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Submerged Resources Center

Comet
Submerged Cultural Resources Site Report

Channel Islands National Park

Matthew A. Russell

COMET
SUBMERGED CULTURAL RESOURCES SITE REPORT
CHANNEL ISLANDS NATIONAL PARK

a product of the
NATIONAL PARK SERVICE
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COMET

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CHANNEL ISLANDS NATIONAL PARK

Matthew **A.** Russell

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FOREWORD

In March 1999, San Miguel Island Ranger Ian Williams discovered winter storms had removed sand from Simonton Cove exposing the wooden structure of *Comet*. Vessel identification was certain and had long been known. *Comet* hull structure had been episodically exposed since its loss in 1911, the last time in 1984. Matt Russell, who had recently joined the National Park Service (NPS) Submerged Resources Center (SRC), formerly Submerged Cultural Resources Unit or SCRU, briefly examined this site during a 1993 documentation of several other Channel Island National Park (CHIS) beached shipwrecks. At the time of his visit, only the anchor was visible.

Cornet, a Pacific Coast lumber schooner, regularly traversed the Santa Barbara Channel between 1886 and 1911, hauling lumber from the Pacific Northwest to southern California ports. These once numerous schooners with hulls and rigging adapted to the particular demands of the lumber trade and coastal Pacific navigation are now represented by two museum examples. Other historical documentation for these vessels is scant. As-built structural details reflecting West Coast shipbuilding practices, their development and refinement to accommodate the Pacific Coast lumber trade must therefore come from the archeological record. When the 1999 storm exposed *Comet*, CHIS Archeologist Don Morris, seizing the opportunity, was quick to request Matt, a specialist on coastal lumber schooners, to assist him in leading a team to document and record *Comet's* remains.

Matt Russell and Intermountain Region Archeologist Jim Bradford arrived April 1999 with Systemwide Archeological Inventory Program funds for a weeklong project. Matt departed Santa Fe with instructions to push the project beyond just documenting visible remains to address larger research goals and long-term management objectives. Don and Matt quickly assembled a team drawing heavily from a network of CHIS Volunteer In Parks (VIPs) that had previously worked with Matt. The assembled team was surprised to find *Comet's* bow section emerged nearly intact from Simonton Cove's beach sands making it the best-preserved example of Pacific coastal lumber schooners found archeologically.

Although beached shipwreck research extends at least to the early 1970s with the study of *Amsterdam*, a 1749 Dutch East India Company vessel in the surf zone in Hastings, England, there have been few professional investigations of such sites. It has been much more common to rely on "common-sense" assumptions about poor preservation in high-energy beach environments that obviously degrade materials and dismiss beached wreck remains as unimportant, uninteresting or impossible to understand archeologically. However, the NPS mission compels active management of all resources, natural and cultural, in its jurisdiction. Consequently, NPS has fostered several beached wreck studies beginning in the mid-1980s on *Pomo* in Point Reyes National Seashore. Other studies soon followed, including in Golden Gate National Recreation Area on ***King Philip*** and *Neptune*, Cape Cod National Seashore (NS) and in Cape Hatteras NS. More recently others, in particular the North Carolina Underwater Archaeology Unit, have begun systematic investigations of beached vessel remains. These investigations

have convincingly demonstrated that beached maritime sites often display remarkable preservation and can produce significant information about the past when studied systematically within an archeological framework. The *Comet* study joins other NPS investigations as the most detailed and comprehensive example so far of what can be learned archeologically from beached shipwreck remains.

This report presents hull structure documentation and interpretation in a wide economic and historical context to explicitly consider site formation processes, which are fundamental to understanding any archeological site. It also provides specific information and recommendations to aid long-term management decisions about site preservation. **A** significant contribution in this regard is constructing the research and report in such a manner that it provides a ready baseline against which future site condition assessments can be compared. Like many SRC publications, the *Comet Submerged Culturul Resources Site Report* means to inform management, serve as an NPS model for future investigations of this kind and contribute significantly to the discipline of maritime archeology. In this effort, Matt followed instructions admirably; he went well beyond site documentation *to* address larger research and management goals, as well as telling us something we would not have otherwise known about our maritime past.

Larry E. Murphy, Chief
Submerged Resources Center

ACKNOWLEDGEMENTS

Both Don Morris and I waited many years for *Comet* to become exposed in Simonton Cove, and I'm grateful to Don for thinking of me when it finally happened. I appreciate him giving me the ball to run with, and hope this report makes a contribution to the knowledge and preservation of a significant park resource. Many people contributed to this project's success and this report's completion. Fieldwork to record *Comet* in April 1999 was organized and planned by Don Morris, and was conducted by Don, Jim Bradford, Ian Williams, Hank Silka, Bob Schwemmer, Georgia Fox, Patrick Smith and myself. I especially appreciate Jim's guidance and advice during the project and the high-quality illustrations he contributed to the report. Thanks also to the team who worked on the site in fall 1993: Bob Schwemmer, Tom Harris, Bill Harris, Jack Carraher and Mark Linder. The report was reviewed and improved by Larry Murphy, Dan Lenihan, Dave Conlin and Don Morris; Fran Day designed this publication and formatted it for printing. Special thanks to Rob Turner for his stunning final rendering of the ***Cornet*** site map.

Matthew A. Russell, Archeologist
Submerged Resources Center

EXECUTIVE SUMMARY

In April 1999, Channel Islands National Park Archeologist Don Morris asked the National Park Service's Submerged Resources Center (SRC) to lead documentation efforts on the remains of the schooner *Comet*, exposed on the beach in Simonton Cove, San Miguel Island. *Comet* had been exposed by winter storms, the first recorded exposure since 1984. SRC archeologists, park staff and volunteers, spent five days documenting *Comet's* remains with scale drawings, photos and video.

The team found one of the most well-preserved wooden shipwreck sites on the West coast. The remaining bow section is substantially intact, with machinery still mounted on the main and forecastle decks. Even though only the vessel's bow is present, because it is so intact it is a repository for construction practices from once common, now rare, coastal lumber schooners.

This report discusses the Pacific Coast lumber trade and *Comet's* career hauling lumber from the Pacific Northwest to California, and describes the schooner's wreck on San Miguel Island. It describes the remaining hull structure, bow rigging, and ground tackle elements in detail, and analyzes them in terms of contemporary nineteenth century wooden shipbuilding practices. Finally, it discusses site formation processes and offers suggestions for future research and management of *Comet*.

CHAPTER 1

Introduction

In March 1999, *Comet*, a late-nineteenth century lumber schooner that wrecked in August 1911, became exposed on the beach in Simonton Cove, San Miguel Island, Channel Islands National Park (CHIS). Winter storm activity in 1998 and 1999 removed nearly 6 ft. of sand that usually covers the site, and Don Morris, CHIS park archeologist, scheduled **a** week-long documentation project in April 1999 to record *Comet's* hull before its inevitable natural reburial.

National Park Service (NPS) personnel have known about the *Comet* site since at least 1977 when the first documented site exposure occurred. The next recorded exposure was in 1984, when CHIS Ranger Reed McCluskey took several photographs of *Comet's* exposed remains (Figures 1.1, 1.2 and 1.3). Although an anchor and capstan are clearly visible in the photographs, insufficient hull structure was exposed then to allow identification of specific features. Between 1984 and 1999, the site remained deeply buried by beach sand with only the tip of the anchor stock visible. In 1993, Matt Russell, from the NPS Submerged Resources Center (SRC, formerly Submerged Cultural Resources Unit) attempted unsuccessfully to uncover *Comet's* remains during an investigation of several other coastal lumber schooners wrecked in the park. Due to extremely deep sand covering the site, he and his team were only able to expose and document the anchor (Russell 1996). At that time, it was apparent that complete site documentation would only be possible if the site uncovered naturally, as it had in 1977 and 1984; this finally happened in 1999.

The *Comet* documentation project was organized by CHIS Archeologist Don Morris in response to the site's natural uncovering. The project focused on gathering information for NPS site protection and interpretation purposes. Documentation would also contribute to Pacific Coast maritime history, and it would answer general archeological and historical questions about the site. The present study expands on a general research and interpretive foundation laid by Moms and Lima (1996) in *Channel Islands National Park and Channel Islands National Marine Sanctuary Submerged Cultural Resources Assessment,*

Figure 1.1. The *Comet* site exposed in Simonton Cove in 1984. NPS photo by Reed McClusky.

Figure 1.2. *Comet* timbers and anchor exposed in 1984. NPS photo by Reed McClusky.

Figure 1.3. *Comet's* capstan in 1984. NPS photo by Reed McClusky.

COMET DOCUMENTATION PROJECT OBJECTIVES

The project's goal was to thoroughly document *Comet's* remains to determine the wreck's nature, extent and level of preservation. The immediate purpose of data gathering was for long-term management by the NPS. In the past, this site has been naturally exposed for only short periods, then buried for many years before its next exposure. Documentation of *Comet's* remains provides baseline data that can be used for monitoring the vessel's condition during future exposures to determine the rate of change and if significant site deterioration has occurred.

PROJECT DATES AND PARTICIPANTS

After notification of the site's exposure by San Miguel Island Ranger Ian Williams in March 1999, Don Morris planned several documentation phases. First, the day after Williams reported the site was exposed, Channel Islands National Marine Sanctuary Cultural Resources Coordinator Robert Schwemmer visited the *Comet* site and documented it with photographs and field sketches. Schwemmer's initial work was done in case the wreck was quickly reburied before full documentation could be completed. Next, Morris planned a two-phase project for mid-April 1999. During the first of these phases, Santa Barbara Maritime Museum Curator and Archeologist Georgia Fox, Ian Williams and Volunteer-in-Park (VIP) Patrick Smith from California Maritime Archaeological Resources (CMAR) conducted a preliminary site investigation April 15–17. CMAR is a nonprofit volunteer organization that assists researchers with fieldwork and focuses its attention on CHIS. Full documentation of exposed features took place April 18–23 during the second phase conducted by a team including Don Morris, Ian Williams, Intermountain Support Office Archeologist Jim Bradford, SRC Archeologist Matt Russell (principal investigator) and CMAR VIP Hank Silka.

Although investigators presumed the exposed remains were from *Comet's* bow (based on the anchor and capstan in the 1984 photographs), they were unprepared for just how intact and well preserved the site is. The hull remains observed include *Comet's* nearly intact bow from the break of the forecastle deck forward. The bow section is heeled to starboard; consequently, much of the port side has deteriorated, but the starboard side, including the starboard half of the forecastle and main

decks, is largely intact with machinery still mounted in its original location. Although only the bow section was observed during this project, this section of *Comet's* hull is the most intact and most well-preserved Pacific Coast lumber schooner documented in the archeological record. Only one other intact section of lumber schooner hull has been recorded on the West Coast, which was a small section of the side of the schooner *Neptune* (Delgado 1986:95–108). Other than *C.A. Thayer* and *Wawona* preserved as museum ships at San Francisco Maritime National Historical Park and NW Seaport Maritime Heritage Center and the only two lumber schooners still afloat, *Comet* provides the best opportunity yet discovered to learn about the design, construction, and modifications of these once common West Coast vessels. Given the high-energy nature of San Miguel Island's beach environment, *Comet's* preservation is another example of how the common sense notion of poor preservation of beached shipwreck remains is often wrong. Under certain initial conditions, a beached shipwreck can be quickly buried and remain very well preserved (Delgado 1985). *Comet* is a good example of a well-preserved beached shipwreck site.

Comet is one of CHIS's premiere historical archeological sites; the level of preservation observed on this site is rare in any wooden Pacific Coast shipwreck. This project and report provides baseline data on the site's condition and significance against which future work can be compared. The report includes historical context, a description of 1993 archeological work, a complete site description and analysis, and recommendations for future research and monitoring.

CHAPTER 2

Historical Context

PACIFIC COAST LUMBER TRADE

Most historians agree the Pacific Coast lumber trade began in the late 1840s. Lumber was certainly used and exported before this period, but in a quantity too small to be considered a sustained trade or industry. The gold rush sparked the American development of California: first in the gold rush cities of San Francisco, Sacramento and Stockton; later in southern California's metropolitan areas. These burgeoning urban areas prompted development of Washington, Oregon and northern California's lumber industries, all of which ultimately relied on the Pacific Coast lumber schooner.

In 1850, with the Pacific Northwest lumber industry still in its infancy, it was cheaper to ship wood 10,000 miles from the East Coast than to obtain it from the closer Pacific Northwest (Hall 1884:131). Increasing lumber demand fueled by the gold rush, however, insured a boom in the West Coast lumber industry by the 1860s. The lumber business received another boost during the 1880s with a sharp increase in southern California development and the demand for lumber it created. Further economic upswings occurred in the early twentieth century, especially after the 1906 San Francisco earthquake (Olmsted 1972:4). Although railroads came to the west during the 1880s, demand for coastwise and export lumber remained high until after World War I (Vinnedge 1923:11).

In 1849, when the lumber industry was still young, the West Coast was a vast, untapped source of premium soft woods. Puget Sound, the only protected, natural ocean harbor between San Francisco and the Canadian border, became the main lumber source for the entire Pacific Basin. Washington Territory's magnificent timber stands became legendary. John Hittel, commenting on Pacific Coast industries in 1882, wrote the "fir and cedar forests of Washington . . . as sources of lumber for exportation . . . are unequaled" (Hittel 1882:35). The 1872 *Business Directory and* ***Guide*** *to Washington Territory* (Anonymous 1872:2) estimated more

than 20 million acres of marketable timber in Washington Territory, consisting mostly of Douglas fir, hemlock, cedar and spruce.

Pacific Coast timber exploitation began in earnest with the huge demand for lumber created by the California gold rush. At the height of the gold rush, lumber, which could be obtained in the Pacific Northwest for $10 per thousand board feet (BF), was selling for $500 per thousand in San Francisco (McNairn and MacMullen 1945:12). [Note: The unit of measure used for lumber was, and still is, the board foot (BF). A BF is 144 in.^{3} of lumber—a 12-in. square board, 1-in. thick, equals 1 BF.]

San Francisco remained the West Coast lumber industry's commercial center throughout the nineteenth century. Most Northwest mill operators had San Francisco partners who marketed the final product and obtained capital for the mill (DeLong 1985:39). Initially, most mill operators relied on independent shippers to transit lumber to market. This changed quickly, however, as mills greatly reduced overhead costs by purchasing their own lumber schooner fleets. For example, in 1862, the Puget Mill Company owned at least ten vessels; two decades later it owned a fleet of sixteen sailing vessels and four tugs (Cox 1974:116). The Port Blakely Mill Company acquired its first three vessels in 1866. Its fleet expanded rapidly, especially when the Hall Brothers, a well-known Puget Sound shipyard, moved to Port Blakely in 1880 and began adding to the supply of available sailing vessels (Cox 1974:121).

In the early 1880s, between 150 and 200 million BF of lumber were shipped from Puget Sound annually (Hittel 1882:215; Johansen and Gates 1957:389). The increasing lumber output was fueled by California demand, which increased rapidly during the 1880s. The Santa Fe railroad's completion into Los Angeles in 1885 set off a major boom in southern California real estate development. Many companies anticipating this boom set up lumberyards in the area before 1885. For instance, in addition to its northern California lumberyards at Vallejo and Alemeda, the Port Blakely Mill Company acquired new yards at Santa Barbara, San Buenaventura, and San Pedro during the mid-1880s (Cox 1974:122). Between 1883 and 1889, total lumber shipments to California increased from 200 million BF to 323 million BF annually (Johansen and Gates 1957:390).

The two main Los Angeles-area harbors at this time were Santa Monica and Wilmington (which later became San Pedro). These ports were not ideal, however. In 1882, John Hittel wrote in *The Commerce and Industries of the Pacific Coust of North America:* "Santa Monica has a wharf accessible for large vessels with abundant room and deep water; but the anchorage is not secure in stormy weather. All the steamers and nearly all the sailing vessels go to Wilmington . . ." (Hittel 1882:29). The problem with Wilmington was that it was too shallow for navigation at low tide. Therefore, all cargo had to be lightered ashore, which increased shipping costs into this port (Hittel 1882:29). Wilmington harbor improvements began in 1871, but a universally accessible port was not finished until the 1890s, at which time San Pedro became Los Angeles' chief port (Barsness 1965:293). The real estate boom ceased in the late 1880s, and lumber demand from southern California decreased significantly until another building boom occurred at the beginning of the twentieth century. During the second decade of the twentieth century, California received an average of 1 billion BF of lumber annually from the Pacific Northwest. California remained a steady market for lumber until the decline of coastwise shipping after World War I (Cox 1974:219; Vinnedge 1923:16).

In addition to California, several other coastal markets opened for Pacific Northwest lumber in the 1880s. Chile's victory over Peru and Bolivia in the War of the Pacific (1879–83)

encouraged them to embark on a program of railroad construction that lasted throughout the decade creating demand for lumber (Cox 1974: 214–215). Limited development also occurred in Peru and Mexico during the 1880s and 1890s, which created further lumber markets requiring shipping for transportation.

On Puget Sound, the Northern Pacific Railroad's 1883 arrival into Tacoma created an economic tremor (Chasan 1981:15). This railroad was extended northward from the Columbia River, and Tacoma became its first seaport connection. The railroad's arrival allowed a vast increase in the amount of lumber cut in the Pacific Northwest: in 1890, Washington cut more than one billion BF of timber; in 1895, two billion BF; and three billion in 1902 (Johansen and Gates 1957:389). In the early twentieth century, many smaller mills around Puget Sound closed due to high technological costs; railroads and modem, mass production mill machinery required a tremendous capital outlay (Newell and Williamson 1960:142). Although railroad competition affected ocean-going trade, shipping lumber by sea still dominated the coastal and overseas markets into the twentieth century. Nonetheless, midway through the first decade of the century, total lumber shipped by rail surpassed its seabome competition, which signaled the inevitable decline of the Pacific Coast lumber schooners, both sail and steam (Newell and Williamson 1960:112).

Although the lumber industry is still a mainstay of the Pacific Northwest economy, the historical period of lumbering that utilized sailing, and later steam, schooners as a means of transport ended after World War I. At this time, transportation needs not fulfilled by railroads were taken over by steel-hulled, steam-powered vessels. From the 1870s to the 1920s, however, coastal lumber transportation relied heavily on ships specially designed for the lumber trade. These vessels, the two-, three-, and four-masted coastal lumber schooners, were designed to reflect the particular needs of the Pacific Coast lumber trade, and they came to dominate it during this period.

PACIFIC COAST LUMBER SCHOONERS

West Coast geography ensured that transporting milled lumber to California markets was carried out solely in ocean-going vessels into the 1880s. The Sierra and Rocky Mountains were natural barriers to overland trade, and there were no means of overland transportation before the mid-1880s completion of the transcontinental railroads (Mears 1935:48).

A distinctive vessel-type emerged for lumber transportation: the Pacific Coast lumber schooner, whose design was influenced by Pacific Coast environmental conditions and the requirement to carry an all-lumber cargo (Figures 2.1 and 2.2). The lumber schooner carried the raw material of California development. It delivered the basic construction material, which laid the foundation for nearly all California's metropolitan centers, making the vessel regionally significant as the primary cargo carrier.

The focus of West Coast shipbuilding activities during the 1860s was on the small coastal trader, and a variety of different vessels were used in the lumber trade. Soon, however, shipyards were producing larger vessels that would bring higher profit margins with each voyage.

Schooners built for the Pacific Coast lumber trade during the early 1870s generally ranged in size from 100 to 300 tons, with the majority in the 100 to 200-ton range. At Humboldt Bay, the second most important shipbuilding region on the Pacific Coast behind Puget Sound, in a three-year period, 1874–76, 31 schooners totaling 4,059 tons were built, an average of just over 130 tons per vessel (Hall 1884:132). The first three-masted schooner registering larger

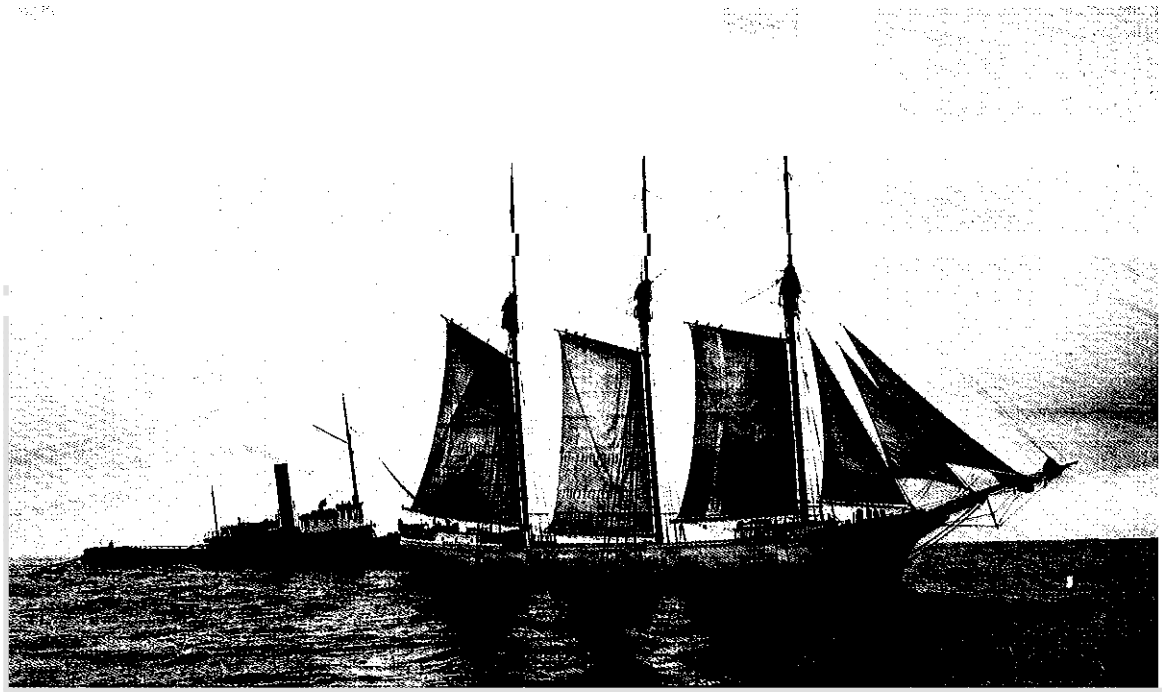

Figure 2.1. The schooner *J.M. Colman* about 1900, photographed off Cape Flattery or in the straits of Juan de Fuca. *J.M. Colman* was built by the Hall Brothers Shipyard, who also built *Comet*. Photo by Hiram Hudson Morrison, courtesy of San Francisco Maritime NHP.

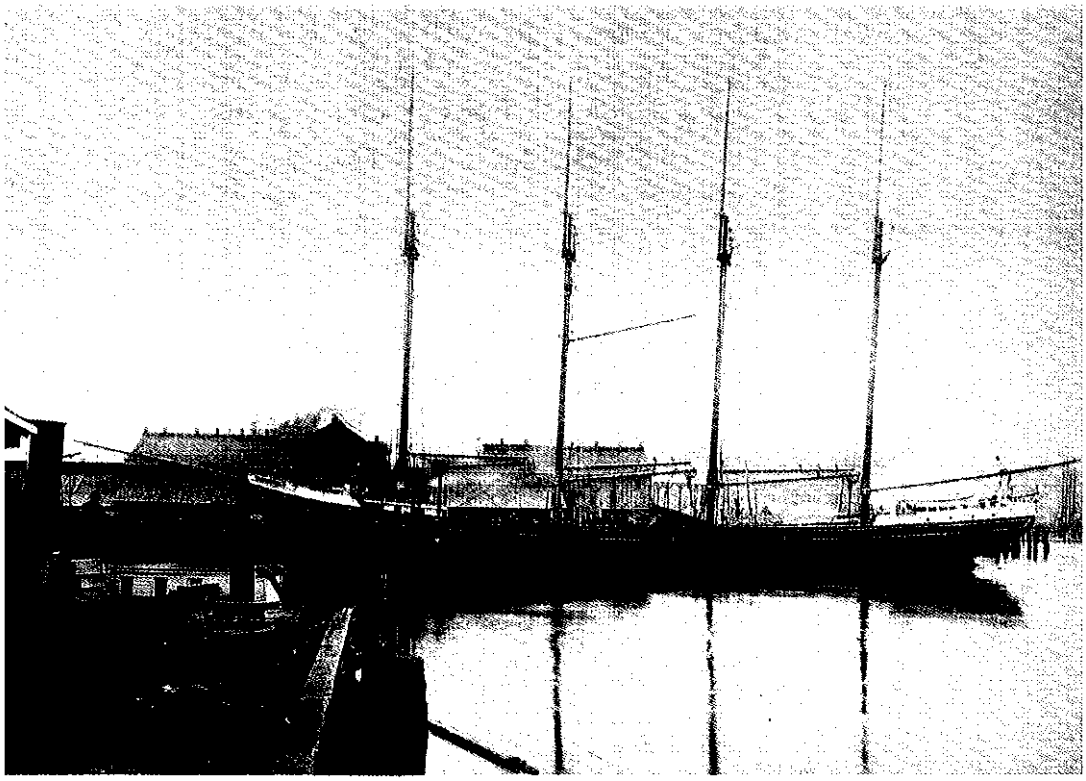

Figure 2.2. The schooner *Watson A. West* at an unknown port. *Watson A. West* was also built by the Hall Brothers. Photo courtesy of San Francisco Maritime NHP.

than 300 tons, *Sunshine*, was built on the Pacific Coast in 1875 (MacGregor 1982:61). Larger hulls soon became common: most lumber schooners built in the late 1870s and early 1880s approached 300 tons in size. Henry Hall noted in his 1884 *Report on the Shipbuilding Industry of the United States* that "latterly the vessels built at Humboldt have been schooners of 250 and 300 tons register . . ." (Hall 1884:132). An important "first" was achieved in 1882 when the Hall Brothers of Port Blakely constructed *William Renton*, the first three-masted schooner on the Pacific Coast registering more than 400 tons (MacGregor 1982:61).

Four-masted schooners built for the lumber trade did not make an appearance until the late 1880s, when they became an important addition to the industry. A total of 130 four-masted schooners were built on the Pacific Coast between 1864 and 1904, most registering between 550 and 750 tons. Five-masted schooners, huge vessels generally registering more than 1,000 tons, did not play a significant role in the coastal lumber trade, but were more heavily involved in overseas trade. The first "proper" Pacific Coast-built, five-masted schooner was *Inca*, built by the Hall Brothers in 1896, registering 1,014 tons. Only nine five-masters were constructed between 1888 and 1916 (MacGregor 1982:62, 109).

In addition to being convenient, Puget Sound's abundant timber made shipbuilding material inexpensive (Hall 1884:131). A hypothetical cost comparison between building a three-masted ship in Bath, Maine versus Puget Sound, conducted by Hopkins in his 1874 publication, *Shipbuilding on the Pacific Coast (No. 2)*, showed the difference to be enormous. The price for materials in Bath, including masts and yards, would be $39,305, compared to $14,997 for the same materials in Puget Sound (Hopkins 1874:22). On the West Coast, milled lumber ready for shipbuilding could be purchased for $10 to $20 per thousand BF, while on the East Coast it cost between $40 and $65 (Hopkins 1874:21).

The region's chief timber was Douglas fir *(Pseudotsugamenziesii)*, known as "yellow fir" in the nineteenth century. Douglas fir proved to be an ideal wood for shipbuilding, and the San Francisco Board of Marine Underwriters endorsed it in 1875 as an accepted shipbuilding material (DeLong 1985:14). Both Hall and Hopkins praised Douglas fir for shipbuilding. One of the greatest selling points was the length of timber that could be obtained. Hall noted that West Coast trees grew from 150 to 300 feet tall, so that "keel and keelson pieces and plank could be obtained of any length, and a vessel could be built with a far less number of butts and joints than in any other part of the United States" (Hall 1884:131). To this Hopkins added:

> It is needless to remark that the great length of our lumber saves labor and fastening in scarphs and butts, gives greater elasticity to the ship's hull, and diminishes the danger of springing a leak. Moreover, our firs are superior to oak in the tenacity with which they hold iron fastenings. Bolts and spikes will generally break before they can be drawn or backed out of fir, and iron never becomes "sick" when imbedded in it. . .[Hopkins 1874: 21].

As noted by Hopkins, fir holds fasteners better than oak because, as a soft wood, it swells much more than oak when immersed in water. In addition, fir contains a balsam that reduces iron deterioration, an attribute lacking in *oak* (Hall 1884:131). Because of these qualities and the growing acceptance of Douglas fir as a shipbuilding material, the Pacific Coast became a major shipbuilding center.

In 1875, 14 shipyards were active on Puget Sound; by the end of the era of coastal sailing schooners, more than 50 major shipbuilders

operated on the West Coast (Williamson and Gibbs 1976:58; Newell and Williamson 1960:21). There was a trade-off between building vessels at San Francisco (then still a major shipbuilding center) and building on Puget Sound. Shipyards at San Francisco had the disadvantage of increased lumber cost, while builders at Puget Sound had to obtain fasteners, sails, rigging, oakum and other materials not available in the Pacific Northwest from San Francisco (Hopkins 1874:18). Regardless, shipbuilding in the Pacific Northwest became a major industry that complemented the nearby lumber mills. Both large mill companies and independent shippers accumulated fleets, so the demand for vessels during this time remained steady (Newell and Williamson 1960:21).

The schooner-rigged vessel proved best suited for the Pacific Coast lumber trade in the second half of the nineteenth century. This ship type, with fore-and-aft rigging and two or more masts, developed as a distinct American design in the early-eighteenth century (Edson 1989:198). The first mention of the term "schooner" comes from American colonial records. During this period, schooners were fitted with at least one square topsail and were known as "topsail schooners" (Bauer 1988:32; Edson 1989:198). By the turn-of-the-nineteenth century, however, this topsail was largely abandoned in the United States, and a pure fore-and-aft rig became prominent (Edson 1989:205). By 1800, most vessels involved in the American coastal trade were schooners because of the sailing advantages offered by this type of rig in prevailing and offshore winds (Chapelle 1935:258). The fore-and-aft-rigged vessel had three major advantages over the traditional ship rig: it could sail closer to the wind; it could more easily maneuver into harbors and rivers; and it required a smaller crew for an equivalent size ship (Hall 1884:93; Bauer 1988:191). The attributes that led to its adoption gave schooners nearly two centuries of popularity, lasting until the final days of sail (Edson 1989:203).

In the eighteenth century, East Coast schooners were small vessels, carrying two masts and ranging from 40 to 50 tons. During the mid-nineteenth century, however, they grew considerably: two-masters ranged from 100 to 250 tons, and three-masters ranged from 300 to 750 tons (Hall 1884:94). The shift to three-masted schooners on the East Coast began around 1850, and by the mid-1860s, they were the most common vessels in the coastal trade (Chapelle 1935:258–259). The increase in number of masts was an effort to reduce individual sail size so that smaller crews could handle them, while at the same time increasing the total canvas spread necessary for larger hulls and greater speed. During the 1870s, East Coast three-masted schooners increased in size, growing from an average 500 tons to an average 920 tons (Bauer 1988:271).

West Coast schooners, especially lumber schooners, had a different configuration than those on the East Coast. West Coast schooners had full poops and raised topgallant forecastles. In addition, West Coast schooners often omitted separate topmasts, leaving tall, one-piece masts. Employing a "leg-0-mutton" (triangular) sail on the aftermost mast was also a popular West Coast innovation (Greenhill 1980:76).

The sailing qualities of schooner-rigged vessels were appropriate to beat up the West Coast against the prevailing northwesterly winds. Early lumber schooners were small, two-masted vessels with a cargo capacity between 75,000 and 150,000 BF of lumber. Larger, three-masted schooners became dominant during the 1870s (Ryder 1948:28–29; Olmsted 1972:2). Three-masters had a maximum capacity of approximately 500,000 to 600,000 BF (Martin 1983:166; Newell 1966:80). Finally, in the late

1880s, four-masted schooners, which could carry 650,000 to 1,200,000 BF, became common (Olmsted 1972:2; Newell 1966:68).

Lumber schooner construction was tailored to the trade's specific requirements and reflected a design that was, above all, economically viable. The Pacific Coast lumber schooner needed to be loaded quickly; carry this heavy, cumbersome cargo to its destination; discharge it quickly; and return empty, without ballast (DeLong 1985:1; Olmsted 1972:4). On these short trips, it was not economically feasible to load ballast for each return voyage and discharge it before loading lumber for the next trip. Rapidly increasing demand and expanding markets **put** a high value on speed and quick turnaround times in port.

The West Coast lumber schooner design that eventually became standard was a single-decked vessel (giving it only one large hold) that had a broad beam, long bow, square or elliptical stem, and oversized hatches to allow quick and efficient lumber stowage (Hall 1884:133). In addition, they were sometimes fitted with bow or stern ports that allowed easier access to the hold and quicker loading (Cox 1974:247).

West Coast vessels had shallow drafts and flat bottoms for two main reasons. First, shallow draft resulted in a reduced distance between the keel and the deck, which assured satisfactory structural strength (Cox 1974:247). Most ocean-going ships had two decks to ensure adequate longitudinal strength. Second, shallow draft and flat bottoms allowed schooners to visit sawmills located in shallow coves and harbors, often obstructed by sand bars. These shallow hulls eliminated waiting time for high tide and the need for lightering.

Flat-bottomed schooners were sometimes fitted with retractable centerboards to help counteract leeward drift typical of a shallow-draft hull (Cox 1974:250). The centerboard was retractable so it could be raised when the vessel crossed a sandbar or entered shallow water. Centerboards were common on Great Lakes schooners, but little has been written about West Coast centerboard construction. Historian Thomas Cox has suggested that the practice was limited mostly to small schooners servicing northern California dogholes (small ports) and Oregon's bar harbors, where shallow draft was especially crucial (Cox 1981:68). Evidence based on Hall Brothers' vessels supports this assumption. Of 108 vessels built by the Hall Brothers Shipyard during their 29 years as one of the leading shipyards on the Pacific Coast, only 20 vessels, most two- and three-masted schooners in the 200 to 300-ton range, were built with centerboards (Lyman 1951). The largest centerboard schooner constructed by the Hall Brothers was the 429-ton *Comet*, the subject of this report.

Documents about Great Lakes centerboard use gives additional details about this device. By the mid-nineteenth century, all centerboards operated on a single pivot on the forward edge, as opposed to rising straight up into the centerboard trunk. There were two possibilities in the centerboard placement: through the keel or alongside the keel. During the mid-nineteenth century, Great Lakes builders preferred the offset centerboard, primarily because it offered convenience in stepping the mast (Barkhausen 1990:3). In 1866, the Board of Lake Underwriters, however, adopted a resolution that required through-keel centerboards in all vessels, which probably reflected a change that had already taken place, because it led to stronger, better quality vessels (Barkhausen 1990:4, 24). West Coast centerboard practice probably followed the same policy, although there is little documentation.

West Coast schooner construction incorporated some features that provided additional longitudinal hull strength, such as large, built-up keelsons; bilge stringers added to the ceiling; and use of thickened ceiling

planking to the turn of the bilge (MacGregor 1982:63; Haller and Kelly 1990:16). The keelson was bolted through the floors into the keel. Rider keelsons, of which there could be as many as four, were then bolted directly onto the main keelson. Sister keelsons were placed on both sides of the main keelson, butted up to it and bolted into the floors and horizontally edge-bolted into the main keelson. Finally, a number of assistant keelsons were placed on top of the sister keelsons, bolted to the sister and edge-bolted to the riders (Desmond 1984:55–56).

The vessels were generally built entirely of Douglas fir, with the exception of the stem post and stern post, which were of more durable laurel and white oak (Hall 1884:131,133). Cabins were generally white cedar, pine, or redwood (Hall 1884:131,133). Schooners were typically double framed, fastened with both iron spikes and wooden treenails. Treenails, made from durable and flexible eastern locust or oak, were brought from the East Coast (Olmsted 1972:2; Weinstein 1978:45).

Along with adistinct hull design, West Coast lumber schooners also had a unique schooner rig. Known as "baldheaded" schooners, they often carried only their gaff sails, preferring to run without topsails because "in the long beat to windward of the return trip there were no gaff-topsails to shift when tacking" (Weinstein 1978:20) (see Figure 2.1). Many lumber schooners were "terns," or vessels with masts of equal height (Bauer 1988:271) (see Figure 2.2). Some schooners were also outfitted with a yard on the foremast to carry a square sail, known as a hermaphrodite rig. This sail, however, was furled into the mast, like a drapery, rather than up to the yard (Olmsted 1972:17). This allowed furling the sail from the deck, so the vessel did not need more sailors than a regular-rigged schooner, although it carried more sail. Some West Coast lumber schooners set a leg-of-mutton sail on the aftermost mast instead of a gaff sail, depending on the personal preference of the master (MacGregor 1982:62).

A typical West Coast lumber schooner carried a crew of eight or nine, including the captain. In the case of the lumber schooner ***C.A. Thayer***, preserved at San Francisco Maritime National Historical Park, the crew consisted of four seamen, two mates, a cook and the captain (Olmsted 1972:4). Many lumber schooners, including ***C.A. Thayer*** and ***Comet***, were equipped with steam-powered donkey engines to assist in raising the sails and working the deck machinery and pumps. If a vessel had no steam donkey, the crew would be slightly larger. Crew duties included handling lines, raising and lowering sails, and handling cargo (DeLong 1985:52). For his labor, the sailor received pay and provisions. The Shipping Articles for 1900 listed a mate's pay at $55 per month, the second mate and cook's pay at $50 per month, and seaman's pay at $40 per month. The captain's salary began at $100 per month, plus a share in the profits of each voyage if he owned an interest in the vessel (DeLong 1985:52). The crew's quarters aboard a lumber schooner were small and spartan, consisting of a 6-by-8-ft. cabin forward of the galley, containing bunks for six. The captain's quarters, located near the stern, were considerably roomier and often richly furnished (DeLong 1985:52) (Figure **2.3).**

Lumber schooners were considered to be owned by a single company, although 16 or more individuals often jointly owned vessels; shares in these vessels might be divided into as little as 1/64s. It was also common for the yard that built the schooner to retain a share of the ownership (DeLong 1985:4).

Loading and discharging lumber from a schooner was a time-consuming process. The larger mill ports employed stevedores, while at others, loading and unloading was the duty of the crew. If the crew was required to do the work, they were typically paid more while in

Figure 2.3. Hulda and Otto Lembke aboard *Comet* at Santa Barbara, 1905. Photo courtesy of San Francisco Maritime NHP.

port than at sea. For example, on a 1904 voyage to Honolulu, seamen aboard ***C. A. Thuyer*** were paid $35 per month while at sea and $40 per month while in port (Olmsted 1972:15). Even with professional stevedores loading the lumber, however, it was a long process—it took an average of 10 days to load a vessel, plank by plank. In the larger harbors, loading was accomplished using a series of ramps that sloped up from the wharf to the stem and then down into the hold. If the vessel was equipped with bow or stern loading ports, the ramps were sloped up to these. In all cases, after the hold was full and the cargo secure, the rest of the load was piled onto the deck and tightened down with chain and turnbuckles. Deckloads often represented more than half the cargo and often resulted in a 12 to 14-ft. stack of lumber (Weinstein 1978:39). With deckloads that high, little freeboard was left, and the decks were often awash. For a voyage to be profitable, however, such deckloads were required, and they were possible because of the cargo's inherent buoyancy (Cox 1974:248). After introduction of steam donkey engines in the early 1880s, stevedores used a vessel's donkey engine to assist in loading, or if the vessel did not have one, they used an engine on a floating barge brought to the vessel's side (Cox 1974:248).

DECLINE OF THE PACIFIC COAST LUMBER SCHOONER

Although sailing schooners were used in the lumber trade up to World War I, the last order for constructing a new sailing schooner was placed in 1905 (Olmsted 1972:5). Growing competition from steam schooners introduced in the 1880s caused the steady decline of its wind-driven predecessor. The result of this competition was that "sailing schooner construction was suddenly pinched off just when it hit its peak" in the early-twentieth century (Olmsted 1972:5).

The first lumber schooners employing steam engines were traditional sail-driven schooners fitted with auxiliary steam machinery around 1880 (Newell and Williamson 1960:61; McNairn and MacMullen 1945:14). Steam-powered schooners were well suited to working conditions in northern California dogholes, and they were used there first. The first documented vessel built from the keel up as a steam schooner was *Newsboy*, built in 1888 by Boole & Beaton of San Francisco. This vessel ran between Eureka and San Francisco (Newell and Williamson 1960:67; McNairn and MacMullen 1945:17).

As noted before, the change from sail to steam was a slow process and never universal in the West Coast lumber trade. Many ship owners were slow to change, and some, like the well-known Pope and Talbot, never changed (Newell and Williamson 1960:67). Initially, many ship owners were reluctant to switch, For several reasons. There was concern over loss of cargo space both in the hold and on deck due to space needed for machinery and coal (McNairn and MacMullen 1945:15). Another concern was the false belief that steam schooners could never be economically viable in anything but the short northern California run. This was because early steam schooners had small carrying capacities, and the largest coastal steamers had freight rates prohibitively high to carry lumber (Cox 1974:252). By the 1890s, however, steam schooners were profitably making the run from Puget Sound to southern California, proving critics wrong.

Until the first part of the twentieth century, steam lumber schooners built on the West Coast were "single-ended" (Bauer 1988:278). This meant that steam machinery was near the vessel's stem, aft of the cargo-handling gear. The first double-ended steam schooner, *Daisy Mitchell*, was built in 1905 by Hans Bendixsen (McNairn and MacMullen 1945:19). This innovation placed steam machinery amidships, allowing cargo to be stowed fore and aft, which significantly increased carrying capacity (Bauer 1988:278).

In the Great Lakes, the consort system of towing lines of schooners with a steam vessel was a popular mode of transporting bulk cargos such as lumber in the late-nineteenth century. This system never made significant inroads on the West Coast, possibly due to different sailing conditions. Towing was not ignored altogether on the Pacific Coast, however. It was employed to a certain degree on the California redwood coast during the late 1880s and 1890s. Competition from large steam schooners on this run made towing small schooners up the coast, which saved both time and wages, attractive to many small vessel owners (Cox 1974:252). The practice of towing did not become common on the longer run from Puget Sound.

Wooden vessels involved in the West Coast lumber trade experienced a brief boom during World War I, but this generally marks the end of wooden-hulled vessel use in this trade. Steel-hulled ships soon dominated the market (McNairn and MacMullen 1945:19).

The coastal sailing schooner's longevity as the primary mode of Pacific Coast lumber transport from mill to market is testimony to this vessel-type's historical significance. For more than half a century, the lumber schooner was an important part of the Pacific Coast's lumber-based economy.

CHAPTER 3

Comet Background

VESSEL HISTORY

The Hall Brothers built the schooner Comet at their Port Blakely shipyard in 1886. The ship was built at a time when the southern California demand for lumber was rising, increasing the need for coastal lumber schooners. Increased demand was sparked by completion of the Santa Fe railroad into Los Angeles in 1885 and the resultant real estate boom. In addition to the need for lumber in the southern California metropolitan area, the newly completed railroad shipped lumber to markets in the southwestern United States. In 1883, the *Los Angeles Daily* Times noted that a "large number of lumber schooners are reported in the bay at San Pedro, loaded with lumber. The Arizona, New Mexico and Texas trade is constantly increasing, and all the facilities of the lumber companies are taxed to the utmost to keep pace with the demand" (*Los* ***Angeles*** *Daily Times* [*LADT*], 10 June 1883:4).

Comet was produced to meet increasing lumber demand, and the three-masted design reflected the current trend in lumber schooner construction. Three-masters began to replace the two-masted schooners during the 1870s, and by the 1880s, the three-masters, which could carry up to 600,000 board feet (BF) of lumber, were dominant in the trade.

Comet was launched from the Hall Brother's Port Blakely yard in October 1886. The original contract for the vessel survives, giving a complete record of construction (see Appendix A). Comet had a length of 136.0 ft. on the keel, 144.6 ft. overall, with a breadth of 35.2 ft., a depth of 11.4 ft., and registered 429.74 gross and 408.26 net tons (J. Porter Shaw Library, San Francisco [JPSL], Hall Brothers Shipyard Contract Number 49, 1886). It had one deck, three masts, a billet head, an elliptic stern (National Archives, Washington D.C. [NA], Record Group 41 [RG 41], Records of the Bureau of Marine Inspection and Navigation, Certificate of Registry Number 18, 1886), and it was constructed entirely of Douglas fir, with the exception of the stem and stem posts, which were "hardwood" (JPSL 1886). Comet was entirely iron fastened, with the addition of 1¼-in. locust treenails on the outer hull planking. The vessel was also equipped with a centerboard, and had bow and stem ports for

loading and unloading lumber. During construction, Comet was "salted from lower edge of wales to deck" to reduce dry rot (JPSL 1886). This was a common practice required by many classification societies (for example see American Shipmasters' Association 1879:xx). The contract also notes information on caulking and painting, indicating the bottom was painted with two coats of "Tar and Wonson's copper paint.'' In addition, the vessel was fitted with "composition rudder braces, diamond-cut screw steering gear, 24" windlass purchase" and "#3 capstan." The contract also specifies number and size of anchors, chain and line, as well as furniture, fixtures and ship's boats. In total, the Hooper Brothers of San Francisco and C. F. S. Lass of Oakland agreed to pay $30,000 in US Gold Coin, in four installments for Comet's construction (JPSL 1886).

Cornet's first registration records C. F. S. Lass as master and one-third owner, and J. A. Hooper and F. P. Hooper each owning one-third of the vessel (NA 1886:RG 41:Registry 18). The Hooper Brothers owned interest in several lumber companies, as well as shares in a fleet of lumber schooners, and were well known in the West Coast lumber industry.

One reason for owning partial shares in many vessels was to minimize financial risk from vessel loss. As a result, owners were often willing to forego insurance. It was noted of John A. Hooper that "because of his diversified partial interest in so many vessels, the insurance companies were losers, as far as he was concerned, in premium collections over a long period of years. He 'carried his own insurance ...'" (Drury 1952:53).

Cornet was originally registered at Port Townsend, Washington, on October 19, 1886. The Hooper Brothers and Lass remained the vessel's owners for its entire life, with various masters occasionally gaining small interests in the schooner. Although the owners remained the same for Comet's entire career, it was variously registered at Port Townsend, San Francisco, Eureka, San Diego, Port Angeles (Washington) and Los Angeles. Masters changed several times over the vessel's career, the most notable being F. E. Rensch from June 9 to July 16, 1904 (NA 1895:RG 41:Enrollment 16). This is the same Frank E. Rensch that commanded Dora *Bluhm*, another lumber schooner wrecked at CHIS, for a short time in 1890–91 (Russell 1996:88). Nicolas Borgenson was captain of Cornet for two major mishaps that occurred during its career, including its loss in August 1911 (NA 1910:RG 41:Enrollment 6; NA 1910:RG 41:Enrollment 261).

Cornet was actively involved in the coastal lumber trade for its entire 25-year career. Newspaper accounts from December and January 1892–93, as well as San Pedro port records from 1895–96, show that Cornet frequently called on San Pedro from Puget Sound during this period (Sun Francisco Chronicle, 17 December 1892–25 January 1893; Marquez 1975:127–128) (Figure 3.1). Comet was issued Certificates of Registration three times during its career, all before 1895. These certificates were issued for vessels involved in foreign trade and probably issued to Cornet for voyages to Mexico or Latin America. In addition to records from the mid-1890s, the vessel transit records of the San Francisco Marine Exchange record Comet's voyages from 1902 to its loss in 1911 (JPSL:Records of Vessel Transit, 1902-1911). These records show that San Pedro and Santa Barbara were the vessel's most frequent destination (Figure 3.2), with occasional stops at San Francisco. Its most common port of origin was Aberdeen/Grays Harbor, but it also sailed from Port Blakely, Port Gamble, Port Townsend, and Port Hadlock.

Tonnage changes were noted for Cornet on May 7, 1896, at Port Townsend, Washington. Enrollment Number 16 notes that the changes were made under a law passed the previous year,

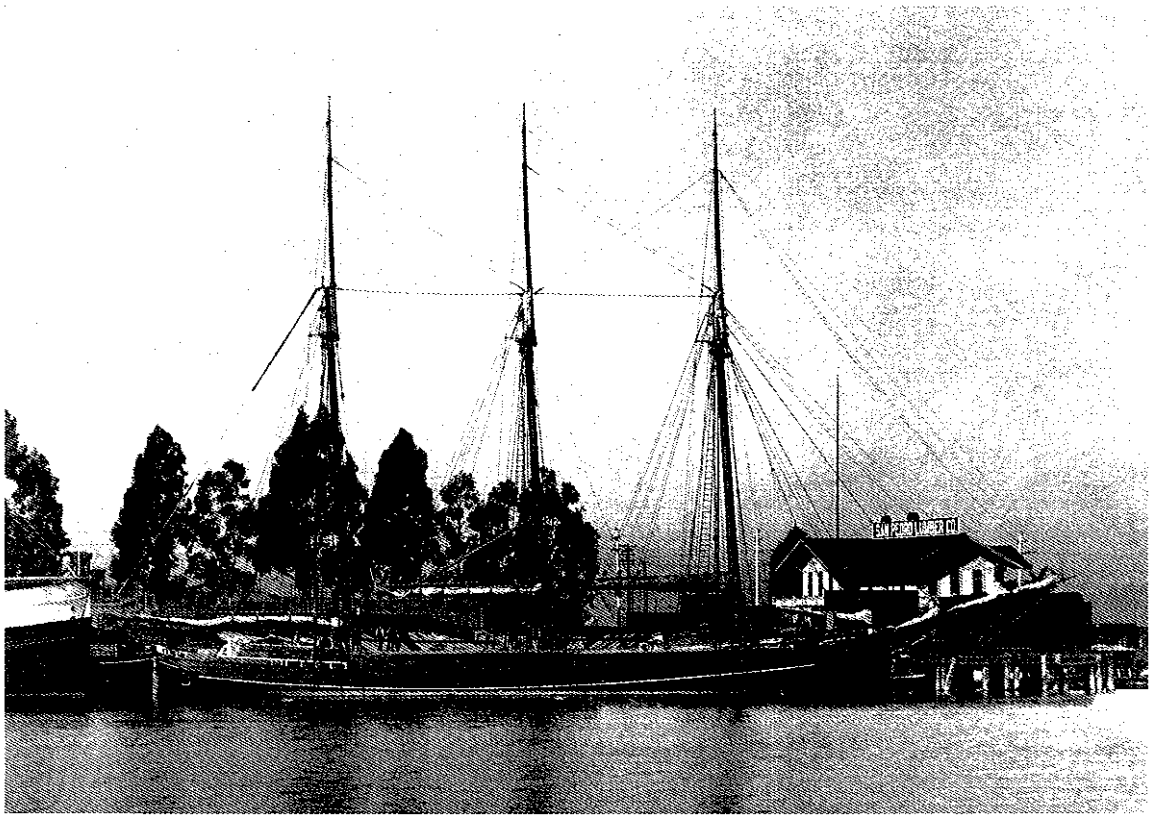

Figure 3.1. Schooner *Comet* docked at San Pedro, California. Photo by William Phelps, courtesy of San Francisco Maritime NHP.

which reducednet tonnage to 378 (NA 1895:RG 41:Enrollment 16). Enrollment Number 151, on February 23, 1905, further reduced net tonnage to 368, deducting 60.91 tons from the gross tonnage of 429 for crew space (25.86), master's cabin (14.89), boatswain's stores (5.96), storage of sails (5.96), and donkey engine and boiler (8.24) (NA 1905:RG 41:Enrollment 151). Although the construction contract specified that the forecastle be adapted for a donkey engine, this is the first time that one was mentioned on board *Cornet.* Because it was not noted on the original contract, the schooner was presumably not originally equipped with one.

Four mishaps are recorded during *Comet's* career before its loss in 1911. The first occurred in Puget Sound January 2, 1902 (National Archives, Washington D.C. [NA], Record Group 36 [RG 36], Records of the US Life-Saving Service, Wreck Report Number 133, 1902). *Comet* was sailing to Port Blakely from San Pedro with an empty hold when the steamer Rainierran it down. Although *Comet's* damage was estimated at $5,000, the specifics were not noted. The damage was severe enough, however, that the schooner had to be towed to Port Townsend by Rainier.

The second accident occurred February 5, 1905, while anchored at Santa Barbara, California (NA 1905:RG 36:Wreck Report Number 169). The schooner's anchor chain parted during a storm, and the vessel crashed into the Santa Barbara Wharf causing $1,000 in damage to the vessel.

Few details are known about the third mishap, which occurred March 3, 1907, when the schooner collided with the bark General Faidherbs at San Francisco (National Archives,

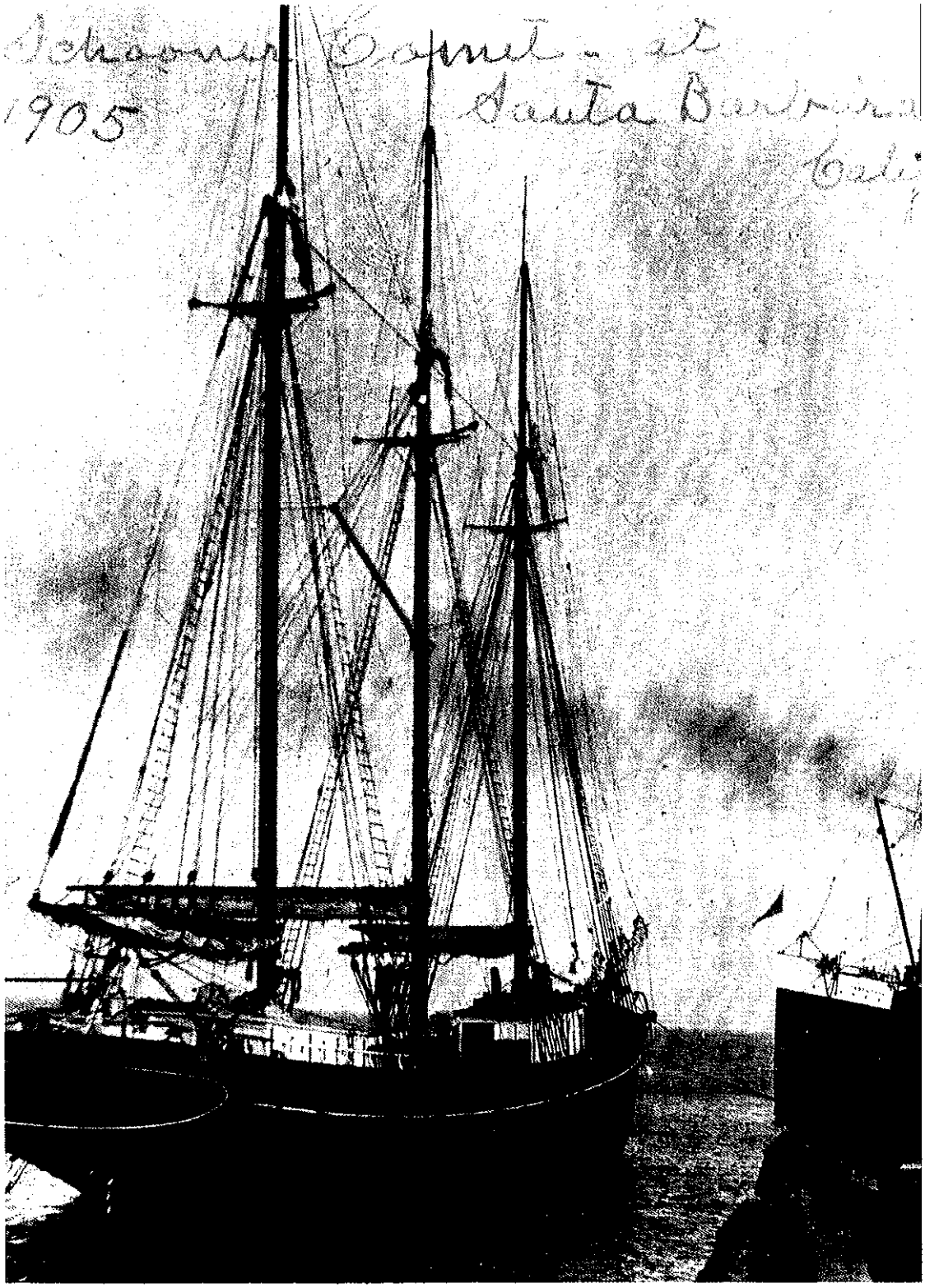

Figure 3.2. *Comet* at Santa Barbara, 1905. Photo courtesy of San Francisco Maritime NHP.

Pacific Sierra Region, Record Group *36*, Records of the US Life-Saving Service, Wreck Reports of the Point Reyes Lifesaving Station, 1898–1915). Damage is unrecorded.

Cornet's fourth accident occurred in February 1911 at San Francisco. On February 28,1911, the *San Francisco Cull* reported that the schooner *Comet* collided with the launch *John* **A,** sinking the launch and drowning the two passengers (*San Francisco Call* [*SFC*], *28* February 1911:30). Two days later, the *Sun Francisco Call* ran the headline "CAPTAINOF COMET ERRATIC IN ORBIT," and claimed Borgenson, the vessel's master, had given a false position for the accident *(SFC,* 2 March 1911:12). The article reported that the position given by Borgenson was more than a mile from water deep enough for *Comet,* and that the master "had either made a careless mistake or performed a miracle." The report went on the say that:

> When the accident occurred Borgeson [sic] was on his way to sea under sail. **A** full gale was blowing at the time and in attempting the handling of a three masted schooner under canvas in a crowded harbor with weather conditions as they were on Saturday it is the general opinion that Captain Borgeson was taking liberties with the law of common sense [*SFC*, 2 March 1911:12].

Borgenson briefly stopped to report the accident to *Comet's* managing owner, J. A. Hooper, and proceeded to sea without giving an accurate account of the accident. The newspaper noted that "this is the first time on record that the captain of the boat that did the running down went to sea without giving the owner of the sunken boat at least an approximate hearing which would aid him in recovering his property" *(SFC,*2 March 1911:12). There was no further report of the incident. The next time *Comet* made headlines, it had wrecked on San Miguel Island.

DESCRIPTION OF LOSS—THE WRECK EVENT

Comet wrecked on San Miguel Island August 30, 1911 (Figure **3.3).** The vessel left Aberdeen, Washington, August 23 loaded with approximately 500,000 B F of lumber bound for San Pedro, California. On Wednesday, August 30 at 8:00 P.M., while sailing in heavy seas with a thick fog, *Comet* struck what was reported as Richardson Rock, approximately 20 mi. south **of** Point Conception and 7 mi. north of San Miguel Island in the Santa Barbara Channel (NA 1911:RG 36: Wreck Report Number 221). It was later determined that the schooner actually hit Wilson Rock, which is 22 mi. northwest of the island and closer to *Comet's* final resting place *(Santa Barbara Independent [SBI],* 14 September 1911; *LADT*, 15 September 1911:15). After the vessel struck the rock, it was pulled off by the current and began drifting south towards San Miguel Island. The *Comet's* master, Captain Nicolas Borgenson, noted:

> I thought when the Comet was freed from her first perilous position, that I would be able to bring her to Santa Barbara, but she filled rapidly and I soon found that she was badly stoved in. She became water logged and I knew the best I could do was to beach her on San Miguel. She is lying in a favorable position and unless the seas become heavy, we may be able to get her off. Her hull must be in bad shape. There was a hard wind as well as a heavy fog when she struck. The ship's chronometer must have been faulty for we were about ten miles off our course *[SantaBarbara Morning Press* [*SBMP*], *2* September 1911:8].

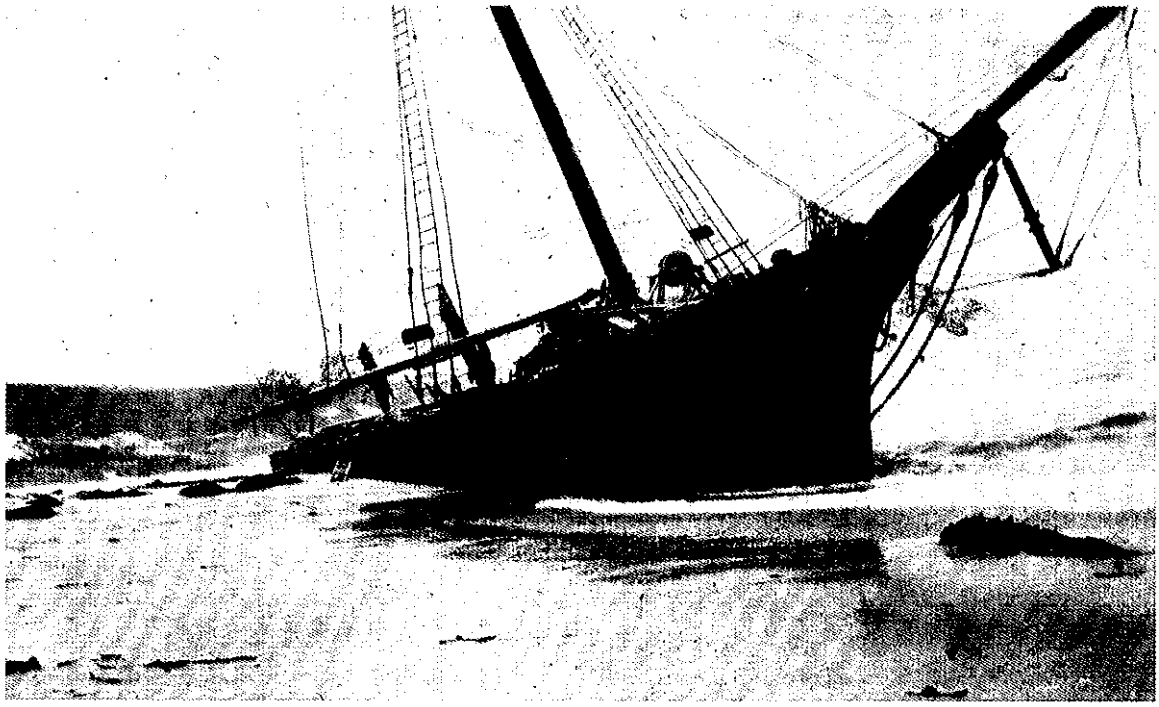

Figure 3.3. *Comet* aground at Simonton Cove, San Miguel Island. Photo courtesy of Santa Barbara Museum of Natural History.

It was later reported that *Comet's* chronometer was in San Francisco being repaired, and the vessel was using one on loan, which was not accurate and placed the schooner 8 to 10 mi. off course (*SBI*, 16 September 1911).

Captain Borgenson "lowered the sails to ease the strain," and then grounded the schooner in Simonton Cove, San Miguel Island (NA 1911:RG 36:Wreck Report Number 221). He, his wife, several members of the crew, and the ship's cat boarded a boat bound for shore (*SBI*, 1 September 1911; *SBMP*, 2 September 1911:8). They found the waves between them and the beach so great that they were forced to change course and head for Santa Rosa Island instead, where they remained all day Thursday, August 31 (*SBI*, 1 September 1911). On the following morning, Frank Pepper of the Santa Rosa Island Company took Borgenson, his wife, and the cat to Santa Barbara, where the first report of the wreck was made (SBMP, 2 September 1911:8). The rest of the crew returned to *Comet*.

POST-DEPOSITIONAL IMPACT—HISTORICAL SALVAGE

On Friday, September 1, Borgenson set out for San Miguel Island to inspect the wreck. At the time, if not optimistic about the chances of saving *Cornet*, he was at least hopeful about salvaging its cargo. Before leaving Santa Barbara he remarked he would examine the vessel to "decide whether she should be unloaded or whether she can be towed to port with the load on" (*SBI*, 1 September 1911). He believed the schooner was "beyond repair" (*SBMP*, 2 September 1911:8).

When Borgenson arrived at *Comet* that day, he was in for two unpleasant surpnses. First, the schooner's second mate, Hans Maihbom, a 24-year-old German, had drowned when he attempted to swim to the wrecked vessel from the beach. Second, severe conditions at the wreck site precluded salvage. He reported the vessel was lying broadside to shore with heavy

seas pounding over its deck, and its rigging had been entirely carried away. He thought the wreck would soon be dashed to pieces *(SBMP*, 3 September 1911:1).

On the morning of September 16, 1911, John A. Hooper, one of *Comet's* owners, amved in Santa Barbara and reported the vessel was likely to prove a total loss to him and the other owners, as neither vessel nor cargo was insured (*SBI*, 16 September 1911). There is some discrepancy in the historical record over how much that loss would be. The *Santa Barbara Morning Press* reported the vessel was valued at $12,000 and the cargo at $13,000 *(SBMP*, 2 September 1911:8). The official wreck report filed by Captain Borgenson, however, noted that the schooner's value was $5,000 and the cargo $3,000(NA 1911:RG36: Wreck Report Number 221). The previous year another lumber schooner, *Dora Bluhm*, was lost on Santa Rosa Island, and its 350,000 BF of lumber was valued at $10,000. Therefore, it is more likely that *Comet's* 500,000 board feet was worth $13,000 than $3,000.

Because of *Comet's* exposed position and the high seas, breaking 200–300 yds. offshore the wreck, it was impossible to salvage the cargo from the ocean-side. Deckload lumber was reported scattered along the island's shore for nearly a mile, but the cargo still within the vessel's hold was virtually intact (*LADT*, 15 September 1911:15). This was no doubt a tempting prize for any salvager, considering the lumber cargo was worth more than the schooner even before it wrecked. The cargo's value is probably what led Mr. Vickers, one of the owners of Santa Rosa Island, to buy the wreck from Hooper, considering the questionable worth of the hull. It was reported that Vickers intended to use the salvaged lumber for improvements to his Santa Rosa cattle operations, and he hoped to earn some of his money back through the sale of *Comet's* donkey engine *(SBMP*, 22 September 1911:8).

At this point, the historical record becomes confusing. After the September 22 report of *Comet's* sale to Vickers, there is no further mention until October 16, 1911, when the *Sun Francisco Cull* stated that salvage rights went to G W. Waters, San Miguel Island's owner. Waters permitted no one to transport lumber to the beach for salvage, and, because salvage by sea was impossible, Waters purchased the rights to the wreck for $1,000. According to the article, Waters and his partner expected to clear about $10,000 in the venture and had already made enough from the rigging alone to cover expenses (*SFC*, 16 October 1911:1).

There are two likely explanations for what transpired. The first is that when Vickers heard that Waters would not allow salvage from land, he backed out of the deal, and Hooper was forced to sell to Waters. This is the most plausible explanation. The other interpretation is that the *Cull* article had its facts mistaken, and that the sale to Vickers went through; he was then forced to sell to Waters for $1,000. Either way, there is no doubt that Waters, through his perspicacity, was the ultimate winner in *Comet's* salvage.

A series of photographs were taken of *Cornet* sometime after the wreck and before the vessel broke up (Figures 3.4 and 3.5). These photos, from the Santa Barbara Museum of Natural History's collection, show the schooner lying broadside to the surf, port side to sea. The vessel is firmly embedded in the sand, probably between the mean high- and low-tide lines. The foremast is still standing, but the main- and mizzenmasts are gone. Two photographs, taken from the forecastle deck looking forward, show a man and woman standing on *Comet's* bow (Figures 3.6 and 3.7). These photographs are the key evidence in identifying the wreck in Simonton Cove as ***Comet.*** In the background of the photographs is an easily identifiable rock formation that is east of the wreck in Simonton Cove today (Figure 3.8). Analysis of the

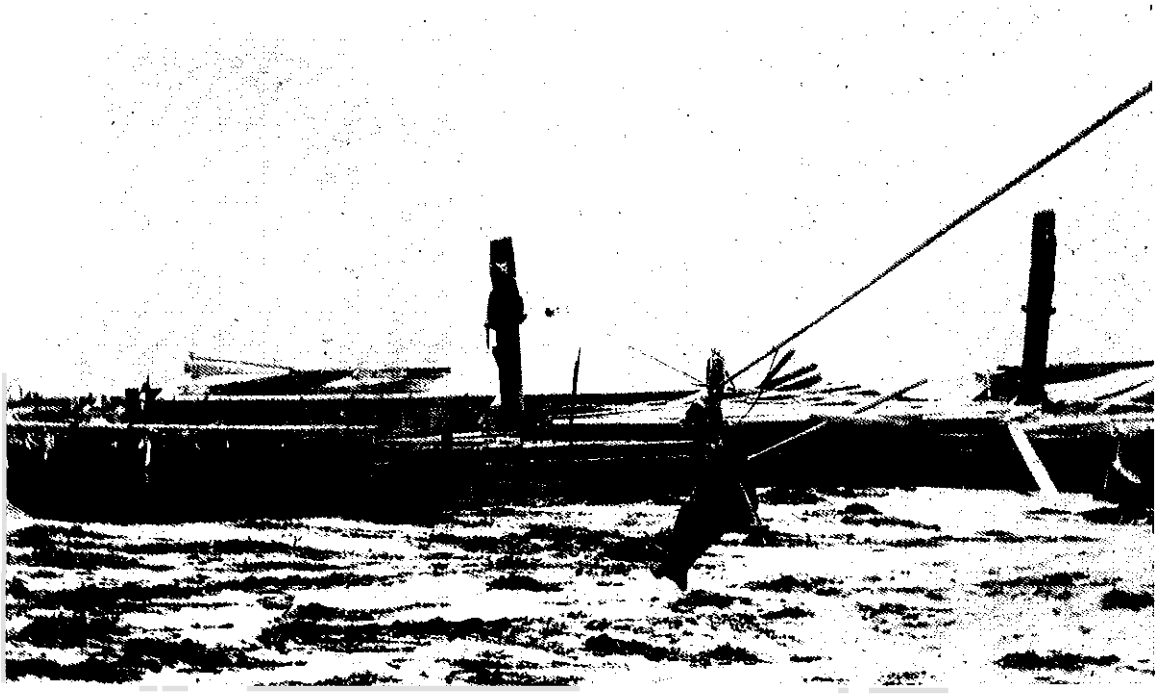

Figure 3.4. *Comet* aground in Simonton Cove, San Miguel Island, with unidentified woman. Photo courtesy of Santa Barbara Museum of Natural History.

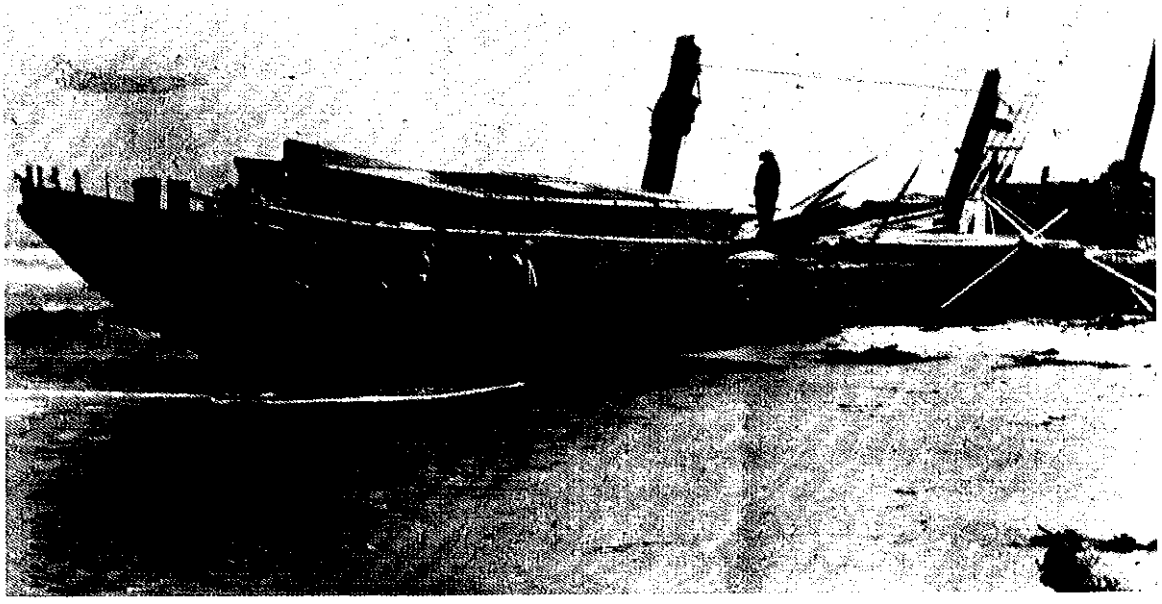

Figure 3.5. *Comet's* stern, aground in Simonton Cove, San Miguel Island. Photo courtesy of Santa Barbara Museum of Natural History.

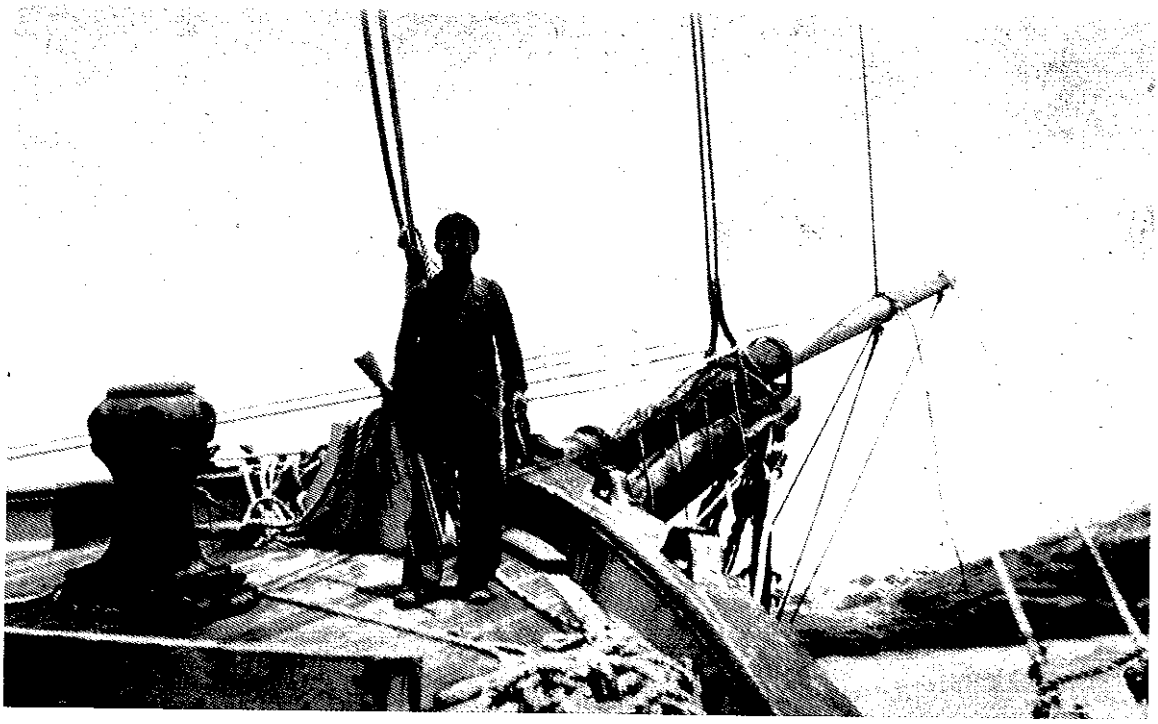

Figure 3.6. Unidentified man on *Comet's* forecastle deck. Note the capstan which is still mounted in the same location today. Also, note the rock ledge in the background which can be compared to Figure 3.8. Photo courtesy of Santa Barbara Museum of Natural History.

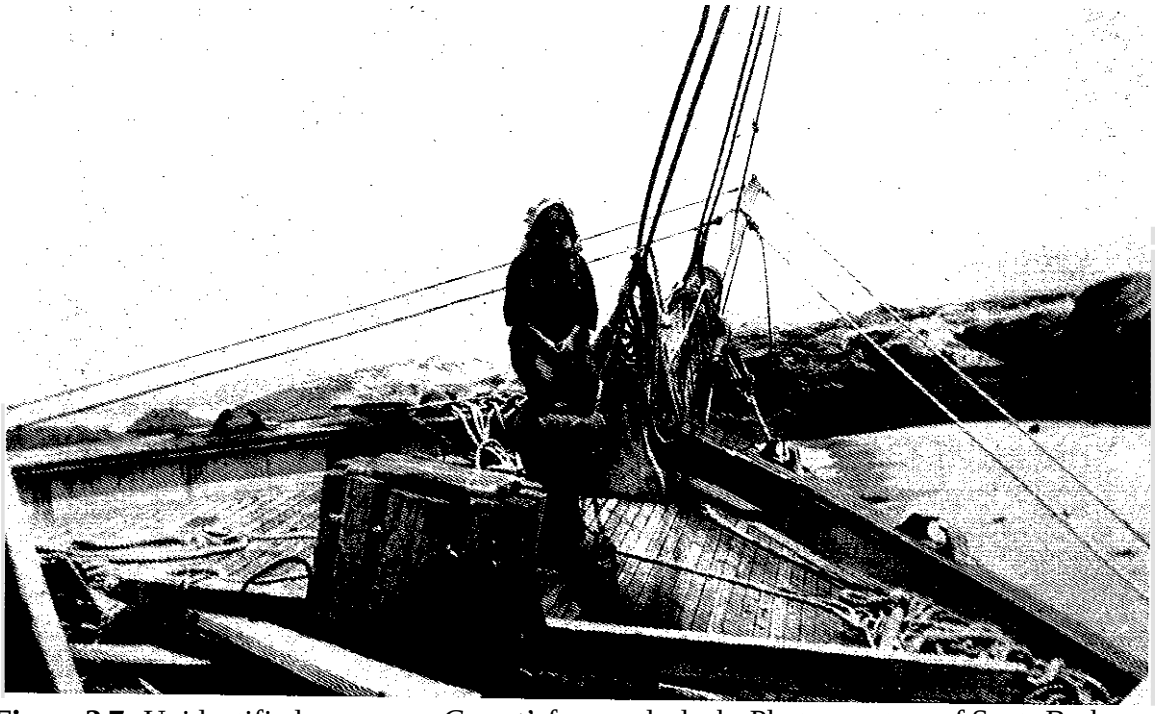

Figure 3.7. Unidentified woman on *Comet's* forecastle deck. Photo courtesy of Santa Barbara Museum of Natural History.

historical photographs provided positive identification of the *Comet* wreck site.

PREVIOUS RESEARCH

In October 1993, Submerged Resources Center Archeologist Matt Russell conducted Master's thesis research on three Pacific Coast lumber schooners wrecked in Channel Islands National Park (CHIS) (Russell 1996). Research focused on wrecks located in Northwest Cove, San Miguel Island and at Cluster Point, Santa Rosa Island, possibly belonging to *J.M. Colman* and *Dora Bluhm*, respectively; and *Comet* in Simonton Cove, San Miguel Island. Unlike the wreck scatters at Northwest Cove and Cluster Point, the wreck in Simonton Cove was positively identified as *Comet* using historical photographs (see above). At the beginning of the 1993 project, the tip of the anchor stock was the only feature protruding above the beach surface. This was used as a starting point to attempt to uncover the wreckage visible in the 1984 site photographs (see Chapter I). Because the wreck had been exposed in the past, sand overburden could be removed without destroying undisturbed stratigraphy. In addition to site documentation, a terrestrial magnetometer survey was conducted over the site to test the possibility of more extensive remains than appear in the 1984 photographs.

Archeologists and volunteers spent several days digging (Figure 3.9), which uncovered the anchor and a few unidentified timbers. Although the timbers located are certainly from *Cornet*, no details could be recorded because the walls of the hole kept collapsing as the timbers were exposed. In total, about 16 m^3 of sand were removed from a hole 6.4 m in diameter at the top and 2.I m deep. The exposed anchor

Figure 3.8. Anchor stock sticking out of the sand in Simonton Cove in the 1980s. Compare the rock ledge in the background to Figure 3.6. NPS photo by Don Morris.

Figure 3.9. Volunteers working to expose *Comet* wreckage in October 1993. Just the tip of the anchor stock was exposed before digging began. NPS photo by Matt Russell.

was recorded in detail, but it was apparent that full site documentation would have to wait until the site uncovered naturally.

To test for further remains beyond those visible in the 1984 photographs, researchers conducted a terrestrial magnetometer survey over a 20 m x 40-m area centered on the anchor. An EG&G Geometrics model G-856 terrestrial magnetometer was used, with a 2-m sample interval. With the exception of two points where the test hole was located, a reading was taken at each 2-m interval, resulting in a data set of 227 points. A magnetic base station was not available, so these readings were not corrected for diurnal variations, which reduce solar and local magnetic noise fluctuations. However, this data set can be viewed as a generally accurate magnetic representation of the site.

The magnetic survey showed a very active magnetic zone in the entire survey area. The region just east of the anchor is relatively quiet. The anchor itself shows up as a very large anomaly, greater than 2,000 gammas (nanoteslas). Adjacent to the anchor to the north is a distinct, several-hundred-gamma anomaly. The area northwest showed a series of large anomalies that extended throughout the rest of the survey area. Although it is impossible to determine exactly what caused the anomalies, the contour map represents a highly concentrated area of magnetic intensity around the anchor (Figure 3.10). These anomalies surrounding the anchor indicate that structure appearing in the 1984 photographs was still extant.

ANCHOR ANALYSIS

Although 1993 fieldwork exposed little of *Comet's* remains, it was possible to completely expose and record the anchor. *Comet's* anchor

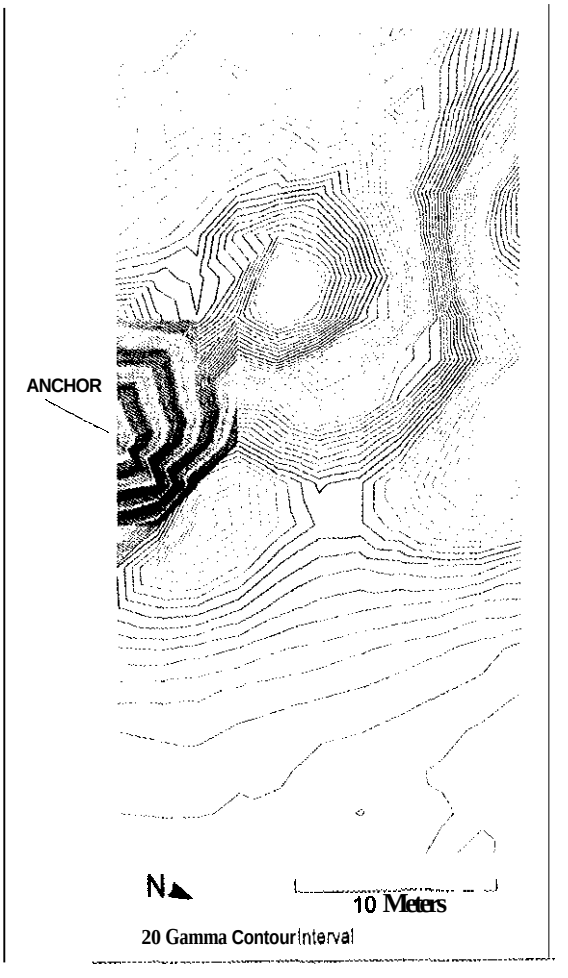

Figure 3.10. *Comet* site magnetometer data. The survey block is 40 m by 20 m.

is iron, with a collapsible iron stock (Figures 3.11–3.13). The anchor is fitted with a ring, but no cable is present. The overall length is 7 ft. 11 in.; stock length is 7 ft. 9% in. Anchor arms are 3 ft. long, with 5 ft. 6 in. between palm tips. The palms measure 1 ft. 3% in. wide by 1 ft. 6 in. long, and 1¼ in. thick.

Contemporary late-nineteenth century and early-twentieth century vessels carried a variety of anchors. Classification rules required most ocean-going vessels carry at least three, usually four, anchors, including two bowers, a stream, and a kedge (Desmond 1984:156). The bower anchors were the largest and most important anchors aboard a vessel. They were "lowered from the bow, hence their name . . ." and were kept rigged and ready for deployment at all times (Paasch 1977:150). The stream and kedge anchors were smaller (stream about one-third the weight of the bower, and the kedge about one-half the weight of the stream) and often broken-down and stowed below-decks until needed. These smaller anchors were used for such things as moving the vessel around (kedging), temporary anchoring, and as a stern anchor to keep the vessel from swinging in a tide (Paasch 1977:151).

Classification rules stipulated anchor-type's size (weight) based on a vessel's registered tonnage (Paasch 1977:151). Calculating an anchor's weight can determine what role it played on a vessel. The *Cyclopaedia of Useful Arts* (1854) provides a formula for estimating anchor weight (in hundredweights [cwt] = 110 pounds): cwt = Overall length^3 x ,0114 (Murphy 1993:288). Using this formula, *Comet's* anchor weighs approximately 5.6 cwt or 616 lbs. A table of minimum anchor weights for sailing vessels found in Desmond (1984) shows a 400-ton vessel (*Comet* registered 429 gross and 368 net tons) was required to carry two 1,850-lb. bower anchors, a 600-lb. stream anchor and a 300-Ib. kedge anchor. The anchor found on *Comet* most likely represents its stream anchor.

Comet's original contract states the vessel was equipped with one 1,800-lb. anchor, one 1,550-lb. anchor, and one 400-lb. kedge (JPSL 1886). No mention is made of a stream anchor. It is quite likely, however, that the vessel changed or replaced anchors during its 24-year career.

If this anchor represents *Comet's* stream anchor, then a number of questions are raised. Murphy (1993:288) states that, because vessels carried at least four anchors, "multiple anchors are expected on wreck sites." In addition, "if a ship were in distress, the bower and other

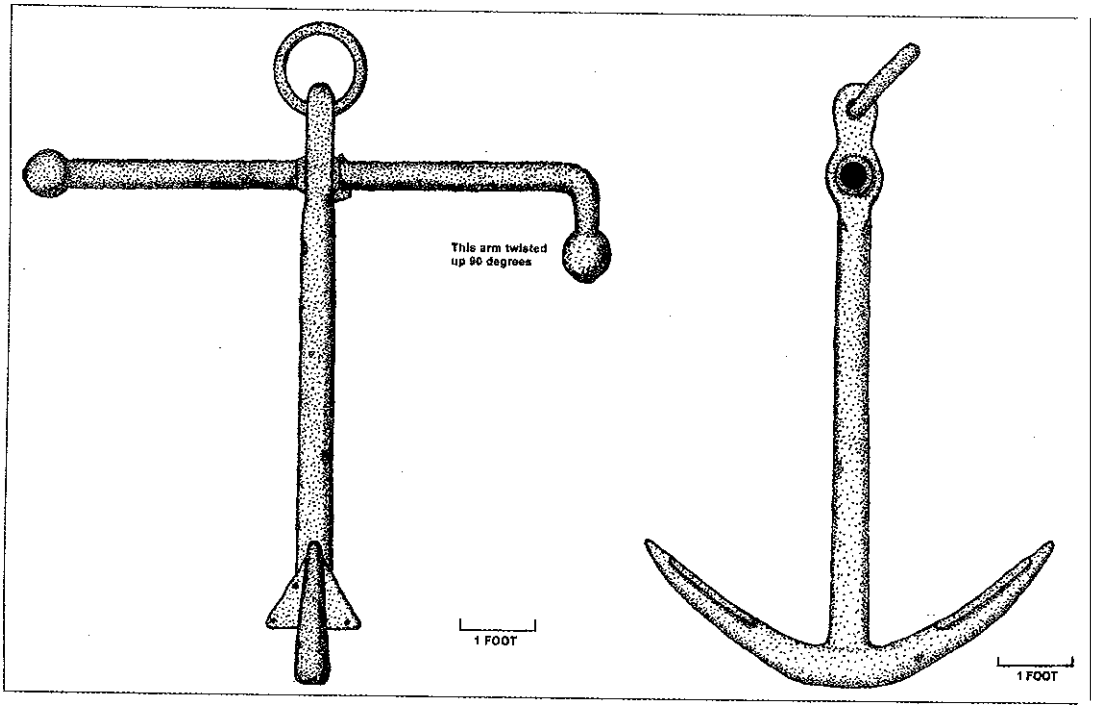

Figure 3.11. *Comet's* anchor. Drawing by Matt Russell.

Figure 3.12. *Comet's* anchor after exposure in 1993. NPS photo by Matt Russell.

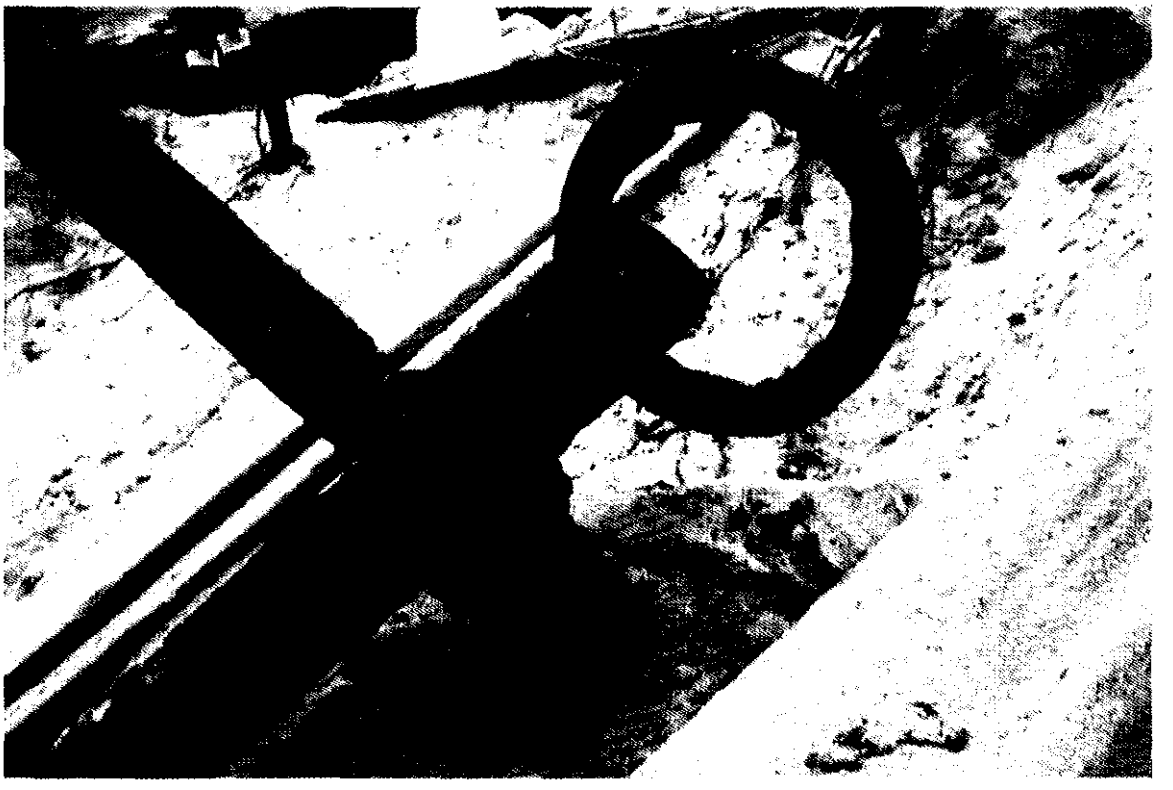

Figure 3.13. *Comet's* anchor ring. NPS photo by Malt Russell.

anchors might be deployed and perhaps lost; smaller anchors would, consequently, be more likely to be found near the structure of a shipwreck" (Murphy 1993:288).

In *Comet's* case, however, anchors were probably not deployed during the wreck event. After the schooner struck Wilson Rock, it was intentionally grounded in Simonton Cove, so unless anchors were deployed when the vessel initially struck, it is not likely they were dropped to keep the schooner from going ashore on San Miguel Island. **Also,** *Comet's* wreckreport notes that the only action taken to avoidcasualty was that the vessel "lowered the sails to ease the strain" (NA 1911:RG 36:Wreck Report Number 221). No mention is made of deploying anchors. The most likely scenario, then, is that *Comet's* other anchors were either removed during salvage operations in the months following the wreck event, or are still buried elsewhere in Simonton Cove.

Besides documenting *Comet's* anchor, 1993 fieldwork confirmed that extensive remains were likely present beneath the sand and established that site documentation could only take place after winter storms removed overlying beach sand. This finally occurred in March 1999.

CHAPTER 4

Comet Site Discussion

SITE LOCATION

The *Cornet* site is located in Simonton Cove, on San Miguel Island's northern shore, in Channel Islands National Park, California (Figure 4.1 and 4.2). The site's exposed portion is highly compact and lies about 180 m northeast of a US Navy range pole. The site's proximity to the high-tide line changes with the amount of sand on the beach: in 1993, when *Comet* was completely buried, the site was about 12 m above the high-tide line; in 1999, the site was located between the high- and low-tide lines.

RESEARCH METHODOLOGY

Five days were spent during the full documentation phase of the *Comet* project. Researchers defined several goals for the project, including: 1) a detailed description of site nature, extent and preservation; 2) producing a site map for use in interpretation and monitoring future exposures; 3) detailed measured drawings of all vessel elements and features; 4) complete photographic and video documentation; and 5) collecting relevant samples for analysis, especially wood samples.

Fieldwork was scheduled to take advantage of a series of negative tides from April 18–23, 1999. Although *Comet's* remains were more exposed than they were in 1984, each day during the recording process the remains were dug out to the water table. Researchers used shovels to remove sand from various areas around the bow so they could be drawn, photographed and videotaped. Because the site is relatively small, the most efficient methodology for site mapping was to establish a central datum and use a Brunton Pocket Transit mounted on a tripod to turn angles to each feature mapped and a tape to measure the distance. Nearly 100 points were mapped across the hull remains, and direct measurements and scale drawings were used to map the structure around these points. All site features, such as the capstan, windlass, outer hull planks, and forecastle-deck planking, were drawn to scale, and the entire site was documented with video and photographs. In addition, four wood samples, five fasteners, and one caulking sample were collected for analysis.

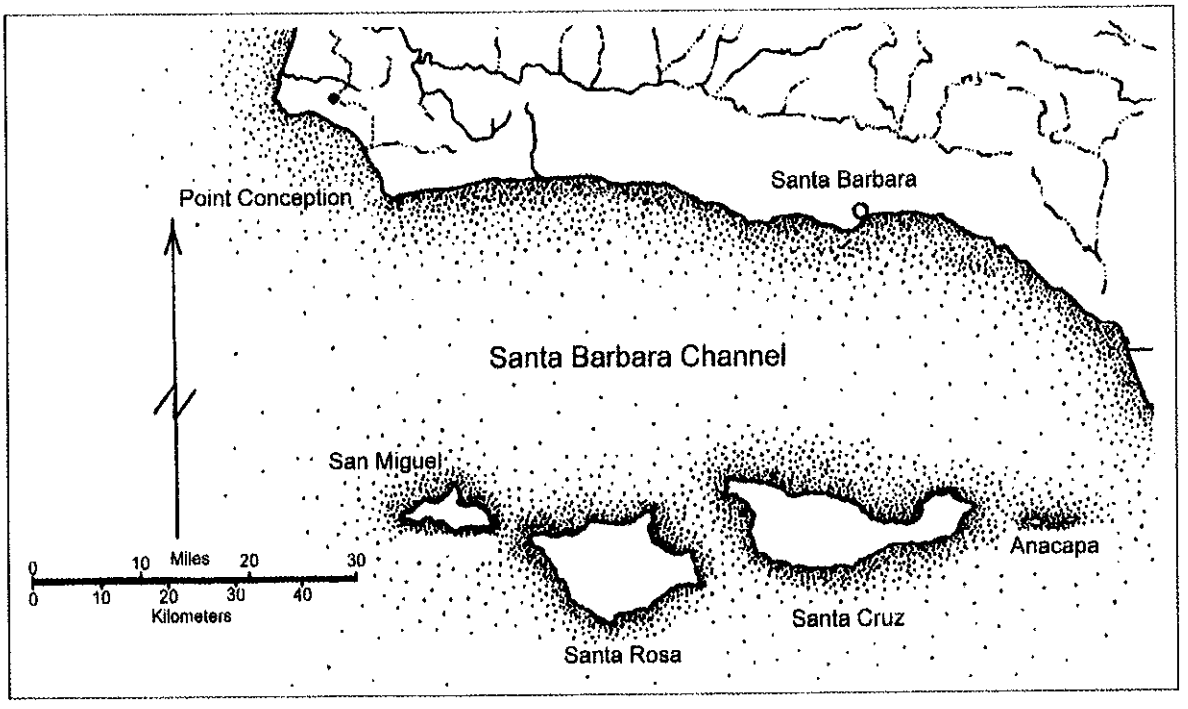

Figure 4.1. Channel Islands National Park.

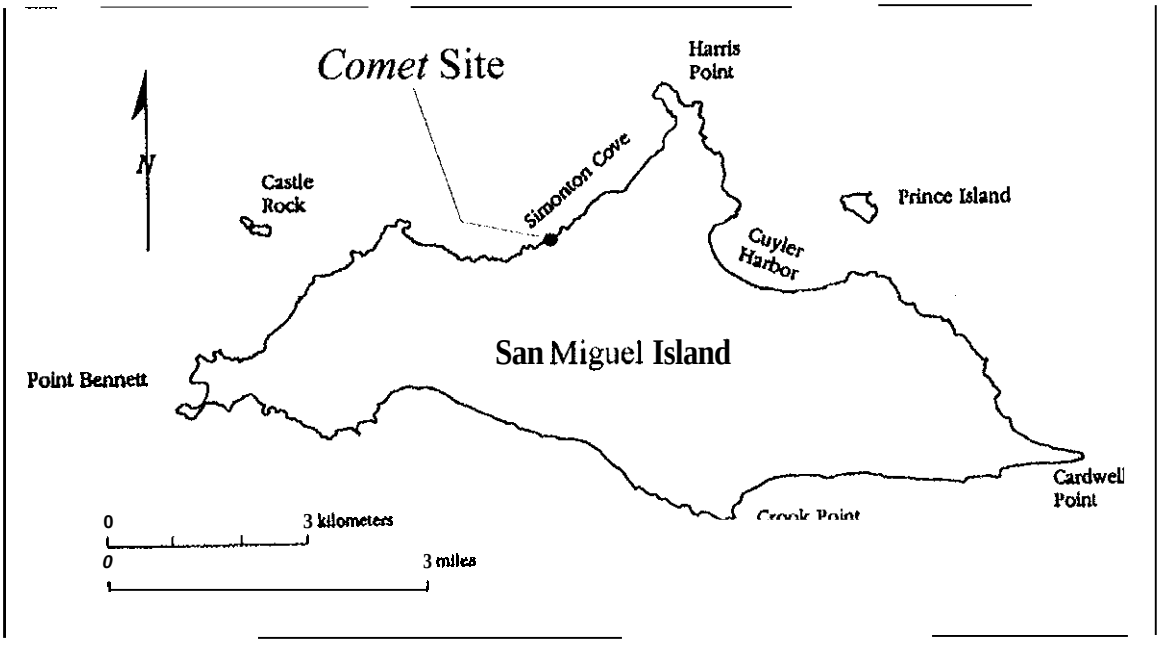

Figure 4.2. *Comet* site location on San Miguel Island.

SITE DESCRIPTION

Comet's hull remains consist of the vessel's remarkably intact bow section, from just aft of the forecastle-deck-break forward. The site is compact, entirely encompassed within an area approximately 10 m x 8 m. The nearly intact bow section points out to sea on a heading of 317° magnetic, and the bow is heeled 55" to starboard and tilted forward 20". Much of the bow's port side has been worn away by natural deterioration (Figures 4.3–4.6).

Nearly all *Comet's* original bow structure and related features are represented on the site (Figure 4.7). Exposed structural elements include port-bow framing and outer-hull planking; the partially intact forecastle deck and forecastle-deck beams; the partially intact main deck and main-deck beams below the forecastle deck; the pawl post (sometimes called a pawl bitt or Samson post) extending through the main deck and broken off at the forecastle-deck level; the bowsprit, extending from where it is stepped into the pawl post's forward face to about 19 ft. forward of the bow; the forecastle- and main-deck deck-hooks and waterway hooks; and several bow pointers. Other features present are bow rigging elements and ground tackle features including an anchor; the capstan mounted in its original location on the forecastle deck; the intact log windlass' starboard half, still mounted in its original location on the main deck, along with the iron parts of the windlass' port half; the port bow stopper or riding chock; and the port hawse pipe. Although more of the wreck is exposed than the 1984 photographs show, much of the starboard bow still lies deeply buried in the sand and was not documented.

SITE ANALYSIS

Analysis of *Comet's* bow remains logically falls into three categories: wooden bow structure, bow rigging components and ground tackle elements. Each category is discussed separately. Comparisons are made to *Comet's* original construction contract and the American Shipmasters' Association *Rules for the Construction of Wooden Vessels* (1879) to see if actual construction varied from planned construction. Classification rules such as those published by the American Shipmasters' Association were used by marine underwriters to determine insurance premiums and establish minimum standards for ship construction for insurance purposes. To meet classification standards for insurance purposes, many vessels built in the US were constructed according to standards published annually in the *Record of American and Foreign Shipping* by the American Shipmasters' Association, beginning in 1870 (Luckenbach 1943:1). Comparing classification rules for wooden ship construction and the original construction contract to *Comet's* remains can help to determine if actual construction followed published standards and written agreements, or if cost-cutting shortcuts were taken. In addition, both natural and cultural site-formation processes have significantly affected the site. With only *Comet's* bow remaining, it is obvious that significant natural and cultural forces worked to remove the remainder of the vessel, and these processes are examined.

BOW STRUCTURE

Comet's exposed bow structure includes most principal components used in wooden sailing vessel bow construction. Because the wreck is heeled over to starboard, the starboard side remained deeply buried in the sand and only the port side was accessible for documentation. Port-side hull remains includes six frame pairs, two hawse timbers, and the port knighthead, along with outer hull planking and interior ceiling planking. The stempost was not observed during documentation because it was

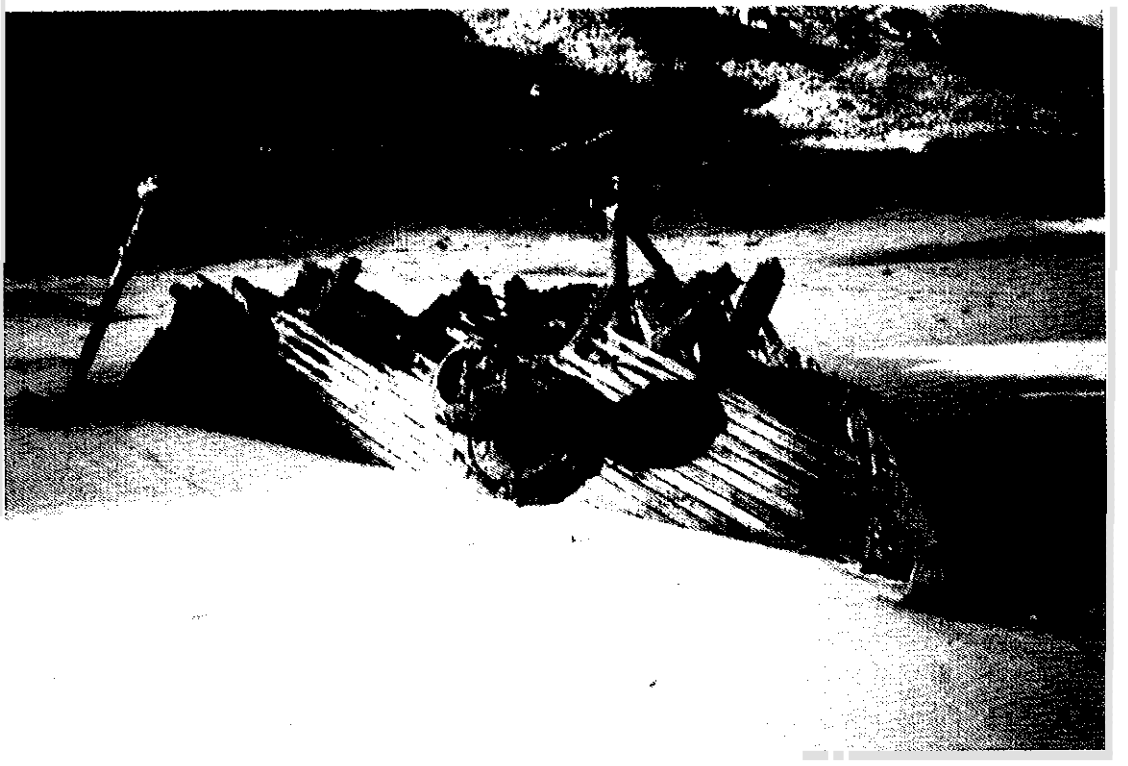

Figure 4.3. *Cornet* site in April 1999, looking down on the forecastle deck with the capstan mounted to it. The bow is to the right. NPS photo by Matt Russell.

Figure 4.4. *Cornet* site in April 1999, looking at the port side outer hull timbers. NPS photo by Don Morris.

Figure 4.5. *Comet* site in 1999, looking towards the windlass (mounted on the main deck) in the center of the photo, with the capstan (mounted on the forecastle deck) to the right. NPS photo by Don Moms.

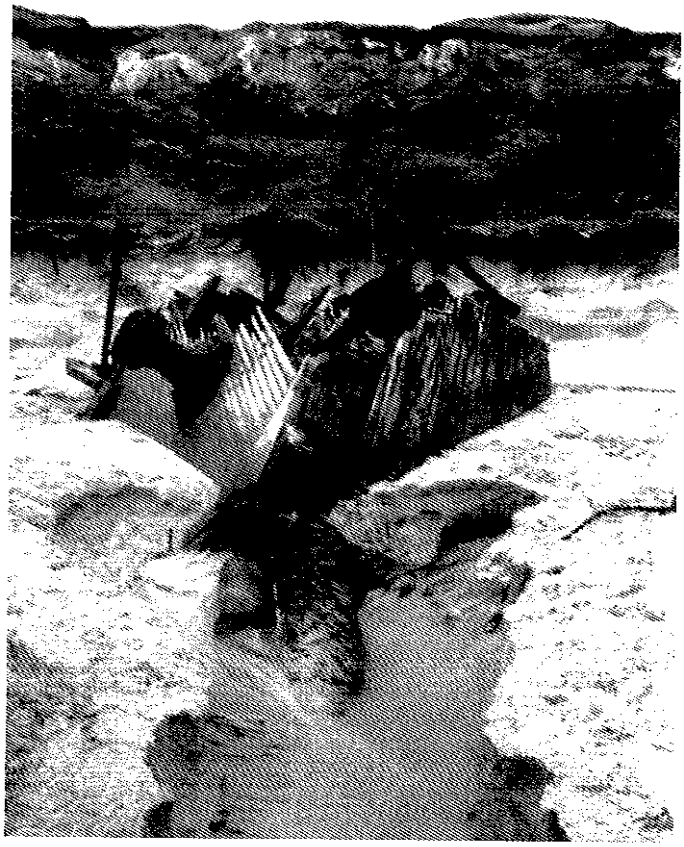

Figure 4.6. *Comet* site in April 1999, looking straight towards the bow, which is canted to the left in this photo. The forecastle deck is to the left, port side outer hull planking to the right, and the bowsprit is in the bottom of the photo. NPS photo by Matt Russell.

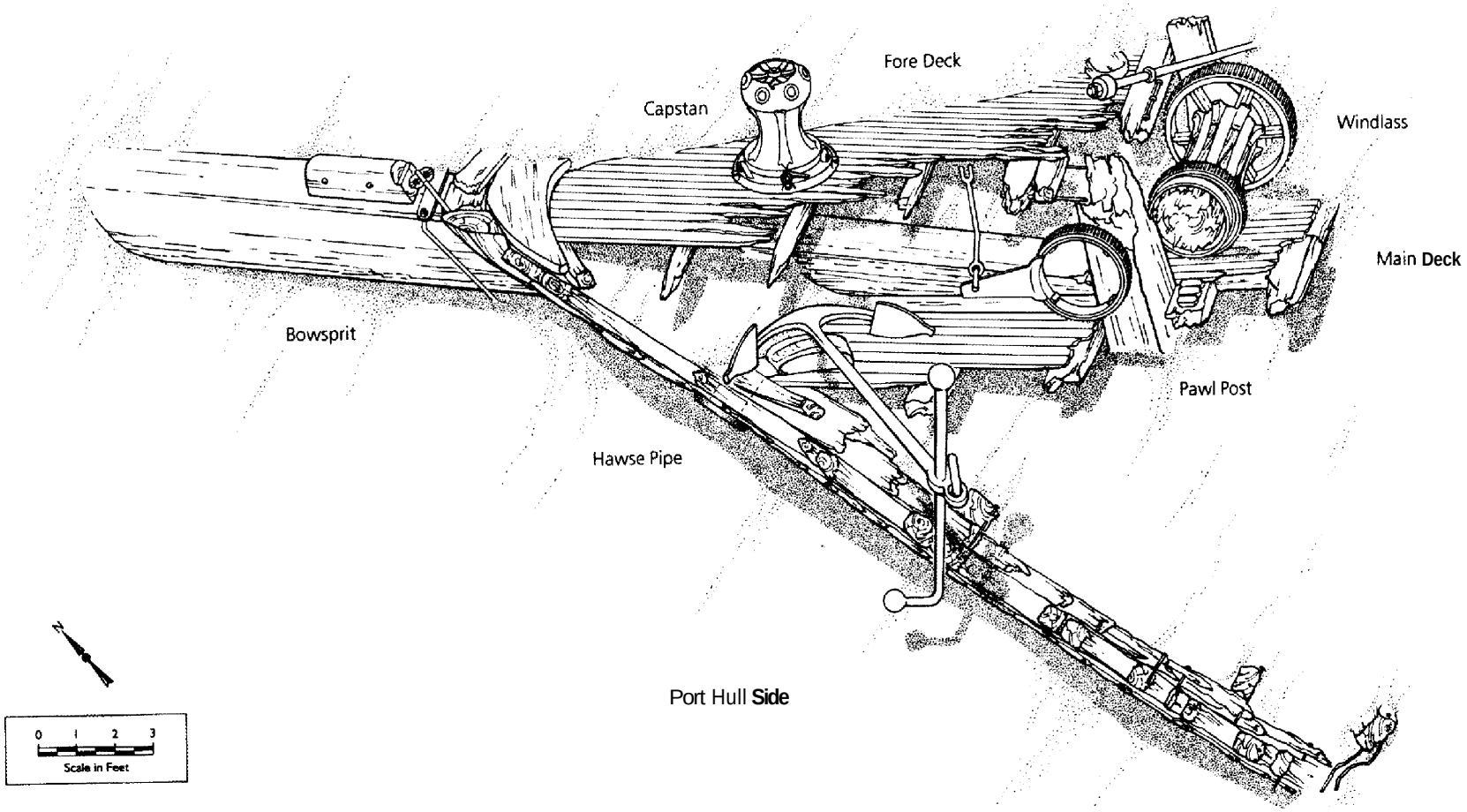

Figure 4.7. *Cornet* site plan. **Field** drawing by Matt Russell. Final drawing by Robert **Turner.**

buried in the sand beneath the bowsprit. Interior hull features such as pointers, hooks, clamps and decks are also present, as well as the bowsprit and pawl post.

Bow framing in a wooden vessel includes cant frames, hawse timbers, knightheads and the stempost (Figures 4.8–4.10). Cant frames are frame pairs made up of futtocks and top timbers (futtock heels are notched into the bow deadwood, so there are no floors) that are rotated forward of perpendicular to the keel to create the vessel's bow form. Forward of the cant frames are hawse timbers, which solidly fill the space between the cant frames and knightheads. A vessel's hawse pipes pass through the hawse timbers, which provide a solid foundation for fastening the hawse pipe flanges (Desmond 1984:55). The knightheads are timbers located on both sides of the stempost and extend above it to support the bowsprit, which rests atop the stempost and between the knighthead timbers (Desmond 1984:50).

Although it was difficult to verify because of limited access and complex angles involved, the six frame pairs are most likely all cant frames as opposed to half frames (Figure 4.11; see Figure 4.10). At their greatest dimension, which was closest to the sand, each frame measured 9% in. sided and 10 in. molded. Each frame's molded dimension at the top, approximately main-deck level, was 8 in. *Comet's* contract specifies frames as sided 10 in. and molded 13 in. at the keel and 6% in. at the deck (J. Porter Shaw Library, San Francisco [JPSL], Hall Brothers Shipyard Contract No. 49, 1886). *Rules for the Construction of Wooden Vessels* stipulates a 400-ton vessel built of "yellow fir" should have top timbers (frames at deck-level) sided 8 in. and molded 7% in. (American Shipmasters' Association 1879:xxviii). Taking into account timber erosion from natural weathering, *Comet's* cant frames' sided dimension matches that specified in the contract and exceeds that given in the rules; molded dimensions exceed both the contract and rules, but this is possibly only true for the cant frames, as no square frames were present to be examined. Individual frames making up each frame pair were fastened together with treenails measuring between 1% and 1% in. in diameter. A combination of treenails and iron drift pins fasten the outer hull planking, frames and ceiling planking together. Forward of the forward-most frame pair is what appears to be a single frame, but it is likely its adjacent frame member is broken below the sand line and could not be observed. This makes a total of six frame pairs represented on site.

Forward of the frame pairs are two hawse timbers, or hawse pieces (Figure 4.12; see Figure 4.11). These timbers ". . . close the openings between forward cant frames from the knightheads aft as far as necessary to give good solid fastening for hawse-pipe flanges. The lower ends of hawse timbers are bolted to the apron and the several hawse timbers are edge-bolted together. . ." (Desmond 1984:55). The hawse pieces are 6 in. molded and 2 ft. sided, though their sided dimension appears to narrow over their length, and the aft hawse piece is eroded on its aft face, making an accurate original sided dimension difficult to measure. The top edge of the hawse pipe is located 5 ft. 5 in. below the upper surface of the hawse timbers. Forward of the hawse timbers is the port-side knighthead (Figures 4.13 and 4.14; see Figure 4.11). The knightheads strengthen the bowsprit and support the hooding ends, which are the forward ends of the outer hull planks (Desmond 198450). The knighthead is rhomboid in shape, with each side varying slightly between 1 ft. 2 in. and 1 ft. 3 in., and its shape narrows and curves over its length. Neither hawse timbers nor knightheads are mentioned in *Corner's* contract, but the ***Rules for the Construction of Wooden Vessels*** states that knightheads and hawse timbers should have double the sided dimension of the frames (American

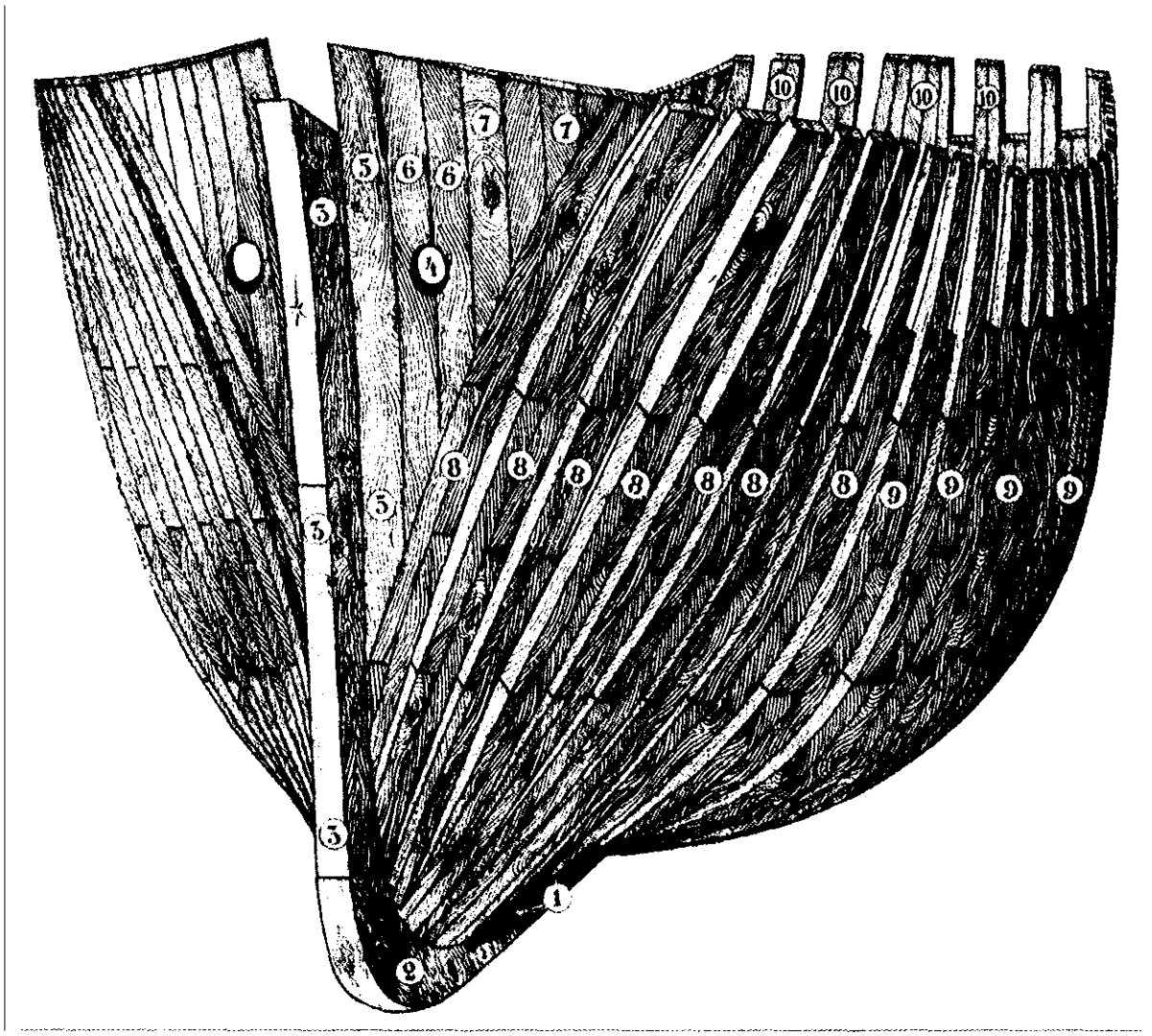

Figure 4.8. Bow framing, including stempost (3), knighthead (5), hawse timbers *(6)* and cant frames (8) (from Paasch 1977:plate 5).

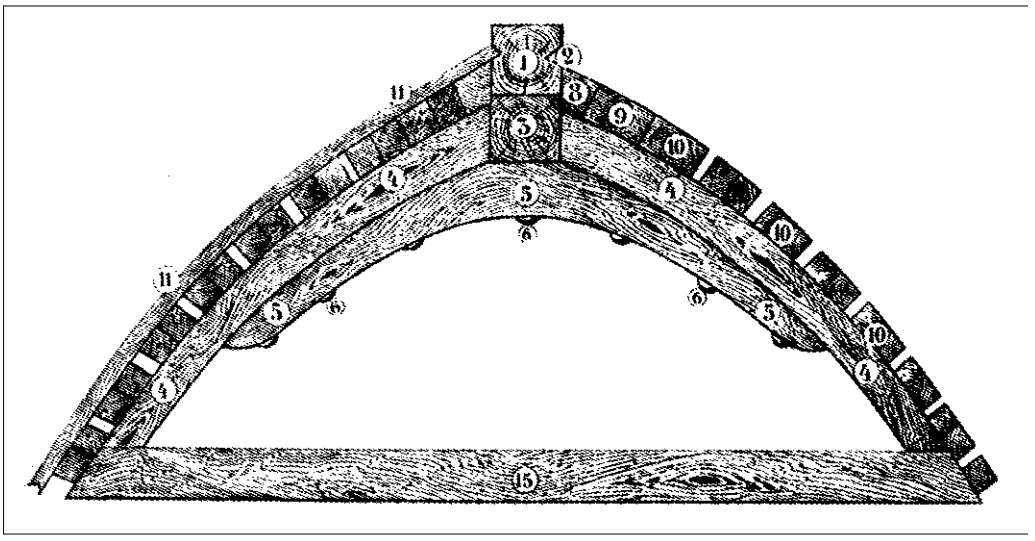

Figure 4.9. Bow framing, including stempost (1), knighthead (8), hawse timbers (9) and cant frames (10). Additional features observed on *Comet* include the deck hook (5), deck beams (15) and outer hull planking (11) (from Paasch 1977:plate 15).

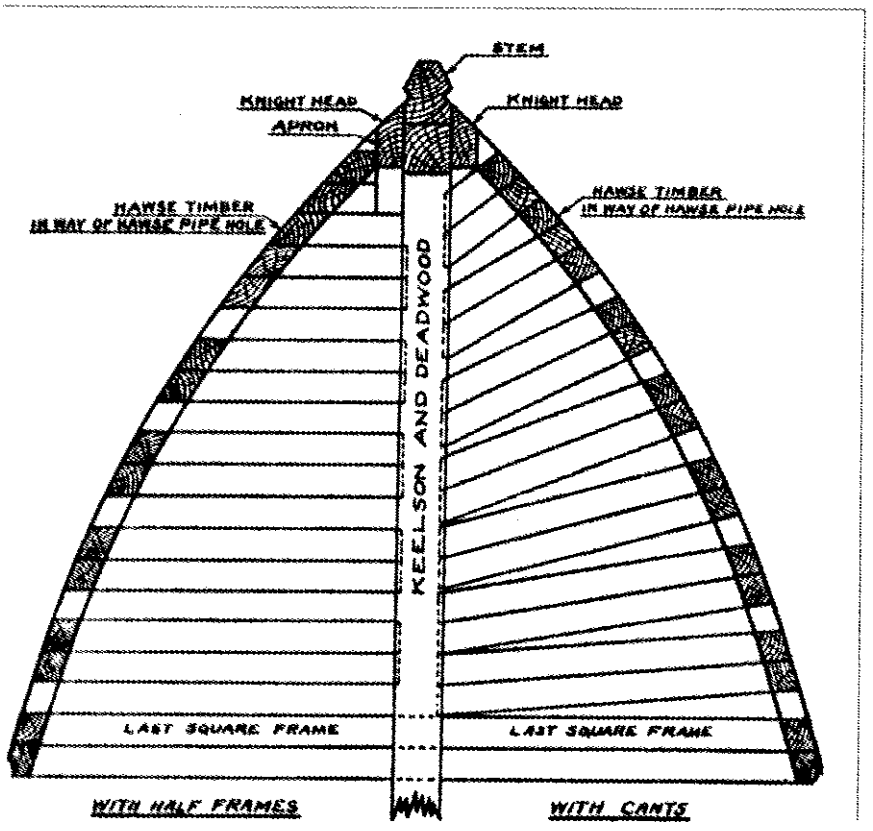

Figure 4.10. Bow framing, showing difference between cant frames and half frames (from Curtis 1919:58).

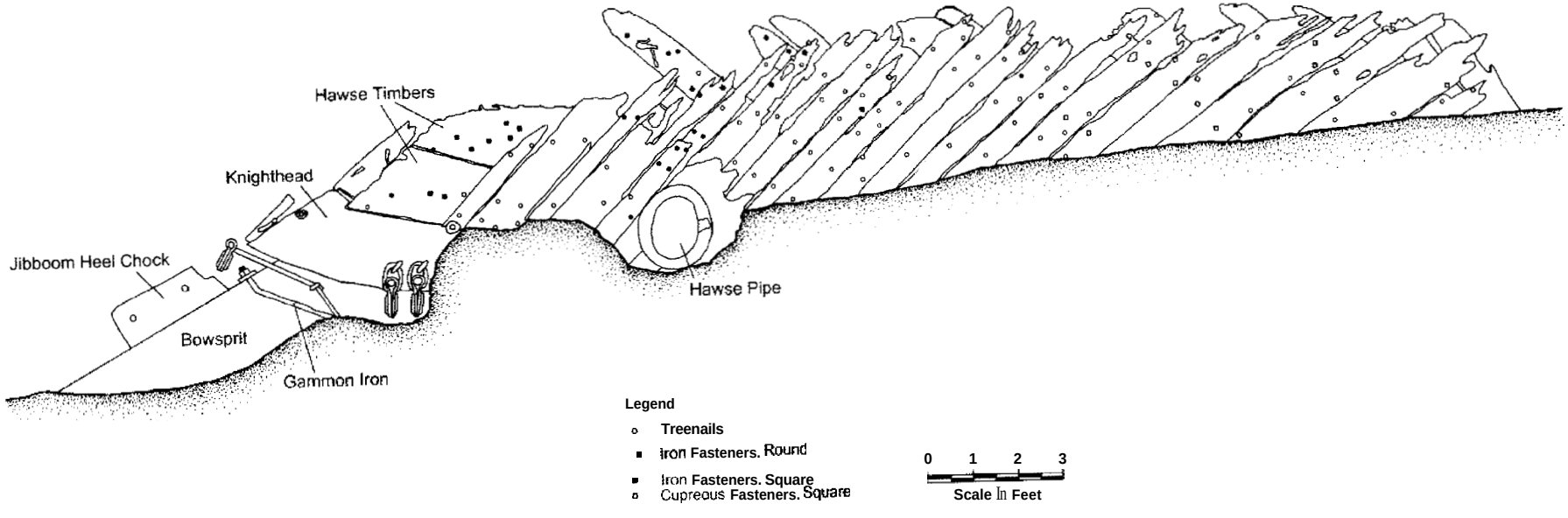

Figure 4.11. *Comet* port elevation drawing. Drawing by Jim Bradford.

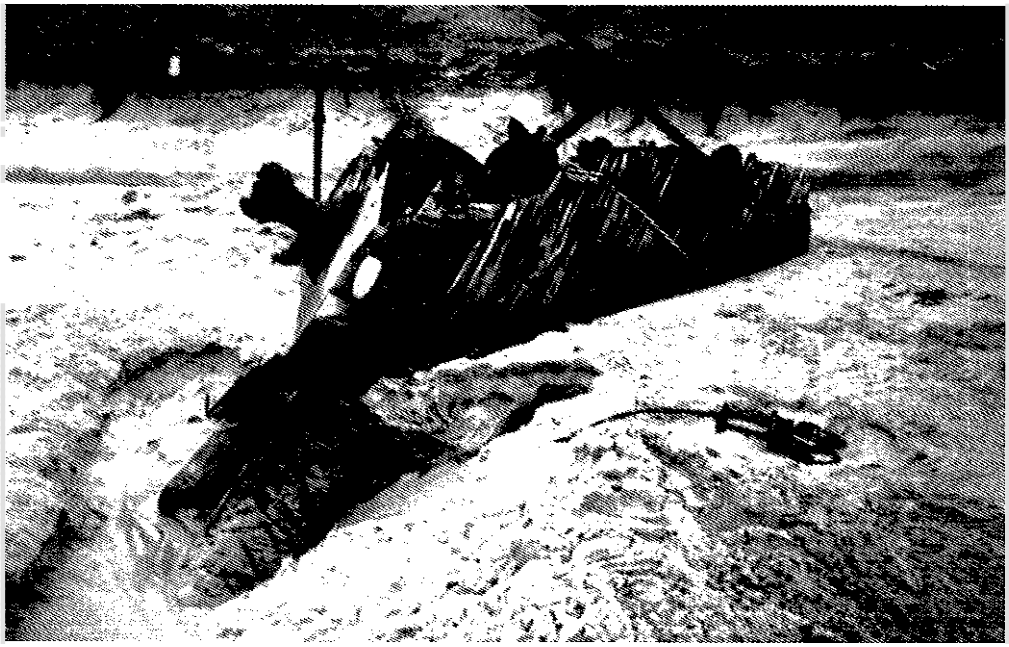

Figure 4.12. *Comet's* bow. The hawse timbers are in the center with the white float on them. The hawse pipe is visible at the sand-line, to the right of the hawse timbers. In the right foreground is an unattached rigging element. NPS photo by Matt Russell.

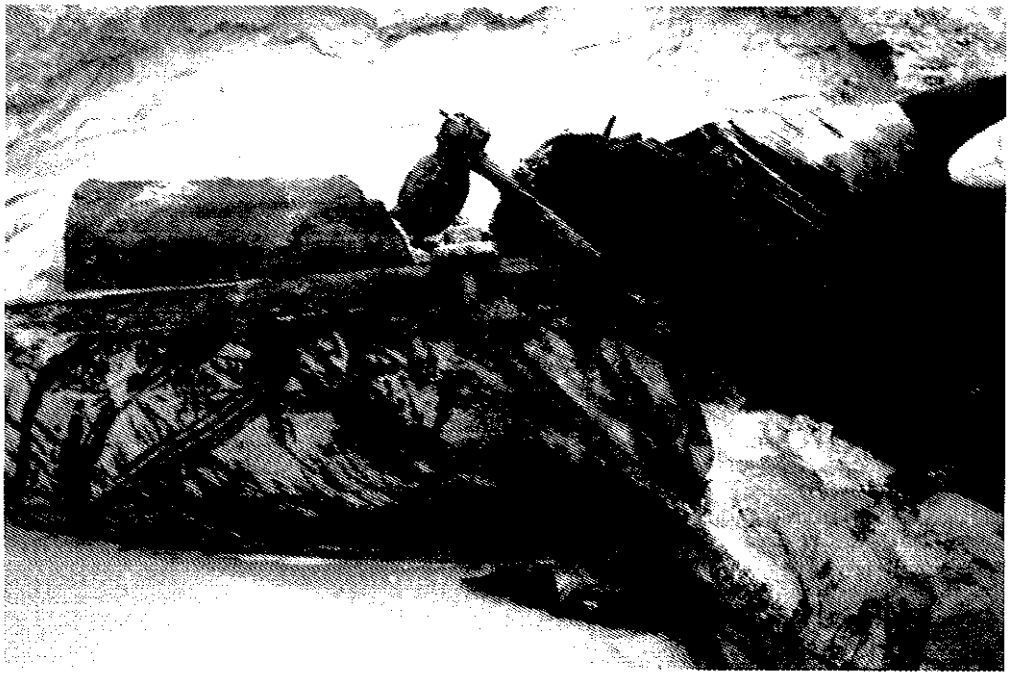

Figure 4.13. Side view of *Comet's* port knighthead (to the right) and bowsprit where it exits the hull. The jibboom heel chock is on top of the bowsprit. Also visible is the gammon iron and the bull's eye for the fore-stay. NPS photo by Matt Russell.

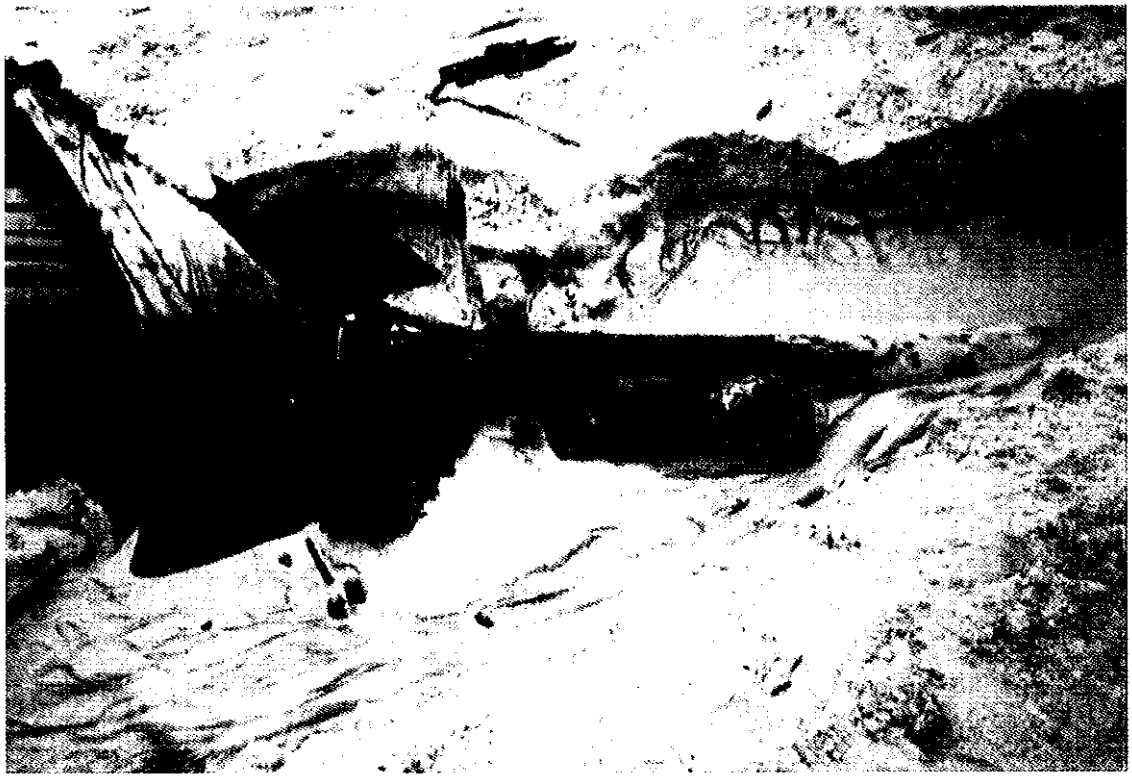

Figure 4.14. Top view of *Cornet's* knighthead (to the lower right of the white float), bowsprit and jibboom heel chock. NPS photo by Matt Russell.

Shipmasters' Association 1879:xxi). *Comet's* hawse timbers are sided more than double the frames' sided dimensions, and the port knighthead, if measured on the diagonal, also follows this specification. The starboard knighthead and stempost were buried in the sand beneath the bowsprit and neither was observed.

A total of 21 outer hull planks were recorded, varying in width from 5 in. to 1 ft. 2 in. and from 1 to 2 in. thick (see Figure 4.11). *Comet's* contract states planking should be 4 in. thick, while *Rules for the Construction of Wooden Vessels* specifies it should be 3½ in. thick (JPSL 1886; American Shipmasters' Association 1879:xxviii). Erosion likely accounts for the difference between *Cornet's* outer hull planking thickness and the thickness recorded in historical documents. Outer hull planks were fastened to the frames with a combination of treenails, round iron fasteners, and square iron and cupreous spikes, which conforms to outboard fastenings specified in the contract (JPSL 1886). Two strakes overlay the outer hull planking directly above the hawse pipe, creating a double layer of planking. This feature is undocumented in contemporary historical records, and how common a construction practice this was in Pacific Coast lumber schooner shipbuilding is unknown. The ends of eight ceiling planks were exposed on *Comet's* interior, varying between 6 and 8 in. thick, and attached to the frames with both round iron fasteners and wooden treenails. *Cornet's* contract states that the ceiling from the turn of the bilge to the clamps should be 8 in. thick (JPSL 1886), which matches on-site measurements, taking into account timber erosion. This far exceeds the 4 in. thick ceiling specified by *Rules for the Construction of Wooden Vessels* (American Shipmasters'

Association 1879:xxviii), however, thickened ceiling planking was commonly used in lumber schooners to increase longitudinal strength, which was necessary in a single-decked vessel (MacGregor 1982:63).

Both the main deck and forecastle deck are intact and in place from the centerline starboard, though almost the entire port half of each deck has deteriorated due to natural erosion (Figure 4.15). Four main-deck beams are visible supporting remnants of the main deck. Exposed ends of each deck beam are eroded, but dimensions vary from 10 to 13 in. wide and 7 to 9 in. thick, indicating the deck beams were originally at least 1 ft. 1 in. wide X 9 in. thick. Deck beams are specified in *Comet's* contract as being sided 14 in. and molded 11 in. (JPSL 1886), which matches reasonably, taking into account timber erosion. This again exceeds the 10½ in.-sided dimension specified in *Rules for the Construction of Wooden Vessels* (American Shipmasters' Association 1879:xxviii). Although not noted in the literature, possibly larger deck beams were used because of the large deckloads lumber schooners were required to carry. Thickening deck beams would have increased ship construction costs minimally, but returns on this small investment would have accrued throughout the vessel's operational life. Two deck beams are located directly fore and aft of the pawl post, a third is located 1 ft. 4% in. aft of the beam butting the pawl post's aft face, and the fourth is located 2 ft. 10% in. forward of the beam hutting the pawl post's

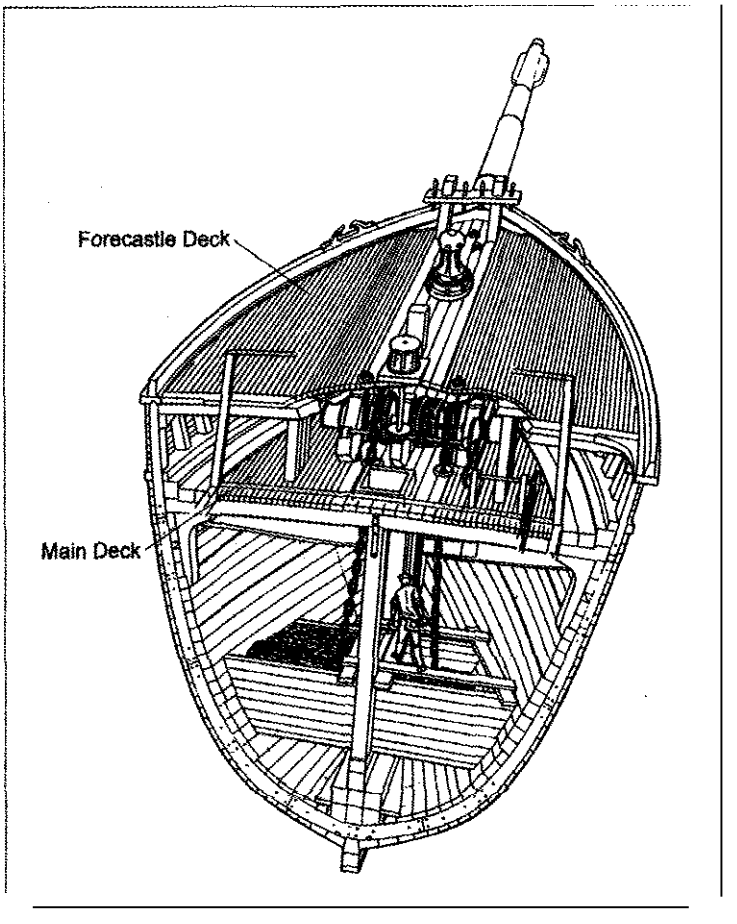

Figure 4.15. Bow section of a wooden-hulled schooner showing main deck, forecastle deck and location of windlass (from Greenhill and Manning 1995:90).

forward face. It is unknown if the latter beam is the forward-most beam or if there are more between it and the bow. Deck clamps (supporting structure for beam-ends) are not present on the port side. Twenty main-deck planks are visible: **12** starboard of the bowsprit and 8 to port. Deck planks are **3%** in. sided x **3** in. molded with a ¼-in. caulk-line between each at the surface. Deck planking is specified in the contract as 4 in. x 4 in., and in *Rules for the Construction of Wooden Vessels* as **3%** in. molded (JPSL 1886; American Shipmasters' Association 1879:xxviii). These figures are all reasonably close, and erosion could account for observed on-site differences. Each plank is fastened to each deck beam with two iron spikes. Main-deck spikes are 6 1/8 in. long with 7/16-in. square shanks and 13/16-in., four-faceted heads, and are countersunk and plugged with I-in. diameter wooden plugs. A main-deck hook and main-deck waterway hook are present in the bow. The forward ends of the main-deck planks rest on and are fastened to the main-deck hook and butt against the main-deck waterway hook, which follows the typical practice (Figure 4.16) (Curtis 1919:134–135, 144–145). As with the deck clamps, waterway strakes arc no longer present.

The starboard side of the forecastle deck is intact from the bow to the deck's aft end above the windlass (see Figures 4.3 and 4.6). Forecastle deck remains are supported by five deck beams; the three forward-most beams are 5½ in. sided, while the two aft beams, fore- and aft- the pawl post, are sided between 9% and 10% in. Like on the main deck, port clamps are absent. Thirty forecastle-deck planks are exposed; all 3 in. sided x 2% in. molded. Each plank is fastened with a single boat spike at its forward end, a single boat spike at its aft end (for complete planks), and a single boat spike in each deck beam. Forecastle-deck spikes are 5¼ in. long with 3/16-in. square shanks and 11/16 in., four-faceted heads and are countersunk and plugged with I-in. diameter wooden plugs. Deck plank forward ends are resting on and fastened to the forecastle-deck hook and are butted against the forecastle-deck waterway hook (see Figure 4.14). Again, like the main deck, waterway strakes are gone. Complete deck plank aft ends are resting on and fastened to a recessed shelf notched into the forward edge of the aft-most forecastle-deck beam (Figure 4.17). Forecastle deck beam and plank dimensions are not specified in either *Comet's* contract or *Rules for the Construction of Wooden Vessels.*

The pawl post, sometimes called the pawl bitt, Samson post or heel bitt when the bowsprit is stepped into it, is present from forecastle-deck level to the main-deck level, where it is buried in the sand (Figures 4.18–4.20). The pawl post is a solid timber, usually stepped into the keelson or bow deadwood, which extends upward and ends above forecastle-deck level (Chapelle 1973:368–370; de Kerchove 1961:91; Underhill 1958:88). In *Comet,* the pawl post served two purposes: I) the bowsprit's inboard end, called the heel, is stepped into the pawl post's forward face; so the pawl post serves as a major reinforcing member for the bow rigging; and 2) the windlass pawl was mounted on the pawl post's aft face, though neither the windlass pawl nor pawl rim are present on site. The pawl post measures I ft. 6 in. fore and aft **x** I ft. 7 in. side to side at main-deck level, and 1 ft. 4 in. fore and aft x 1 ft. 6 in. side to side at forecastle-deck level. Approximately 4 ft. of the pawl post was exposed.

Comet's bowsprit is present and appears to be completely intact, though its outboard end, called the head, could not be uncovered. The bowsprit heel is stepped into a 6-in. wide x 10-in. high x 7-in. deep notch in the pawl post's forward face. At the heel, the bowsprit is 10 in. high x I ft. 7 in. wide (the width of the pawl post). A filler piece is fitted below the bowsprit heel between the bowsprit and the main deck.

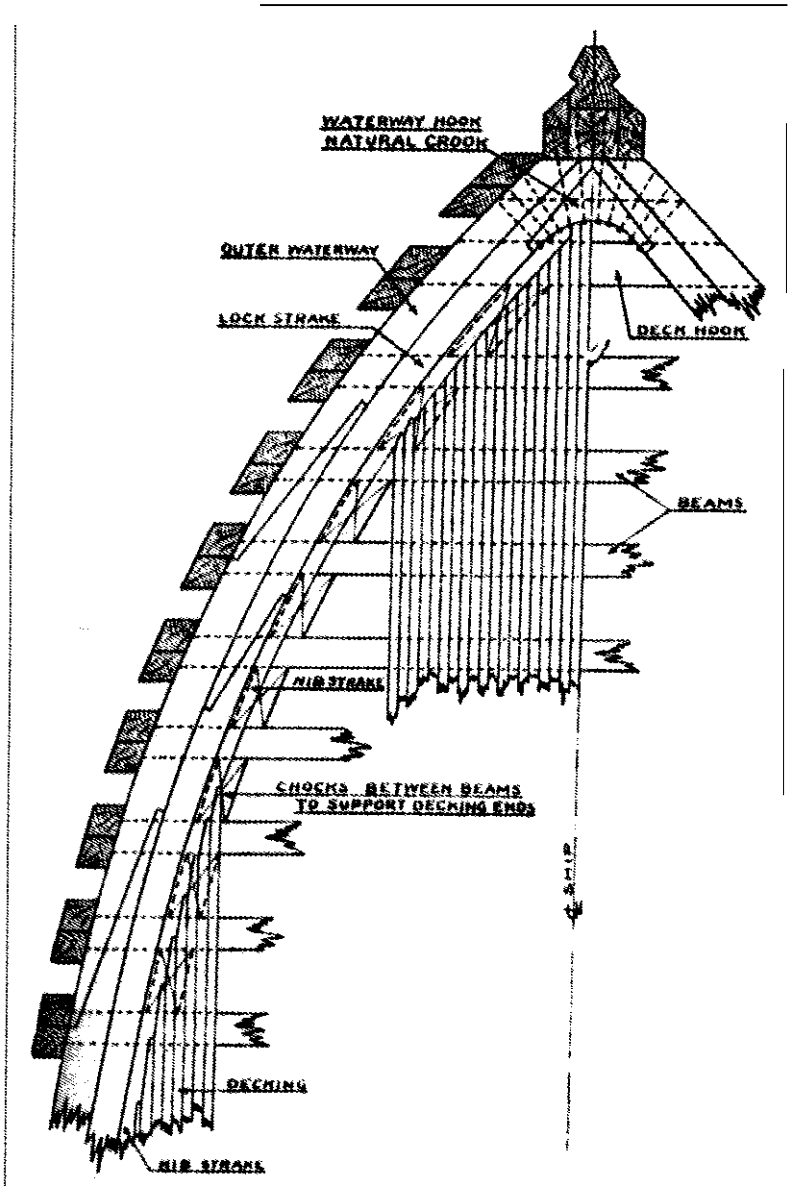

Figure 4.16. Planking details, showing deck and waterway hooks (from Curtis 1919:146).

Figure 4.17. Top-view of the aft end of the forecastle deck. The aft-most forecastle deck beam is the vertical timber in the center of the photo. The windlass is to the left, mounted on the main deck below; the starboard cathead is the angled timber to the right. NPS photo by Matt Russell.

Figure 4.18. Photograph taken from the perspective as if the viewer were standing on the main deck looking forward. The pawl post is to the left of the windlass. NPS photo by Matt Russell.

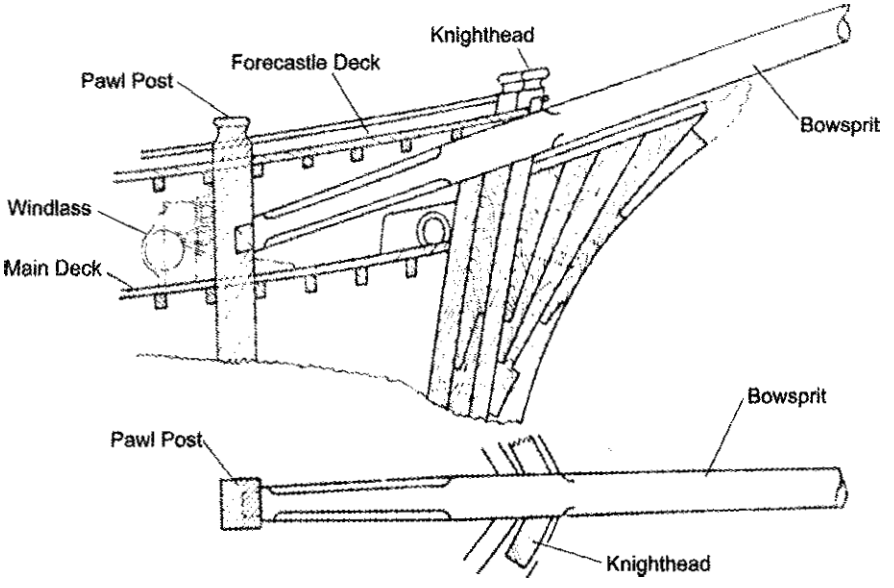

Figure 4.19. Schooner bow section showing the bowsprit stepped into the forward face of the pawl post (after Underhill 1958:88).

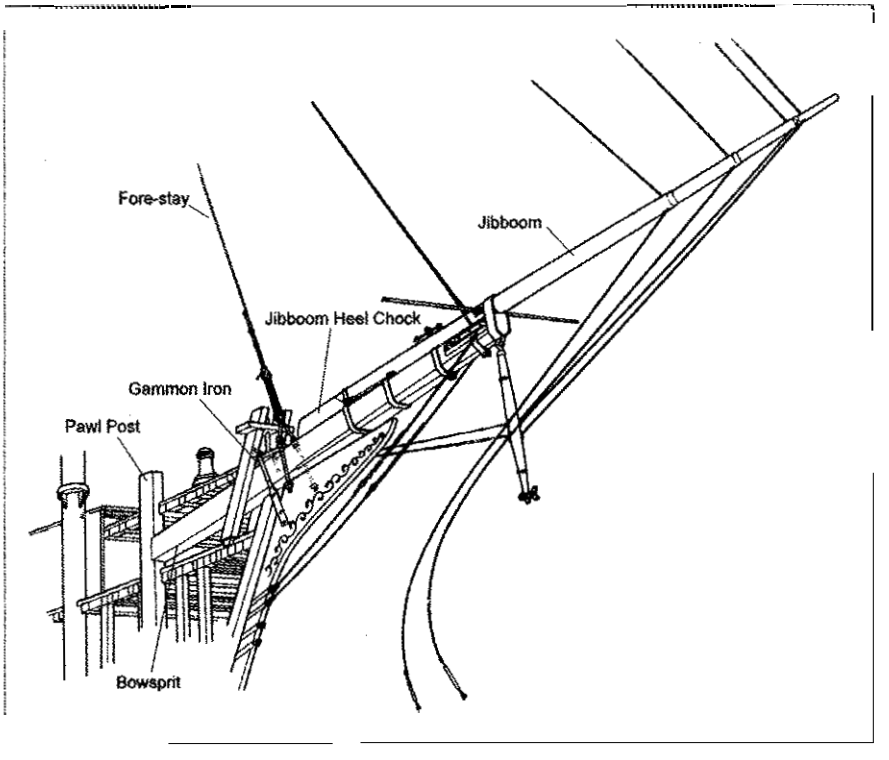

Figure 4.20. Schematic of a schooner bow-section, showing the bowsprit stepped into the pawl post, the jibboom, jibboom heel chock, gammon iron and fore-stay (after Greenhill and Manning 1995:113).

This filler piece is 9 in. thick, with an exposed length of 6 ft. 9 in. (its forward end was buried beneath the sand). The forward-most section of the bow, between decks, is buried in the sand, so the point where the bowsprit exits the hull could not be examined, however, the bowsprit presumably passes on top of the stempost and between the knightheads. Forward of the bow, the bowsprit transitions from a square cross-section to a rounded cross-section, and most likely begins to taper (see Figures 4.6 and 4.12–4.14). Just forward of the bow structure, the bowsprit is 2 ft. square.

The final structural members discussed are two timbers in the site's southwest corner, rising vertically out of the sand inside the ceiling planks (Figure 4.7). At the deepest exposure, about 2 ft. of these timbers were visible. The aft-most timber measures I ft. 2 in. x 9 in., and has two 7/8-in. diameter iron fasteners in it. The forward-most of these two timbers measures 11 in. x 7 in. These structural timbers are likely pointers, placed in the bow and stern angled down diagonally in their normal upright position (Figures 4.21 and 4.22). According to Curtis (1919:101), pointers are used to ". . . furnish additional stiffening to the hull at the locality where the pointer is placed, to aid in resisting panting movements and stresses, and. . . to add additional strength against torsional strains such as are experienced at the ends of a ship when rolling heavily at sea." Pointers are fastened at a 45" angle atop the ceiling planks and into the cant frames, and they extend from the lower part of the hull upwards to the first, or in *Comet's* case, main deck (see Great Lakes Register 1908:183; Curtis 1919:101–102). *Comet's* contract only states: ". . . there shall be breast hooks and pointers forward and aft . . ." (JPSL 1886).

According to the original construction contract, *Comet's* hull was constructed entirely of Douglas (yellow) fir, with the exception of the "outside of stem, rudder [stern] post, bitts, (with the exception of pawl bitt) . . . and windlass to be of hardwood (JPSL 1886). Visual examination of all exposed wooden structural members verified all were Douglas fir except the carrick bitt and windlass (see below). As noted above, *Comet's* hull was

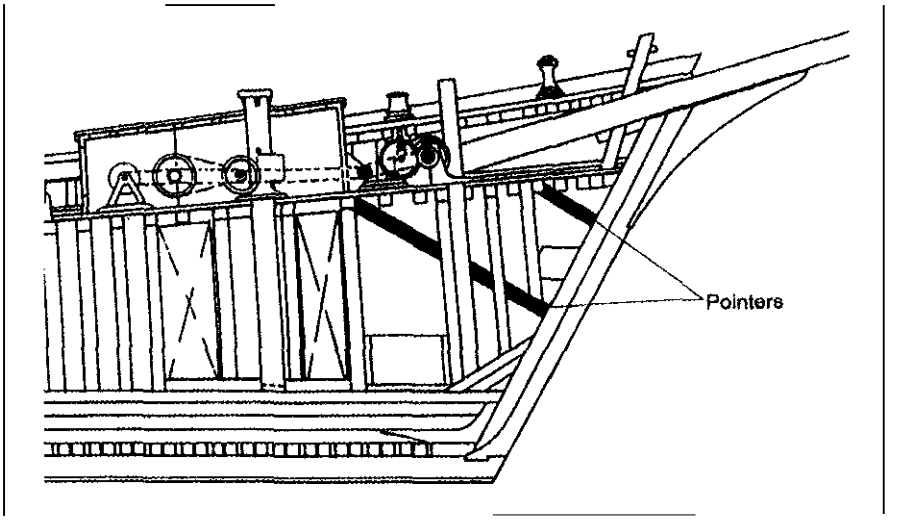

Figure 4.21. Bow pointers in a wooden-hulled schooner (after Greenhill and Manning 1995:63).

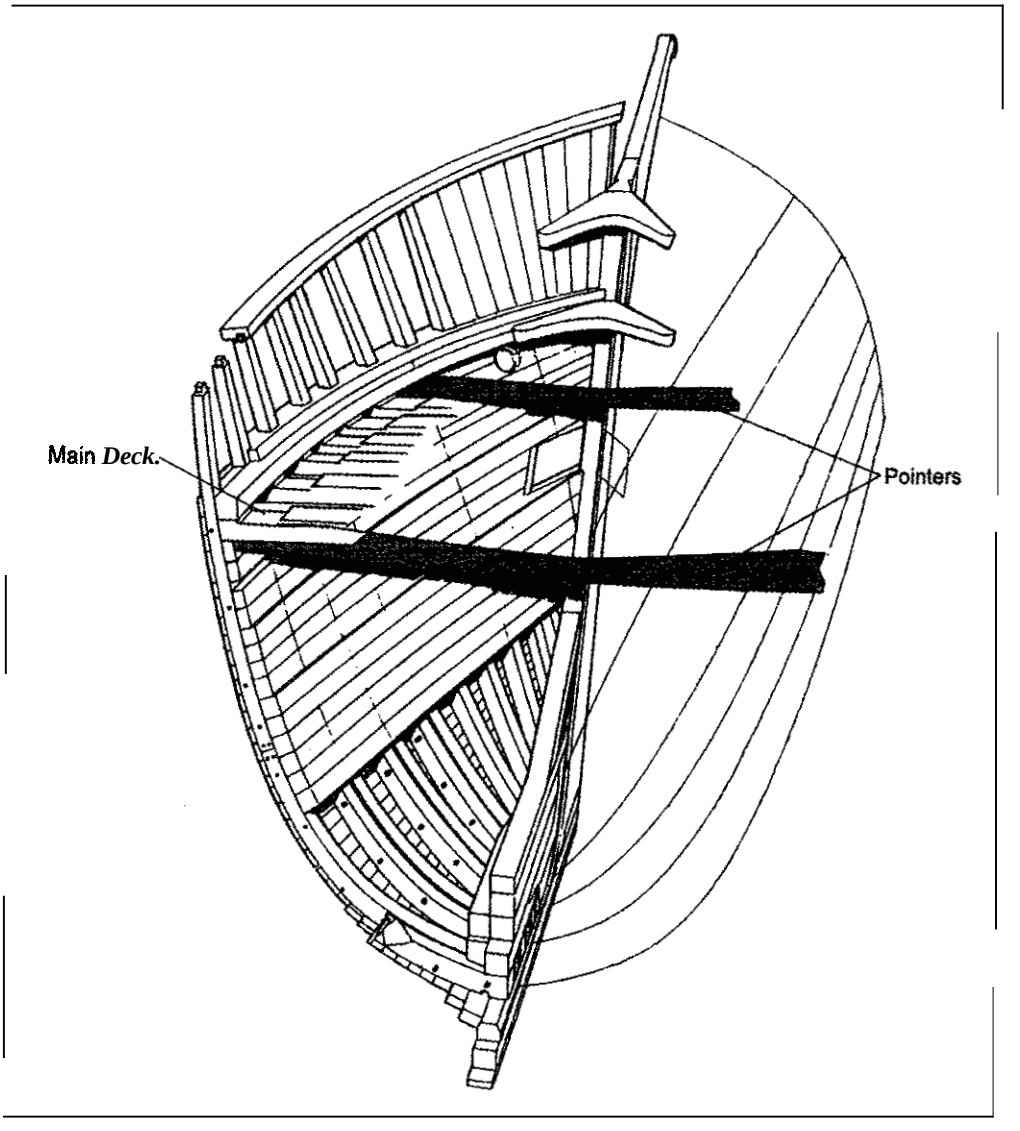

Figure 4.22. Schematic showing location of bow pointers in a wooden-hulled schooner (after Greenhill and Manning 1995:70).

fastened with a combination of iron and cupreous spikes, iron drift pins and wooden treenails. The contract gives specifics for many fastening types and sizes, and it notes that outer hull plank fastenings would include "treenails from turn of bilge to planksheer Locust" (JPSL 1886). Two treenails were sampled for wood identification (Field Samples #03 and 04), both from near the planksheer (main-deck line), hut it was impossible to determine if they were precisely from above or below the planksheer. Field Sample #03 is Douglas fir (*Pseudotsuga menziesii*), while Field Sample #04 is Osage-orange (*Maclura pomifera*) (Puseman and Scott Cummings 1999:Table 2). Osage-orange is noted to be "hard, heavy, strong and very durable" (Puseman and Scott Cummings 1999:2). It is unknown why locust was not used as specified, though perhaps Osage-orange was a suitable substitute, although this could not be

verified through documentary sources. In addition to fastenings, *Comet's* contract notes that caulking between the outer hull planks would be "six thread of oakum in garboards and hawsed, from thence to plank sheer four threads and hawsed . . ." (JPSL 1886). Oakum was a common caulkmg material, made from "strong, pliable tarred rope fibers obtained from scrap rope, which swell when wet . . . Before oakum is used it is worked or spun into threads . . ." (de Kerchove 1961:543). **A** caulking sample (Field Sample #05) was collected from between outer hull planks, and it was identified as jute (*Corcherus capsularis*), a well-known fiber commonly used for rope (Puseman and Scott Cummings 1999:2).

BOW RIGGING

Several major bow rigging elements arc present on the *Cornet* site, including the bowsprit, the gammon iron, the jibboom heel chock, two bullseyes attached to the port bow, a single bullseye above the bowsprit where it exits the hull, and an unattached iron rigging element located off the port bow. Each of these elements was an integral part of *Cornet's* bow rigging support.

As noted above, *Cornet's* bowsprit is intact and in its original position (see Figures 4.6, 4.7 and 4.12–4.14). On a wooden sailing vessel, the bowsprit, a spar that projects forward from the bow, serves two main purposes: 1)to extend the head sails forward, balancing the sail plan by counteracting the effect of the after sails; and 2) to support the foremast, which is fastened to it with stays (see Figure 4.20) (de Kerchove 1961:90). *Cornet's* bowsprit is formed from a single, large timber, most likely Douglas fir.

Just forward of the knighthead, set up around the bowsprit, is the gammoning or gammon iron (see Figures 4.13 and 4.14). The gammoning secures the bowsprit to the stempost and counters the upward lift of the foremast stays. Before the late nineteenth century, gammoning consisted of rope or chain lashed over the bowsprit; later it was replaced by an iron band, which could be tightened with nuts and screws (de Kerchove 1961:323). Chapelle (1973:479) depicts gammon iron consisting of iron straps for both the horizontal (across the bowsprit's upper surface) and vertical (down the bowsprit's sides and bolted to the stempost) components (Figure 4.23; see Figure 4.20). *Cornet* has 5-in. wide x 1-in. thick iron strap across the bowsprit's upper face secured by 1½-in. diameter, round iron bar stock on either side of the bowsprit to the stempost. The top of the bar stock is threaded and tightened to the strap with 2¾-in. hex nuts. The point where the bar stock attaches to the stempost was buried and could not be documented.

Located on the bowsprit's upper surface,just forwardof the gammon iron, is the jibboom heel chock or block, also called the jibboom saddle (see Figures 4.13 and4.14) (Chapelle 1973:359, 368, 503; de Kerchove 1961:408; Underhill 1958:33). This is a small wood block that supported the jibboom heel. The jibboom is a spar located on top of and attached to the bowsprit that extends forward of it (see Figures 4.20 and 4.23) (de Kerchove 1961:408).

Attached to the outside face of the port knighthead, above and forward of the hawse pipe, are two bull's eyes, which are similar to deadeyes used for mast shrouds but with a single large hole in the block instead of three smaller ones. The bull's eye wooden blocks are round, 7 in. in diameter with a 3-in. diameter hole, and 3¾ in. thick. The iron strops around the blocks are 1¾ in. wide, ¼ in. thickandareeachattached to the knighthead with an iron ring through an iron eyebolt (see Figure 4.13). *C.* **A.** *Thayer*, a late-nineteenth century, three-masted lumber schooner preserved at San Francisco Maritime National Historical Park, has identical bull's eyes in the same location that support the bowsprit guys (Figure 4.24) (see also Underhill

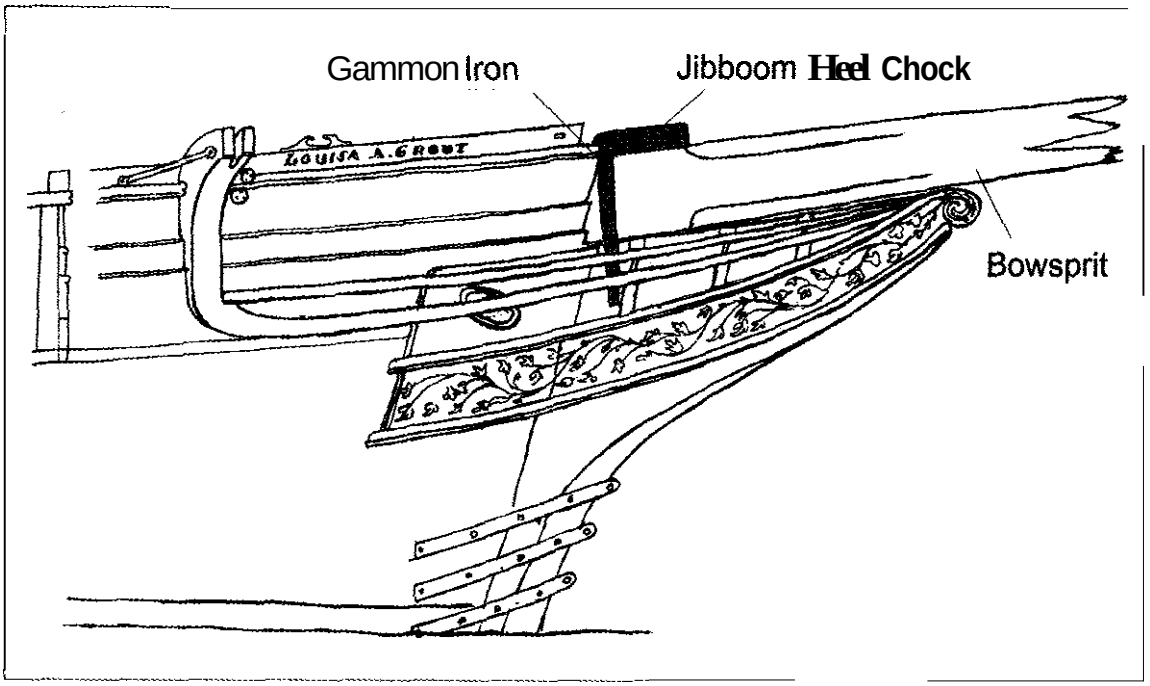

Figure 4.23. Vessel bow section showing location of the gammon iron and jibboom heel chock (after Chapelle 1973:359).

1978:103). Alternatively, these bull's eyes could support bow rigging footropes, jumbo stays or the martingale guys (Chapelle 1973:603; Underhill 1958:250).

Another single bull's eye attached to a 1½-in. diameter iron rod is bent over on top of the bowsprit (see Figures 4.13 and 4.14). The bottom of the iron rod is buried in the sand below the bowsprit, so its attachment point could not be recorded. The bull's eye itself has the same dimensions as the bull's eyes described above. This is most likely one of the attachment points for the fore-stay, which supported *Comet's* foremast. *C. A. Thuyer* has identical bull's eyes supporting its foremast in the same location. Underhill (1958:64) also depicts a similar forestay configuration (Figure 4.25).

Located off *Comet's* port bow is an unattached iron rigging element (Figure 4.26 and 4.27; see also Figure 4.12). It consists of a 4 ft. 3 in.-long iron rod with a 5 in. long x 2% in. wide x ½ in. thick plate on one end, attached to an 11%-in. long x ¾ in. diameter iron fastener that is attached to a 1 ft. 6½-in. long x 1-in. thick iron plate. The plate is pierced by two 1 ft. 3-in. long x 1-in. diameter eyebolts, each of which has an iron ring attached to an iron strop from a bull's eye or deadeye (the wooden block is no longer present), similar to those described above. In addition, the iron plate has two iron hooks cast as part of its upper surface. Although documentary research could not identify the element's proper name, its function was identified. This object was originally fastened to the foreside of the port cathead and provided the attachment point for the inner- and outer-jibboom guys, or shrouds (see Figure 4.25) (Underhill 1958:64). Chapelle (1973:398) notes that "as long as the schooners carried jibbooms, the jibboom shrouds were set up with hearts, or small deadeyes, and lanyards on the foresides of the catheads." *C.A. Thayer* has similar,

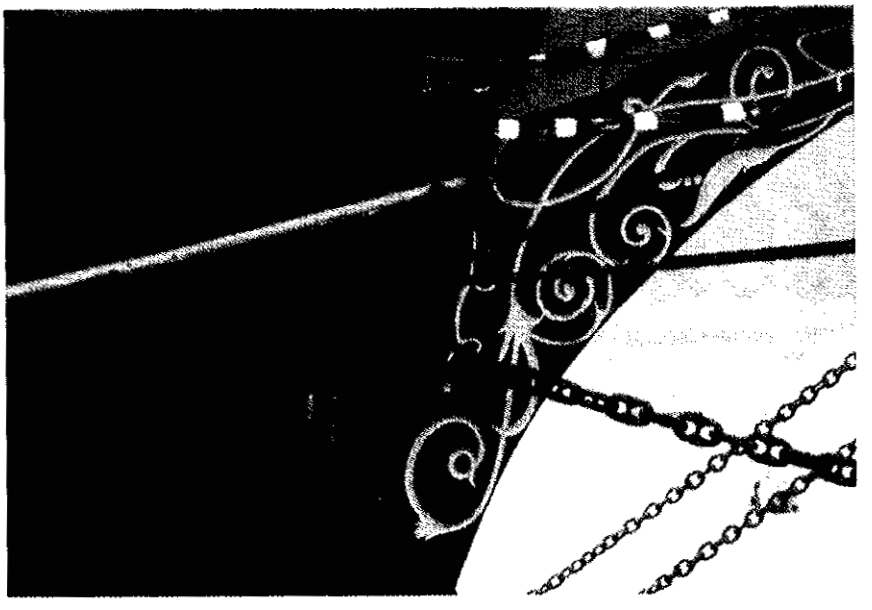

Figure 4.24. Bull's eye above and forward of the hawse pipe (at the top-center of photo) support the bowsprit guys on **C.A. *Thayer*** in San Francisco Maritime National Historical Park. NPS photo by Matt Russell.

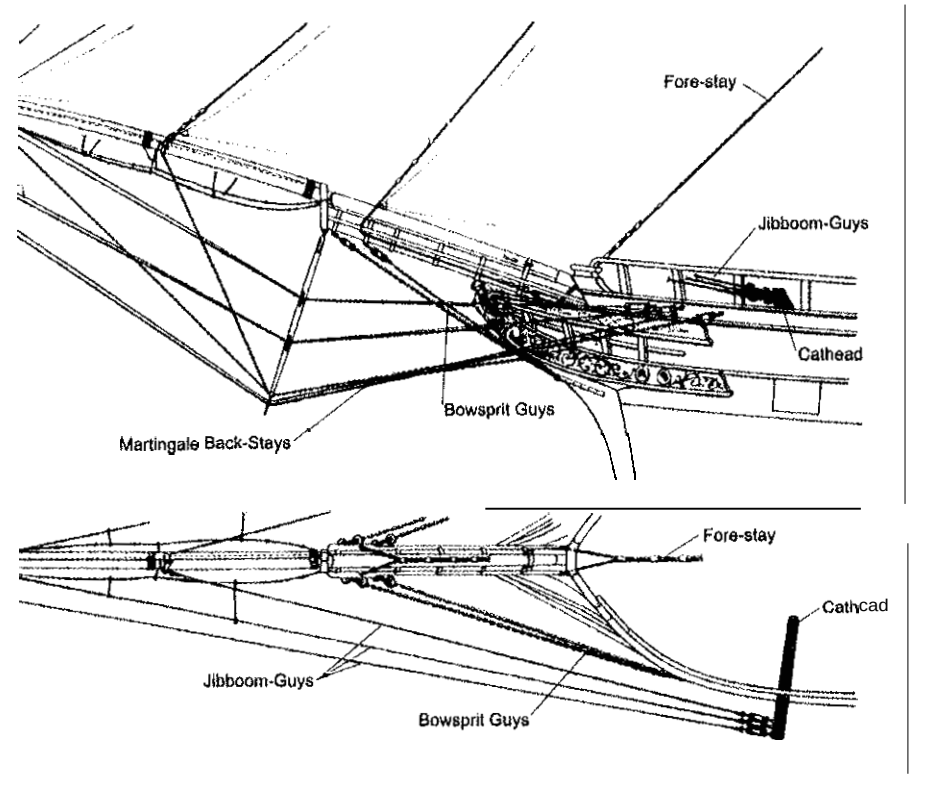

Figure 4.25. Bow rigging elements found on *Comet* site (after Underhill 1958:64).

Figure 4.26. Rigging element off *Comet's* port bow. NPS photo by Matt Russell.

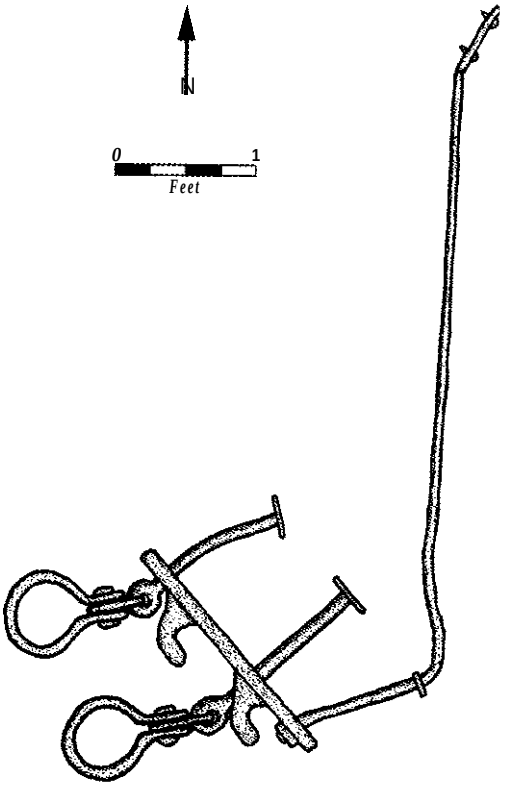

Figure 4.27. Rigging element from port cathead that secured the jibboom guys. Drawing by Matt Russell and Don Moms.

though not identical, rigging elements on the foresides of its catheads, which support the jibboom guys (Figure 4.28). In addition, historical photos of *Comet* wrecked in Simonton Cove give indirect evidence for this identification. Although the photos do not show the cathead or this particular element, they depict the jibboom guys coming to a point that can only be on the foresides of the catheads (see Figures 3.6 and 3.7). The iron hooks are called jib stay hooks (Greenhill and Manning 1995:103), and the iron rod was a brace between the cathead and the rail (Chapelle 1973:398). The rod's angle identifies this object coming from the port, rather than the starboard, cathead.

GROUND TACKLE

Ground tackle is a collective term referring to gear associated with anchoring. In *Comet's* case, this includes the windlass and disarticulated windlass parts, bow stopper, hawse pipe, starboard cathead and the anchor itself. Although not technically part of the ground tackle, the capstan is also discussed in this section. *Comet's* contract only notes that the vessel was equipped with a "24" windlass purchase. . . [and] #3 capstan . . ." (JPSL 1886).

Comet's windlass is a type generically known as an "Armstrong Patent", or pump-brake, windlass, which was introduced during

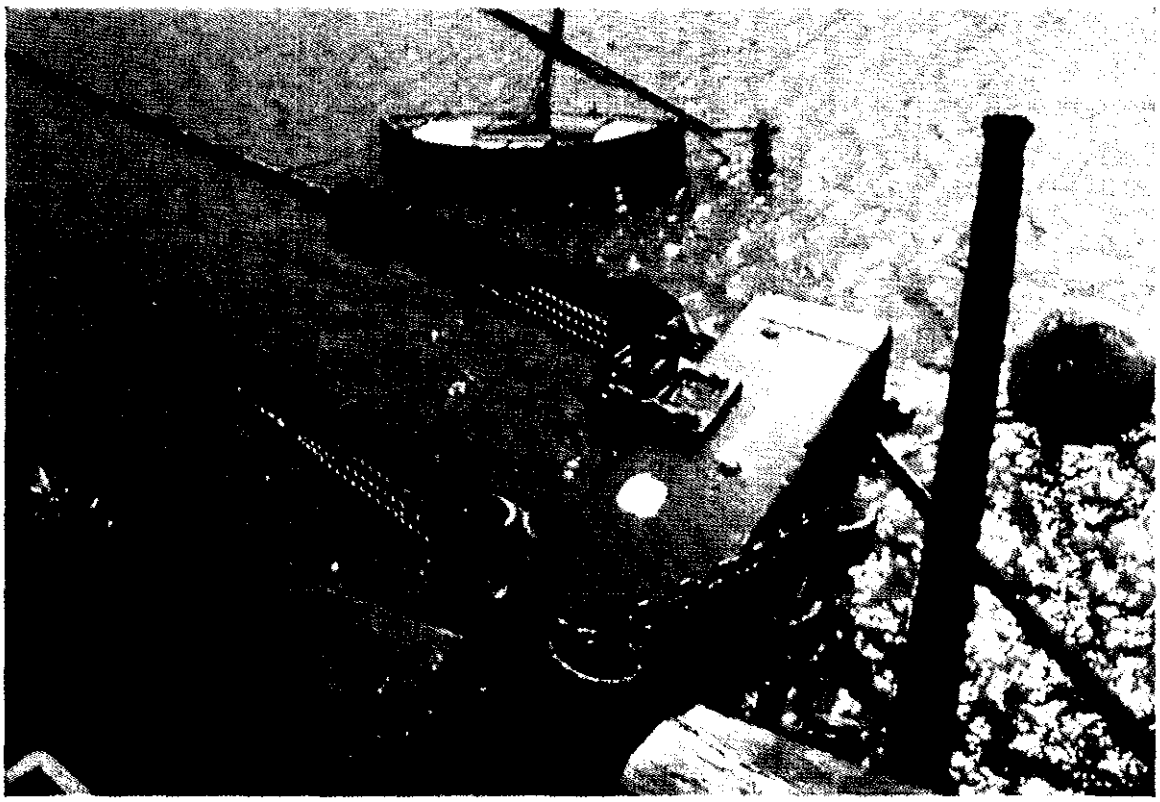

Figure 4.28. Rigging element supporting jibboom guys on forward side of *C.A. Thayer's* cathead. NPS photo by Matt Russell.

the 1840s, quickly replacing older models employing handspikes. Pump-brake windlasses, which used purchase levers and pump handles, remained in use into the twentieth century (MacGregor 1984:88). Chapelle (1973:677) refers to this type of windlass as a "wooden, or log, windlass, with pump-brake ironwork" (Figures 4.29–4.34).

Comet's windlass is mounted on the schooner's main deck, just aft of the pawl post (Figure 4.35 and 4.36). It has a wooden windlass barrel with iron whelps supported by hardwood carrick bitts, and it was worked with two iron purchase rims (with 1 ft. 11½ in., or 23% in., inside diameter) and purchase arms connected by iron purchase rods to a pivoting rocker, or crosshead, mechanism that was originally mounted above the windlass on the forecastle deck (Figure 4.37) (Chapelle 1973:669–680; Paasch 1890:Plate 70). Just forward of the pawl post at forecastle-deck level are two fasteners and the remains of a block that supported the crosshead on the forecastle deck. On either side of the pawl post are openings in the forecastle deck where the purchase rods connected the windlass purchase arms to the rocker on the forecastle above.

In this type of windlass, a pawl mounted on the aft face of the pawl post engaged either teeth cut into the center of the windlass barrel or an iron pawl rim mounted on the windlass barrel, which prevented the barrel from reversing direction (see Figures 4.33 and 4.34) (Chapelle 1973:677; Paasch 1977:Plate 70). Neither the pawl nor a pawl rim is present on the *Comet* site, possibly indicating the pawl engaged teeth cut directly into the windlass barrel rather than a pawl rim. An auxiliary warping drum, or gypsy head, was present outside each carrick bitt (see Figure 4.36). Only the starboard half of the windlass barrel remains intact, including the starboard purchase rim and arm, the starboard carrick bitt supporting the windlass, and the starboard warping drum outside it. Much of the windlass's port-side ironwork is present, however, laying loose on the main deck against the bowsprit's port side, including the port purchase rim (Figure 4.38), arm, and rod; four iron whelps from the port-side windlass barrel; a single large iron fastener with a diamond-shaped rove that held the port-side carrick bitt, cheek, and knee together (an identical fastener is still in place on the starboard side); and the rocker base plate with two fasteners that held it to the forecastle deck (Figure 4.39).

On the windlass's starboard end, just inside the carrick bitt, is a 3 ft. 6½-in. diameter gear that is not integral to the primary workings of the windlass. In addition, an upright iron shaft with some heavily encrusted bands that may have been gearing is sticking out of the sand near the windlass's starboard end (Figure 4.40; see Figure 4.36). Indications are that this is part of a messenger chain system for driving the windlass by an endless chain from a donkey engine. Figure 4.41 depicts a similar arrangement, with a geared shaft mounted above the windlass articulated to a large gear on the windlasss outside end. A similar system is depicted in drawings of *Bertha L. Downs*, another late-nineteenth century schooner (Figure 4.42) (Greenhill and Manning 1995:79–81, 90). Essentially, a messenger chain system was used to run several pieces of machinery off a single donkey engine. Using a system of shafts, gears, and chains, a donkey engine could power the windlass, pumps, auxiliary warping heads, and other hoisting equipment. As discussed in Chapter 3, *Comet* was probably not originally equipped with a donkey engine, but one was added in the 1890s.

Included in the iron material located on the main deck are an eyebolt fastened into the bowsprit's port face with another eyebolt attached to it, some small link chain with 2-in. long x %-in. diameter links, 10 loose iron fasteners, and an iron bar measuring 3½ to 4 in. square x 3 ft.

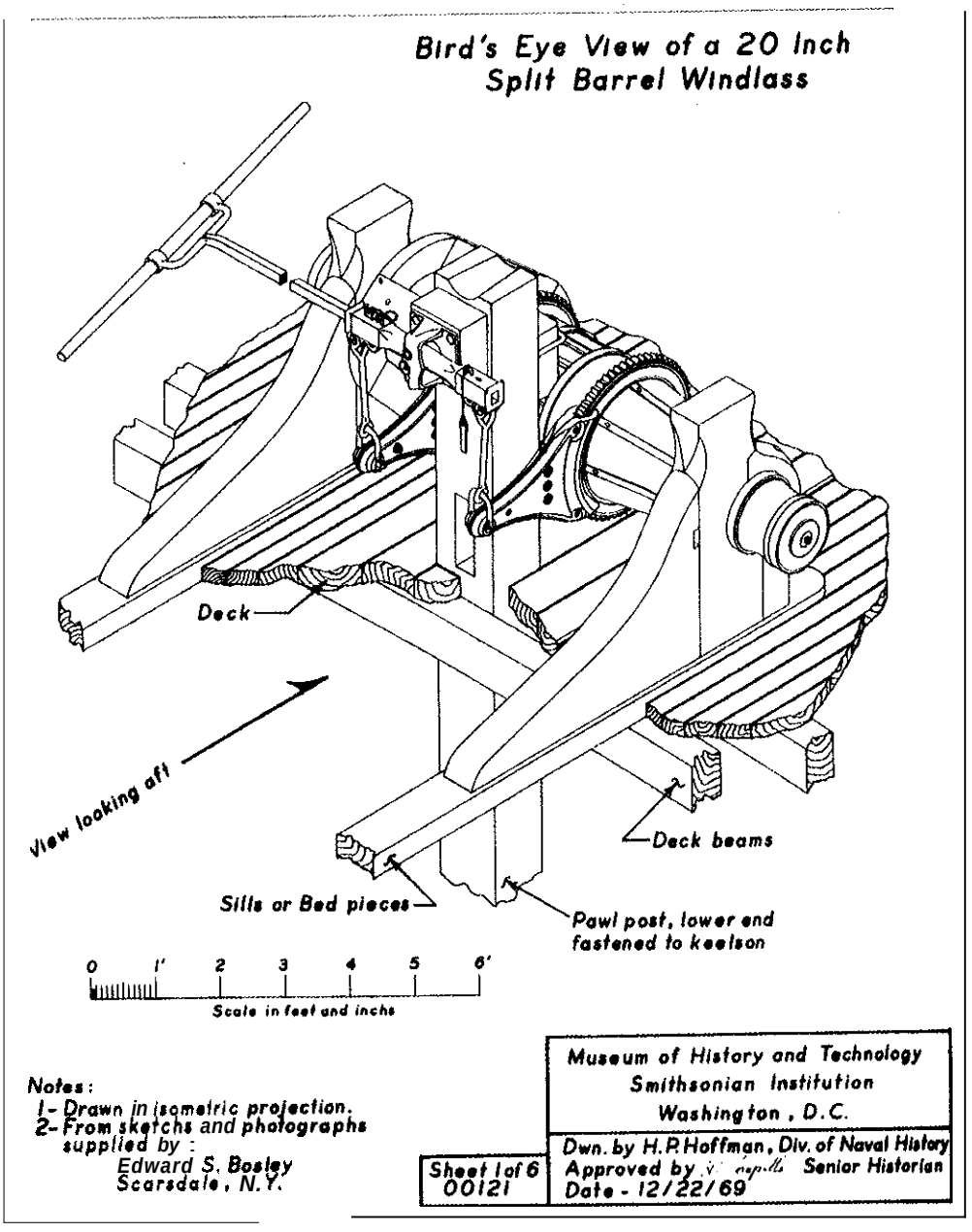

Figure 4.29. This series of **six** drawings from the Smithsonian Institution depicts details of a windlass very similar to *Comet's.*

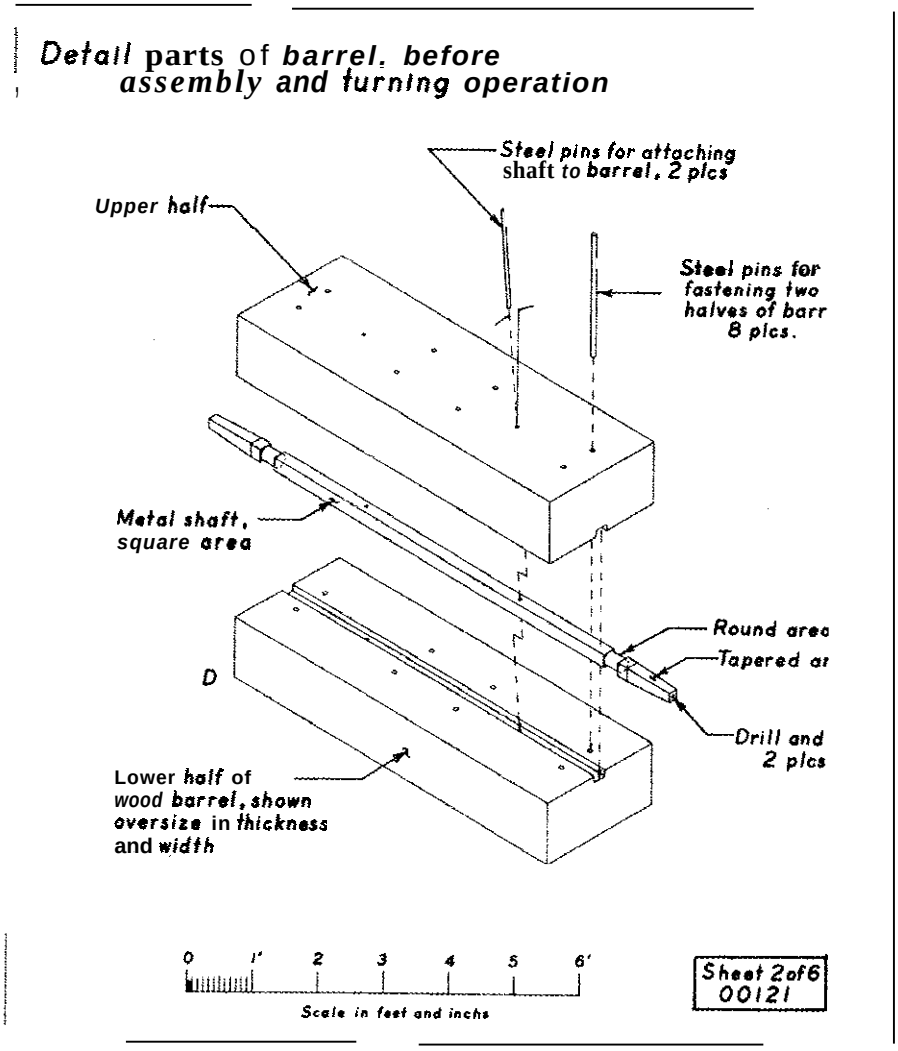

Figure 4.30. Drawing two of the series.

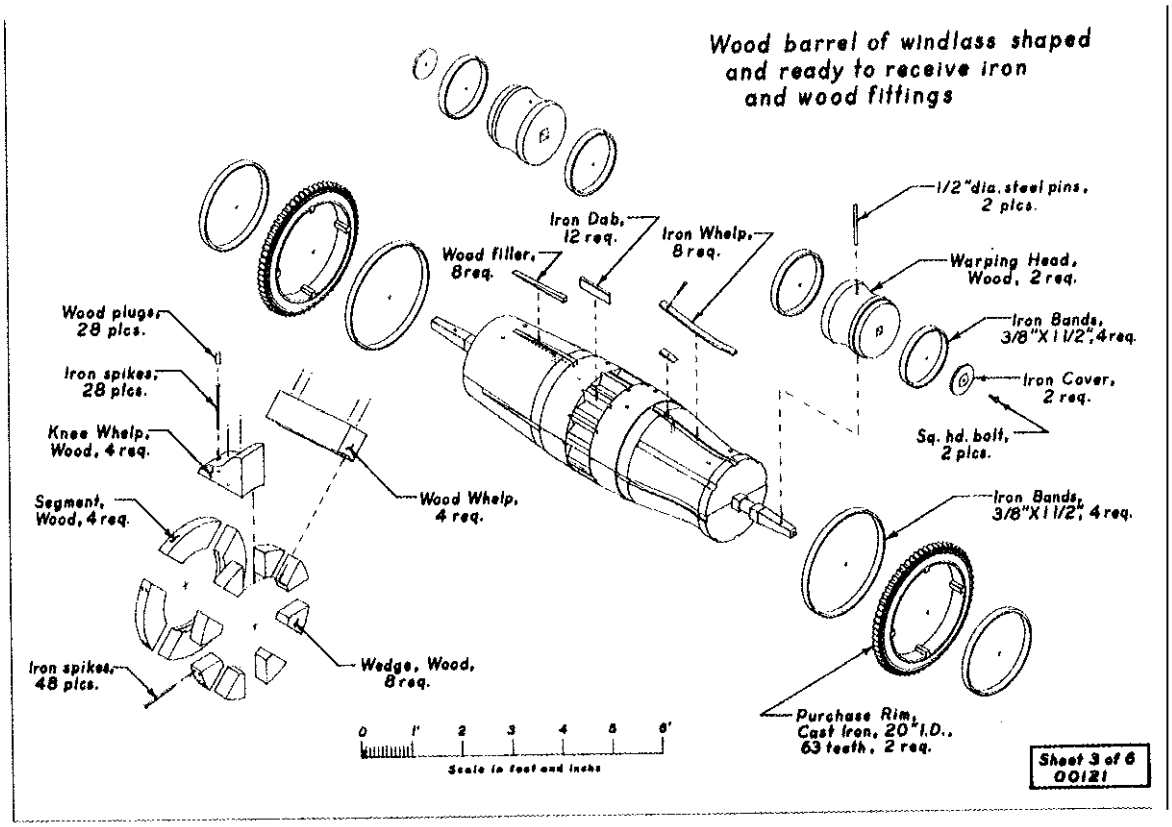

Figure 4.31. Drawing three of the series.

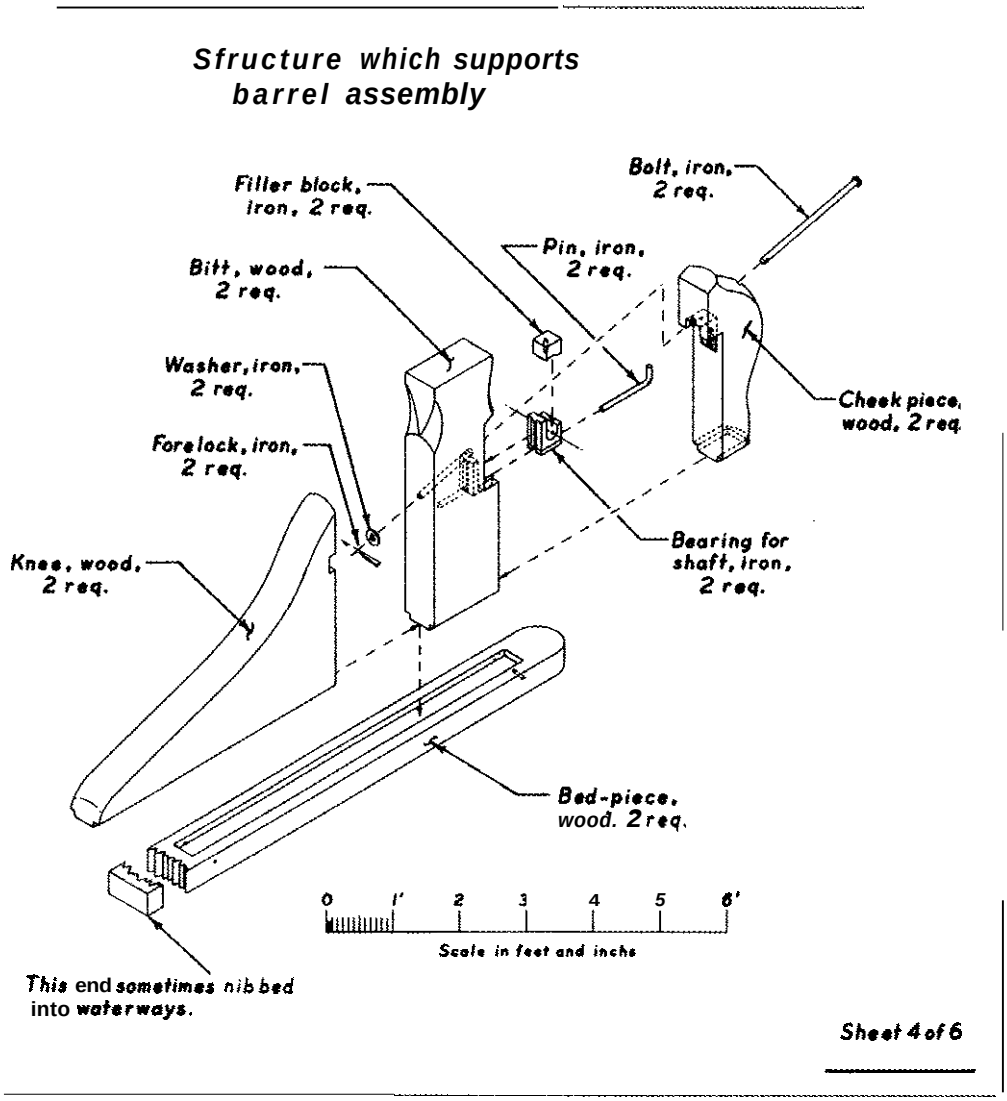

Figure 4.32. Drawing four of the series.

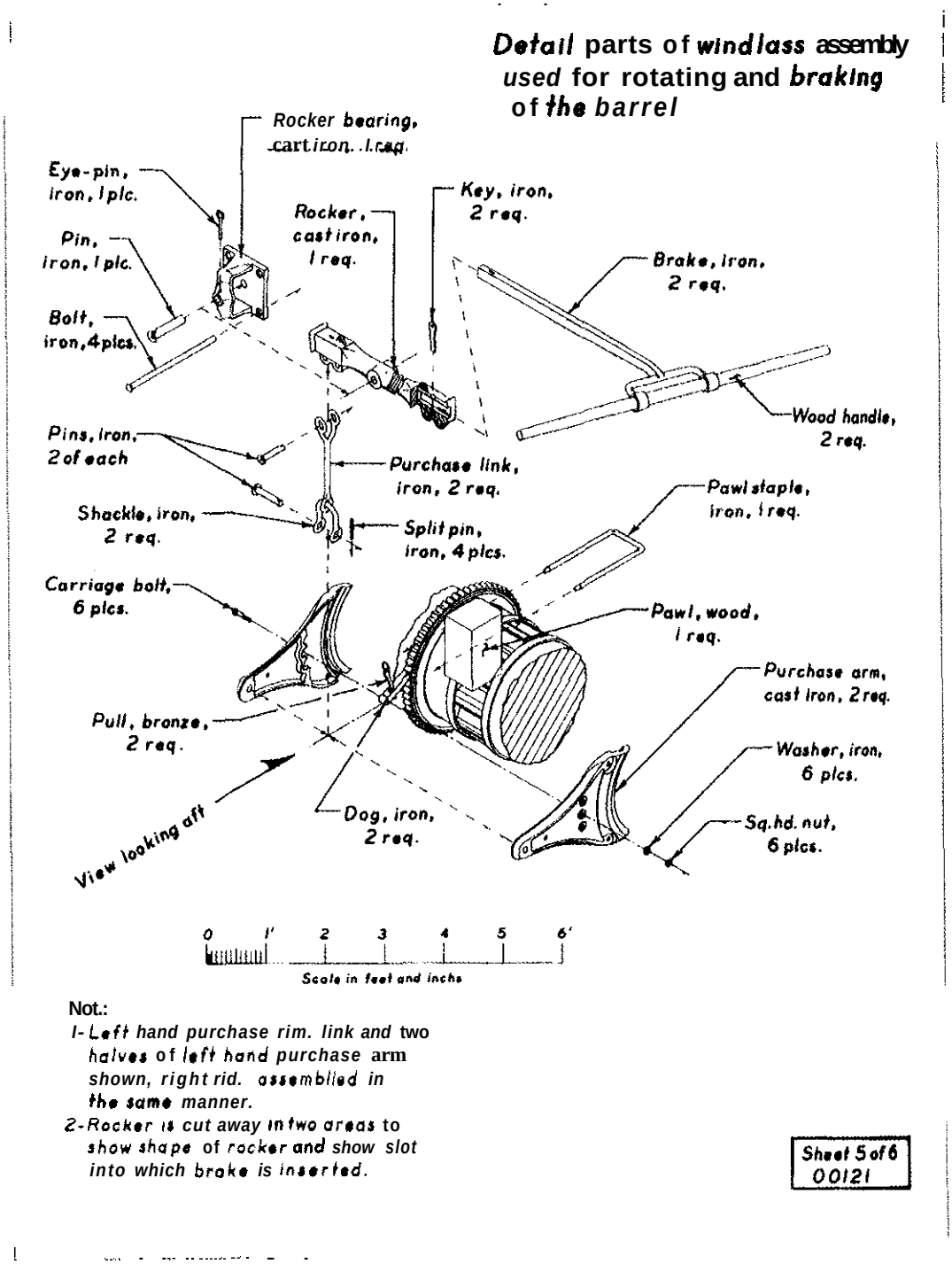

Figure 4.33. Drawing five of the series.

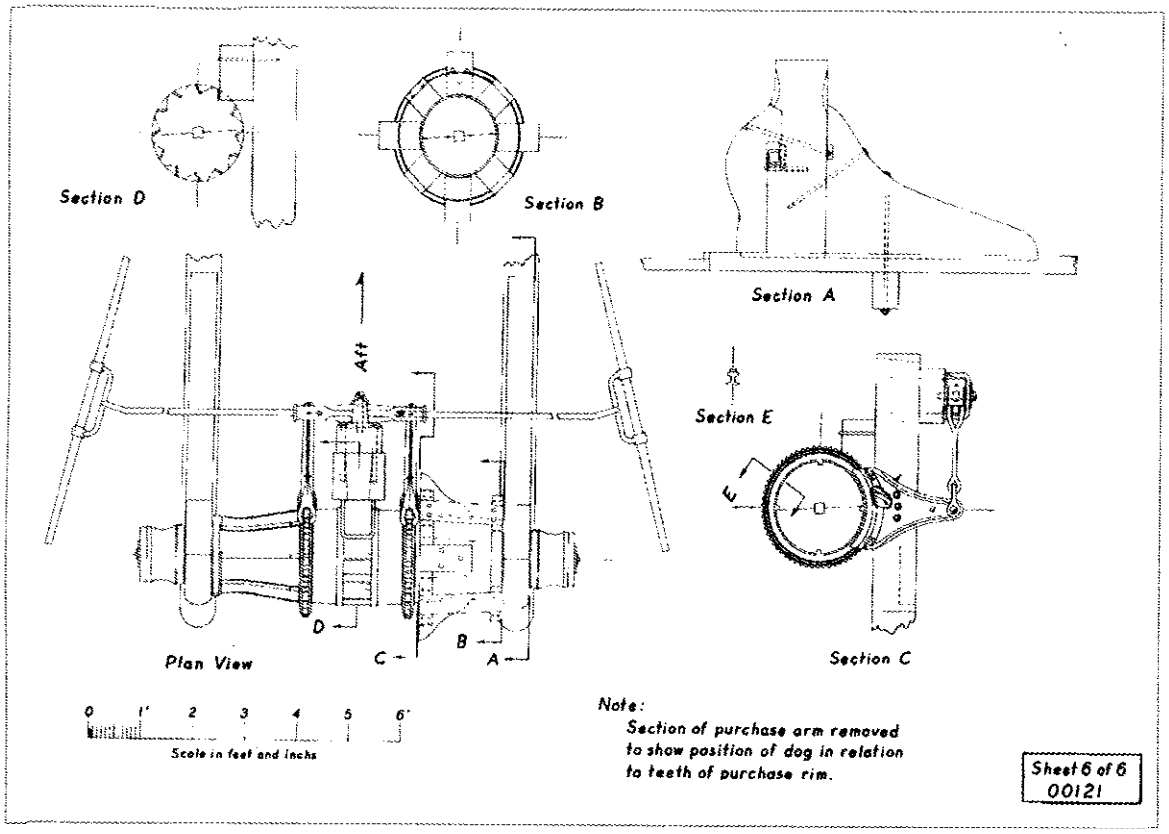

Figure 4.34. Drawing six of the series

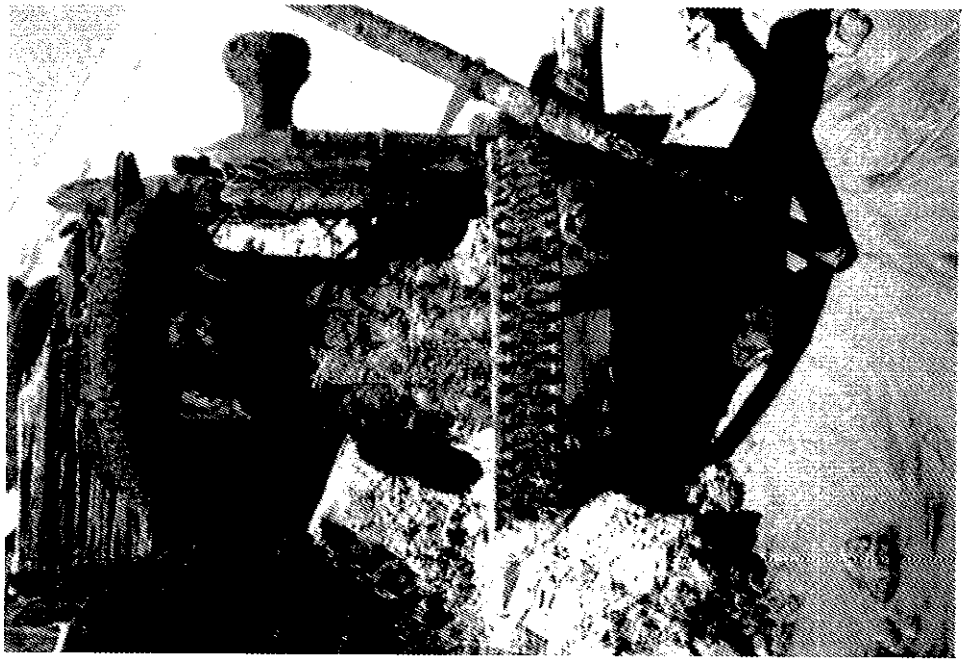

Figure 4.35. ***Cornet's*** windlass, mounted on the main deck. NPS photo by Matt Russell.

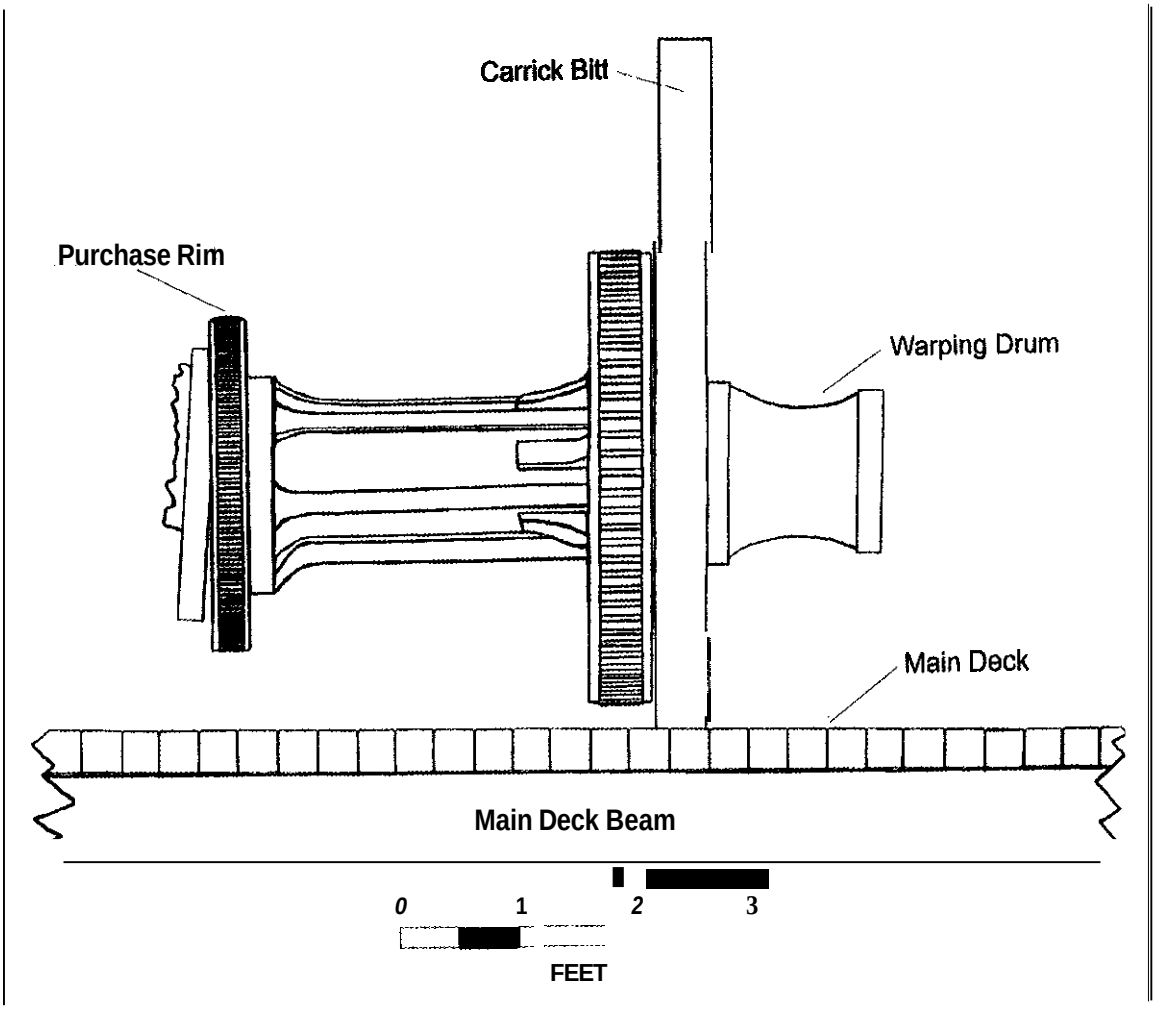

Figure 4.36. *Comet's* windlass, elevation view looking forward on main deck. Drawing by Jim Bradford and Matt Russell.

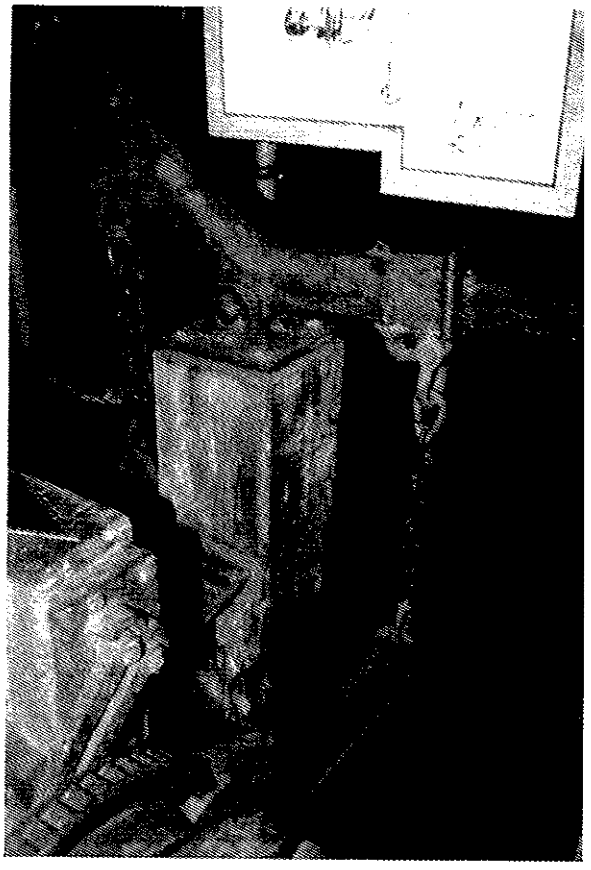

Figure 4.37. Pivoting rocker, or crosshead, mechanism connected to a windlass purchase arm with chain. *Comet* was equipped with a smiliar windlass type. NPS photo by Matt Russell.

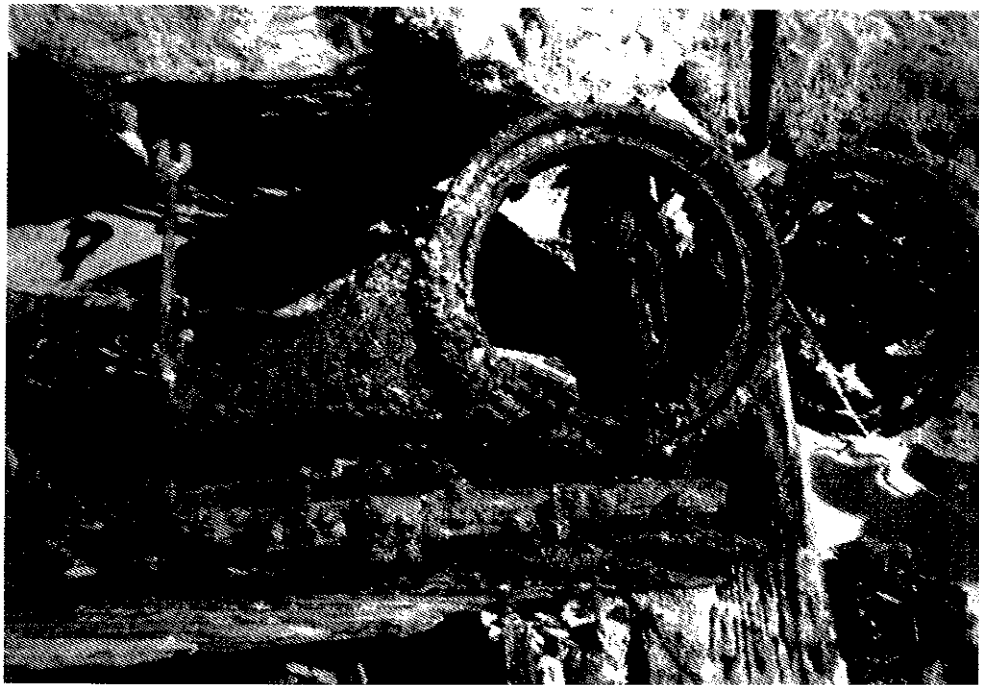

Figure 4.38. *Comet's* port windlass purchase arm and windlass hardware on the main deck laying against the port side of the pawl post and bowsprit. NPS photo by Don Moms.

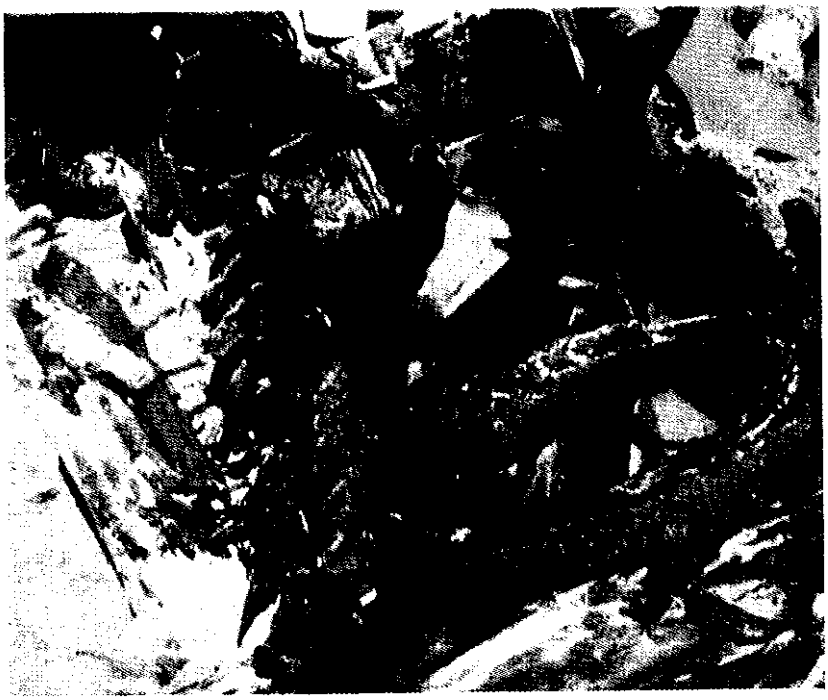

Figure 4.39. ***Comet's*** port windlass hardware laying on the main deck. NPS photo by Don Morris.

Figure 4.40. ***Comet's*** windlass and the iron shaft sticking out of the sand on the right side of the photograph. NPS photo by Matt Russell.

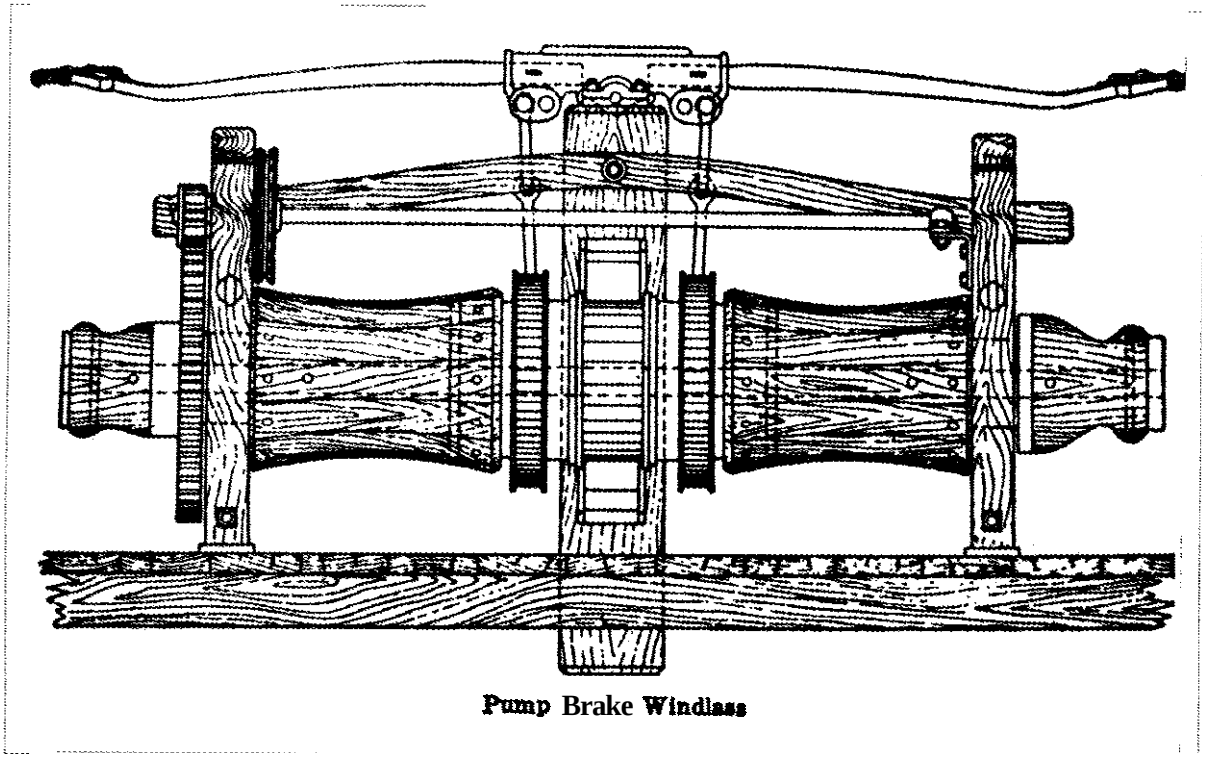

Figure 4.41. Windlass nearly identical to *Comet's* windlass, including the gearing (in this case on the port side) for the messenger chain system.

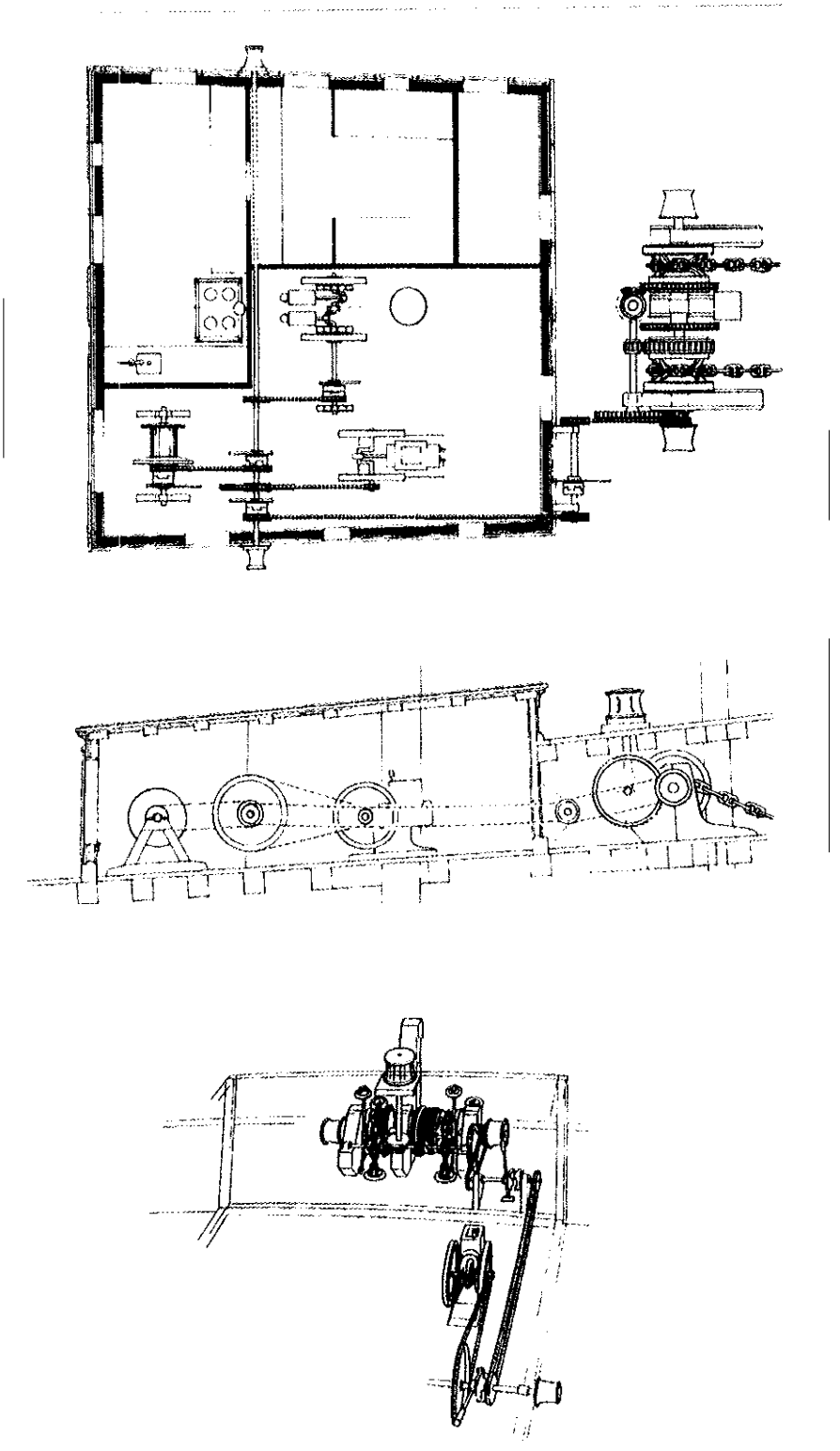

Figure 4.42. Messenger chain-driven windlass system (from Greenhill and Manning 1995:79 and 90).

9% in. long. The fasteners are probably from the windlass' port side, the link chain is possibly from the messenger chain or connected the purchase arm with the rocker (see Figure 4.37), and the iron bar is possibly part of one of the pump-brake hand levers.

Wood samples were taken from the windlass barrel and carrick bitt for wood species analysis. Both windlass and carrick bitt are hardwood, as specified in the contract (JPSL 1886). Field Sample #01 is from the carrick bitt and identified as prima vera wood (*Cybistax donnell-smithii*) (Puseman and Scott Cummings 1999:1). Prima vera is a hardwood found only in Mexico, Guatemala, El Salvador and Honduras, and marketed as "white mahogany" (Puseman and Scott Cummings 1999:1). This is unusual because no historical documentation for importation of Central American timber to the Pacific Northwest for use in ship construction could be located. Exporting Pacific Northwest timber to Mexico and Central and South America has been documented, so it is plausible that local species were carried north as a return cargo. On the other hand, use of this native Central American timber for the carrick bitts could represent a repair carried out while delivering cargo to a Central American port. Field Sample #02 is from the windlass barrel and identified as California laurel (*Umbellularia californica)* (Puseman and Scott Cummings 1999:1). California laurel is a hardwood native to California and Oregon and was used "under the keel in launching ships; appears to resist crushing better and have more 'slip' than any other local species" (Panshin and Zeeuw 1980:587 quoted in Puseman and Scott Cummings 1999:2). These same qualities would he ideal for a windlass barrel hauling in an anchor with several wraps of chain around it.

The port hawse pipe is in place, piercing the port hull at main-deck level (Figure 4.43).

Figure 4.43. *Comet's* port-side hawse pipe. NPS photo by Don Morris

The hawse pipe provided an opening for the anchor chain cable to pass through the bow to the windlass, and from the windlass into the chain locker. The hawse pipe is a flanged iron pipe with an outer face angled to fit the shape of the outer hull. The flanged opening is I ft. 5 in. long x 1 ft. 6 in. wide, and the hawse pipe has an 11-in. interior diameter.

Mounted on the main deck just inside the port hawse pipe is a wood-and-iron hawse block, also called a bow stopper or riding chock (see Figure 4.7) (Chapelle 1973:491). The hawse block routed the chain cable up and over the lower inboard rim of the hawse pipe (Chapelle 1973:491). Sometimes the hawse block was fitted with a chain stopper, which held the chain in addition to the windlass, but there is no evidence of a chain stopper on *Comet*. The hawse block is 2 ft. 6 in. long x 10%in. wide x 8 in. high in the center. Its upper surface is rounded and has an iron pad in the center to resist chain abrasion.

The aft end of the starboard cathead was visible attached to the forecastle deck (see Figure 4.17). A cathead is a wood beam that projects out over port and starboard bow to support the anchor before releasing or while retrieving or stowing (see Figure 4.25) (de Kerchove 1961:132)—when the anchorring has been hoisted up to the cathead, it has been "catted." *Comet's* cathead is a solid timber, 11¼ in, wide x 5 in. thick with an exposed length of 2 ft. 7 in. A 3¾-in. diameter, 1-in. thick iron ring is fastened to its upper surface at the lowest exposure, 2 ft. 7 in. from the aft end. No other details about the cathead were observed because most of its length was buried.

The most obvious ground tackle element remaining is the anchor. The iron, collapsible-stock anchor is resting on the remains of the main deck's starboard side. It was uncovered and recorded in 1993, and a full analysis is found in Chapter 3. The anchor weighs approximately 616 lbs. and is most likely *Comet's* stream anchor.

Figure 4.44. *Comet's* capstan, mounted in the center of the forecastle deck. NPS photo by Don Morris.

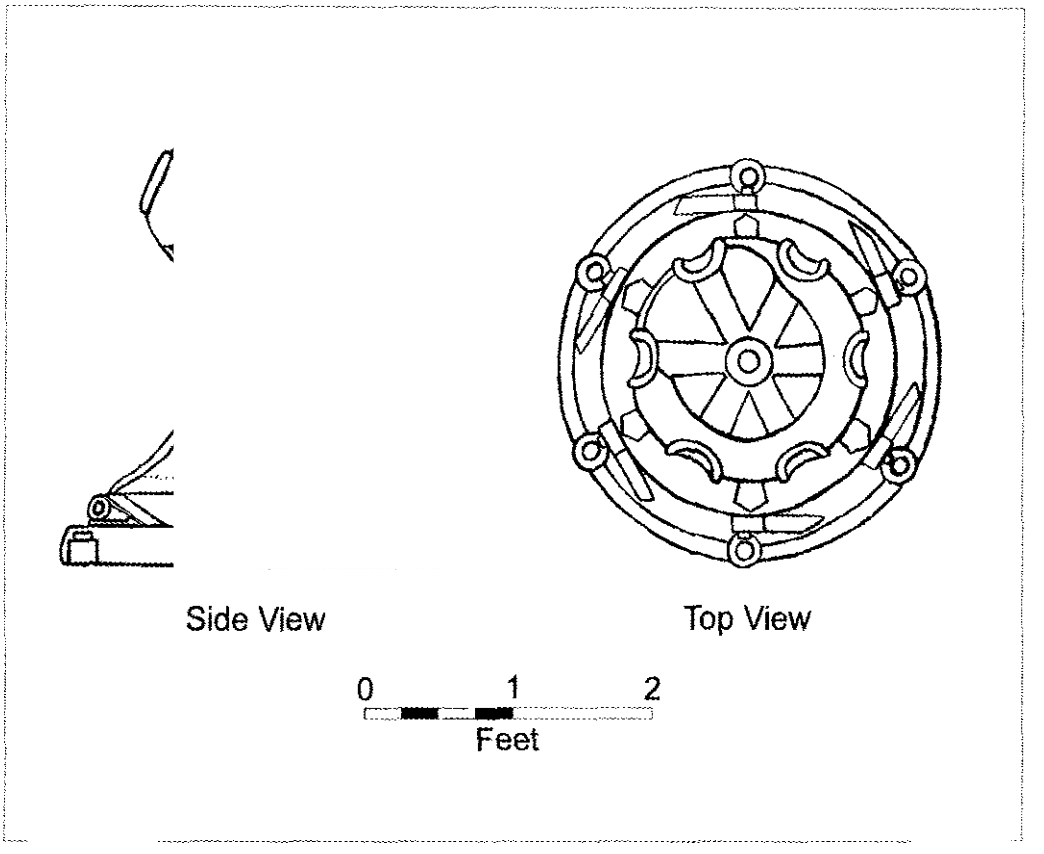

Figure 4.45. *Cornet's* capstan. Drawing by Jim Bradford

A hand-powered capstan is mounted in the center of the forecastle deck (Figures 4.44 and 4.45). It is not linked to the windlass, so is not technically part of the ground tackle. It was used for warping only, including such tasks as handling lines and assisting with raising sail (Campbell 1974:135). The capstan is 2 ft. 10 in. tall, with a 2 ft. 8-in. diameter base and 1 ft. 8-in. diameter head. This is presumably the "#3 capstan" specified in *Cornet's* contract.

SITE FORMATION PROCESSES

Based on observation and analysis of historical photographs and those made on the *Comet* site, a sequence of events can be developed to account for *Comet's* present condition. No geomotphologic, sedimentologic, or oceanographic studies were conducted to determine the exact natural forces that have acted on *Cornet's* remains over the past 88 years, so a rigorous examination of natural site formation processes is not possible at this time. Nor is a precise accounting of salvage activities on *Cornet* available, although contemporary salvage is historically indicated. There are no obvious archeological indicators of salvage, so a discussion of cultural site formation processes is also necessarily limited. What is offered is a brief description of contemporary salvage gleaned from the few available newspaper records, which can account for the absence of certain materials from the site and inform speculation of the hull break-up sequence and deterioration that led to the site's present condition.

Contemporary newspaper articles in the *Los Angeles Daily Times*, *Santa Barbara Morning Press* and *Sun Francisco Cull* offer the only information on salvage activities after the wreck. The lumber cargo was the most valuable part of *Comet's* wreck, and it is mentioned as being salvaged in several articles (*Santa Barbara Morning Press [SBMP]* 2 September 1911:8; *Los Angeles Daily Times*, **15** September 1911:15; *SBMP*, 22 September 1911:8). The only two other objects mentioned specifically were rigging, some of which had already been salvaged at the time an article in the *Santa Barbara Morning Press* was published (*SBMP*, 22 September 1911:8), and the donkey engine (*San Fruncisco Call*, 16 October 1911:14). It is unknown if the donkey engine was ever salvaged, but it would have been one of the more valuable objects on board. Presumably the windlass, capstan and anchor would also have been high-cost, reusable items, but they obviously were not salvaged. In general, limited newspaper discussions of salvage can explain the absence of some rigging, possibly the donkey engine and the lumber cargo from the site. Additional salvage almost certainly took place, but it is not documented historically. Opportunistic salvage probably also occurred as the schooner broke apart and pieces were scavenged for various uses. Salvage alone cannot explain, however, why only the bow is present today.

Observation of site layout suggests a series of events that led to the wreck's present condition. The last known historical photographs of *Comet* (see Figures 3.3–3.5) show the vessel laying broadside to the shoreline, somewhere between high and low tide. Subsequently, *Cornet's* bow broke away from the rest of the hull at a point just aft of the forecastle deck and forward of the forward deck house (Figure 4.46). It is possible the stempost/keel joint broke, but the pointers kept the bow structure together to aft of the forecastle deck. The pointers crossed and were fastened into multiple frame pairs, including all the cant frames, and would have provided reinforcement to help bind them together (see Figures 4.21 and 4.22).

After it broke free from the rest of the hull, the bow rotated 90° to face seaward, and possibly shifted closer to the embankment behind the beach. The bow must have detached from the hull before it rotated because there would not have been enough room on the beach for the entire vessel to rotate. After it broke free and rotated, the bow section heeled over to starboard and filled with sand to the level reflected in preserved structure observed on site during this study. Much of the port bow was exposed to the elements, and was, in effect,

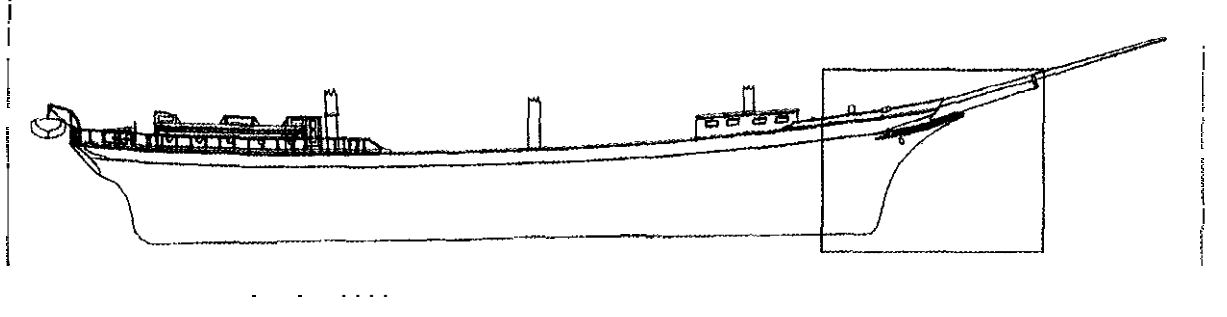

Figure 4.46. Area of *Cornet's* preserved hull.

"sheared off by natural deterioration. Exposed wood portions of the wreck, such as the port sides of the outer hull, forecastle deck, main deck and windlass, deteriorated and were removed from the site, probably by natural processes. This natural "shearing" process must have taken place after the bow broke away, rotated and heeled to starboard because of the evident "line" of preservation and the position of the iron features within the wrecksite. Major iron features, including the anchor, port windlass hardware, and port cathead rigging element, appear to have essentially dropped to their current locations as their wooden support structures deteriorated. For example, the cathead rigging element dropped outside the hull when the cathead deteriorated, and the windlass' port-side hardware fell to its current location on the main deck against the bowsprit when the port half of the wooden windlass barrel deteriorated.

Based on its location in the wreck, one interpretation of the anchor's location is that the anchor was catted and fished (when the anchor crown has been hoisted to the gunwale) on *Cornet's* port side when the vessel wrecked. As the bow section heeled to starboard and deteriorated, the anchor simply dropped to its current location. If this sequence of events is accurate, then the question is: why did *Comet* have its stream anchor catted and fished on its port side, and not one of its bower anchors? Another problem with this interpretation is the lack of chain cable on site. An anchor would never have been catted without chain cable attached, and it seems unusual to remove the chain while leaving the anchor catted. It is possible the chain was disconnected from the anchor ring, threaded through the hawse pipe, and then either removed or dropped into the chain locker. But why would salvagers disconnect the chain unless they meant to salvage it, and if the chain was salvaged, why was the anchor left behind? A simpler explanation is that the stream anchor was not catted, but was stowed, unrigged, on the forecastle deck or on the main deck under the forecastle deck and lashed in place. Given the hold was completely full of lumber and the huge deckloads these schooners carried, on or under the forecastle deck would be nearly the only place a spare anchor could be stowed and be easily accessible. As *Cornet's* port side deteriorated, the anchor could still have dropped to its current location. This would explain why chain cable was not rigged to the anchor. Further site investigation could provide more insight into these questions. Deeper excavation could determine whether chain remains in the chain locker, or even if the starboard anchor depicted in Figure 3.3 is present below the hull. With this information a better interpretation could be made of site formation processes and salvage activities.

The majority of *Comet's* hull cannot be accounted for in the archeological record. Only about 10% of the hull was observed during this project. Significant natural forces worked to break the hull and separate the bow, but the location of the remainder of the hull is unknown. It is possible it is still buried elsewhere on the beach in Simonton Cove or was transported offshore and settled into the sediment. Alternatively, it could have gradually broken up and the pieces floated off into the Santa Barbara Channel. Further research, especially terrestrial and marine magnetometer surveys, could determine if significant hull remains are present elsewhere in Simonton Cove.

Overall, *Comet* is a remarkably well-preserved piece of Pacific Coast maritime history and a significant archeological site. The nearly intact bow section provides much information about Pacific Coast shipbuilding and site formation processes. In general, taking into account timber erosion, *Comet's* scantlings

and fastenings met or exceeded those specified in its contract and published classification rules indicating the schooner was built as part of a mature and well-established Pacific Coast shipbuilding industry. Several structural features, such as thickened ceiling planking and larger deck beams, are likely construction characteristics specific to Pacific Coast lumber schooners and reflect particular needs of these bulk lumber carriers and requirements of Pacific Coast environmental conditions. The site's integrity directly contradicts the often repeated notion that shipwreck remains cannot be preserved in any significant way in high-energy environments. Like other West Coast examples, such as *King Phillip* on Ocean Beach in Golden Gate National Recreation Area (Delgado 1985), *Cornet* demonstrates that under certain environmental conditions, wooden shipwreck remains can be quickly buried by beach sands and preserved.

CHAPTER 5

Conclusions and Recommendations

CONCLUSIONS

Even though only about 10% of *Comet's* hull was observed during this project, the schooner's bow section is one of the most well preserved historical shipwreck sites in Channel Islands National Park (CHIS), as well as one of the best-preserved wooden shipwrecks recorded on the West Coast. It represents a regionally important vessel type linked to the economic development of major metropolitan areas on the Pacific Coast, and it offers insight into West Coast shipbuilding practices, especially those particular to lumber schooners. Pacific Coast environmental conditions dictated the design and construction of vessels engaged in the coastal lumber trade, and the lumber schooner, from its emergence in the 1870s until after World War I, was the most important vessel type involved in that trade.

This project has collected important baseline data regarding site condition and significance that can be used for management, interpretation, site protection and future research. In addition, a historical context has been developed for the site, which is important for site interpretation.

RECOMMENDATIONS

Several recommendations are offered for future work on *Comet*. Perhaps the most important is to regularly monitor the site, especially during winter months, to note subsequent exposures and compare the site's condition annually. Data collected in 1999 should be used as a baseline for comparing future site condition and deterioration. If significant site erosion is noted in the future, additional steps should be taken, including more detailed and extensive site documentation and consideration of selected recovery of specific features. Additional magnetometer survey, both offshore and onshore in Simonton Cove, might reveal more sections of *Comet* that could lead to a more accurate model of site formation processes.

Site jurisdiction appears to change with varying beach levels. The National Park Service

(NPS) owns all land above mean high tide, while the State of California owns lands below mean high tide. In 1993, when beach levels were high, *Comet* was clearly within NPS jurisdiction; in 1999, however, with nearly 6 ft. of sand removed from the beach, the site was often below the high-tide line. It is recommended that NPS continue to actively manage *Comet* as one of its resources as it has in the past. If ownership issues are raised in the future, CHIS should enter into an agreement with the State of California ensuring the site's future protection as a significant archeological resource. The NPS Archeology and Ethnography Program, under Dr. Frank McManamon, is currently developing a generic draft agreement for use between states and the NPS.

Comet is eligible for the National Register of Historical Places and listing would increase site protection. The site is possibly eligible under criterion A, C, and/or D. Criterion A requires a vessel "be associated with events that have made a significant contribution to the broad patterns of our history" (US Department of the Interior 1986:5). As an active lumber schooner for nearly 25 years, *Comet* participated in the economic development of the U.S. Pacific Coast, which is a contribution to the broad patterns of West Coast history. *Comet* is likely eligible under criterion C, which requires a vessel "embody the distinctive characteristics of a type, period or method of construction ..." (US Department of the Interior 1986:5). As discussed above, lumber schooners were unique in many ways, and particularly suited to their trade. *Comet* represents many of the characteristics typical of Pacific Coast lumber schooners. Finally, the well-preserved *Comet* is likely eligible under criterion D, which requires a vessel to "have yielded, or may be likely to yield, information important in ... history" (US Department of the Interior 1986:6). The unexcavated portions of the *Comet* site will undoubtedly yield additional information important to a better understanding of West Coast shipbuilding practice, vessel modification and site formation processes. In addition to a National Register nomination, the *Comet* site should be included in the State of California archeological inventory.

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APPENDIX A

Schooner *Cornet*

SCHOONER *COMET*

CONTRACT NUMBER 49:

Contract and specifications for building a three masted schooner at Port Blakely, W.T., between the following parties:

F. P. Hooper, J. A. Hooper, C. Lass, parties of the first part and W. G. Hall of the second part.

Said vessel to be of the following dimensions:

DIMENSIONS:

One hundred and thirty-six ft. keel, thirty-four ft. moulded beam and eleven ft. deep.

TIMBER:

Outside of stem, rudder post, bitts, (with the exception of pawl bitt) cleats, cavils, jaws to gaff and booms, trestle trees, cross-trees, pin rail in rigging and windlass to be of hardwood. The balance of wood, unless specified, to be of yellow fir.

KEEL:

To be 16 X 17 inches, and 14 inches of keel and shoe below garboards.

FRAME:

Frame to be spaced 29 inches from centers and sided Ten inches. Moulded 13 inches at keel and 6½ inches at deck, with a stanchion on every frame.

KEELSONS:

Main keelson 16" x 20"; sister keelsons 14" X 18". Bed piece of sufficient depth to come to top of sister keelsons and sided 14".

CENTER CASE:

Center case to have an 8" opening, plank of case to be 8" thick. Case coppered to top of Keelson.

DECK FRAME:

Deck beams to side 14" and mould 11 inches. To be secured to a clamp 11 inches in thickness, said clamp to be worked onto frame and bolted with 2-1" bolts in each and every frame, driven from outside and clinched. Beams to be let into said clamp 1". There shall be a piece of timber dovetailed between all the beams, within 1" of the top of the beam and flush with clamp, with the bolts in every piece driven from the outside and clinched.

HANGING KNEES:

Deck frame to have a hanging knee to each beam, where practicable. Knees to be fastened with 7/8" inch iron. Throat bolts one iron *[sic].*

CEILING

Ceiling out of turn of bilge four inches, the lower strake of thick ceiling 10" and graduated in three strakes to 8", from thence to clamps 8", the two upper strakes scarphed. All thick ceiling edge bolted.

PLANKING:

Garboards **7**" in thickness and graduated in **3** strakes to thickness of bottom plank, which shall be 4", wales 5", planksheer 5" in thickness; washboard flush with wales. Bulkwarks 2" thick, rail *5"*, monkey chock and rail whole length of vessel.

DECK:

Deck **4 x 4";** quarter deck and housetop 3" **x** 3".

FASTENING:

Keel, keelsons, stem, stem post and deadwood to be fastened with 1¼" and 1 1/8" iron. There shall be breast hooks and pointers forward and aft; also a breast hook above and below lumber port. Hooks and pointers fastened with 1" iron. Thick ceiling square fastened with 7/8" iron to bottom of hanging knees, from thence to clamps ¾" iron, enough driven from the inside to work the plank, the balance driven from the outside and clinched.

OUTBOARD FASTENING:

Garboards to be edge bolted to the keel. Planking to be worked with composition spikes to the wales, thence to plank sheer galvanzied iron. Planking to be square fastened with 1¼" treenails, driven through to make square fastening and wedged on both ends. Treenails from turn of bilge to planksheer Locust. Fastenings for deck, housetop, bulwarks and stern to be galvanized, all other fastenings used in construction of said vessel, not specified as galvanized, to be of black iron.

SALT:

Vessel to be salted from lower edge of wales to deck.

CAULKING:

Six threads of oakum in garboards and hawsed, from thence to plank sheer four threads and hawsed, deck and housetop two threads. Center case six threads and hawsed. Seams on bottom cemented to water line, from thence to plank sheer white leaded. Deck pitched. Center case, two lower seams, cemented, the balance white leaded.

PORTS:

Vessel to have bow and stern ports.

FORECASTLE & CABIN:

Forecastle and cabin to be on deck, with water-closet and stationary wash-bowl complete Forward house to be adapted for donkey engine.

PAINTING:

Bottom two coats of Tar & Monsons copper paint, topsides and deck work two coats of paint. Spars oiled.

STEERING GEAR, ETC:

Vessel to have composition rudder braces, diamond cut screw steering gear, **24**" windlass purchase. #3 capstan and patent traveler for spanker, spars to be in proportion to hull and all iron of the best quality and workmanship.

SAILS. RIGGING ETC:

Standing rigging of wire, 4 shrouds each side for fore and mainmasts and **3** each side for mizzen mast 4" wire. Main jib stays double 4½" wire. Topmast backstays 3¼", middle and flying jib stays *of* wire. Halliards, throat and peak for foresail and mainsail to be 3½", the balance of running rigging to be in proportion to its use.

BLOCKS:

All blocks custom made. Throat, peak and jib halyards 15" steel rollers, the balance of the blocks in proportion. Boom tackle, reef tackle, watch tackle and cargo purchase complete.

BOWSPRIT

Outboard on bottom 19', diam and 16", outer bobstay 16½", inner bobstay 19%" and 18¼", athwartships 9%" flat.

JIBBOOM:

Diam in cap 14", diam in hounds 13½", from cap to hounds 14½', from hounds to outer band 15', diam hounds 8%" outside, diam of grommet 12" clear, diam. outer band 7¼" clear, outer jibstay hole 4', inside of outer band. Topmast stay hole 18" outside of hand. Pole 5', sliding iron 9'.

FOREMAST

Diam 24", spider 20½", mast head 11', squares 16W and 13½", wythes 13 7/8" and 14%".

MAIN MAST

Length from top main rail to cap 78', diam 23", spider 19", mast head 11', squares 15%" and 12½", wythes 12 7/8" and 13½".

MIZZEN MAST

Diam 21½", spider 18", mast head 11', squares 15½" and 12½". Wythes 12 7/8" and 13%".

TOP MASTS:

Fore topmast length 51', diam in cap 13", hounds 10½" and 7", grommets 9" and 5 ½", pole 8 + 5 = 13'.

Main and mizen topmasts length 51', diam in cap 12", hounds 10" and 6¾", grommets 8½" and 5½", pole 8+5=13'.

BOOMS:

Boom for jib 37', diam 8½", topping lift 7%" outside, clew 8", outer end 7½", sheet 8 1/8".

Fore and main booms length 39' 6", diam 10½", topping lift 9%" outside, sheet 10¼", clew 10".

Spanker boom length 50', sheet 11½", clew 9½", topping lift 8" outside.

GAFFS:

Fore and main gaffs 37', diam 8¾", bands 8 3/8", 8", 6 5/8" and 5".

Spanker gaff 34', diam 8¾", bands 8 3/8", 8", 6 5/8", and 5".

HEEL HOOPS. ETC:

Heel hoops 22½", 21%". 20". Fore sheet ring bolt 14¾" W & W.

Main sheet traveler 18" x 18" to key fore and aft.

RAKE:

Fore and main masts rake ¾".

Misen masts rake 7/8".

SAILS:

Sails to be of cotton duck, spanker, mainsail, foresail and jib to be No. 1, the balance of sails to be in proportion to their size and use.

CHAINS, ANCHORS, ETC:

One 1800 lb. anchor, one 1550 lb. anchor, one 400 Ib. kedge, 60 fthms. of 1 3/8" chain; 60 fthms. 1¼" chain; 120 fthms. of 7" hawser, 120 fthms. 5"; 60 fthms. 6" wharf fast and one coil of 3%" running line; chain cat stoppers and shank painters, tarpaulins and mast coats, galley fixtures, cabin furniture, carpet, table, chairs, clock and crockery. Lamps, cabin and state room lamps, side lights, mast head lights, galley and forecastle lamps. One spirit compass and one of

brass. Patent log, sounding lead and line. 1000 gallons of water casks. One 18' boat and oars, rigging screws marline spikes and ship's tools.

Vessel to be fitted for sea for a coasting voyage, with the exception of provisions and bedding. Vessel to be launched on or before the 20th day of September 1886.

In consideration of the fulfillment of the foregoing contract, the parties of the first part agree to pay to the party of the second part, the sum of Thirty Thousand Dollars ($30,000) in U.S. Gold Coin, in the following payments, viz:

$5000	On signing contract
7500	On July 10th, 1886
7500	On Aug. 10th, 1886
10000	When vessel is delivered at Port Blakely, W.T.

(Signed) F. P. & J. A. Hooper, 2/3rds

C. F. S. Lass, 1/3rd

(Signed)

W. G Hall,

Party of second part.

APPENDIX B

Enrollment and Registration Data: Schooner *Comet*

ENROLLMENT AND REGISTRATION DATA:
SCHOONER *COMET*

Registry: 126379

Built: Port Blakely, Washington, 1886

Shipbuilder: Hall Brothers Shipyard

Ownership:

1) Certificate of Registry (no. 18)
C.F.S. Lass (1/3) of Oakland; J.P. Hooper (1/3) and F.A. Hooper (1/3) of San Francisco
19 Oct 1886 - 11 Nov 1886
C.F.S. Lass, Master
First Registration
Port Townsend, Washington

2) Certificate of Enrollment (no. 76)
Owners same
11 Nov 1886 - 16 Sept 1889
C.F.S. Lass, Master
Change of home port
Port of San Francisco

3) Certificate of Registry (no. 2)
Owners same
16 Sept 1889 - 17 Feb 1890
George G. Lovdall, Master (at time of registry)
William Ternstrom, Master, 17 Feb 1890SD
Change of trade
Port of Eureka, CA

4) Certificate of Enrollment (no. 6)
Owners same
17 Feb 1890 - 9 May 1895
William Ternstrom, Master (at time of enrollment)
H.P. Hallbeck, Master, 13 Dec 1893 SP
William Ternstrom, Master, 16 Feb 1894SP
Change of trade
Port of San Diego

5) Certificate of Registry (no. 30)
Owners same
9 May 1895 - 11 June 1895
William Temstrom, Master
Change of trade
Port Angeles, Washington

6) Certificate of Enrollment (no. 16)
Owners same
11 June 1895 - 23 Feb 1905
William Temstrom, Master (at time of enrollment)
James McVicar, Master, 13 Feh 1896 SP
L. Larsen, Master, 20 Dec 1896 PT
William Ternstrom, Master, 6 Jan 1897 SP
[information missing]
F.E. Rensch, Master, 9 June 1904 LA
John W. Manka, Master, 16 July 1904
Change of trade
Port of Los Angeles

7) Certitificate of Enrollment (no. 151)
John A. Hooper (1/3), F.A. Hooper (1/3), C.F.S. Lass (4/15), and John W. Manka (1/15).
23 Feb 1905 - 5 March 1907
Otto Lembke, Master
Change of owners in part and change of home port
Port of San Francisco

8) Certificate of Enrollment (no. 258)
John A. Hooper (8/15), Isabel Norwood (1/15), C.A. Hooper & Co. (1/15), C.F.S. Lass (4/15), Otto Lembke (1/15) of Aberdeen, Wash.
5 March 1907 - 1 March 1910
Otto Lembke, Master (at time of enrollment)
Nicolas Borgensen, Master, 28 Feb 1910 SD
Change of owners in part
Port of San Francisco
Liscence renewed:
5 Feb 1908, Port Townsend
5 Feb 1909, Port Townsend
23 Feb 1910, San Diego

9) Certificate of Enrollment (no. 6)
Nicolas Borgensen (1/15), others same.
1 March 1910 - 27 May 1910
Nicolas Borgensen, Master
Change of owner in part
Port of San Diego

10) Certificate of Enrollment (no. 261)
Owners same
27 May 1910 - 30 Aug 1911
Nicolas Borgensen, Master
Change of home port
Port of San Francisco

Documents Surrendered: San Francisco, 11 Sept 1911

Cause of Surrender: Vessel Lost, Stranded on San Miguel Island, CA, 30 Aug 1911.

SUBMERGED RESOURCES CENTER REPORT AND PUBLICATION SERIES

The Submerged Cultural Resources Unit was established in 1980 to conduct research on submerged cultural resources throughout the National Park System with an emphasis on historic shipwrecks. One of the unit's primary responsibilities is to disseminate the results of research to National Park Service managers, as well as the professional community. A report series has been initiated in order to fulfill this responsibility. It has been incorporated into an umbrella series entitled Southwest Cultural Resources Center and Intermountain Cultural Resource Centers Professional Papers. The following are the categories:

SUBMERGED CULTURAL RESOURCES ASSESSMENT

First line document that consists of a brief literature search, an overview of the maritime history and the known or potential underwater sites in the park, and preliminary recommendations for long-term management. It is designed to have immediate application to protection and interpretation needs and to become a source document for a park's Submerged Cultural Resources Management Plan.

SUBMERGED CULTURAL RESOURCES SURVEY

Comprehensive examination of blocks of park lands for the purpose of locating and identifying as much of the submerged cultural resources base as possible. A comprehensive literature search would most likely be a part of the Phase I report but, in some cases, may be postponed until Phase II.

Phase I — Reconnaissance of target areas with remote sensing and visual survey techniques to establish location of any archeological sites or anomalous features that may suggest the presence of archeological sites.

Phase II — Evaluation of archeological sites or anomalous features derived from remote-sensing instruments to confirm their nature, and if possible, their significance. This may involve exploratory removal of overburden.

SUBMERGED CULTURAL RESOURCES STUDY

A document that discusses, in detail, all known underwater archeological sites in a given park. This may involve test excavations. The intended audience is managerial and professional, not the general public.

SUBMERGED CULTURAL RESOURCES SITE REPORT

Exhaustive documentation of one archeological site which may involve a partial or complete site excavation. The intended audience is primarily professional and incidentally managerial. Although the document may be useful to a park's interpretive specialists because of its information content, it would probably not be suitable for general distribution to park visitors.

SUBMERGED CULTURAL RESOURCES SPECIAL REPORT

These may be in published or photocopy format. Included are special commentaries, papers on methodological or technical issues pertinent to underwater archeology, or any miscellaneous report that does not appropriately fit into one of the other categories.

SUBMERGED RESOURCES CENTER PROFESSIONAL REPORTS

1. Daniel J. Lenihan, Toni L. Carrell, Stephen Fosberg, Larry Murphy, Sandra L. Rayl and John A. Ware. *Final Report of the National reservoir Inundation Study.* Two volumes. Submerged Cultural Resources Unit, 1981.

2. Larry E. Murphy, Editor. *Submerged Cultural Resources Survey: Portions of Point Reyes National Seushore and Point Reyes-Farallon Islands National Marine Sanctuary.* Submerged Cultural Resources Unit, 1984. Originally published as Southwest Cultural Resources Center Professional Papers #1.

3. Toni Carrell. *Submerged Cultural Resources Inventory: Portions of Point Reyes National Seashore und Point Reyes-Furallon Islands National Murine Sanctuury.* Submerged Cultural Resources Unit, 1984. Originally published as Southwest Cultural Resources Center Professional Papers #2.

4. Toni Carrell. *Submerged Cultural Resources Site Report: NOQUEBAY, Apostle Islands National Lakeshore.* Submerged Cultural Resources Unit, 1985. Originally published as Southwest Cultural Resources Center Professional Papers #7.

5. Daniel J. Lenihan, Editor. *Submerged Cultural Resources Study: Isle Royale National Purk.* Submerged Cultural Resources Unit, 1987. Originally published as Southwest Cultural Resources Center Professional Papers #8.

6. Toni Carrell, Editor. *Submerged Cultural Resources Site Report: Charles H. Spencer Mining Operation and Paddle Wheel Steamboat, Glen Canyon National Recreation Area.* Submerged Cultural Resources Unit, 1987. Originally published as Southwest Cultural Resources Center Professional Papers #13.

7. James P. Delgado and Stephen A. Haller. *Submerged Cultural Resources Assessment: Golden Gate National Recreation Area, Gulf of the Farallones National Marine Sanctuary and Point Reyes National Seashore.* Submerged Cultural Resources Unit, 1989. Originally published as Southwest Cultural Resources Center Professional Papers #18.

8. C. Patrick Labadie. *Submerged Cultural Resources Study: Pictured Rocks National Lakeshore.* Submerged Cultural Resources Unit, 1989. Originally published as Southwest Cultural Resources Center Professional Papers #22.

9. Daniel J. Lenihan, Editor. *Submerged Cultural Resources Study: USS Arizona Memorial and Pearl Harbor National Historic Landmark.* Submerged Cultural Resources Unit, 1989. Originally published as Southwest Cultural Resources Center Professional Papers #23.

10. Toni L. Carrell, Editor. *Submerged Cultural Resources Assessment of Micronesia.* Submerged Cultural Resources Unit, 1991. Originally published as Southwest Cultural Resources Center Professional Papers #36.

11. James P. Delgado, Daniel J. Lenihan and Larry Murphy. *The Archeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons, Republic of the Marshall Islands.* Submerged Cultural Resources Unit, 1991, Originally published as Southwest Cultural Resources Center Professional Papers #37.

12. Larry E. Murphy. *8SL17: Natural Site-Formation Processes of a Multiple-Component Underwater Site in Florida.* Submerged Cultural Resources Unit, 1990. Originally published as Southwest Cultural Resources Center Professional Papers #39.

13. Larry Murphy, Editor. *Dry Tortugas National Park, Submerged Cultural Resources Assessment.* Submerged Cultural Resources Unit, 1993. Originally published as Southwest Cultural Resources Center Professional Papers #45.

14. Don Moms and James Lima. *Channel Islands National Park and Channel Islands National Marine Sanctuary, Submerged Cultural Resources Assessment.* Submerged Cultural Resources Unit, 1996. Originally published as Intermountain Cultural Resource Centers Professional Papers #56.

15. Larry E. Murphy, Editor. *H.L. Hunley Site Assessment.* Submerged Cultural Resources Unit, 1998. Originally published as Cultural Resources Management Professional Papers #62.

16. James E. Bradford, Matthew A. Russell, Larry E. Murphy and Timothy G. Smith. *Yellowstone National Park Submerged Resources Survey.* Submerged Resources Center, 2003. Cultural Resources Management Professional Papers #65.

17. Matthew A. Russell. *Comet Submerged Cultural Resources Site Report.* Submerged Resources Center, 2003.

Mission: As the Nation's principal conservation agency, the Department of the Interior has responsibility for *most* of our nationally-owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preseving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral reources and work to assure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under US Administration.