal target for salvage. Salvage of wrecked vessels was common practice by the eighteenth century and results of the current investigation support this statement. The relatively shallow water would have left the majority of the hull above water, making salvage opportunities ideal. Salvage efforts also likely contributed to the disintegration of the hull in attempts recover cargo or wood timbers for use on shore.

The salvage of wreck sites has been divided into three primary phases: the primary salvage, the secondary salvage, and tertiary salvage. These three phases, described by Richards (2002), are as follows:

- *Primary salvage*: the pre-depositional salvage [by owners/insurers of their agents] carried out before final deposition or abandonment;
- *Secondary salvage*: the phase of salvage that occurs post-depositionally (post-abandonment) in the short term normally by the owner/abandoner of the vessel. Such salvage attempts are usually related to the appropriate abandonment of the vessel, or are a part of the cost recovery efforts associated with the decision to abandon;
- *Tertiary salvage*: attempts at salvage that occur through time after abandonment. Such attempts are intermittent and opportunistic, and will usually occur after a change in ownership to an individual or group of individuals not related to the primary and secondary phases of salvage (2002:345).

Salvage efforts were likely extensive and probably continued for some time after the wreck event. Review of shipwreck salvage records indicate that in some instances salvage of vessels lasted more than a year and that “anything of value left onboard, including personal effects and shipboard items, that were easily removed were also taken” (Russell 2005:136). Salvage accounts regarding the Schooner *Comet*, built in 1886, which wrecked in the Santa Barbara Channel off California suggest that:

Although no records of exactly how much material was salvaged from the vessel, contemporary newspaper accounts suggest the salvage was extensive. Most likely, salvage efforts reduced both vessels [the *J.M. Colman* was the second vessel] to stripped hulks, and have therefore considerably affected the nature of the archaeological remains. [Russell 2005:136]

Moreover, it is very likely that the environment has played a significant role in the deterioration of the Roosevelt Inlet Shipwreck. One of the preliminary studies of site formation processes with regards to shipwreck sites was first proposed by Muckelroy (1978). Muckelroy suggested that there are “several transformational factors and processes unique to shipwrecks in the archaeological record...including the process of wrecking, salvage operations, disintegration of perishables, sea-bed movement, and deposition of intrusive materials” (Russell 2005:5-6). Another interpretation of shipwrecks has been proposed by Steffy (1994) which also applies to the Roosevelt Inlet Shipwreck:

Sunken wooden ships don't simply lie there and gently rot away. There are long periods of quiet disintegration, of course, but there are also times of violence, of lurching and breakage. Ships seldom die peacefully. In warm waters, shipworms combine forces with oxidation, erosion and corrosion to speed up the disintegration process. They completely eliminate the exposed areas of the hull, causing deck beams to fall or cargo to shift. Cargo and ballast press against the weakened hull sides. As supporting hull timbers lose their integrity, others bear the strain. When their weakened fastenings let go, planks or entire hull sections can be projected for from their original orientation. [1994:190]

As mentioned above, water, currents, storm events, ice, and tidal action probably had a significant impact on the hull fabric. Referring again to the *J.M. Colman*, launched in April 1888 and wrecked in 1905 in the Santa Barbara Channel (Russell 2005:33), archaeological investigation of the site determined that very little of the hull remained at the location of the wreck event. The investigation of the site determined that:

As the vessel slowly broke apart, elements and fragments either floated away or were washed up on the beach. Later storms and tides probably carried away or buried many wooden components from the beach, eventually reducing the visible material to the present collection. Because the *J.M. Colman* did not carry ballast, nothing was present to trap and preserve the hull bottom. [Russell 2005:136]

Since the Roosevelt Inlet Shipwreck appears to have been an inbound merchant vessel loaded with goods bound for Philadelphia, it is likely the cargo was extensively salvaged, leaving the majority of the lower hull exposed to natural elements. Over time portions of the lower hull may have simply broken off and drifted away. The large concretions, millstones, brick, and other artifacts found onsite may have protected the small amount of scantling found onsite during the current investigation whereas a large portion of the hull was not protected from the elements. Variable water temperature and exposure of the wreck to marine wood borers, such as the Teredo Worm (*Teredo navalis*) may also have contributed to the ultimate deterioration of the hull of the Roosevelt Inlet Shipwreck. An expanded remote sensing survey of the area (beyond that of the current investigation),

followed by diver investigations, may help determine whether any additional hull remains associated with the Roosevelt Inlet Shipwreck are located within the area.

Although very little remains of the hull of the Roosevelt Inlet Shipwreck, the artifact assemblage can tell us a great deal about the political, social, and economic life of the period. The artifact assemblage tells us that both utilitarian and non-utilitarian items were being transported to North America from well-established European countries. The predominance of primarily utilitarian goods (such as pewter shoe buckles) points to this cargo being intended for sale primarily to the common man. Higher-status individuals would have preferred gold, silver, or even a copper alloy such as pinchbeck to pewter, even during hard economic times. Some artifacts recovered such as the copper alloy stirrup, porcelain, decorated buttons, and miniatures suggest, however, that North American society was also refined.

It is unknown whether or not the Roosevelt Inlet Shipwreck was involved with any regional or coastal trade. It is clear from the artifact assemblage that the vessel was inbound from Northern Europe, likely headed directly for Philadelphia. Philadelphia was the largest port on the East Coast during the last quarter of the eighteenth century, and a substantial amount of goods were coming in and out of that port alone. As stated above, Philadelphia served a hub for incoming goods from Northern Europe. Once in Philadelphia, goods brought in by vessels from Europe, such as the Roosevelt Inlet Shipwreck, were transported via other routes/vessels to outlying areas.

Research indicates that during the late-eighteenth century outbound vessels from North America followed both linear and circuitous routes back to Northern Europe. It depended on whether the vessel could be loaded with sufficient goods at Philadelphia to return directly back to Northern Europe or needed to make additional ports-of-call for more goods to warrant the return voyage. It was well known that:

The need to make full use of ships on all legs of voyages, to coordinate shipping movements with colonial agents, to time voyages to coincide with the availability of seasonal crops, and to cope with the irregularity of many markets and the instability of prices posed ever-present problems that made multilateral routes more speculative than bilateral routes. [Morgan 1989:525]

During the latter half of the eighteenth century exports from Philadelphia consisted primarily of grain and flour but also included meat, lumber, barrel staves, flaxseed, pig and bar iron, deerskins, and furs (Thayer 1982). As bilateral routes were preferred over multilateral routes and exports from Philadelphia were increasing, it seems likely that vessels outbound for Europe could easily be loaded with sufficient cargo to circumvent a circuitous route.

Vessel Candidates for the Roosevelt Inlet Shipwreck

An inventory of vessels lost in the vicinity was compiled from a collection of primary and secondary sources (including Berman 1973; Dolan Research, Inc. 2005; Lytle et al. 1975; Marx 1971; and Shomette 2007). These sources identified a total of 228 vessels recorded as lost near Lewes, Delaware Bay, Cape Henlopen, Delaware Capes, Hen and Chickens Shoals, etc., between 1632 and 1850. We can refine this list of shipwrecks substantially by considering the date range of artifacts associated with the Roosevelt Inlet Shipwreck. More specifically, the recovery of a copper alloy cast button dating to 1772 (2006.33.163), helps provide a *terminus ante quem* for the Roosevelt Inlet Shipwreck. Establishing a definitive *terminus post quem* is slightly more difficult. Tin-glazed earthenwares were no longer in general manufacture after ca. 1800 and can be considered a good *terminus post quem* artifact. The dearth of painted creamwares/Pearlwares also points to a pre-nineteenth century date. As the Industrial Revolution progressed and ceramics, in particular, became so easily and cheaply decorated with the advent of transfer printing, fewer plain vessels were in demand in the market place. Also, the inclusion of shoe and knee buckles in this vessel's cargo is indicative of an eighteenth century timeline as by the end of the century buckles were being replaced by shoelaces and breeches ties, respectively.

In an effort to gather more information relative to vessel losses in the area from 1772-1800 additional primary research was conducted by SEARCH. The primary focus of this research was Philadelphia's leading colonial newspapers, *The Pennsylvania Gazette* and *The Pennsylvania Packet*, both of which contained reports on shipping activity in the port. These periodicals have been digitized and are available for searching through a subscription to *Accessible Archives* (<http://www.accessible.com/accessible/>). Search terms included possible vessel names and various words indicative of maritime accidents ("ashore", "on shore", "wrecked", "shipwrecked", "lost", etc.). In order to find information on potential candidates, searching was done using these same accident terms with the addition of geographical points in the area ("Cape Henlopen", "Hen and Chicken Shoals", "Lewestown", "Lewes", etc.).

A total of 63 reported vessel losses were identified from primary and secondary sources from 1772 to 1800. Although this inventory is still somewhat sizeable we can further refine this list by eliminating vessels on the basis of their hull type, location of reported vessel loss, and type of accident. Analysis of the extant hull remains suggests the Roosevelt Inlet Shipwreck represents the remains of a merchant vessel (i.e., brig, ship), not a smaller vessel such as a schooner. In addition, vessels clearly reported lost or wrecked outside the general area of the Roosevelt Inlet Shipwreck have been excluded. A number of vessels reported as "burned as a war loss" have also been discounted. There was no evidence of burning on either the small amount of hull remains or artifact assemblage recovered during the current investigation. After refining the shipwreck inventory a total of 31 vessel losses in and around Cape Henlopen have been identified (Table 9.1).

Table 9.1 Reported vessel losses in and around Delaware Bay from 1772 to 1800.

Name	Date Lost	Comments
<i>Severn</i>	1774	"The <i>Severn</i> , Hathorn, from Bristol for Philadelphia, is on shore in the Delaware Bay and full of water. The crew was saved." (New Lloyds List No. 545, Tuesday, June 14, 1774).
<i>Hotham</i>	1779	A vessel of unknown type listed as "Cast Away" from Cape Henlopen, Delaware.
<i>General Green</i>	1780	A ship listed as either pirate or privateer that was lost "in the Delaware."
<i>Mentor</i>	1783	A vessel of unknown type stranded or driven ashore as a war loss "within the capes of Delaware."
<i>Success</i>	1783	A ship lost at Cape Henlopen, Delaware.
<i>Count de Ducat</i>	1783	A brig lost at Cape Henlopen, Delaware.
<i>Patriot de Roum</i>	1783	A brig lost at Cape Henlopen, Delaware.
<i>Sophia</i>	1783	A brig lost at Cape Henlopen, Delaware.
Unidentified	1783	A brig lost at Cape Henlopen, Delaware.
<i>Alexander</i>	1784	A brig stranded "on the bar near the mouth of Lewiston Creek", Delaware.
<i>Maria Johanna</i>	1784	A vessel of unknown type stranded "on the inside of Cape Henlopen", Delaware.
<i>Brilliant</i>	1784	A transport that was stranded 1/2 mile north of Hen and Chickens Shoal, Delaware.
Unidentified	1785	A brig that foundered at the Delaware Capes.
<i>Santa Rosalea</i>	1788	A Spanish vessel of unknown type that stranded "at the Delaware Capes."
<i>Pomona</i>	1789	A vessel of unknown type listed only as "lost" in the Delaware River.
<i>John</i>	1790	An English merchantman wrecked in Delaware Bay.
Unidentified	1790	A brig that was stranded "1 mile north of <i>Friendship</i> wreck, Delaware Bay."
<i>Betsy</i>	1792	A vessel of unknown type that was stranded "in the Delaware."
<i>Industry</i>	1793	A merchantman that foundered in Delaware Bay.
<i>Peggy</i>	1794	A ship "lost in the Delaware."
<i>St. Joseph</i>	1794	A ship foundered "in the Delaware."
<i>Harmony</i>	1794	A vessel of unknown type that was abandoned near the Delaware Capes.
Unidentified	1795	A ship that stranded "in the roads of Delaware Bay."
<i>Lively</i>	1795	A ship that was "lost near the Delaware."
<i>Favourite</i>	1796	A merchantman that foundered "near the Delaware."
<i>Minerva</i>	1796	A vessel of unknown type lost "near the Delaware."
<i>Henry and Charles</i>	1796	A vessel of unknown type stranded "near the Delaware Capes."
<i>John</i>	1797	A ship that wrecked near Cape Henlopen, "in the Delaware."
<i>New Jersey</i>	1798	A vessel of unknown type that was either stranded or lost "in the Delaware."
<i>Admiral Parish</i>	1800	A vessel of unknown type that was stranded near Cape Henlopen, Delaware.
<i>Susannah</i>	1800	A ship that wrecked "in the Delaware."

Vessel losses reported as lost “at Cape Henlopen” or “off Cape Henlopen” have not been discounted as potential candidates for the Roosevelt Inlet Shipwreck. Review of seventeenth- to eighteenth-century maps of the area identified a large portion of the southern Delaware Bay coastline (including Lewes) as “Cape Henlopen.” In addition, vessels reported as lost or foundered at the “Delaware Capes” were also considered as this area covers a broad geographic region that may include Lewes.

The following information relative to specific vessel losses in and around Delaware Bay was gathered from previous research conducted by the State as well as data gathered by SEARCH.

The Severn

A substantial amount of research has been conducted to date relative to the loss of the *Severn* in Delaware Bay in 1774. Conducted by the State (see Griffith and Fithian 2007) and individual researchers (i.e., Diane Hungate), this research has identified a significant amount of information relative to the vessel, its routes, and owner. SEARCH was contracted to additional research relative to the *Severn*. Archival research on the *Severn* was conducted in various locations in Philadelphia, although this research did not produce significant new evidence about the *Severn* or related topics. The records relating to ship traffic (Maritime Records, Port Warden’s Minutes, Pennsylvania Court of Admiralty Records, and Custom House Papers) at the Historical Society of Pennsylvania (HSP) were intermittent for the period before and during the Revolutionary War, the generic span of time when the ship is believed to have been lost. Several mentions of Captain James Hathorn were found within these records. Each mention was for the date of 1784 and related to the period when he was master of the ship *Brothers*. No details relating to the *Severn* were found in these records.

Philadelphia’s *Pennsylvania Gazette* (on May 11, 1774) and London, England’s *New Lloyds List* (on June 14, 1774) reported the loss of the *Severn* in Delaware Bay as a result of flooding (Griffith and Fithian 2007). Appearing in *Lloyd’s Register of Shipping* for the first time in 1769, the *Severn* was a trans-Atlantic merchant vessel owned by Thomas Penington, a merchant based in Bristol, England. It is interesting to note that review of the Lloyd’s Register of Shipping from 1769 indicates the *Severn* was built in Philadelphia (Faye Stocum personal communication). However, records collected by English researcher Diane Hungate infer the ship was built in England.

The *Severn* is known to have made at least ten voyages between 1769 and 1774. Most of these voyages were between Philadelphia, Pennsylvania and Bristol, England. Occasionally, the ship called on New York, Leghorn (Italy), Barcelona (Spain), and Lisbon (Portugal), but the Bristol-Philadelphia route appears to have been the standard. Through Penington, Bristol merchants such as Thomas Lucas, Purnell & Locker, Sam Taylor & Sons, Joseph Godwin, and Robert Rogers, arranged to transport a wide variety of goods.

Nails, earthenware, shoes, beer, green glass bottles, bedsteads, chests, window glass, wrought iron, brass, and gun powder were among those items shipped to Philadelphia. Penington himself exported goods such as wool, grindstones, tobacco pipes, and cheese. From Philadelphia, items such as deer skins, flour, Indian corn, wheat, barley, iron, planks, and staves were exported on the *Severn* (Griffith and Fithian 2007; McVae 2008). As period newspaper advertisements indicate, quite a number of Philadelphia merchants stocked their warehouses along the waterfront with goods brought over on the *Severn*: Donald McLean, Joseph Stansbury, Joseph Carson, John Mason, Abraham Usher, and Stocker & Wharton.

After the loss of the *Severn* in an intense snowstorm (all on board reportedly survived), Hathorn went on to captain other ships, including the *Brothers* and the *Birmingham*, participating heavily in the trade between Philadelphia and Bristol (Griffith and Fithian 2007). Additional evidence of this was discovered by chance at the HSP. Elizabeth Drinker, an affluent Quaker Philadelphian and diarist, mentioned in a 23 August 1783 entry that her son, Henry, was a playmate of “Wailing[,] the Mate of the Ship Brothers, Capt. Haythorn” (Crane 1991). Newspaper articles support that Hathorn was the captain of the ship *Brothers* at this date and that the boat was in port at Philadelphia in August (*Pennsylvania Gazette*, 2 August 1783). In the following year, he was importing goods from Bristol on the *Brothers* for Brooke Smith, Abel James, and William & John Setgreaves (Maritime Records of the Port of Philadelphia [Port Wardens Minutes] 1784).

The *Alexander*

The most significant finding on the brigantine *Alexander* was a brief article appearing in the *Pennsylvania Gazette* from February 25, 1784. This report provides information on the foundering and subsequent freeing of the vessel earlier in the month. On the 13th of February, as reported in the article, “The Bay is intirely [sic] full of ice; the brig *Alexander*, Gilpin, ashore on the bar near Lewis-town creek mouth”. Apparently, there was a strong storm in the area because numerous other ships are listed as having run into trouble in the area. The *Alexander* managed to survive the incident. The article tersely reports that, on February 19th, the *Alexander* “got off” (*The Pennsylvania Gazette* 25 February 1784).

The *Industry*

A newspaper article from May 8, 1793, clearly describes the loss of the *Industry* on the preceding 20th of April.

We are sorry to announce to our readers, that in the heavy N.E. gale on Friday, the 20th ult, the ship *Industry*, Capt. Cassin, of this port, from Havre de Grace, put into Delaware Bay, and got up as high as the Brown, where she remained until Saturday morning, having three anchors out - when the gale increased, forced her from her moorings, and she went on shore at Lewistown bar; eight French passengers who came in the *Industry*, became impatient, and desired to be put on shore. The ship's yawl was lost previous to this, whereupon the long-boat was hoisted out, but before it had been let

down, the passengers got into her, the tackle fall gave way, and the boat went down stern foremost; by which melancholy accident the eight persons became an easy prey to that boisterous element. The cook and one of the hands were washed overboard before she went on shore. Eight of the bodies were found and decently interred in Lewistown churchyard, before our informant came away. [*The Pennsylvania Gazette* May 8, 1793]

Further information on this disaster was not found in the sources researched.

Searching in the Philadelphia newspaper archives for ship accidents near the project area resulted in two additional candidates, one an unidentified Spanish brig that may have been lost and the other a Dutch ship called the *Maria Johanna* that appears to have been a total loss. The report about the Spanish brig appeared in *The Pennsylvania Gazette* on March 12, 1783 and reads as follows:

A Spanish brig from Cádiz, bound to this port, about the middle of last week arrived in our Bay; but by the unskilfulness [*sic*] of her Pilot, she run ashore near the mouth of Lewistown creek, where it is feared she is lost. As she left Cádiz the 24th of December we have nothing new by her. [*The Pennsylvania Gazette* March 12, 1783]

The wreck of the *Maria Johanna* was reported in *The Pennsylvania Gazette* on March 24, 1784. The report reads as follows:

We are sorry to hear, that in the night of the 10th instant, the ship *Maria Johanna*, captain Pieter Yallings Bonk, from Amsterdam, in a gale of wind was drove ashore on the inside of Cape Henlopen, where she soon beat to pieces, and all on board, 21 in number, except the supercargo and his clerk, who drifted ashore on a piece of plank, perished. [*The Pennsylvania Gazette* March 24, 1784]

It is clear from the archival research that a multitude of vessels have wrecked in and around Delaware Bay during the last quarter of the eighteenth century. Additional archival research as well as a continuing analysis of the artifacts may help in positively identifying the Roosevelt Inlet Shipwreck.

Interpreting the Roosevelt Inlet Shipwreck

In an effort to interpret the data collected from the Roosevelt Inlet Shipwreck it is helpful to review the social, political, and economic status of the colonial society during the last half of the eighteenth century. Research gathered from the Historic Context Chapter of this report is helpful in understanding late eighteenth century society, the transatlantic trade, and the role of the Roosevelt Inlet Shipwreck. It is clear that the population growth and prosperity of the North American colonies were increasing as the eighteenth century

progressed. This growth created a wealth of new markets for European consumer goods. In addition, the production of agricultural products and other raw materials allowed the colonists to trade on a much larger scale with merchants in Europe. As society and the economic status of the North American colonies flourished, a transition from pioneer conditions to domestic comfort increased the demand for textiles and a variety of export wares (McCusker and Menard 1985; Morgan 1993:89). Research to date suggests that by the 1770s about half of all British exports (including ironware, copperware, earthenware, glassware, window glass, printed cotton and linen goods, silk, goods and flannels, and also 2/3 or more of all cordage, sailcloth, iron nails, beaver hats, wrought leather, linen, and Spanish cloth woolen goods) were being shipped to the colonies (Morgan 1993). As the eighteenth century progressed, colonists became increasingly attached to consumer goods from Northern Europe.

This growth of commerce is also evidenced by the expansion of the Philadelphia waterfront as the eighteenth century progressed. In 1723 an average of 85 ships cleared the port at Philadelphia. By 1750 this number had increased to 400 ships. By the mid-eighteenth century, as a result of the Navigation Acts, much of the goods entering Philadelphia were being exported from England (Breen 1988). However, imports from all over Europe continued to pour into Philadelphia, including wines from Portugal and Madeira, clothing and personal wares from England, rum and molasses from the West Indies, as well as goods from the Mediterranean.

By the American Revolution the Dutch had become a major ally of the North American colonies, much to the consternation of the British. The Dutch succeeded in supplying the colonies with much needed goods including arms and other trade items. As a result, the Dutch were one of the first to establish a formal trading relationship with the Americans with the establishment of the Treaty of Amity and Commerce in October of 1782 (Jameson 1903). Commerce from other Northern European countries (including France, Germany, and Scandinavia) followed suit, opening up large, direct trade routes with the United States as a result of independence (Shepherd and Walton 1976:407).

With the growth of the American colonies and the demand for European goods increasing, the transatlantic trade grew immensely as the eighteenth century progressed. This in turn created a demand for merchant vessels capable of transporting cargos to and from the North American colonies. To accommodate this demand vessels continued to be built throughout Northern Europe with an increasing amount being built in America.

Interpretation of the artifact assemblage recovered from the Roosevelt Inlet Shipwreck suggests the vessel was supplying goods desired from Europe. While the cargo is primarily utilitarian in nature, other artifacts (such as porcelain, pewter miniatures, copper alloy stirrups/spurs, and German mineral water) indicate colonists were sophisticated, financially established, and yearned to remain current with social trends of the late eighteenth century.

Recommendations

Research on this important project is on-going by the staff of the Delaware DH & CA. The Roosevelt Inlet Shipwreck provides an intriguing look into the late-eighteenth century commercial merchant trade. This is evidenced by the broad array of artifacts recovered from the site during the current investigation. While a substantial amount of data has been gathered from the site since it was first discovered in 2004, further research, including additional archival research and artifact analysis can help in interpreting the site more thoroughly, which indeed has continued to date. The significance of the site, its role in the political and economic setting of the late eighteenth century, and its importance to the maritime history of State of Delaware all afford the Roosevelt Inlet Shipwreck protection in the form of future site management.

Archival Research

Continued archival research relative to the Roosevelt Inlet Shipwreck is perhaps the most important recommendation relative to interpreting the site. Additional archival research should focus on shipwreck events within Delaware Bay during the last quarter of the eighteenth century. More specifically, this research should focus on shipwrecks from 1772 to 1800. A review of shipwreck inventories in the general area of Cape Henlopen and Delaware Bay suggest approximately 31 vessels foundered in this area during this period (Berman 1973; Lytle et al. 1975; Marx 1971; Shomette 2007). Continued research of all pertinent wreck events in local, national, and international repositories should continue in an effort to identify the Roosevelt Inlet Shipwreck. A continued and thorough analysis of artifacts recovered to date, coupled with more extensive archival research, may help shed light on the identity of the Roosevelt Inlet Shipwreck.

Artifact Analysis

Further study of the artifact assemblage may provide additional insight into the identification of the Roosevelt Inlet Shipwreck and add to the current body of knowledge with regards to late-eighteenth century wares and trade. The substantial collection of artifacts, including architecture, activities, clothing, furniture, kitchen, miscellaneous, personal, armor/weaponry, and tobacco items, can continue to provide a wealth of information relative to the Roosevelt Inlet Shipwreck. A more specialized approach, including other scientific disciplines (i.e., metallurgists, ethnobotanists, zooarchaeologists), may also assist with a more comprehensive assessment of objects recovered to date.

Allowing researchers access to the artifact collection is also recommended to enhance the body of knowledge concerning the Roosevelt Inlet Shipwreck. Physical access to the artifacts by researchers, graduate students, and the public may provide valuable insight into how the collection fits into the social and economic pattern of the late eighteenth century. Comparison of artifacts recovered from the Roosevelt Inlet Shipwreck with contemporaneous terrestrial sites of the region may also provide valuable insight into trade patterns and distribution of goods during the late eighteenth century. Due to the extensive

collection of artifacts, continued studies in the form of graduate research and scholarly publications should also be encouraged by the State.

In addition, an online database of artifacts recovered from the Roosevelt Inlet Shipwreck may provide a valuable tool for researchers worldwide. Granting the general public access to the database via the internet may assist in gathering information relative to the collection from a wide audience.

Site Management and Protection

The Roosevelt Inlet Shipwreck should be monitored by the State to ensure its continued protection from unauthorized disturbances (i.e., looting), fishing/trawling activities, and exposure from major storm events. Monitoring, in the form of periodic underwater inspections, should be undertaken to assess the condition of the site on a regular basis. Volunteer or non-profit groups, such as the Institute for Maritime History (IMH), can be a valuable resource for conducting such underwater inspections. Over the past few couple years the IMH has conducted reconnaissance dives on the Roosevelt Inlet Shipwreck under the auspices of the State. While the site is located in a high-visibility area, communication with the local community, U.S. Coast Guard, and others familiar with the site should be continued to ensure the protection of the site from accidental (i.e., trawling activities) and intentional (i.e., looting) site disturbances.

A Notice-To-Mariners, issued prior to archaeological investigations in 2006, should remain in effect for the continued protection of the Roosevelt Inlet Shipwreck (Appendix K). This Notice-To-Mariners restricts public access to the site by prohibiting anchoring, dredging, diving, or fishing near the site. Penalties for any unauthorized person found excavating, collecting, defacing, injuring, or destroying an archaeological resource includes fines and penalties up to \$20,000, 30 days imprisonment, restitution to the State, and forfeiture of all equipment and tools used in such activities. This type of Public Notice can be an effective tool in preventing unauthorized access to the Roosevelt Inlet Shipwreck.

It is unfortunate that the Roosevelt Inlet Shipwreck was impacted by dredging activities. This type of incident can be averted in the future by close review of submerged cultural resource surveys prior to potentially damaging impacts, such as dredging or marine-related construction activities. The remote sensing signature of the Roosevelt Inlet Shipwreck is indicative of a potentially significant submerged cultural resource and should have been recommended for avoidance or identification prior to dredging activities in 2004. Remote sensing surveys within State waters should, at a minimum, be conducted with a magnetometer and side scan sonar, both integrated with a Differential Global Positioning System (DGPS) and only by qualified underwater archaeologists. All magnetometer data should be contoured to determine association with other magnetic targets and/or side scan sonar targets.

To date there are no current survey standards for submerged cultural resource surveys within the State of Delaware. The State should implement a standard set of guidelines for

all archaeological surveys regarding submerged cultural resources within State waters. These standards should require remote sensing survey line spacing to be established at a maximum of 100 feet (30 meters) in areas considered high probability for historic shipwrecks. The Minerals Management Service (MMS), Atlantic Outer Continental Shelf (OCS) Region has recently adopted this line-spacing standard for all remote sensing surveys conducted in waters 200 meters or less (U.S. Department of the Interior, 2008). The State of Texas has recently implemented new survey line-spacing standards with regards to submerged cultural resource surveys in high-probability areas within State waters. These revised survey standards state “The maximum line spacing has changed to 20 meters for any high probability tracts within the 3-nautical mile line offshore and 30 meters for any high-probability tracts further offshore” (Hoyt personal communication 2008). A variety of states such as Florida, Texas, Mississippi, and Louisiana have established state survey standards for submerged cultural resource surveys which can be adapted and executed by the State of Delaware. An example of survey standards and guidelines for submerged cultural resource surveys, implemented by the State of Mississippi, has been provided in Appendix L.

Submerged cultural resource surveys should be required within any State waters prior to any activities that may impact potentially significant submerged cultural resources. This includes any State waterways that may have been utilized by historic watercraft. The State has a rich maritime past and its submerged cultural resources, which are finite, should be protected from any future threats, such as dredging or marine-related construction activities, which may impact potentially significant submerged cultural resources. Approximately 228 reported shipwrecks have occurred in and around Cape Henlopen from 1624 to the present (Berman 1973; Lytle et al., 1975; Marx 1971; Shomette 2007). Implementing State standards and guidelines would help in identifying and protecting other historic shipwrecks in Delaware waters.

The implementation of a Submerged Cultural Resources Management Plan, relative to inundated resources within State waters, may assist the State of Delaware’s Division of Historical and Cultural Affairs with issues related to such resources. The development of such a program has been outlined by the State of Delaware:

The Division may establish a Shipwreck Management Program, in cooperation with other state and federal agencies experienced in the management of subaqueous lands and resources, to encourage the identification, protection, and, where appropriate, the recovery and disposition of abandoned shipwrecks embedded in or located on state-owned or state-controlled subaqueous lands. The Division is authorized to establish a professional staff for the purpose of implementing the Program. [Delaware Code (7 Del C. § 5316)]

In 1988 the federal government transferred ownership of abandoned shipwrecks (located within state waters) to each respective state to manage subsequent to the passage of the

Abandoned Shipwreck Act (Pub.L. 100-298; 43 U.S.C. 2101-2106). Advice on how to accomplish the basic components of shipwreck management has been provided in the Abandoned Shipwreck Act Guidelines. These guidelines can be found at <http://www.nps.gov/archeology/submerged/state.htm>. The guidelines, relative to shipwreck management include:

- **Guideline 1:** Involve interest groups in shipwreck program development and management activities.
- **Guideline 2:** Establish a shipwreck advisory board.
- **Guideline 3:** Assign responsibility for State-owned shipwrecks to appropriate agencies.
- **Guideline 4:** Establish regulations, policies, or procedures for the long-term management of State-owned shipwrecks.
- **Guideline 5:** Provide adequate staff, facilities, and equipment.
- **Guideline 6:** Cooperate and consult with State and Federal agencies.
- **Guideline 7:** Establish a consultation procedure to comment on State and Federal activities that may adversely affect State-owned shipwrecks.
- **Guideline 8:** Use the National Register of Historic Places criteria.
- **Guideline 9:** Use applicable standards and guidelines.
- **Guideline 10:** Prosecute persons who willfully violate the State's shipwreck management program.
- **Guideline 11:** Provide legal recourse for persons affected by the State's management program.

The Abandoned Shipwreck Act Guidelines also offer instruction for funding, surveying, documenting, recovery, public access, interpretation, volunteers, and establishing underwater parks.

A Submerged Cultural Resource Management Plan can assist in interpreting submerged archaeological sites including prehistoric sites, historic shipwrecks, shipbuilding yards/marine railways, wharfs, and other marine-related sites. The Plan can aid in the development of practical phases with which to implement underwater archaeology and a submerged cultural resource management program. This Plan should be considered an evolving document which is reviewed and evaluated on a regular basis. For a comprehensive review of submerged cultural resource programs within the United States see Elliott et al. (2000).

In addition to instituting standards for a Submerged Cultural Resources Management Plan, the State should maintain a centralized, fully functional, and well-staffed archaeological laboratory. This laboratory should uphold standardized procedures for handling, processing, and maintaining any archaeological material that comes from submerged sites and any archaeological excavations. Consistent methods of analysis and standards for recordation create a solid foundation for specialized research that can answer many of the questions asked of an archaeological assemblage.

The stewardship of Delaware's submerged cultural resources should be of utmost importance considering the extensive maritime history of the State. The State must address responsibilities include addressing the wide variety of resources present within State waters, funding, increased destruction of submerged resources, looting of archaeological sites, lack of awareness on the part of the public and policy makers, and lack of a Submerged Cultural Resources Management Plan. Addressing these issues can ensure the protection of these resources, stimulate local and state economies through heritage tourism, and assist in interpreting these resources for generations to come.

This Page Intentionally Left Blank

REFERENCES CITED

Anonymous

1880 *Delaware Bay*. Electronic document, http://historicalcharts.noaa.gov/historicals/historical_zoom.asp, accessed October 26, 2009.

Armstrong, Richard

1969 *A History of Seafaring The Merchantmen*. Frederick A. Praeger Publishers, New York.

Ayto, Eric G.

2002 *Clay Tobacco Pipes*. Shire Publications, Buckinghamshire, England.

Bache, Hartman

1836 *Chart, showing site of Light House proposed for the Brandy Wine Shoal, Delaware Bay*. 24th Congress, 1st Session, Vol. 288. Electronic document, <https://web.lexis-nexis.com/congcomp>, accessed October 26, 2009.

Barker, David

2009 *Slipware*. Reprint, originally published in 1993. Shire Publications, Ltd., Ashford Colour Press, Ltd., Great Britain.

Bartels, Michiel

1998 *Stoneware Bottle Chronology and Use*. Document provided by Author through the Arizona State University Historical Archaeology Archives, on file at Southeastern Archaeological Research, Inc., Newberry, FL.

Barton, K.J.

1973 *The Western European Coarse Earthenwares from the Wreck of the Machault*. County Museum Service, Winchester, England.

Baterden, J.R.

1908 *Timber*. Archibald Constable & Co. LTD., London, England.

Beaudry, Mary C.

2006 *Findings: The Material Culture of Needlework and Sewing*. Yale University Press, New Haven, CT.

Benjamin Fuller Letterbook

1773 Letter to Anthony Stocker dated November 15, 1773. Letterbook on file at Historical Society of Pennsylvania, Philadelphia.

- Berman, Bruce D.
1973 *Encyclopedia of American Shipwrecks*. The Mariners Press, Boston, MA.
- Blair, Elliott H., Lorann S.A. Pendleton, Peter Francis Jr., Eric A. Powell, and David H. Thomas
2009 *The Beads of St. Catherines Island*. American Museum of Natural History Anthropological Papers No. 89 (April 1), New York.
- Boone, Mary Lou
1998 *Four Centuries of French Ceramics Terre et Feu From the Boone Collection*. University of Washington Press, Pasadena, CA.
- Boston University
2010 Painted Tableware and Other Ceramics of the Midi Toulousain. Electronic document, <http://people.bu.edu/arcange/lomagne.shtml>, accessed January 2010.
- Bjork, Gordon C.
1964 The Weaning of the American Economy: Independence, Market Changes, and Economic Development. *Journal of Economic History* 24(4):541-560.
- Brain, Jeffrey P.
1979 *Tunica Treasure*. Papers 71. Peabody Museum of Archaeology and Ethnology, Harvard University Press.
- Breen, T.H.
1986 An Empire of Goods: The Anglicanization of Colonial America, 1690-1776. *Journal of British Studies* 25(4):467-499.
1988 "Baubles of Britain": The American and Consumer Revolutions of the Eighteenth Century. *Past & Present* 119:73-104.
- Brewington, Marion V.
1939 Maritime Philadelphia, 1609-1837. *The Pennsylvania Magazine of History and Biography* 63(2):93-117.
- Bronner, Edwin B.
1982 Village Into Town, 1701-1746. In *Philadelphia: A 300-Year History*, edited by Russell F. Weigley. W.W. Norton, New York.
- Brown, Ian W.
1979 Bells. In *Tunica Treasure*, by Jeffrey P. Brain, pp. 197-205. Papers 71. Peabody Museum of Archaeology and Ethnology, Harvard University Press.

Brunhouse, R.L.

1930 The Effect of the Townshend Acts in Pennsylvania. *Pennsylvania Magazine of History and Biography* 54(4):355-373.

Buffalo Architecture and History

2005 Chairs: Styles and Designers. Electronic document, <http://www.buffaloah.com/f/glos/chairs/styles/chairstyles.html>, accessed January 2010.

Bureau of Land Management

2006 Historic Glass Bottle Identification and Information Website, electronic document, http://www.blm.gov/historic_bottles/index.htm.

Burnett, Edmund C.

1911 Notes on Negotiations for Commercial Treaties 1776-1786. *American Historical Review* 16(3):579-587.

Campbell, James W.P., and Will Pryce

2003 *Brick, A World History*. Thames & Hudson Ltd., London, England.

Campo, Josef del

c.1785 *Plano de la Bahi de la Ware y Entrade de Filadelfie*. Library of Congress. Electronic document, <http://www.loc.gov>, accessed October 26, 2009.

Chapman, F.H.

1768 [1971] Reprint. *Architectura Navalis Mercatoria*. Original edition published by Stockholm, 1768. Praeger Publishers, New York.

Coclanis, Peter, ed.

2005 *The Atlantic Economy During the Seventeenth and Eighteenth Centuries: Organization, Operation, Practice and Personnel*. University of South Carolina Press, Columbia.

Collect Medical Antiques

2010 Gastroenterology: The Clyster. Electronic document, <http://www.collectmedicalantiques.com/potpourri2.html>, accessed January 2010.

Committee of Tarring and Feathering

1773 To the Delaware Pilots [Broadside]. Library of Congress, Washington, D.C.

Cooper, Peter

1720 The Southeast Prospect of the City of Philadelphia. Courtesy of the Library of Congress, Washington, D.C.

- Coysh, A.W. and R.K. Henrywood
1989 *The Dictionary of Blue and White Printed Pottery 1780-1880 Volume II*. Antique Collectors' Club Ltd., Woodbridge, Suffolk, England.
- Crane, Elaine Forman, ed.
1991 *The Diary of Elizabeth Drinker*. Northeastern University Press, Boston, MA.
- Crosby, Alfred W.
1965 *America, Russia, Hemp, and Napoleon: American Trade with Russia and the Baltic, 1783-1812*. Ohio State University Press, Columbus.
- Davey, Peter
2010 Personal Communications, January-April 2010.
- Deagan, Kathleen
1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800, Volume I: Ceramics, Glassware, and Beads*. Smithsonian Institution Press, Washington D.C.
2002 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800, Volume 2: Portable Personal Possessions*. Smithsonian Institution Press, Washington D.C.
- Doerflinger, Thomas M.
1983 Philadelphia Merchants and the Logic of Moderation, 1760-1775. *The William and Mary Quarterly*, Third Series, 40(2):197-226.
- Dolan Research, Inc.
2005 *Phase 1 and Phase 2 Underwater Archaeological Investigations Lewes Beach And Roosevelt Inlet Borrow Areas Delaware Bay Sussex County, Delaware*. Submitted to the U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania. Submitted by Dolan Research, Inc., Newton Square, PA.
- Dubin, Lois Sherr
1987 *The History of Beads from 30,000 B.C. to the Present*. Abrams Inc., New York.
- DuPlessis, Robert S.
2005 Cloth and the Atlantic Economy. In *The Atlantic Economy During the Seventeenth and Eighteenth Centuries: Organization, Operation, Practice and Personnel*, pp. 72-94. University of South Carolina Press, Columbia.
- Dury, Andrew
1776 *A Chart of Delaware Bay and River....* Electronic document, <http://www.nmm.ac.uk/collections/explore/index.cfm/category/charts>, accessed November 6, 2009.

- Edlin, Herbert L.
1969 *What Wood is That? A Manual of Wood Identification*. The Viking Press, New York.
- Egle, William Henry
1897 *Pennsylvania Archives: Third Series*. William Stawley Ray, State Printer, Harrisburg, PA.
- Elliott, Rita, Ronnie Rodgers, and David Crass
2000 *Stemming the Tide: A Survey of Submerged Cultural Resources Programs in the United States, with a View Toward Georgia*. Submitted to the Department of Natural Resources, Historic Preservation Division. Southern Research Historic Preservation Consultants, Inc. Ellerslie, GA.
- Embassy of Austria
2010 *The History of Austria*. Embassy of Austria, Washington, D.C. Electronic document, <http://www.austria.org/content/view/77/92/>, accessed January 2010.
- Emory, Scott
1989 *State Management Plan for Historical Archaeological Resources of Milford, Delaware: The Shipping Industry of 1830-1880*. Report on file at the Delaware Division of Historical and Cultural Affairs, Dover.
- Encyclopedia Britannica
2009 James Tassie. Electronic document, <http://www.britannica.com/EBchecked/topic/583988/James-Tassie>, accessed 2009.
- Engle, Eloise and Arnold S. Lott
1975 *America's Maritime Heritage*. Naval Institute Press, Annapolis, MD.
- Evans, Joan
1970 *A History of Jewelry, 1100-1870*. Dover Publications, Inc., New York.
- Falconer, W.
1780[1970] Reprint. *An Universal Dictionary of the Marine*. Original edition printed for T. Cadell, in the Strand, London. Augustus M. Kelley, Publishers, New York.
- Federal Writers Project
1938 *Delaware: A Guide to the First State*. Viking Press, New York.
- Finchem, J.
1851 *A History of naval Architecture*. Edition, Scholar Press, London.

Florida Museum of Natural History

2010 Historical Archaeology, Digital Type Collections. Electronic document,
http://www.flmnh.ufl.edu/histarch/gallery_types/

Fremont-Barnes, Gregory, and Richard A. Ryerson, eds.

2006 *The Encyclopedia of the American Revolutionary War*. ABC-CLIO Publishing, Santa Barbara, CA.

French, Christopher J.

1973 "Eighteenth-Century Shipping Tonnage Measurements." *The Journal of Economic History*, Vol. 33, No.2. pp. 434-443.

Gares, Albert J. and Stephen Girard

1948 Stephen Girard's West Indian Trade 1789-1812. *The Pennsylvania Magazine of History and Biography* 72(4):311-342.

Gifford, Edward S. Jr.

1976 *The American Revolution in the Delaware Valley*. Pennsylvania Society of the Sons of the Revolution, Philadelphia.

Gilbert, Geoffrey

1977 The Role of Breadstuffs in American Trade, 1770-1790. *Explorations in Economic History* 14:378-387.

Godden, Geoffrey A.

1965 *An Illustrated Encyclopedia of British Pottery and Porcelain*. Bonanza Books, New York.

1991 *Encyclopedia of British Pottery and Porcelain Marks*. Barrie and Jenkins Limited, Australia.

Goldenberg, J.A.

1976 *Shipbuilding in Colonial America*. University Press of Virginia, Charlottesville.

Goldin, Claudia D. and Frank D. Lewis

1980 The Role of Exports in American Economic Growth during the Napoleonic Wars, 1793-1807. *Explorations in Economic History* 17:6-25.

Goodwin, Peter

1987 *The Construction and Fitting of the English Man of War 1650-1850*. Naval Institute Press, Annapolis, MD.

Gray, John Miller

2009[1894] *James and William Tassie; A Biographical and Critical Sketch, With a Catalog of Their Portrait Medallions of Modern Personages*. General Books, www.General-Books.net, originally published by W.G. Patterson.

Green, John F. and William A. Moore

2007 "The Ship Hector and the Hector Heritage Quay." *Nautical Research Journal*, Vol 52, No. 3., pp. 149-160.

Griffith, Daniel R.

2005 National Register of Historic Places: Nomination Form for Site 7S-D-91A, Roosevelt Inlet Shipwreck Site.

Griffith, Daniel R. and Chuck Fithian

2007 The Roosevelt Inlet Shipwreck: A Framework for Interpretation. Paper presented at the Middle Atlantic Archaeological Conference, March, Ocean City, MD.

Grigsby, Leslie B.

1993 *English Slip-Decorated Earthenware at Williamsburg*. The Colonial Williamsburg Foundation, Williamsburg, VA.

Hamilton, T.M.

1987 *Colonial Frontier Guns*. Pioneer Press, Union City, TX.

Hassler, J.J.S.

1845 *From Cape Henlopen to Indian River*. Electronic document, <http://alabamamaps.ua.edu/historicalmaps/>, accessed October 26, 2009.

Heigesheimer, E.

1884 *Cape Henlopen*. Electronic document, <http://alabamamaps.ua.edu/historicalmaps/>, accessed October 26, 2009.

Heuer, W.H.

1884 *Delaware Breakwater Harbor, Lewes, Delaware*. 48th Congress, 2nd Session. Electronic document, <https://web.lexis-nexis.com/congcomp>, accessed October 26, 2009.

Hoadley, Bruce R.

1990 *Identifying Wood*. The Taunton Press, Inc., Newtown, CT.

Hoyt, Steve

2008 Personal communication, Email to Jason Burns dated August 13, 2008.

Hunter, Robert

2003 *Ceramics in America*. Chipstone Foundation, Milwaukee, WI.

2007 *Ceramics in America 2007*. Chipstone Foundation, Milwaukee, WI.

2008 *Ceramics in America 2008*. Chipstone Foundation, Milwaukee, WI.

Hutchinson, W.

1794 [1969] Reprint. *A Treatise on Naval Architecture*. 4th ed. Conway Maritime Press, London, England. Original edition printed by T. Billinge, Liverpool, England.

Jameson, J. Franklin

1903 St. Eustatius in the American Revolution. *American Historical Review* 8(4):683-708.

Jensen, Arthur L.

1954 The Inspection of Exports in Colonial Pennsylvania. *The Pennsylvania Magazine of History and Biography* 78(3):275-297.

Johnson, Victor L.

1959 Fair Traders and Smugglers in Philadelphia, 1754-1763. *The Pennsylvania Magazine of History and Biography* 83(2):125-149.

Jones, Olive R.

1986 *Cylindrical English Wine and Beer Bottles 1735-1850*. Published under the authority of the Minister of the Environment, Ottawa, Canada.

Jones, Olive and Catherine Sullivan

1989 *The Parks Canada Glass Glossary for the Description of Containers, Tableware, Flat Glass, and Closures*. National Historic Parks and Sites, Canadian Park Service, Environment Canada; Studies in Archaeology Architecture and History.

Knowles, W. Pitcairn

2008 *Dutch Pottery and Porcelain*. JM Classic Editions. Huddersfield, West Yorkshire, England.

Koski-Karell, Daniel

1995 *Historic Archaeological Context on the Maritime Theme with the Sub-Theme Shipwrecks, Coastal Zone (1495-1940 +/-): Volume 1, Historic Context*. Report on file at the Delaware Division of Historical and Cultural Affairs, Dover.

Kovel, Ralph and Terry Kovel

1995 *Kovels' Dictionary of Marks: Pottery and Porcelain*. Random House Reference, New York.

- Kowalsky, Arnold A, and Dorothy E. Kowalsky
1999 *Encyclopedia of Marks on American, English, and European Earthenware, Ironstone, and Stoneware*. Shiffer Publishing, Ltd., Atglen, PA.
- Kraft, J.C.
1971 *A Guide to the Geology of Delaware's Coastal Environments*. Technical Report. College of Marine Studies, University of Delaware, Newark.
- Lefferts, Charles M., Lt.
1926 *Uniforms of the Armies in the War of the American Revolution, 1775-1783*. Limited Edition of 500. New York Historical Society, New York.
- Lloyd's Register of Shipping
1769 *Lloyd's Register of Shipping, 1768-69 Edition*, London, England.
- Lucas, Fielding, Jr.
1840 *A Chart of the Chesapeake and Delaware Bays*. Electronic document, http://historicalcharts.noaa.gov/historicals/historical_zoom.asp, accessed October 26, 2009.
- Lukezic, Craig
2007 *Pewter Toys from the Severn*. Delaware Division of Historical and Cultural Affairs. Document on file at Southeastern Archaeological Research, Newberry, FL.
- Lytle, William M., Forest R. Holdcamper, and C. Bradford Mitchell
1975 *Merchant Steam Vessels of the United States 1790-1868*. De Troy Bergen Press, Fair Lawn, NJ.
- Maritime Lanka
2003 *The Avondster: the ship & her wrecking*. Maritime Lanka: Maritime Archaeology & History of Sri Lanka. Electronic document, <http://cf.hum.uva.nl/galle/avondster/story.html>, last updated 1 March 2003.
- Maritime Records of the Port of Philadelphia
1784 *Port Wardens Minutes, Section 1, Volume 2, May 1784*. On file at Historical Society of Pennsylvania, Philadelphia.

Maryland Archaeological Conservation Lab

- 2002a Diagnostic Artifacts in Maryland: Tin-Glazed. Electronic document, http://www.jefpat.org/diagnostic/Historic_Ceramic_Web_Page/Historic%20Ware%20Descriptions/tin_glazed.htm, accessed January 2010.
- 2002b Diagnostic Artifacts in Maryland: Staffordshire-type Slipware. Electronic document, http://www.jefpat.org/diagnostic/Historic_Ceramic_Web_Page/Historic%20Ware%20Descriptions/Staffordshire_Slip.htm, accessed January 2010.
- 2002c Diagnostic Artifacts in Maryland: English Brown. Electronic document, http://www.jefpat.org/diagnostic/Historic_Ceramic_Web_Page/Historic%20Ware%20Descriptions/English_Brown.htm, accessed January 2010.

Marzagalli, Silvia

- 2008 The Failure of a Transatlantic Alliance? Franco-American Trade, 1783-1815. *History of European Ideas* 34:456-464.

Marx, Robert F.

- 1971 *Shipwrecks of the Western Hemisphere*. World Publishing Company, Canada.

McCarthy, Michael

- 2005 *Ships' Fastenings From Sewn Boat to Steamship*. Texas A&M University Press, College Station.

McConnell, Kevin

- 2008 *Redware America's Folk Art Pottery, Fourth Edition*. Schiffer Publishing, Atglen, PA.

McCusker, John J.

- 1967 "Colonial Tonnage Measurement: Five Philadelphia Merchant Ships as a Sample." *The Journal of Economic History*, Vol 27, No. 1., pp. 82-91.

McCusker, John J. and Russell R. Menard

- 1985 *The Economy of British America, 1607-1789*. University of North Carolina Press, Chapel Hill.

McNally, Paul

- 1972 *Table Glass from the Wreck of the Machault*. National Historic Parks and Sites Branch. Ottawa, Canada.

McVae, Bridget Christine

- 2008 The Roosevelt Inlet Shipwreck: Identification, Analysis, and Historical Context. Master of Arts Thesis, August 2008, Texas A&M University, College Station.

Meng, John J.

- 1938 French Diplomacy in Philadelphia: 1778-1779. *The Catholic Historical Review* 24(1):39-57.

Merchant Ventures Wharfage Books

1773 and 1774 "An Accounting of Money Collected by Charles Jones for Moorage of Ships and Vessels from the 25 December 1773 to the 25 March Following."
Merchant Ventures Wharfage Books, Port of Bristol, England.

Meredith Family Papers, Correspondence

October 8, 1795 Box 90, Folder 5, Correspondence, 1795-1796. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

October 26, 1795 Box 90, Folder 7, Correspondence, 1795-1796. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

Meredith Family Papers, Letterbook

November 29, 1785 Letterbook 1785-1786. Vol. 116. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

October 29, 1795 Letterbook 1795-1799. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

Meredith Family Papers, Waste Book

March 1793 Waste Book 1793-1797. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

April 1793 Waste Book 1793-1797. Series VIII (Hawthorn & Kerr records), 1756-1964. On file at Historical Society of Pennsylvania, Philadelphia.

Miller, George L.

1980 Classification and Economic Scaling of 19th Century Ceramics. *Historical Archaeology* 14: 1-40.

Miller, Richard G.

1982 The Federal City, 1783-1800. In *Philadelphia: A 300-Year History*, edited by Russell F. Weigley. W.W. Norton, New York.

Mishoff, Willard O.

1937 Business in Philadelphia during the British Occupation, 1777-1778. *The Pennsylvania Magazine of History and Biography* 61(2):165-181.

Mitchell, Amy M.

1994 *A Comparison of Wood use in Eighteenth-Century Vessels*. Unpublished Master's Thesis, Department of History, East Carolina University, Greenville, NC.

Morgan, Kenneth

- 1989 Shipping Patterns and the Atlantic Trade of Bristol, 1749-1770. *The William and Mary Quarterly* 46(3):506-5383.
- 1993 *Bristol and the Atlantic Trade in the Eighteenth Century*. Cambridge University Press, New York.
- 2000 Business Networks in the British Export Trade to North America, 1750-1800. *The Early Modern Atlantic Economy*, John J. McCusker and Kenneth Morgan, eds. Cambridge University Press, Cambridge, England.

Muckelroy, K.

- 1978 *Maritime Archaeology*. Cambridge University Press, Cambridge, England.

Murray, M.

- 1765 *A Treatise on Ship-Building and Navigation*. Second Edition, printed for A. Millar, London, England.

Nash, R.C.

- 2005 The Organization of Trade and Finance in the British Atlantic Economy, 1600-1830. In *The Atlantic Economy During the Seventeenth and Eighteenth Centuries: Organization, Operation, Practice and Personnel*, pp. 95-151. University of South Carolina Press, Columbia.

Neumann, G.C., and F. J. Kravic

- 1989 *Collector's Illustrated Encyclopedia of the American Revolution*. Rebel Publishing Co., Inc. Texarkana, TX.

New York Gazette

- 1749 29 May 1749. Newspaper on file at Historical Society of Pennsylvania, Philadelphia.

Nienhaus, Heinz

- 1984 To the Jug-Baker-Craft in the Westerwald. Zum Krugbackerhandwerk im Westerwald. Vom schlichten Haushaltsgeschirr über kunstvolle Prunkgefäße zu den Brunnenkrügen. Translation provided by the State of Delaware Division of Historical and Cultural Affairs.

Noël Hume, Ivor

- 1969 *A Guide to Artifacts of Colonial America*. University of Pennsylvania Press, Philadelphia.
- 2001 *If These Pots Could Talk: Collecting 2,000 Years of British Household Pottery*. University Press of New England, Hanover, NH.

- Oaks, Robert F.
1977 Philadelphia Merchants and the Origins of American Independence. *Proceedings of the American Philosophical Society* 121(6):407-436.
- Ormrod, David
2003 *The Rise of Commercial Empires: England and the Netherlands in the Age of Mercantilism, 1650-1770*. Cambridge University Press, New York.
- Ossowski, Redaktor tomu Waldemar
2008 *The General Carleton Shipwreck, 1785*. Polish Maritime Museum, Gdańsk, Poland.
- Ostrander, Gilman M.
1973 The Making of the Triangular Trade Myth. *The William and Mary Quarterly* 30(4):635-644.
- Panshin, Alexis and Carl deZeeuw
1980 *Textbook of Wood Technology*. Volume 1, 4th edition. McGraw Hill, New York.
- Paul, Michael J. and William S. Lynch
1989 *Historic Context for Aids to Navigation in Delaware*. Report on file at the Delaware Division of Historical and Cultural Affairs, Dover.
- Pearson, Charles E. and Paul E. Hoffman
1995 *The Last Voyage of El Nuevo Constante: The wreck and Recovery of an Eighteenth-Century Spanish Ship off the Louisiana Coast*. Louisiana State University Press, Baton Rouge.
- Pennsylvania Gazette*
1771 Advertisement (Stocker & Wharton). *Pennsylvania Gazette*, 24 October 1771. On file at Historical Society of Pennsylvania, Philadelphia.
1772 Advertisement (Stocker & Wharton). *Pennsylvania Gazette*, 14 May 1772. On file at Historical Society of Pennsylvania, Philadelphia.
1773 Article. *Pennsylvania Gazette*, 24 November 1773. On file at Historical Society of Pennsylvania, Philadelphia.
1774 Article. *Pennsylvania Gazette*, 11 May 1774. On file at Historical Society of Pennsylvania, Philadelphia.
1783 Philadelphia. March 12. Philadelphia.
1783 Article. *Pennsylvania Gazette*, 2 August 1783. On file at Historical Society of Pennsylvania, Philadelphia.
1784 Philadelphia. February 25th. February 25. Philadelphia.
1784 Philadelphia. March 24. Philadelphia.
1793 Extract of the Journal of the Extraordinary. May 8. Philadelphia.
1795 Article. *Pennsylvania Gazette*, 19 October 1795. On file at Historical Society of Pennsylvania, Philadelphia.

Pratt, Jaime C.

2007 *Cape Henlopen Spit Complex and Recent Evolution of Breakwater Harbor, Lewes, Delaware*. Masters Thesis, University of Delaware.

The Quartermaster General

2010 Electronic document, <http://www.thequartermastergeneral.com/>, accessed January 2010.

Rafferty, Sean M. and Rob Mann

2004 *Smoking and Culture: The Archaeology of Tobacco Pipes in Eastern North America*. Edited by Sean M. Rafferty and Rob Mann. The University of Tennessee Press, Knoxville.

Redknap, Mark

1997 *Artefacts From Wrecks, Dated Assemblages from the Late Middle Ages to the Industrial Revolution*. Short Run Press, Great Britain.

Richards, Nathan

2002 *Deep Structures: An Examination of Deliberate Watercraft Abandonment in Australia*. Doctoral Dissertation, Flinders University of South Australia.

Rickard, Jonathan

2006 *Mocha and Related Dipped Wares, 1770-1939*. University Press of New England, East Nassau, NY.

Rijksmuseum Amsterdam

2010 Meissen Porcelain. Museum for Art and History. Electronic document, http://www.rijksmuseum.nl/aria/aria_encyclopedia/00069051?lang=en, accessed January 2010.

Roberts, D.H., ed.

1992 *Eighteenth Century Shipbuilding: Remarks on the Navies of the English and the Dutch from Observations Made at Their Shipyards in 1737 by Blaise Ollivier, Master Shipwright of the King of France*. Jean Boudriot Publications, Rotherfield, England.

Rosloff, Jay Paul

1986 *The Water Street Ship: Preliminary Analysis of an Eighteenth-Century Merchant Ship's Bow*. Unpublished Master's Thesis, Department of Anthropology, Texas A&M University, College Station.

Russell, Mathew A.

2005 *Beached Shipwreck Archeology: Case Studies From Channel Islands National Park*. Submerged Resources Center, Professional Reports No. 18. Submerged Resources Center, Intermountain Region, National Park Service, Santa Fe, NM.

- Schiffer, Peter, Nancy Schiffer, and Herbert Schiffer
1978 *The Brass Book, American, English and European Fifteenth Century through 1850*.
Schiffer Publishing Ltd., Atglen, PA.
- Scott-Ireton, Della
2009 Personal communication, Email to Jason Burns.
- Shallat, Todd A.
1994 *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers*.
University of Texas Press, Austin.
- Sharf, J. Thomas
1888 *History of Delaware, 1609-1888*. 2 vols. LJ Richards & Company, Philadelphia, PA.
- Shepherd, James F. and Gary M. Walton
1972 *Shipping, Maritime Trade, and the Economic Development of Colonial North America*.
Cambridge University Press, Cambridge, England.
1976 Economic Change After the American Revolution: Pre- and Post-War Comparisons
of Maritime Shipping and Trade. *Explorations in Economic History* 13(4):397-422.
- Shomette, Donald
2007 *Shipwrecks, Sea Raiders, and Maritime Disasters along the Delmarva Coast, 1632-2004*.
John Hopkins University Press, Baltimore, MD.
- Ships Registers for the Port of Philadelphia
1762-1775 "Ships Registers for the Port of Philadelphia, 1762-1775" *The
Pennsylvania Magazine of History and Biography* (1877-1906). Vol. 28 No. 2, p.
218.
- South, Stanley
1977 *Method and Theory in Historical Archaeology*. Academic Press, Inc., New York.
- Stalkartt, M.
1787 [1991] Reprint *Naval Architecture*. 2nd ed. Jean Boudriot Publications
Rotherfield, England. Original edition published in London, England,
1787.
- Steele, David
1805 *Naval Architecture*. London, England.
- Steffy, J. Richard
1994 *Wooden Shipbuilding and the Interpretation of Wooden Shipwrecks*.
Texas A&M University Press, College Station.

Stocum, Faye

2008-2010 Personal Communication, Email to Debra J. Wells.

Stout, Neil R.

1973 *The Royal Navy in America, 1760-1775*. Naval Institute Press, Annapolis, MD.

Sullivan, Catherine

1986 *Legacy of the Machault: A Collection of 18th-century Artifacts*. Minister of the Environment, Quebec, Canada.

Sutherland, W.

1711 *The Ship-Builder's Assistant: Or, Some Essays Towards Compleating the Art of Marine Architecture*. Printed for R. Mount, A. Bell, and R. Smith, London, England.

Tate Museum

2010 A Laundry Maid Ironing circa 1765-82. Tate Online. Electronic document, <http://www.tate.org.uk/servlet/ViewWork?workid=10302>, accessed January 2010.

Taylor, Alan

2002 *American Colonies: The Settling of North America*. Penguin Books, New York.

Thayer, Theodore

1982 Town Into City, 1746-1765. In *Philadelphia: A 300-Year History*, edited by Russell F. Weigley. W.W. Norton, New York.

Tinckom, Harry M.

1982 The Revolutionary City, 1765-1783. In *Philadelphia: A 300-Year History*, edited by Russell F. Weigley. W.W. Norton, New York.

Thwaite, Anthony

n.d. "The Chronology of the Bellarmine Jug." St. Robert Bellarmine Website, Bellarmine University, Electronic document <http://www.bellarmino.edu/content/about/strobert/jugs/index.html>, undated.

UK Detector Finds Database

2005 Nuremberg Jetons. Electronic document, <http://www.ukdfd.co.uk/pages/nuremberg-jetons.html>, accessed January 2010.

United States Army Corps of Engineers (USACOE)

- 1927 *Report of the Chief of Engineers, Army, 1927*. Part I, Serial Set ID 8910 H.doc.11, 70th Congress, 1st Session, Vol. 36. Government Printing Office, Washington, D.C.
- 1933 *Report of the Chief of Engineers, U.S. Army, 1933*. Part 1, Serial Set ID 9842, H.doc.117, 73rd Congress, 2nd Session, Vol. 38. Government Printing Office, Washington, D.C.
- 1996 *Drilling Log, KAV-54 Lewes Delaware*. Department of the Army, South Atlantic Division Laboratory. Work Order 8015, Requisition: CENAP-EN-98-013.

University of Glasgow

- 2010 The Hunterian Museum and Art Gallery. Viking Linen Smoother. Electronic document, http://www.hunterian.gla.ac.uk/education/vikings/linen_smoother.shtml, accessed January 2010.

U.S. Coast & Geodetic Survey

- 1849 *Sketch B. Showing the Progress for Section No. 2*. 31st Congress, 1st Session, Vol. 572. Electronic document, <https://web.lexis-nexis.com/congcomp>, accessed October 26, 2009.
- 1855 *Preliminary Chart of Delaware and Chesapeake Bays and the Sea Coast from Cape Henlopen to Cape Charles*. 34th Congress, 1st Session. Electronic document, <https://web.lexis-nexis.com/congcomp>, accessed October 26, 2009.
- 1914 *Cape Henlopen and the Delaware Breakwater*. Electronic document, http://historicalcharts.noaa.gov/historicals/historical_zoom.asp, accessed November 16, 2009.
- 1946 *Cape Henlopen and the Delaware Breakwater*. Electronic document, http://historicalcharts.noaa.gov/historicals/historical_zoom.asp, accessed November 16, 2009.
- 1973 *Delaware Bay*. Electronic document, http://historicalcharts.noaa.gov/historicals/historical_zoom.asp, accessed November 16, 2009.

U.S. Department of the Interior

- 2008 "Notice to Lessees and Operators (NTL) of Federal Oil and Gas Leases and Pipeline Right-of-way (ROW) Holders on the Outer Continental Shelf (OCS), Gulf of Mexico OCS region (GOMR), Revisions to the List of OCS Lease Blocks requiring Archaeological resource Surveys and Reports" U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region; NTL No. 2008-G20 (Issue Date: 10/15/2008).

van der Meulen, J.

- 2003 Gouda Pipemakers and their marks (Goudse pijpenmakers en hun merken). The original is published by 'de Pijpelogische Kring Nederland', Leiden and 'de Stedelijke Musea Gouda'. This internet publication has been permitted by the author. Electronic document,
<http://www.goudapipes.nl/books/Meulen/digital.php>

VanHorn, Kellie Michelle

- 2004 *Eighteenth-Century Colonial American Merchant Ship Construction*. Unpublished Master's Thesis, Department of Anthropology, Texas A&M University, College Station.

Victoria and Albert Museum

- n.d. The Double-Headed Eagle (Magnificence of the Tsars). Victoria and Albert Museum. Electronic document,
http://www.vam.ac.uk/collections/fashion/tsars/double_headed_eagle/index.html, accessed January 2010.

Vinal, W.I.

- 1882 *Cape Henlopen and Vicinity, Delaware*. Electronic document,
<http://alabamamaps.ua.edu/historicalmaps/>, accessed October 26, 2009.

Vinckeboons, Joan

- c.1639 *Caert vande Syndt Rivier in Nieuw Nederland*. Electronic document,
<http://www.loc.gov>, accessed October 26, 2009.

Walton, Gary M.

- 1967 Colonial Tonnage Measurements: A Comment. *The Journal of Economic History*, Vol. 27, No. 3, pp. 392-397.
1968 New Evidence on Colonial Commerce. *The Journal of Economic History* 28(3):363-389.

Wang, Chung Yu

- 1919 *Antimony: Its History, Chemistry, Mineralogy, Geology, Metallurgy, Uses, Preparations, Analysis, Production, and Valuation*. Second Edition, Charles Geiffin & Company, Limited, London, England.

Western Australian Maritime Museum (WAMM)

- nd *Vergulde Draeck: Gilt Dragon (1653-1656)*. Shipwreck information page, Western Australian Maritime Museum. Electronic document
<http://www.museum.wa.gov.au/collections.maritime/march/shipwrecks/metro/verdra/vergulded.html>, undated.

White, Carolyn L.

2005 *American Artifacts of Personal Adornment, 1680-1820, A Guide to Identification and Interpretation*. A Division of Rowman & Littlefield Publishers, Inc., Lanham, MD.

Willmott, Hugh

2009 Personal communication. Email to Debra Wells dated January 27, 2009.

Winship, W.W.

1866 *Delaware Breakwater, Delaware Bay*. 39th Congress, 1st Session. Electronic document, <https://web.lexis-nexis.com/congcomp>, accessed October 26, 2009.

ADDITIONAL RESOURCES CONSULTED

Barber, Edwin A.

2001 *Marks of American Potters*. Blackburn Press, Caldwell, NJ.

Bass, George F., ed.

1988 *Ships and Shipwrecks of the Americas, A History Based on Underwater Archaeology*. Thames and Hudson, Inc., New York.

Crowther, Simeon J.

1973 The Shipbuilding Output of the Delaware Valley, 1722-1776. *Proceedings of the American Philosophical Society*, 117(2):90-104.

Doerflinger, Thomas M.

1983 Commercial Specialization in Philadelphia's Merchant Community, 1750-1791. *The Business History Review*, 57(1):20-49.

Little, Cynthia J.

1996 Business History Holdings at the Historical Society of Pennsylvania. *The Business History Review* 70(1):91-107.

Luís de Almeida, Manuela Maria

2005 "Eighteenth-century wheel-engraved glassware from Lisbon" in *Post-Medieval Archaeology* 39/2 (2005), pp. 233-242.

Scull, G.D., ed.

1882 *Collections of the New York Historical Society for the Year 1881: The Montessor Journals*. New York Historical Society, New York.

Water Resources Development Act of 1999

1999 113 Stat. 276. Public Law 106-53, 106th Congress. August 17, 1999

From Historical Society of Pennsylvania, Philadelphia, PA

Primary Sources

- Benjamin Fuller Letterbooks, 1762-1781
- Campbell Collection (Penington Family)
- Custom House Papers, 1704-1789
- Fuller and Sinnickson Ledger, 1763-1782
- Joseph Carson, Receipt Books, 1775-1795
- Maritime Records of the Port of Philadelphia
 - Chronological List of Crews, 1789-1880
 - Port Wardens Minutes, 1766-1880

- Meredith Family Papers (Series VIII [Hawthorn & Kerr records]), 1756-1964
 - Correspondence, 1795-1796
 - Letterbook, 1785-1786
 - Letterbook, 1795-1799
 - Waste Book, 1793-1797
 - Journal, 1793-1795
 - Receipt Book, 1795-1800
 - Legal, 1780-1803
- Pennsylvania Court of Admiralty Records, 1770-1804
- Wharton Family Papers, 1679-1891 (Series III)
 - Thomas Wharton Letterbook, 1773-1784
- William Wharton, receipt book, 1765-1771
 - Receipt Book, 1765-1791

Genealogical Sources

- Abstracts of Deeds Pertaining to Penington Families of Cecil and Queen Ann Co., MD
- Bible Records of Benjamin and Mary Penington
- Eberman Family of Lancaster County, PA (James Hawthorn Steinmetz)
- Family of Thomas Penington of Georgia
- Hathorne [genealogical notes]
- Hathorne Family of Salem, MA
- Miscellaneous Notes on the Penington Family of England and Philadelphia
- References to the Penington Family Found in the Abington Monthly Meeting Records
- St. Pauls's Church
 - Baptisms, 1704-1819
 - Marriage Records, 1759-1806

Newspapers

- *Boston News Letter*, 1766
- *Claypoole's American Daily Advertiser*, 1795
- *Dunlap's Pennsylvania Packet*, 1773
- *Massachusetts Spy*, 1773
- *New England Chronicle*, 1766
- *New York Gazette*, 1770-1774
- *New York Mercury*, 1755-1764
- *Pennsylvania Chronicle*, 1769-1774
- *Pennsylvania Gazette*, 1769-1774
- *Pennsylvania Journal*, 1742-1793

Secondary Sources

Dreby, Edwin C.

1986 Benjamin Fuller, an 18th Century Philadelphia Merchant. Genealogical Society of Pennsylvania, Philadelphia.

Ellis, Franklin and Samuel Evans

1883 *History of Lancaster County, Pennsylvania, with Biographical Sketches of its Pioneers and Prominent Men.* Everts and Peck, Philadelphia, PA.

Genealogical Publishing Company

1968 *Pennsylvania Marriages Prior to 1810.* Genealogical Publishing Company, Baltimore, MD.

Genealogical Society of Pennsylvania

1899 *Deaths in Poulson's American Daily Advertiser, 1791-1799.* Genealogical Society of Pennsylvania, Philadelphia.

c.1980 *Abstracts of Lancaster county, Pennsylvania, Wills, 1721-1820.* Volume 24. Genealogical Society of Pennsylvania, Philadelphia.

Hawbaker, Gary T. and Clyde L. Groff

1981 *A New Index of Lancaster County Pennsylvania Before the Federal Census.* N.P., Hershey, PA.

Jordan, John W., ed.

1911 *Colonial Families of Philadelphia.* Volume I & II. Lewis Publishing Company, New York.

Lim, John B. and William H. Egle, eds.

1976 *Pennsylvania Marriages Prior to 1790.* Genealogical Publishing Company, Baltimore, MD.

Mayhill, Thomas R., ed.

1979 *Lancaster County, Pennsylvania, Deed Abstracts & Revolutionary War Oaths of Allegiance: Deed Books A through M.* Bookmark, Knightstown, IN.

McElwain, Wilbur J.

1994 *United States Direct Tax of 1798: Tax Lists for Cumberland County, Pennsylvania.* Heritage Books, Bowie, MD.

Meginness, John Franklin

1903 *Biographical Annals of Lancaster County, Pennsylvania.* Beers, Chicago, IL.

Pennsylvania Provincial Secretary's Office

1890 *Names of Persons for Whom Marriage Licenses were issued in the Province of Pennsylvania Previous to 1790.* E.K. Meyers, State Printer, Harrisburg, PA.

United States Bureau of the Census

1966 *Heads of Family at the First Census of the United States Taken in the Year 1790: Pennsylvania.* Genealogical Publishing Company, Baltimore, MD.

Winslow, Stephen Noyes

1864 *Biographies of Successful Philadelphia Merchants.* J.K. Simon, Philadelphia, PA.

Worner, William Frederic

1984 *Gravestone Inscriptions: Lancaster County Pennsylvania.* Historical Society of Pennsylvania, Philadelphia.

**From the J. Welles Henderson Archive and Library,
Independence Seaport Museum [ISM], Philadelphia, PA**

Byars, William Vincent

1916 *B. and M. Gratz: Merchants in Philadelphia, 1754-1798.* The Hugh Stevens Printing Company, Jefferson City, MO.

Roach, Hannah Benner

1999 *Colonial Philadelphians.* The Genealogical Society of Pennsylvania, Philadelphia.

Kew, England (Collected by Diane Hungate)

British Customs Records, 1772-1773