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Marianne Simoulin
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MANAGING A LOST STEAMER:
RECOMMENDATIONS FOR AN UNDERWATER PARK
AT THE *SS POMONA* SHIPWRECK SITE, FT. ROSS COVE

A Project Report

Presented to

The Faculty of the Department of

Interdisciplinary Studies

San Jose State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Sciences

By

Marianne Simoulin

December 1999

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ABSTRACT

MANAGING A LOST STEAMER: RECOMMENDATIONS FOR AN UNDERWATER PARK AT THE *S.S. POMONA* SHIPWRECK SITE, FT. ROSS COVE

by Marianne Simoulin

This report proposes a management plan for a potential underwater park in Fort Ross Cove, at the wreck site of the *S.S. Pomona*. The project addresses maritime history on the California Coast at the turn of the century, the role of the *S.S. Pomona* in the development of the steamship, and the importance of Fort Ross as a doghole port. Marine archaeology and historical research on the vessel demonstrate that this was a significant ship, justifying the listing of the wreck site in the National Register of Historic Places. The park plan includes management of the historic and cultural resources of the *S.S. Pomona*, as well as the ecological resources of the cove, as the ship serves as an artificial reef for marine life. Practical aspects of park management are listed, such as access to the park, public safety and information, museum displays and brochures.

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INTRODUCTION

Numerous vessels have been wrecked on the California coast during the past four centuries. Only a small number of these wrecks have been explored by skin divers, and even fewer have been studied by archaeologists. As a result, our submerged cultural heritage is fast disappearing, a victim of the elements and the hands of treasure-hunters. The goal of this project is to create an underwater State Park to protect one of these wrecked vessels: the *S.S. Pomona*. Wrecked in Fort Ross Cove in 1908, adjacent to the boundaries of what is now Fort Ross State Historic Park, the wreck of the *Pomona* has been relatively protected from the elements, sheltered from the prevailing north-western seas by a rocky point. Thus, the effect of storms and surge has been lessened during the ship's ninety years underwater. The wreck's location near a state park should make the task of implementing an underwater park easier. The proximity of interpretive historical display will generate public interest, which in turn should be a motivation to preserve what is known. The rangers already on duty at Fort Ross State Historic Park, can help educate the public and interpret the site. Finally, national recognition of the site will help enhance its status and protect it from looters.

The goals for this Master's project can be described as follows:

- Research the history of the vessel and its role in California maritime trade.
- Learn the tools and methods to conduct underwater surveying.
- Record the site via video and photography.
- Help produce a site map.

- Assess the biological diversity and health of the marine life in the cove.
- Update the site record with new information.
- Prepare a proposal for an interpretive display.
- Prepare a nomination to the National Register of Historical Places.
- Research existing management plans and prepare a proposal for the underwater park.
- Organize and catalogue documents relating to this project.
- Produce site reports and this project report.
- Present the results of the research to park rangers, agencies, and the public.

Research

This project report describes the work from August 1998 to November 1999.

Historical research on the *Pomona* required consulting a variety of sources in numerous libraries.

A wealth of information was recovered from newspaper articles, archives, and consultation with engineers and maritime experts. The first chapter of this report will present the results of this research. It provides an overview of the maritime trade, the history of the vessel, the history of Fort Ross, the vessel's final days, and the wreck. The second chapter will describe the archaeological work performed on the vessel since its discovery by skin divers. Readers wanting in-depth descriptions should refer to the site reports¹.

Many research leads did not bear fruitful results. For example, a propeller from a "*Pomona*" displayed at the Monterey Maritime Museum actually came from a later vessel

of the same name. The name boards of the *Pomona* have not yet been recovered. Some sources recalled seeing a board at the Point Arena lighthouse, but a visit to the lighthouse failed to turn one up. Perhaps the board has been lost among other exhibits. Other observers recalled seeing a second board at the San Francisco Maritime Museum; but in the huge warehouse at this museum the board could not be located. Finally, the original plans of the *Pomona* have been lost, though they may be among the uncatalogued boxes at the J. Porter Shaw Library of the National Maritime Museum in San Francisco. Additional funding is needed for a complete catalogue of these resources. The master carpenter certificate was also lost and could not be located, even from the National Archives in Washington D.C.

Underwater Archaeology

The second chapter of this report addresses some other goals of this project: to learn the tools and methods of underwater surveying, to help produce a site map, and to record the site with video and still photography. My training in underwater surveying was directed by John W. Foster and Charles D. Beeker. This work resulted in the site map produced by the team during the summer of 1998. The final map found in Appendix F, was produced by the Underwater Science Program at Indiana University. All measurements, though usually taken using the metric system, are displayed here in feet and inches to reflect the system used at the time of the vessel's construction in the late 1880s.

The original 1988 videos are on file at the California Department of Parks and Recreation, Cultural Heritage Section, Sacramento, California. A final video is

undergoing editing and will be submitted to both California Department of Parks and Recreation and Indiana University, Underwater Science Program, Bloomington, Indiana. Two different collections of photographs are on file. Archival pictures from various sources, especially from the San Francisco Maritime Museum, San Francisco, California, were ordered and sent to California Department of Parks and Recreation. Some of these photographs can be found in Appendix F and are reprinted here with permission of the San Francisco Maritime Museum. Underwater photographs came from a variety of sources, from earlier research (Jack Hunter, 1988), ongoing marine life identification (Chuck Honek), and field research in 1998 and 1999 (the author).

Marine Life on the S.S. Pomona

Chapter Three of this report addresses the goal of assessing the biological diversity and health of the marine life in the cove. It presents the results of three assessments of the marine life at Fort Ross Cove made in 1987, 1998, and the most recent in 1999. This research included numerous dives on the site, as well as interviews with marine biologist Paul Haskins, M.S., and a review of prior reports made by James Barry, Ph.D., Sr. State Park Ecologist.

Paperwork, Site Reports, and Nominations

Appendices A, C, and D present various forms that have been filed with State Agencies to change the status of the site. The site record, filed with the Northwest Coast Information Center at Sonoma State University, has been updated with new information gathered since the original filing in 1988. Form DPR 38 is a proposal for an interpretive

display, planned to be filed with the California Department of Parks and Recreation. The Nomination to the National Register of Historical Places is in its second draft form. It has been reviewed by the appropriate agency once and is undergoing its final edit. An intermediate report is on file with California State Parks. Finally this project report will be filed with California Department of Parks and Recreation.

Proposal for an Underwater Park

Chapters four and five present the costs and benefits of the proposed Fort Ross Cove Underwater Park and describe a management plan for the park. This plan was formulated after studying existing parks' plans, such as the Florida Keys National Marine Sanctuary Management Plan and the Eglin Air Force Base Cultural Resources Management Plan, and obtaining regulatory information from the California Department of Parks and Recreation. The first step toward having the *Pomona* wreck site officially listed as a California State Park was taken in August 1999, when Charles D. Beeker, John W. Foster, park rangers, students, and the author placed a buoy displaying the California State Parks logo on the site of the *S.S. Pomona*.

Disseminating Information

Public involvement is essential to the success of the park project. Local divers may be enlisted to support the project and protect the wreck as a historical site. An entire session of the 1998 annual meeting of the Society for California Archaeology was dedicated to the presentation and discussion of the *Pomona*'s research to inform other professionals of the ongoing work. Park rangers and officials were presented with the

results of the survey in 1998, and with a proposal for a management plan in 1999. Two additional papers on the site will be presented in January 2000 at the Society for Historical Archaeology annual meeting. In addition, a repository of information will be established at the Fort Ross Library so that interested professionals, as well as the public, may have access to this research.

CHAPTER 1

THE HISTORY OF THE S.S. *POMONA*

The S.S. *Pomona* was built in San Francisco, California, to meet a growing need for shipping along California's north coast. In the late 19th century there was no highway or railway along the coast, and ocean and river vessels served the needs of communities by transporting passengers, mail, and produce. The *Pomona*, one of the first steel-hulled ships constructed on the West Coast, as well as one of the first steamers built in San Francisco, plays an important role in West Coast maritime history.

Maritime History of the West Coast

Seafaring had been the chief mode of transportation used by the Spaniards since the beginning of the exploration of California. Horse and mule trains could only carry a limited amount of goods. Trails were treacherous and difficult, and bad weather could render roads impassable. The coastline was relatively well charted, due to a developing trade route from southern California all the way to Alaska. Until the advent of steamships, sailing vessels served the needs of commerce up and down the coast. But seafaring had its dangers. Sudden storms and strong currents made the Pacific Coast a perilous area for navigators. Moreover, trade winds blew towards the coast, endangering vessels coming too close to shore. The coast is covered with thick fog during the summer months, rendering navigation difficult. Underwater pinnacles come close to the surface of the ocean, adding obstacles to the already treacherous route. In the 19th Century, aids

to navigation such as lighthouses were scarce or nonexistent. Sailing captains were torn between hugging the coastline, with all its obstacles, and sailing out to sea, where winds were stronger and waves much higher.

Numerous sailing vessels ran ashore during the 19th century and the coastline is now littered with wrecks from this period. Steam-powered engines could navigate more precisely, providing a solution to these problems. Because these vessels were not at the mercy of the winds, steamers could navigate closer to the coastline without risking being blown onto shore. Precise maneuvering allowed the use of small coves, called "dogholes," for loading lumber and other goods at any time of the year. Fort Ross Cove was one such "doghole port." While the remains of sailing vessels attempting to close in on the lumber chute at Fort Ross Cove during rough weather now litter the sea floor, few steamers were lost in that manner. By 1890, steamers had become successful and their safety records drove the cost of insurance down.² Steam vessels also revolutionized scheduling by providing reliable departure and arrival times.³

Built in 1888, the *Pomona* marks the beginning of an era that witnessed the impact of new technology on business. At the time, sailing vessels were still the primary means of ocean transportation. California was flooded with immigrants after the discovery of gold in 1849 and this population required a constant supply of food and building materials. Commerce prospered during the following decades and with more people needing housing, the demand for lumber increased. Soon timber stands near San Francisco were exhausted and lumber merchants had to cut and mill lumber further north. Eventually, virtually every stream flowing into a cove with a safe anchorage along the

Sonoma and the Mendocino coast had a mill at its mouth, including Timber Cove and Fort Ross Cove.

Transport vessels were loaded at "landings" or "outports" where the lumber was sent down from long chutes extending from the bluff.⁴ Steamer design evolved in response to this loading method: a round stern was more easily maneuvered alongside the docks, open decks facilitated loading timber, and booms were designed to grasp the chutes.

Towns sprang up near the mills and anchorage along the coastline. Contact with the larger cities was maintained through ocean trade, as vessels brought news, mail, and manufactured and imported goods from the big cities to smaller towns. On return trips, they carried lumber and produce. Steamers with passenger accommodations contributed to the coastal expansion. On her fateful last voyage, the *Pomona* carried 80 passengers from San Francisco to Eureka with stops along the way. From the list of passengers, we know that entire families were moving north, most of whom carried all their belongings with them locked in chests and suitcases. Such a trip was a serious undertaking. If the vessel was lost or ran ashore, there was no one to help and all could be lost.

The growth of the transportation industry reflects the entrepreneurial spirit of Californians. In 1848, the Pacific Mail Steamship Company was established with federal subsidies to encourage mail service from the East Coast of the U.S. and the growth of business in the Far West. The company was charged with operating a line of steamships from Panama to Oregon⁵ and it dominated the Pacific coastal trade in the years preceding the Civil War. Steam ships received government subsidies to bring passengers and mail from the Isthmus of Panama to San Francisco.⁶ The Pacific Mail Company is significant

in the maritime history of the West Coast because it forced improvements of port facilities at San Francisco, Seattle, Los Angeles, and San Diego,⁷ thereby contributing to the development of these cities.

Initially, two factors stimulated the growth of the ocean transportation industry: outside competition from the railroad industry, and internal competition between steamship companies. In 1863, the Central Pacific Railroad Company was attempting to capture the maritime transport market and the transportation companies banded together against this new competitor. These companies included the Pacific Mail Steamship Company, the California Steam Navigation Company, Wells, Fargo & Company, the California Stage Company, and the Sacramento Valley Railroad.⁸ When their efforts failed, the ocean transportation companies attempted to negotiate with the Central Pacific. But they could not compete with the monopolistic power of the railroad.

In 1869, the Central Pacific Railroad bought the California Steam Navigation Company, thus controlling all river traffic. The Central Pacific began a price war with the established Pacific Mail Steamship Company in an attempt to drive the steamship company out of business, but the two companies eventually came to an agreement. They shared facilities and docks and established alternative schedules.⁹ For ocean commerce, the Central Pacific Railroad first made a series of rate-fixing agreements with the Pacific Mail Steamship Company and then, in 1874, organized their own steamship line, the Occidental and Oriental. By 1880 they had so weakened the formerly dominant Pacific Mail that they were able to control it also.¹⁰

Although weakened by the railway, the steamship companies were able to compete in both time and fare with train transportation until 1916. Competition between

steamship companies led to consolidation of the industry, with companies combining to control trade routes. Although not strictly a monopoly, the Pacific Coast Steamship Company dominated the West Coast trade for over 40 years from 1876-1916.¹¹ This company had its origins in the partnership of Goodall and Nelson, who began running small coasters (small steamers plying the coastal route) from San Francisco in 1860 to transport and sell fresh water to commercial shippers in San Francisco Bay. Ships required fresh water for their stores on board, and there was no easy access to it from the coastal docks. The fresh water came from Spring Valley, in Sausalito, and was transported to the docks or to the ships themselves by steam tugs.¹² As the partners acquired additional steamers and other vessels, the business evolved into a steamship line. In 1872, Senator Charles Perkins joined the firm, which was thereafter called Goodall, Nelson and Perkins Steam Ship Company, and in 1875 they bought the Pacific Mail Company's coastal fleet, increasing the firm's vessel count to 14 steamers. The purchase of the Pacific Mail's interests gave Goodall, Nelson & Perkins Steamship Company access to routes north of San Francisco as well as those of the southern coast. Their routes now extended from San Diego to Victoria, British Columbia. The company changed its corporate name to Pacific Coast Steamship Company in 1876 (Figure 3).

The Admiral Line was the Pacific Coast Steamship Company's biggest competitor. PCSS was able to compete with the Admiral Line and the railroad until the loss of the steamship *Congress* in 1916. This loss was such a financial blow to the company that the Admiral Line was able to purchase it. The new company, renamed the Pacific Steamship Company under the trademark of the Admiral Line, was formed by H.

F. Alexander and operated the expanded service of 18 steamers. By then, large-hulled steamers capable of 25 knots competed with and often matched the railroad in speed.

Eventually, the growing dominance of automobile and railway transportation led to the demise of the steamships. The coastal service finally ended in 1938, when automobiles and air transportation made steamers an expensive alternative. Once the coastal highway was built, steam vessels for cargo and passenger traffic were obsolete.

Table 1: Steamship Companies

Company name	Interests Controlled By
Pacific Mail Steam Ship Co. 1848-1875	Unknown
Pacific Coast Steamship Co. 1876-1916	Goodall, Perkins & Co., 1817-1881 Oregon Improvement Co., 1881-1897 Pacific Coast Co., 1897-1916
Pacific Steamship Co. 1916-1933	H.F. Alexander, 1916-1930
Pacific Steamship Lines 1933-1938	Dollar SS Co., 1930-1938

The Pomona as ship-building innovation

The *S.S. Pomona* was built in San Francisco by the Union Iron Works under the supervision of James Dickie, the Master Carpenter for the Oregon Improvement Company. The growth of the Union Iron Works parallels the growth of industrial technology in 19th-century California (Figure 4.) The Union Iron Works evolved out of the Union Iron and Brass Company. Founded by Irving Murray Scott and Peter and James Donahue at First and Mission Streets in 1849, the firm was the first iron casting foundry in California. After four years in business, the shop equipment was appraised at \$150,000. The foundry did a wide variety of work, but most orders were for mining

machinery, marine engines, and repairs to vessels. In 1883, the Union Iron Works changed ownership and moved to the southeastern shoreline of San Francisco, in the cove formed by Potrero Point known as the Central Basin. Irving M. Scott, who managed the firm, advanced the idea of developing steel shipbuilding on the Pacific Coast. Assessing the development of the railroads and assuming that ocean transportation would have to expand in order to compete, Scott constructed several new buildings to house self-sufficient, steel-related shops. In addition to subsequent successes in both naval and maritime steel production, Union Iron Works continued its vessel repair work as well as the manufacture of steam engines and mine machinery. The Union Iron Works, under the direction of G. W. Dickie, manager of the works, built the first hydraulic dry-dock in California. This 43-foot long dock was an important improvement for steamship operators in San Francisco, as it was the only large dry-dock connected to a well-equipped repair facility. Unfortunately, the dock was destroyed in the 1906 earthquake.

Table 2: Union Iron Works Ownership Changes

Company Name	Date of Acquisition
Union Iron & Brass Co.	1849
Union Iron Works	1883
United States Shipbuilding Co	No date available
Behlehem Steel Corporation	1905

Vessels built of steel, rather than wood or iron, were a British invention. London shipbuilders had first found that iron hulls were superior to wooden ones: the engines could be easily attached to the vessel's metal frame and were thus less prone to fire; in addition they were resistant to water-borne pests such as woodworms, thereby requiring fewer repairs. Steel was an improvement over iron because it is stronger and therefore the vessels fared better in case of collision. Steel-hulled steamers were first built in San

Francisco at the Union Iron Works under the visionary leadership of Irving M. Scott. Later, most steamers would be built in Oregon or Washington and towed to San Francisco where their engines were installed. The *Pomona*, constructed in 1888, was the second steamer with a triple-expansion engine built on the Potrero dock¹³.

The first was the *S.S. Premier*, constructed in 1886. The *Premier*, built for Canadian owners, followed British specifications. The Union Iron Works adopted these new specifications and thus moved to the forefront of American marine engine builders. By 1899 -eleven years after the *S.S. Pomona* was built- the triple-expansion engine had become the international standard for ocean-going vessels and would only be superceded in cargo steamers by turbine engines.

In 1901, the Union Iron Works was sold to an Eastern-based trade combination, the United States Shipbuilding Corporation. That company failed locally in 1904, but a holding committee sustained Union itself until 1905, when it was sold to the Bethlehem Steel Corporation for \$1 million. This Eastern steel giant quickly dominated the local industry. In 1908, Bethlehem bought the Hunter's Point dry-docks from the San Francisco Drydock Company, and eight years later purchased the Alameda yard (90 acres and 6 shipways) from the United Engineering Company. Major improvement began on the Potrero yard (35 acres, 1785 feet of waterfront) in 1910 and continued until World War I.¹⁴

S.S. *Pomona* specifications

The following description of the *S.S. Pomona* is based on Lloyd's of London insurance records for the period 1890 through 1908, plans from the National Maritime Museum of San Francisco, and contemporary newspaper articles.

The *S.S. Pomona* was built with three decks and two iron masts, a plain head (or bow), a round stern, and a steel hull¹⁵. The lower first deck was made of steel, while the second deck was a spar deck constructed with the *scantling*¹⁶ above the main deck heavier than the upper deck. The upper deck was an awning deck, having a continuous upper deck of light construction, and the sides completely enclosed above the main deck. The *Pomona* had five watertight *bulkheads*¹⁷ (Figure 19.) These bulkheads did not run all the way up to the main deck and would prove fatal to the ship once she took in water. She carried two anchors and chains, four metallic lifeboats, and four life rafts. Lloyd's records registered the ship at 1264.08 gross tons, her maximum total weight including ship and cargo. The net gross tonnage was registered at 867, representing the amount of freight she could legally transport, but the vessel had the potential to carry nearly 1200 tons of freight.

The triple-expansion engine had three cylinders which could each generate 188 NHP¹⁸ (nautical horsepower). The diameters of the three cylinders were recorded at 23.5 inch, 34.25 inch, and 56 inch, with a 36-inch piston stroke.

At 225.0 feet long with a *beam* of 33.5 feet, and a *draft* of 16.0 feet, the ship was similar in size to most vessels built around that time. The vessel was painted white above the water line, and black below the water line. The name boards were placed high above the water line and painted black, contrasting with the white background. A white *poop* deck rail surrounded the upper deck.

Although the original plans could not be located, we can assume that the *Pomona*'s construction followed the plans of similar ships, such as the *Peru*, and thus that

the decks and railings were made of wood. There were three portholes on either side of the wheelhouse.

The *Pomona*'s accommodations were described by the *Morning Call* in 1888. The vessel was fitted as a first-class passenger steamer and had accommodations for 200 cabin passengers. There was a social hall inside the vessel, as well as a dining salon. There was a coffee shop separate from the main dining room, and both spanned the full width of the ship. These were fitted with expensive hardwood panels of superb craftsmanship. The social hall was similarly fitted and contained a huge mirror. The vessel throughout, including the staterooms, was lighted with Edison incandescent electric lights.²¹

During her early years, the *Pomona* carried a set of sails in case she ran out of coal or the engine failed (Figure 1.) To support the sails, she was rigged with two iron masts, a bowsprit, main yards, and steel standing rigs²².

Overview of the Engine

The steam propelling equipment found on the *Pomona* consisted of boilers, condensers, engine, and auxiliary equipment. The triple-expansion steam engine used for primary propulsion could generate 1250 HP. The steam that powered the ship was the result of the combustion of coal in the Rowland's corrugated furnaces set inside two circular Scotch boilers, 11 feet 6 inches in diameter and 11 feet long. Originally, the *Pomona* used coal from the Clarke and the Black Diamond coal seams from the northeastern slopes of Mount Diablo.²³ This mid-tertiary low-grade lignite or sub-bituminous coal was the major fuel source for San Francisco during the late 19th century.²² The coal was transported from the mines by a railroad connection to the water-

shipping facilities at Antioch.²³ Lignite does not burn very hot and produces a lot of ash. Because this coal from the West Coast was of such poor quality, the *Pomona* ran multiple experiments with other types of coal to increase her speed. In May of 1895, she ran on Coos Bay (Oregon) coal for two round trips. Franklin and Cardiff coal were also tested²⁴. Franklin coal was the most efficient: it took only 7.575 lbs. of Franklin coal to produce dry steam versus 11.339 lbs. of Cardiff coal.²⁵

The steam cycle began forward of amidships in the fire, or boiler, room. A typical vessel the size of the *Pomona* required a crew of at least two tenders who monitored water flow and levels in the boilers, and four stokers to shovel coal into the furnaces of each boiler. In addition, the engine room crew usually included two or three engineers who operated in shifts, to direct the crew and the operation of the main engine.

The coal fire was lit and maintained in the boilers' furnaces, lined with brick for heat refraction. These bricks were manufactured by Carnegie, a factory in Hollister, California, in operation until the 1906 earthquake. The hot gases from the fire passed toward the rear of the furnace into the combustion chamber where combustion was completed, then out through the boiler tubes. Both the area surrounding the boiler tubes and the area below the furnace were filled with fresh water. As the water evaporated, the steam was collected in the steam space, passed into the dome and was drawn off to the engine through the stop valve. The steam powered the three cylinders of the main engine, as well as several auxiliary donkey engines, and the dynamo²⁶ (Figure 5). A single black smokestack rose 67 feet between the furnaces to let the fumes out. The connections between the uptakes and the stack had slotted holes to allow for expansion. To access the steam whistle, a ladder was set on the smokestack, which was equipped

with a platform and life rail. Two air vents faced forward on either side of the smokestack.²⁷

The steam was used three times. It went first through the smaller cylinder, which operated at high pressure (56"-36" lbs. Per square inch pressure -psi), forcing the piston from one end of the cylinder to the other (called the stroke). The *Pomona* had a 3-foot stroke. The steam expanded during this process, losing heat and pressure. It then moved through the intermediary cylinder at medium pressure (34.25" psi), and finally through the larger cylinder, which ran at low pressure (23.5" psi). Each time, the steam repeated the same process, expanding and losing heat and pressure. The size of each processing cylinder was correspondingly increased to allow the reduced steam to produce constant power.²⁸

From the cylinders, the steam passed to the condenser. The condenser was surrounded by seawater to cool the steam, and any change in seawater temperature could affect the condenser's cooling ability. An air pump removed the air and water from the condenser and pumped the water back into the boiler. Some fresh water was lost in the process, so most ships had to obtain additional fresh water while in port.

Keeping the boilers at the right temperature was labor-intensive and required constant attention. Coal needed to be constantly shoveled into the firebox, and the ashes needed to be removed. Beneath the furnace was an ash pit that could be opened to clean away the ashes. The job was hot and dirty, and most stokers suffered from lung problems. Coal residues collected inside the the firebox and had to be cleaned at least once a year.

There were many types of valves. Piston valves were used to introduce steam pressure on one side of the piston (steam valves), and let the steam exhaust from the other side (exhaust valves).

“A piston inside the cylinder rode up and down as steam was delivered. In order to do that, the steam chest discharged through a flat valve. The high-pressure valve was often a piston valve, while the other valves might have been slide valves. The valve slid so that it admitted steam to the operating side of the piston, and simultaneously closed the opposite side’s inlet and opened its exhaust. These valves were driven by a set of rods leading from eccentrics on the propeller shaft.”²⁹—

These piston valves determined which way the engine was running, ahead or astern. The valves were moved by small eccentric bearings on the shaft through valve rods and eccentric rods. The piston rods drove the single drive shaft and propeller simultaneously. On the *Berkeley*, a vessel of similar dimensions and construction, the propeller ran at a 125 rpm (revolutions per minute) with a rating of 1,450 horsepower³⁰. The pistons were connected to the crankshaft by piston rods and connecting rods. The piston rod was joined to the connecting rod by a crosshead bearing. The crankshaft was connected to a thrust block at the back of the engine by a shaft. This shaft went aft through the stern bearing to the propeller. The shafting was composed of sections coupled together: the tail shaft was tapered to hold the propeller. It usually had a brass sleeve where it came in contact with the stern bearing. There was a short shaft just aft of the engine that carried the work of the engine. The thrust bearing was located just aft, to take the thrust of the propeller. Depending on the size of the vessel, one or more intermediate shafts would be coupled to the tail shaft. Bearings located along the shaft maintained the alignment. The propeller shaft connected the engine to the propeller. This type of propeller was called a “single screw,” because that it had only a single

narrow blade and worked like a segment of a screw to pump water from forward to aft. The blade was 10 feet 6 inches in diameter, with a 16-foot pitch.

Auxiliary engines were used for many purposes: as hoists for loading and unloading cargo, as winches or capstans to pull anchor or tow other boats, and as steering engines. All auxiliary equipment – bilge pumps, whistles, condensated pumps, ventilation, fans, generators, air compressors, fire pumps, and electrical generators – was powered by steam.³¹ The air, bilge, circulating and feed pumps were normally operated by an intermediate pressure cylinder. There was a dynamo to generate electricity. In accordance with U.S. Steamboat Inspection Law, there was a steam fire extinguisher system for each engine.

In late 1894, the *Pomona's* engines were refurbished with Howden's forced draught system and this greatly increased her speed. Without this innovation, wind blowing from the wrong angle, prevented fumes from exiting the stack. This made it difficult to keep steam pressure up.³² Howden's forced draught system resolved this problem by installing a fan between the firebox and the chimney to move the spent smoke upward and increase the heat of the coal fire. This fan was driven by an independent steam engine and "suitably installed with air ducts, steam, and exhaust pipes".³³ Before this modification, the *Pomona's* trip from San Francisco to Eureka took an average of 19.87 hours. After the modification, the average trip took only 18.25 hours, and used less coal.³⁴ This Howden's system increased the power of each cylinder by 50 horsepower each to almost 300. The *Pomona* was used to test this new system which proved beneficial,³⁵ as the vessel could now reach a maximum speed of 15.5 knots

and thus became the fastest steamer on the west coast. In September 1900, the *Pomona* had new boilers installed in Seattle.³⁶

The *Pomona* also introduced a second technological innovation: on-board heating for passengers. As early as 1894 she was equipped with a passenger-cabin heating system of pipe coil radiators supplied with steam from the auxiliary steam system and drained through traps to feed and filter tanks. These radiators were placed in the cabins, bath and wash rooms.³⁷ Every stateroom had a radiator which could be turned off and on. In 1902 the *Pomona* was fitted with electricity: an independent engine ran one of Edison's patent dynamos, capable of powering 172 sixteen-candlepower incandescent lights. These were distributed throughout the ship, providing lighting for each stateroom as well as for the decks. Each stateroom also retained an oil lamp for use if the electricity failed.³⁸ The S.S. *Pomona* was "the Pride of the [Pacific Coast Steamship Company] fleet..."³⁹

The *Pomona's* History

The *Pomona* made a trial trip on the San Francisco Bay on Saturday, July 21, 1888. She left the Union Iron Works carrying a few invited guests, passed by the east side of Angel Island to the Contra Costa side of the bay, and returned via Sausalito.⁴⁰ Captain Alexander noted that the steamer developed a speed of fourteen knots an hour. Her owners, Captains Knowles and Griffiths, were pleased with her performance.⁴¹ Taking the place of the *Los Angeles*, the *Pomona* began her maiden voyage to Wilmington (now San Pedro), on July 28, 1888, via Santa Cruz, carrying a large number of passengers and cargo⁴² (Figure 1).

Once placed in regular service, she traveled as far north as Puget Sound and as far south as San Pedro. In 1889 she sailed once a week on Wednesdays.⁴³ At first the *Pomona* carried lumber, goods and passengers. By 1894, she had settled into the San Francisco-Eureka route, going to Eureka every Wednesday and returning on Friday, although occasionally she went up to Seattle for repairs. An average one-way trip from San Francisco to Eureka took three days, making stops along the way to deliver mail and goods and drop off passengers (Figure 9). She often crossed the Humboldt bar to go to Hookton, a few miles south of Eureka (Figure 8).

For several months in 1894 the *Pomona* serviced Yaquina Bay, Oregon until she was replaced on that route by the *Willamette Valley*⁴⁴ while boiler repairs were made. In 1895, the *Pomona* resumed round trips between Eureka and San Francisco every four days, each trip taking an average of twenty hours, with a stop at Arcata. Between October 14, 1895, and October 17, 1896, she made 92 voyages, never missing a trip. According to the steamer's logbook, the distance covered during these two years was 41,032 miles, almost twice around the world.⁴⁵ In 1895, she was praised for being the fastest steamer along the coast, with average speeds of thirteen and three quarter's knots per hour over the previous hundred and thirty days.⁴⁶ The *Pomona* had enough power to face strong winds even when other vessels were stuck at port. Numerous other steamers ran the same course, and many sank or collided with each other. Such steamers were the *Humboldt*, the *San Benito*, the *City of Chester*, the *Eureka*, and the *Gipsy*. On March 25, 1897, with Captain Doran as Master, there was a competition between the *Humboldt* and the *Pomona*. Both ships made the trip from Eureka to San Francisco in less than fifteen and a quarter hours, but the *Pomona* won by four minutes.⁴⁷

On another occasion, the *Pomona* took the route of the *City of Chester* after this steamer was lost to a storm. This temporary route lasted a year, after which the *Corona* replaced the *Pomona*.⁴⁸

During the 1890's, the *Pomona* carried fairly standard cargoes. From Eureka to San Francisco she carried raw and semi-finished products, such as lumber, shingles and doors, and farming and ranching produce, including wool, apples, butter, carrots, tobacco, currants, bitters, potatoes, peas, and eggs. She also carried forest products, such as deerskins, leather, and hides, and fishing produce, such as fish and salmon.⁴⁹ From San Francisco to Eureka, she carried manufactured goods, passengers, and mail. In 1897, the round-trip Eureka-San Francisco fare on the *Pomona* was \$10 for second-class and \$15 for first-class passengers.⁵⁰

The *Pomona* had three accidents before the final one that ended her career. In 1901, she ran down the wooden schooner *Fearless* off Bolinas during a storm, cutting the sailing vessel nearly in half. She did not suffer any damage. In 1903, she collided with the *Marblehead* in San Francisco harbor during a heavy fog. The *Marblehead* did not suffer any damage, but the *Pomona* suffered \$2,500 worth of damage. In 1904, she collided with the *Westport*, during a heavy fog.⁵¹ The *Pomona* suffered \$500 of damage. Finally, in 1908, she sank off Fort Ross Cove after striking a submerged rock.

Captains

Over the course of her career, the *Pomona* was piloted by fifteen different captains. Notable among these were Captain Levi Hannah and Captain Doran. The *Pomona*'s captains were chosen for their safety records and their seniority in the shipping company. Captain Hannah was a pioneer captain on the West Coast and had commanded

numerous ships for the Goodall, Perkins and Nelson Company. He never had a serious accident while at sea. Captain Doran, the master famous for the race against the *Humboldt*, was removed from office on June 25, 1897. The passengers demanded that he be replaced because he was so intoxicated. First Officer Shea attempted to take command from him, but Captain Doran refused and "a quarrel ensued, in which Captain Doran was floored".⁵²

The following table lists the captains that ran the *Pomona* during her lifetime.

Table 3: Record of Endorsement of Change of Master

Recording Date	Late Master	Present Master	When endorsed
July 16, 1888	S.J. Wheeler	Les Conway	Sep. 13, 1888
July 16, 1888	Thos. Wallace	Jus. M. Jessen	Oct. 9, 1888
July 16, 1888	Jus. M. Jessen	Thos. Wallace	Oct. 30, 1888
July 16, 1888	Thos. Wallace	John Stringalls	Nov. 20, 1888
May 28, 1889	Levi Hannah	G. F. Hall	Mar. 17, 1890
May 28, 1889	G. F. Hall	E. Alexander	Aug. 27, 1890
May 28, 1889	E. Alexander	G. F. Hall	Sep. 5, 1890
May 28, 1889	G. F. Hall	Ed. Smith	Apr. 1, 1891
May 28, 1889	Ed. Smith	G. F. Hall	Apr. 30, 1891
May 28, 1889	E. Alexander	H. D. Leland	Oct. 15, 1891
Nov. 21, 1891	E. Alexander	L. Hannah	Dec. 29, 1891 ⁵³
N.A.	N.A.	Doran	1895 ⁵⁴
Mar. 11, 1898	J. J. Shea	E. W. Parsons	Feb. 3, 1899
Mar. 11, 1898	E. W. Parsons	J. J. Shea	Jul. 27, 1899
Mar. 11, 1898	E. W. Parsons	E. Alexander	Feb. 1, 1900
Mar. 11, 1898	E. Alexander	E. W. Parsons	Mar. 30, 1900
Mar. 11, 1898	C. Randall	J. J. Shea	Aug. 21, 1900
Mar. 11, 1898	E. Swansen	J. J. Shea	Sep. 8, 1906
Mar. 11, 1898	J. J. Shea	E. Swansen	Jan. 19, 1907
Mar. 11, 1898	G. S. Hannah	E. Swansen	May 10, 1907 ⁵⁵

Ownership and Insurance

The *Pomona*'s first recorded owner was the Union Iron Works. In 1890 J. N. Knowles⁵⁶ bought and registered her in San Francisco. Knowles sold the *Pomona* to the

Oregon Improvement Co around 1891. About 1898, the latter sold it to the Pacific Coast Steamship Co., which first registered her in Portland, Oregon. In 1899, PCSS registered the *Pomona* in New York, where she remained registered until 1906. The *Pomona* was insured with Lloyd's of London from 1890 until 1908. There is no record of her being insured prior to 1890. At the time of sinking, the *Pomona* was insured by Lloyd's of London through an agent, the Marine Department of Catton Bell and Co. The local representative was P. A. Becker.⁵⁷

The following table summarizes Lloyd's of London records from 1890-1908 for the *Pomona*, identified as number 150444:

Table 4: Lloyd's of London insurance records 1890-1908

Years	Owner	Port of Registry	Engines	Horse Power
1890-1891	J. N. Knowles	San Francisco, CA	T. 3Cy. 23",34" & 56"-36"	260HP
1891-1892	Oregon Improvement Co.	San Francisco, CA	T. 3Cy. 23",34" & 56"-36"	250HP
1895-1896	Oregon Improvement Co.	San Francisco, CA	T. 3Cy. 23",34" & 56"-36"	188 NHP
1898-1899	Pacific Coast Steamship Co.	Portland, O	T. 3Cy. 23.5",34.25" & 56"-36"	188 NHP
1899-1900	Pacific Coast Steamship Co.	New York, NY	T. 3Cy. 23.5",34.25" & 56"-36"	188 NHP
1908-1909	Pacific Coast Steamship Co.	New York, NY	T. 3Cy. 23.5",34.25" & 56"-36"	188 NHP

Throughout her life, the *S.S. Pomona* was registered under certificate number 150444 as hull number 9 and "SCSRP." "SC" stands for Screw Steamer and "SR" for Schooner. Her official letters, which were displayed on a flag when she entered port, were KHFC. Lloyd's of London began by recording her engine capacity in horsepower

(HP), but later switched to a different calculated rating which included nautical horsepower (NHP).

History of Fort Ross

The Russians originally built Fort Ross in 1814 as a wheat ranch and sea otter hunting station. The Russians undertook boat building for a short period of time. It is interesting to note that no Russian vessel was ever reported wrecked in the cove.

In 1841, the fort was sold to John Sutter, who removed the equipment and livestock to his ranch in the Sacramento Valley and turned the property into a cattle ranch to produce hides and tallow. By then, the Fort Ross boundaries extended from Timber Cove to the Russian River at Jenner. Sutter hired William Benitz as ranch manager in 1843, and he remained there 23 years. New settlers who came with the Gold Rush increased the demand for foodstuffs, and the Fort Ross ranch focused on growing potatoes, which grew well in this cold and damp climate. The first arrival of potatoes from Fort Ross in March and April of 1852 was reported in San Francisco newspapers.⁵⁸ In 1857, a small chute was installed at Fort Ross Cove to load supplies down to a workboat. The workboat would then be tied to a schooner anchored in deeper water. The schooner winched the workboat back to itself to unload the goods. By 1860, timber products were loaded directly in Timber Cove to the schooners from a slide chute.

Throughout the early 1850's the ranch did well with potatoes, but after a series of setbacks partially due to the California depression of 1855, the ranch manager added wheat and apples. In 1865, Benitz, by then owner of the property, sold the ranch to Fairfax and Dixon. Dixon built a sliding chute inside the northwestern side of Fort Ross Cove. With the new chute, schooners could anchor in twelve feet of water at low tide,

eliminating the need for workboats. Each car on the new chute could transport five or six hundred pounds of freight directly onto the ship. Six mooring buoys were installed to secure the ship while it was attached to the chute. The Dixon chute was used for over three decades, loading numerous ships with timber.

When Dixon died in 1869, the land was divided and the Fort Ross home ranch sold to George Washington Call. The Call family still owned the ranch incorporating Fort Ross at the time of the *Pomona*'s sinking in 1908. Call took possession of the chute, which was considered a public utility. The chute was operated under a franchise from Sonoma County, under the authority of the state legislature. Charges for handling freight over the chute were established by the Board of Supervisors.⁵⁹

The chute was generating business mostly from shipping wood products from the ranch, but other ranchers used it as well for their shipping needs. By 1877, Fort Ross business had expanded to 86 vessel visits. But by 1893, the lumber trade was declining since there were few trees left, and only 15 ships used the chute. Between 1897 and 1899, John Call used his own gasoline-powered schooner, *La Chilena*, to move his goods up and down the coast. The boom used by the Call family to load ships blew down in a severe storm in 1898.⁶⁰ Schooners still used the wharf, but in 1899 Call built a new wire chute, powered by a counterweight. The new chute stayed at the old slide location until all the stock-piled split wood had been shipped. Once this was done, the whole assembly was dismantled and re-erected on the opposite side of the northwest cove, in front of the ranch house.⁶¹ After 1910, Call sold the chute to the new owner at Timber Cove and built a new chute that used a donkey engine winch, and that could reach deeper water to

serve small steam schooners. Sometime around the 1920's, the Call family sold their last chute to Timber Cove.

The Sinking of the Pomona

On March 17, 1908, the *Pomona* left San Francisco for her last trip. She was carrying three hundred tons of general merchandise, eighty passengers and a crew of sixty-two men. The seas and winds were strong, with a west-north-west half gale. For this reason, she hugged the shoreline more closely than usual. The captain testified he chose this course because many passengers were seasick, and the seas were calmer close to shore. Nevertheless, some passengers later commented that the ship had been so close to shore, "...you could tell the color of a cow on the hillside".⁶² It was only the *Pomona's* second trip since her boilers had been repaired. Passenger L.F. Puter, a lawyer who had traveled the route from San Francisco to Eureka approximately 250 times noticed that the boilers had been refitted and were used at less than their full capacity, their pressure having been reduced from 150 to 130 pounds. He noted that the boilers could not produce enough steam to make any progress against the strong waves and headwind.

Two miles south of Fort Ross and a mile and a half out to sea, the ship hit a submerged rock, immediately breaking a hole in the hull. Captain Swansen later opined that this rock had been uplifted by the 1906 earthquake and was therefore uncharted.⁶³ The rock was close to the Monterey Reef, an outcrop of rocks that runs straight west from shore.

The rock was struck shortly after 6:30 P.M. and Captain Swansen quickly reversed the engines to pull the *Pomona* off. All was done calmly and the crew reassured the passengers. The *Pomona* was quickly taking in water and already had two feet of

water in her hold within a few minutes after the impact. Swansen decided to run for Fort Ross where he planned to beach the vessel. He sent Second Officer Fred I. Hamma and his men in a small boat to find a landing, while he headed the steamer to Fort Ross (Figure 20). Coming into the cove at thirteen $\frac{1}{2}$ knots, the captain spotted the mooring buoys and, thinking they were channel buoys, commanded the chief engineer to head straight for them.⁶⁴ The *Pomona*, already listing to starboard and with four feet of water in her hold, was hard to maneuver and struck a washrock in the middle of the cove. The impact tore a huge hole in the hull. The *Pomona* was rapidly sinking and Swansen ordered that a raft be sent out to shore to set lights on the beach. The steamer was quickly evacuated, with all passengers wearing life preservers. Women and children were evacuated first, followed by the men. The *Pomona's* six boats took nine trips to get all passengers and crew ashore.⁶⁵ Captain Swansen was the last person to depart. Most of the passengers took their hand luggage with them.

First and coach class passengers were interviewed and praised Captain Swansen for directing a safe and organized rescue.⁶⁶ The passengers had decided what to tell the press beforehand:

"It was understood among us, as we sat around the fire in the house at Mrs. Call's place, that, in our telephone messages and telegrams we would give only that version of the wreck that would reflect credit upon the captain, crew and company."⁶⁷

First mate Robert E. Carey and Second Mate Fred I. Hamma both testified in favor of the Captain. The Chief engineer John F. Clemments also supported the captain, but stated that the bulkheads design made the ship susceptible to sinking if the hull were compromised. The Captain was pleased with this report, especially since a year earlier, he had been suspended for fifteen days for being negligent in boat and fire drills.

Although the ship was a total loss, there was no loss of life nor injury. Even a parrot and three dogs were evacuated safely!⁶⁸

The George Call family lived in a small house on the bluff overlooking Fort Ross Cove, and they had been involved in numerous rescues over time. That evening, while her husband and sons helped unload passengers and cargo, Mrs. Call took the women and children into her house and fed them milk and steaming coffee. The men spent the rest of the night on the "inhospitable beach," lighting bonfires for warmth. Sixteen passengers did not want to wait for another boat and started walking the thirteen miles to Cazadero. From there, they caught the train and arrived in San Francisco on March 19. A Berkeley real estate man, E. J. Burg, surprised his family with his appearance as they were reading a newspaper article discussing the sinking of the *Pomona*.⁶⁹ The remaining passengers and most of the crew were rescued by the steamer *City of Topeka* and also landed in San Francisco on March 19. Most passengers lost the luggage they had carried on the trip except what was in their hand baggage,⁷⁰ as their trunks had been stowed below the hurricane deck, and were now fully immersed.

When all the passengers were ashore safely, the captain, three navigation officers, and nine members of the crew returned to the ship to remove the navigation instruments and to prevent others from looting.⁷¹ The one hundred and two soggy sacks of Wells Fargo mail were recovered three days later.

A few days later, a Reo automobile, being shipped to Eureka by a San Francisco firm, was retrieved from the wrecked steamer. The car, secured on the after deck, had been submerged for three days when Firemen's Fund Insurance Co., which carried a floater policy, supervised its removal. The car was raised and floated to the shore

between two life rafts. A team of draft horses from the Call ranch hauled it up the cliff to the road above. There George Hoyt, the Firemen's Fund adjuster, climbed in and drove the car directly to Santa Rosa. The car, displayed in front of the Santa Rosa Cyclery, was a conversation piece for most of a week,⁷² (Figure 6) before it finally reached Eureka.

Meanwhile, those passengers who had been going to Eureka were stranded without money or belongings in San Francisco. The steamship company put families up in hotels until they could catch the next steamer to Eureka. Instead of offering cash compensation or reimbursement, the company gave them a free trip to their original destination.

In gratitude for their hospitality, the crew of the *Pomona* gave the Call family one of the *Pomona*'s board names. Captain Swansen sent a letter of thanks from the steamship company and a check for \$50 to pay for food and lodging. But although the Call family was praised by all passengers for their hospitality, they were later sued by the Pacific Coast SteamShip Company, which claimed that the Calls had subsequently recovered and sold pieces of cargo, including large quantities of ship's stores, merchandise and two cases of rifles. These charges were subsequently dropped for lack of evidence. A *Pomona* nameplate hung on the Call ranch's porch until it was stolen on New Year's Eve, 1972 (Figure 2). The other nameplate is thought to be located in the warehouse of the San Francisco Maritime Museum, although it cannot now be found.

The Investigation

Captain Swansen attributed the accident to weak boilers, which had made it impossible to face the northerly winds and thus forced him too closely inshore. However,

United States Inspector of Boilers John K. Bulger had inspected the *Pomona*'s boilers prior to her departure and pronounced them sound. He later found proof of their performance in the fact that the *Pomona* had covered eighty-eight miles at an average of eleven knots an hour before she struck the rock. Although Bulger had found some problems with the boilers on two earlier occasions, they had been repaired. The *San Francisco Call*⁷³ described the company's point of view as follows:

"On January 11th of this year the boilers of the *Pomona* were reported to be leaking and Bulger tied her up until repairs were made and after this had been done her steam pressure was reduced to 130 pounds to the square inch. Seven days later Bulger found her boilers again leaking and he tied the steamer up once more, refusing to allow her to go out until the repairs, which eventually cost \$6,800 had been made. The work was completed March 5th and everything was pronounced shipshape and everything demanded by the inspector had been done. She was wrecked on her second trip and Bulger states that her boilers and engines must have been in good shape because she left here at 10:30 A.M. and made eighty-eight miles before she struck, which is an average of eleven knots an hour. He could not understand why any adverse wind could have driven her into such a dangerous position when lumber vessels, steam schooners and the like, making six or eight knots an hour find no difficulty in holding their course in all weather."

In 1908, the wreck of the *Pomona* was adjudicated in San Francisco Maritime Court as case number 13787. According to court records, owners of the *Pomona* had to publish a public notice in a legal newspaper, *The Recorder*, once a week for thirteen weeks to give the public an opportunity to file suit for losses arising from the wreck. Six claimants sued, four companies, and two persons.⁷⁴ As a result of the investigation, Captain Swansen, commanding the vessel at the time of the wreck, was suspended for six months.⁷⁵ The court found the ship's salvage value to be \$1501.28 and the salvage value of freight \$748.70.

Most officers who testified in court blamed the *Pomona*'s design for the loss of the vessel: if the bulkheads had been built all the way to the main deck, the vessel might

have been kept afloat, as the water came into the engine-room through the hatches between decks.

CHAPTER 2

THE ARCHAEOLOGY OF THE S.S. *POMONA*

The History of Research

This section documents the original 1908 salvaging efforts, the skin divers discovery of the wreck in 1959, the preliminary archaeological surveys and magnetic scans, and the initial attempts to map the wreck. It also includes a description of everything known to have been removed from the wreck before 1998.

Today the remains of the *S.S. Pomona* lie approximately 90 miles north of San Francisco in Fort Ross Cove, California. Oriented north-south, the ship is submerged under 17 to 40 feet of water. When the *S.S. Pomona* hit a partially submerged rock, the stern sank first. The ship listed to starboard, where it now rests. The stern points towards shore, at a 33-degree angle East from magnetic North. The stern is in approximately 17 feet of water at mean tide, while the bow, facing the open seas, lies at a depth of 40 feet.

The table below provides a time-line for the *S.S. Pomona*.

Table 5: *Pomona's* Historical Timeline

Date	Event
June 1888	Built in San Francisco.
March 17, 1908	Sinks in Fort Ross cove.
March 24, 1908	Attempt to recover cargo and miscellaneous engine parts succeed.
March 1908	Attempt to lift the vessel off the bottom fails.
March 1908	Dynamited to eliminate vessel as a menace

Date	Event
	to navigation.
August 1908	Declared a total loss by the courts.
November 12, 1908	The Pacific Coast Steamship Company abandons attempts to float her from the rocks.
November 24, 1908	Breaks in two during a storm and slides off the rock on which she had hung.
1959	Sport divers recover portholes, anchors, keys, and teacups.
1984	California Department of Parks and Recreation undertakes preliminary underwater survey.
1988	First recording effort by Jack Hunter and his team.
1992	David Buller researches wrecks along the Sonoma and Mendocino coasts.
1994	First mapping of the drive shaft by James Delgado.
August 1-10, 1998	California State Parks and Indiana University begin mapping the <i>Pomona</i> .
October 10-16, 1998	Author's team continues mapping the <i>Pomona</i> .
August 2-9, 1999	California State Parks and Indiana University complete photo documentation of the vessel.

The 1908 Salvage Efforts

The first salvagers dove on the site less than a week after the *Pomona's* grounding. Ownership for the vessel had passed from the Pacific Coast Steamship Company (PCSS) to their insurers, Lloyd's of London. Lloyd's hired the Coast Wrecking Company to manage the salvage effort. The contract allowed the company to retain 75 percent of the value of any recovered goods and 60 percent of the value of any recovered machinery. The Coast Wrecking Company first hired hardhat diver C. O.

Abraham to recover the *Pomona's* cargo and machinery. By March 24, Abraham had recovered 35 pieces of baggage and some of the deck machinery.⁷⁶ He eventually stripped the *Pomona* of the remainder of her cargo, including a sewing machine, one hundred kegs of nails and a linotype machine.

By this time the ship had settled into an immovable position on the rocks and salvage master Captain Thomas P. Whitelaw and his steam schooner *Greenwood* were hired to complete the salvaging operations.^{77, 78} Whitelaw's contract allowed him to keep sixty percent of what he would salvage. He recovered the almost-new smokestack, the hose, spars and rigging, winches, ropes, windlasses, anchors and chains, steering gear, boats, davits, ventilators, compasses, blocks and sundry mattresses and sheets.

After Abraham and Whitelaw had salvaged all they could, the Coast Wrecking Company, seeking to recover the machinery, attempted to lift the vessel off the rocks using canvas lift bags. This effort failed, and the *Pomona* was declared a complete loss.

The divers of the early 1900s wore cumbersome canvas jumpsuits with lead weights at their waists and on their shoes, and massive bronze and glass helmets. They were tethered to the salvage ship and breathed compressed air pumped from the surface. These heavy suits and short-breathing lines restricted their movement underwater and limited their scope of activity. Despite these difficulties, they managed to recover enough cargo to make the endeavor a partial success.

Sport Divers

Fifty-one years would pass before the *Pomona* was visited again. In 1959, sport divers, using recently developed SCUBA (Self-Contained Underwater Breathing Apparatus) gear and led by Robert Lanham, rediscovered the wreck and recovered portholes, brass keys, teacups, the ship's whistle and two anchors.⁷⁹ With SCUBA gear, divers could swim freely underwater, unrestricted by air hose tethers. These divers were initially interested in sport fishing, but as they discovered shipwrecks, some turned to collecting souvenirs. It became fashionable to display portholes and anchors in one's home. Sport divers recovered numerous portholes and other artifacts from the S.S. *Pomona*, but their current whereabouts are unknown.⁸⁰

Fort Ross Cove Archaeological Surveys

U.C. Berkeley undertook an archaeological survey to find the location of California's first shipyard: the Russian ship building facility, which operated from 1816-1827. Professor Kent G. Lightfoot and James M. Allan⁸¹ supervised the work and recovered what may prove to be the Russian industrial complex. This shipyard produced four sailing ships for use by the Russian-American Company and two ships for use by the Spanish missions.

California State Parks undertook the first official underwater survey of the *Pomona* in April 1981. This was a combined effort by the U.S. Navy Diving Salvage Team, State Parks divers, and interested sport divers under the direction of John W. Foster.⁸² Using a magnetometer, the team recorded six clustered anomalies in the cove,

mapping from near-shore waters to the 120-ft. depth⁸³. Subsequent SCUBA investigations identified two of the anomalies: Cluster 5 was the *Regia*, a 45-ft. fishing vessel lost in 1974 and Cluster 6 was the wreckage of the *Pomona*.⁸⁴ The other four anomalies could not be identified. There are twenty-three known wrecks in the vicinity of Fort Ross Cove;⁸⁵ library research identified eight within the cove itself. Gene Glorvigan, a sport diver, found a Chinese perfume bottle believed to have come from the wreck of a Chinese vessel, which sank around 1815.⁸⁶ Carlos Call thought that vessel was named "something like Chou Litch." Later, circa 1962, three bronze perfume containers from the same wreck were recovered. Carlos Call remembered two other wrecked sailing schooners: the *J. Eppinger*, which sank in 1901, and another, whose name he could not remember. An Italian fishing boat capsized at an unknown date. The fishing vessel *Regia* burned in the cove in 1974.⁸⁷ A sailboat sank recently and its remains lie partially on top of the *S.S. Pomona*. No Russian ships are known to have sunk in the cove, but future research should sound the cove to search for additional wrecks. In the following table, vessels marked with an asterik "*" sank within the cove.

Table 6: Known Vessels Sunk in Fort Ross Cove and Vicinity
(Noted alphabetically)

Vessel	Description	Date Built	Date of Loss
<i>Anita</i>	Gas screw	1936	Mar. 4, 1960
<i>Archie & Fonte</i>	Lumber Schooner	1890	Mar. 31, 1902
<i>Ava</i>	Gas screw	1946	Sep. 11, 1963
<i>Bessie K</i>	Schooner	1893	Unknown
<i>Charles Hanson</i>	Schooner	1881	Unknown
<i>Chou Litch?</i>	Chinese vessel	Unknown	1815?
<i>Christina Steffins</i>	Schooner	1876	Unknown
<i>J. Eppinger*</i>	2-mast schooner	1885	Jan. 2, 1901

Vessel	Description	Date Built	Date of Loss
<i>John Frederick</i>	Schooner	1860	Unknown
<i>John Stitson*</i>		Unknown	Oct. 1878
<i>Joseph F. Spinney*</i>	3-mast schooner	Unknown	Oct. 26, 1892
<i>Mary C</i>	Schooner	1893	Unknown
<i>Mary Deleo*</i>	Lumber Schooner	1868	Unknown
<i>Monterey</i>	Steamer	Unknown	May 25, 1880
<i>Ocean Spray</i>	Schooner	1865	Unknown
<i>Osceola*</i>	Schooner	Unknown	Jan., 1875
<i>Pomona*</i>	Pass. Steamer	1888	Mar. 17, 1908
<i>Regia*</i>	Fishing boat	Unknown	1974
<i>Riga</i>	Oil Screw	1931	Dec. 5, 1932
<i>Rio Rey</i>	Unknown	Unknown	Unknown
<i>Windemere*</i>	Lumber schooner	Unknown	Jul. 9, 1893
<i>Zephyr</i>	Unknown	Unknown	Unknown
Unknown	Sailing vessel	Unknown	Recently

In 1988, Jack Hunter, California Department of Transportation, and his team surveyed the *Pomona* with video equipment. The goal was to draw a composite map of specific features, but the low visibility, combined with surge and kelp growth, impeded the team's efforts. Nevertheless, the video provided the first recorded underwater map of the vessel. Hunter and John Fisher also prepared the first site record for the vessel, denoted CA-SON-1704H.³⁸

In 1992, David Buller, a private consultant was commissioned to conduct documentary research on the shipwrecks off the coast of Sonoma and Mendocino counties. This research provided background information on some of the wrecks in Fort Ross Cove, particularly the *S.S. Pomona*.

In 1994, maritime historian James Delgado and his team from the Golden Gate National Recreation Area (GGNRA) prepared the first underwater map of the ship. This map included measurements for the drive train and rudder.

In August 1998, John W. Foster of California State Parks and Charles D. Beeker of Indiana University led a joint, comprehensive survey of the wreck. Students from San Jose State University, California State University Northridge, the University of San Diego, Indiana University, and Sonoma State University participated in the effort. They mapped the *Pomona's* complete contour, including the hull, bow, boilers, drive shaft and rudder. Identified structural remains included bollards, masts, winch, capstan, boilers, hull, and drive train. The debris field corroborated the San Francisco Chronicle's 1908 assertion that the *S.S. Pomona* sank on her starboard side.

During the remainder of 1998 and the spring of 1999, the author and team continued to map the wreck and photograph its features. The result of this effort was an estimate of the total area in which the wreck is scattered. Several still pictures and a video were also produced.

The August 1999 work was led by John W. Foster of California State Parks and Charles D. Beeker of Indiana University. The team prepared a complete photodocumentary of the wreck and presented a report to the Fort Ross State Historical Park. A buoy bearing the California State Park logo was placed over the datum. The effort concentrated on public relations between the public, park officials, students, and California Department of Parks and Recreation.

Results

Few easily portable artifacts remain at the *Pomona* wreck site today because of the earlier salvaging efforts. In 1908, Thomas P. Whitelaw recovered winches, ropes,

windlasses, anchors and chains, steering gear, boats, davits, ventilators and compasses, blocks, and sundry mattresses and sheets. These items were sold at auction on San Francisco's Broadway Wharf in 1908 for a total of \$3,000. At this time the second wooden name board "S.S. *Pomona*" was removed.⁸⁹

Sport divers told us they had recovered some of the easily portable structural elements, including several portholes, a 30-foot section of anchor chain, a brass steam gauge, a steam whistle, two turnbuckles, a drain cover, a fire valve, a Clovis pin, and a wooden pulley, and such personal articles, as a ceramic dish and a pocket knife. In 1974, sport divers donated a single porthole to the Fort Ross Museum. Museum records indicate that a brass key and teacup were also donated, but they could not be located. Later, skin divers Mark Schrame and Dave Olson⁹⁰ salvaged several portholes and the ship's two anchors.⁹¹ Carlos Call recalled that:

The whistle of the *Pomona* was recovered on Saturday, March 3, 1962 by Frank C. Robinson, 365 Alden Ave., Cotati, phone SW5-4493. He offered to sell it to me, but insisted his price was \$50.00, which I considered to be too much. I am really surprised that Whitelaw hadn't taken it.⁹²

Table 7: Known Artifacts Recovered from the *Pomona* Before 1998

Artifact	Salvager	Recovery Date
Winches	Whitelaw	1908
Ropes	Whitelaw	1908
Windlasses	Whitelaw	1908
Anchors and chains	Whitelaw	1908
Steering gear	Whitelaw	1908
Boats	Whitelaw	1908
Davits	Whitelaw	1908
Ventilators	Whitelaw	1908
Compasses	Whitelaw	1908
Blocks	Whitelaw	1908
Mattresses & sheets	Whitelaw	1908

Artifact	Salvager	Recovery Date
Portholes	Unknown	1959
Brass keys	Unknown	1959
Tea cups	Unknown	1959
Whistle	Robinson	1962
Two anchors	Shrame & Olson	1971
Portholes	Unknown	1974
30' chain	Unknown	1974
Brass steam gauge	Unknown	1974
2 turn buckles	Unknown	1974
Drain cover	Unknown	1974
Fire valve	Unknown	1974
Clovis pin	Unknown	1974
Wooden pulley	Unknown	1974
Ceramic dish	Unknown	1974
Knife	Unknown	1974

The 1998 Underwater Survey

Survey Methods

In August 1998, the author, working with a team of faculty and students from the Underwater Science Program at Indiana University and staff from the California Department of Parks and Recreation, conducted a one-week underwater SCUBA diving survey of the *S.S. Pomona*. This research involved collecting and interpreting documentation from the Fort Ross Library, recording features of the wreck site, preparing site maps, and presenting the results to the Fort Ross staff.

Field directors John W. Foster and Charles D. Beeker used a hand-held global positional system (GPS) unit to relocate the site, using coordinates from Delgado's 1994

survey. The first goal was to relocate the drive shaft, because this marked the centerline of the vessel. Once the drive shaft was identified, buoys were attached to it to mark its location, between the engine and the rudder, and this became the baseline. The datum was established at the Northeast corner of the starboard boiler, because it was the most stable element and marked the center of the engine.

A grid system, typically used in archaeological surveys, could not be used here due to the heavy surge. Instead, using a compass, divers mapped features and artifacts by distance and direction from the initial baseline. During the first stage of the survey, the area around the drive shaft was mapped and measured by one team of three divers, while a second team established the extent of the scatter around this area by swimming regular incremental patterns away from the baseline. The location of each artifact was measured from the baseline and recorded. The port side of the baseline contained a large assemblage of mast parts and steam pipes. On the starboard side there were numerous artifacts, including a brass valve fitting, an iron flywheel, a brass grate, and a complete ceramic plate. Numerous single and double bollards were scattered starboard of the baseline. Finally, the port boiler was found lying about twenty yards north of the rudder. While mapping the location and size of the boiler, divers discovered bricks lining the floor of its furnace. Two bricks, impressed with the word "Carnegie", were brought to the surface and photographed.

In the next phase, the original baseline was extended towards the bow. Divers, working in teams of three, explored the port side of the wreck. One team mapped the exposed hull area, which still contained most of its iron ribs. Another team mapped the

engine area, starting with the three connecting rods (between the crankshaft and the pistons). Two pistons were located. The two boilers were located and mapped. Inside the boilers their steam condensing tubes, fire box and ash window could be seen. There was some scattered debris on the port side, including steel plates and pipes, and the remnants of a pillaged porthole. Artifacts mapped include structural elements such as a probable brass lamp base, ship's outfits such as a ceramic bowl, and such personal possessions as a leather shoe. Further port, extensive structural wreckage included mast fittings, ribs, pipes, and wire running rigging.

The last phase of the survey focused on the bow area. The bow is located seaward of the washrock, and faces south. The original baseline was extended to the bow, for a total length of 190 feet. The hull of the bow is wedged between rocks; consequently, there is little debris to the port. Most elements fell starboard and the divers mapped porthole remnants, single and double-bollards, bowsprits, hawsers and a capstan. There is also an extensive scatter of steel plates and pipes.

The 1998 survey located 190 feet of the original 220-foot hull: only 30 feet were lost in the wreckage. All survey results are documented in Indiana University's Underwater Science Program site report.²³

Finally, the team produced a videotape of the entire length of the *S.S. Pomona* and photographed its artifacts and features in situ.

Artifacts recovered during the 1998 survey include a leather shoe, a brass coat hook, a ceramic plate, a valve fitting, two bricks from the boilers, and some coal. Small brass and copper objects (such as pipes and fittings) were also recovered to prevent

further looting. All artifacts recovered in 1998 are located at the Fort Ross Historic Park Library awaiting conservation.

The results of the 1998 survey are recorded in Indiana University's Underwater Science Program site report and in a detailed site map (Figure 22: Site Plan).

Underwater Recording Methods

Numerous photographs and several videos of the vessel have been taken. John W. Foster, Charles D. Beeker, Chuck Honek, Jack Hunter, and the author took the pictures included in this project report. Jack Hunter took videos in 1988, Charles D. Beeker in 1998, and Mark Simpson in 1999. Because of the 1988 videos, it is possible to compare the current condition of the wreck with what it was eleven years ago.

Underwater Still Photographs

Photographs taken by photographers other than the author include pictures taken by Jack Hunter, John W. Foster, Charles D. Beeker, and Chuck Honek. The author used 100 ASA Sensia film with one strobe for lighting. Pictures taken in 1998 were recorded through a 28mm lens at a distance of three to five feet. Pictures taken in 1999 were recorded through a 15mm lens at one to three feet in order to decrease the backscatter while increasing the angle of coverage.

Video Recording

Jack Hunter kept a log of the three videotapes he recorded in 1988.

The author, working with Mark Simpson, established the following procedures for their videotaping in 1999:

1. Select a flat terrain for composite video/picture (the drive shaft fit this purpose).
2. Remove kelp in the survey area.
3. Establish mooring on the survey area (two buoys).
4. Set flagging tape at the corners of the survey plane for the day.
5. Use 100' white measuring tape to mark grid and set it as taught as possible.
6. Set up grid so that units are 5'x 5'. This 5' square was calculated to provide optimum coverage for both camera and camcorder at a distance of 3' above the ground.
7. Take a running video of the entire section.
8. Take one picture of each unit with 15mm lens.
9. Take three pictures with camcorder set on "scanned picture." Multiple tests showed that scanned pictures provided the best resolution while moving (because of surge).
10. Document each section at the end of the day.
11. Transfer best camcorder picture onto PC.
12. Manipulate pictures to obtain a mosaic composite of each unit using Adobe Premiere.

Wreck Stability

Pictures taken in 1988 and in 1999 indicate that the outside iron lining of the boilers suffered minor deterioration. This is most likely due to sport divers hanging onto the fragile sheeting plates, causing them to collapse or crumble under the touch. Everything else seems intact with no discernable changes. Despite its location in a high-

surge surf and high-wave action environment, the site is quite stable; objects are either lodged between boulders or resting in secure locations. Thus, only public impact, created by diving on the site or anchoring on top of the wreck, could have a detrimental effect. Therefore, future public use of the site will have to be monitored, mooring buoys secured, and perhaps restrictions imposed on the number of scuba divers allowed to dive the site annually.

Feature Descriptions

Structural elements of the wreck and those artifacts which remain in situ are classified here as archaeological features. These features are recorded on the site map (Figure 22: Site Plan) and described below. Measurements were made using feet and inches to allow comparison to the vessel's original plans.

Starboard Boiler

Material: Steel.

Description: Two rows of stays are visible at the stern end of the boiler, with some larger ones in the middle, 28 inches from the edge, then a seam with another two rows of offset rivets.

Location: Amidships in 25 feet of water and in its original position. The site datum was established at the stern end.

Port Boiler

Material: Steel.

Description: Two internal fireboxes penetrate the south end. The front chamber is full of bricks of two types: thick and thin. The bow end contains a furnace window and an ash window. On either side of the windows are two inspection hole handles with dog stays. These may have been used to open a small door to inspect the inside of the boiler.

Location: Directly north and 29 feet from starboard stern, at a depth of 17 feet of water, upside down.

Possible Auxiliary Boiler

Material: Steel.

Description: This large feature contains an ash window, a coal-stoking window and pipes, suggesting that it was either a third boiler or an auxiliary boiler. An auxiliary boiler may have been used to generate heat or electricity.

Location: South of the starboard boiler.

Table 8: Boiler Measurements

	Starboard Boiler	Port Boiler	Auxiliary Boiler
Diameter	11'	9'6"	6'
Length	11'6"	10'	10'

Drive Shaft

Material: Copper.

Description: The drive shaft connects the rudder assembly to the coupler behind the engine. It measures 65 feet in length and is 12 inches in diameter. A large ring gear, three bearing mounts, and three connecting rods are in place. The great length of the drive shaft reflects the Pomona's advanced engineering, as drive shafts on earlier vessels were much shorter and located closer to the stern.

Location: Extends 65 feet from the boiler aft to the rudder.

Steering Assembly

Material: Iron.

Description: The steering assembly is represented by an eight-spoked wheel and shank with attached gear housing. The gear housing is 60 inches long, 61 inches wide and 18 inches high.

Location: Starboard, 15 feet from the engine.

Single Bollard

Material: Iron.

Description: A bollard is a vertical post used for securing lines to the deck. Three identical single bollards have been mapped.

Location: Scattered on the starboard side of the wreck (refer to site map).

Double-bollard

Material: Iron.

Description: Five identical double-bollards have been mapped. Double-bollards have two vertical posts, connected together on a single base.

Location: Refer to site map.

Winch

Material: Iron.

Description: A winch is a "small vertical drum around which a rope or line is passed in order to make it easier to pull the rope."¹⁴

Location: Starboard of the baseline, by the bow, in 34' of water. It is close to the anchor chain retainer.

Capstan

Material: Brass.

Description: A capstan is an "upright cylindrical device found on deck along the centerline of a vessel. The capstan is used for turning ropes attached to heavy objects such as anchors and large sails."¹⁵ Since the S.S. Pomona did not possess sails when it sank, the capstan must have been used to lift the anchors.

Location: Forward, on the starboard side of the bow.

Cargo Hatch

Material: Brass.

Description: The frame of the cargo hatch remains. Its cover, originally made of canvas, has been lost. The cargo hatch is usually found on deck along the centerline of the vessel.

Location: Cargo hatch's brass frame is located forward by the bow, at the edge of the ship's breakage point.

Mast Stay

Material: Iron.

Description: Mast stays provide physical support for an upright mast. This possible mast stay has two arms (4 inches wide and 6 inches high) with cleats in them. It is 12 inches high, 15 inches wide and 43 inches long.

Location: Starboard of the baseline, close to the starboard boiler. It is 76 inches from the double-bollard, at a 150-degree angle, east from the mast stay to the bollard.

Anchor Chain Holder

Material: Iron.

Description: This possible anchor chain holder would have been used to secure the anchor chain. It is curved and rests on an iron base.

Location: Starboard, 30 feet from the tip of the bow, near a winch.

Scupper/Lamp Base (Figure 14)

Material: Unknown.

Description: This feature is cemented to the substrate and resembles a bullhorn or lamp base. All efforts to remove it have failed.

Location: Starboard of the baseline, south of the auxiliary boiler.

Grate

Material: Brass.

Description: This rectangular air vent has a slightly arched face. It is 4 inches wide and 6 inches long.

Location: Starboard of the second mount on the drive train.

Valve

Material: Brass.

Description: This connecting valve has been left in situ.

Location: Spilled from within the auxiliary boiler and recovered near the firebox.

White Ceramic Bowl

Material: Ironware.

Description: This bowl was left in situ but covered with a piece of loose steel plating. All attempts to remove it failed. The bowl could not be removed without either breaking it or part of wreck itself and the thick marine growth surrounding it was too thick to be removed to examine its base for a manufacturer's mark.

Location: Starboard. 5 feet from the starboard boiler.

Artifact Descriptions

The following artifacts were recovered from the site and are currently awaiting curation at the Fort Ross Museum.

Ceramic Plate Fragment (Figure 17)

Material: Ironware.

Description: The fragment is white and vitrified. It has a lion rampant, a maker's mark "John Maddock & Sons England" and importer "Nathan-Dohrmann San Francisco." John Maddock & Sons was based in Burslem, Staffordshire, Great Britain after 1839. The word "England" was required on all ceramics after 1891, and earthenware was vitrified after 1896; therefore the plate dates after 1896. No date could be found for the importer.³⁶

Measurements: .4 inches thick. The foot ring is 3.3 inches in diameter. It could not be reconstructed by its size seems appropriate for a saucer.

Provenience: Recovered behind the flywheel, 35 feet starboard of datum.

Bottle Base (Figure 24)

Material: Glass.

Description: This clear green glass fragment bears two embossed numbers on its base: "1425" and "102."

Measurements: Inner diameter is 1.2 inches and its total diameter is 2.5 inches.

Provenience: Recovered on the port side of the starboard boiler.

Shoe Sole (Figure 12)

Material: Leather.

Description: The stitching holes are still visible. Because of its size, it is most likely part of a man's shoe. The sole is currently submerged in salt water, awaiting curation.

Measurements: 11.14 inches long and a maximum of 3.12 inches wide. The stitching holes are .1 inch apart.

Provenience: Recovered on the port side of the *Pomona* close to the north end of the auxiliary boiler.

Coat Hook (Figure 18)

Material: Brass.

Description: Four identical coat hooks were fitted in the officers quarters.¹⁷ Its provenience near the boilers suggests that this hook may have been located in the crew's quarters.

Measurements: 3.2 inches high and 2 inches wide.

Provenience: Recovered starboard of the baseline.

Brick #1

Material: Early Twentieth century firebricks were usually made of silica and aluminum oxide with traces of iron, calcium, and other oxides.¹⁸

Description: This brick is embossed with the word Carnegie. The Carnegie Brick works collapsed in the 1906 earthquake, indicating that the bricks used on the *Pomona* predate the earthquake. The brick is glazed on one side, possibly due to repeated heating inside the furnace.

Measurements: 1.6 inches thick, 4.10 inches wide and 9 inches long (reconstructed measurement).

Provenience: Recovered from the firebox of the port boiler.

Brick #2 (Figure 16)

Material: Same as Brick #1.

Description: This brick is embossed with the word Carnegie. The Carnegie Brick works collapsed in the 1906 earthquake, indicating that the bricks used on the *Pomona* predate the earthquake.

Measurements: 2.5 inches thick, 4.5 inches wide and 9 inches long.

Provenience: Recovered 8 feet from the auxiliary boiler.

Natural Concretion (Figure 13)

Material: Calcium Carbonate.

Description: This is a natural concretion bearing the impression of the inside of the furnace. It is made of residues from the burning of coal. This piece was molded around the firebox and contains two holes, which match the dimensions of the boilers' rivets.

Measurements: .14 inch thick. Boilers' rivets have 4 inches of spacing between center holes and 1.9 inches in average diameter. The rivets inside the furnace of the firebox were separated by 5 to 6 inches.

Provenience: Recovered 6 feet off the port side of the starboard boiler.

Coal

Material: Possibly anthracite.

Description: Five lumps of coal were found lying together with an assemblage of bricks near the auxiliary boiler. Their location suggests they spilled from the boiler.

Measurements: Largest piece is 2.8 inch long, 1.8 inch wide, and .14 inch thick.

Provenience: Recovered 8 feet from the firebox of the auxiliary boiler, on the starboard side of the ship.

Valve Fitting (Figure 23)

Material: Brass.

Description: This valve fitting connected several pipes to form a t-junction.

Measurements: 5.8" long, 3.2" wide, and 1.9" thick.

Provenience: Recovered 2 feet 3 inches starboard of the drive train and 12 feet 4 inches from the stern end of the drive train.

Porthole (Figure 10)

Material: Brass.

Description: Most of the frame remains. Its condition is delicate and parts, including the glass, are missing. Its temporary accession number is 207-495.

Measurements: The circular porthole glass (missing) has a diameter of 10 inches. The greatest diameter of the porthole is 10 inches and its circumference is 52 inches. The height of its sidewall is 6 inches. The diameter of the inner ring of the turnbuckle catch is 18 inches.

Provenience: Sport divers donated this porthole to the Fort Ross Museum and its exact provenience has been lost. It was recovered on March 16, 1974, from a depth of less than 20 feet and some 200 yards from shore.¹⁰⁰

Steam Pipe (Figure 11)

Material: Copper and bronze.

Description: This copper main engine receiver pipe is brazed with bronze. Its flange is also made of bronze. It was used to connect the two boilers.

Measurements: Pipe is 65 inches long, $\frac{1}{4}$ inch thick, inside diameter is $5\frac{1}{4}$ inch. Its flange is 1.25 inches thick and 3.8 inches high.

Provenience: Recovered off the stern end of the starboard boiler.

The S.S. *Pomona's* Value as an Archaeological Resource

The August 1998 survey provided information on the S.S. *Pomona* that was not available from documentary sources. We found the *Pomona* more intact than we had expected. Newspaper articles reported that the *Pomona's* complete engine had been salvaged in 1908. This proved to be erroneous, for the diving team located most of the parts of the engine, including the pistons and rods. In addition, we found numerous smaller artifacts, despite the premise that looting by sport divers had depleted the S.S. *Pomona* of most non-structural items. Finally, discovery of three boilers on the ship, rather than the two expected, required a re-interpretation of the blueprints. We concluded that the third boiler was from an auxiliary donkey engine, which may have been used to generate electricity for the ship. More can be learned from the data collected and photographs and videotapes recorded in the survey. Marine engineers will see details we missed.

The underwater archaeological work on the *S.S. Pomona* has provided a clearer picture of late 19th-century steel ship building in California. The background research identified other ships lying in the same cove, whose future investigation will add to our knowledge. Carefully recording and excavating underwater cultural resources such as those in Fort Ross Cove can help reveal a more complete history of the northern California coast shipping. Without doubt, further work on the *Pomona* itself will shed new information on the history of the cove, its inhabitants, and its shipwrecks.

The *Pomona* also has the potential to reveal important information on early steamship construction. As one of the first steamships built in California, she initially also carried sails for secondary propulsion, reflecting an uncertainty of the reliability of steam propulsion. The *Pomona* thus represents the transition era between sailing vessels and modern steam vessels. Because no plans of her engines are preserved, the underwater remains of the *Pomona* are the only clues to this type of construction. Additional underwater research may lead to a better understanding of her construction. Adding to the existing map will facilitate assessing the *Pomona*'s integrity and provide the necessary data to support the establishment of an underwater park. Constant monitoring of the wreck will be necessary to identify additional artifacts as they wash ashore, and to uncover them from their rocky substrate after storms.

CHAPTER 3

THE MARINE ENVIRONMENT OF FORT ROSS COVE

“Protected Outer Coast: Under this division we treat the animals of the semi-sheltered coast and open bays, where the force of the surf is somewhat dissipated. These shores, which provide rich collecting, are generally concave, and are characteristically protected by a headland or a close-lying island. (...) An offshore kelp bed will serve the same purpose, smoothing out the water to such an extent that many years ago small coasting vessels often used to seek shelter inside the beds and take advantage of their protection whenever possible in landing goods through the surf.” (*Between Pacific Tides*, Ricketts & Calvin, pp. 3-4)

Fort Ross is located on an ancient coastal marine terrace overlooking a natural harbor: Fort Ross Cove. The cove is protected from the western swells by a small headland. The northern portion of the cove has a rocky substrate, while the southern portion is sandy. The cove is roughly divided by a large submerged rock, which divers call a washrock. The *S.S. Pomona* rests in a natural rock bowl between the washrock and the shore (Figure 15). The environment in which the *Pomona* sank and now lies is biologically rich due to the high offshore wave and surf action, combined with cold, nutrient-rich sea water. Protected in its bay from most effects of surf and waves, the wreck acts as an artificial reef for marine life. The plants, fish, and invertebrates found on the site provide divers with an opportunity to experience a sample of Northern California's diverse environment.

The Biological Diversity of Coastal California

This is a compilation of the marine life observed in the course of five diving days in August of 1998, with an average of two dives per day. The team dove down to the S.S. *Pomona* at Fort Ross cove without departing much from the wreck area. During the dives, juvenile sea lions and spotted harbor seals visited the divers. Although no adult sea lions was observed, they could be heard from camp. A large group of offshore rocks to the west is a seasonal home to Steller's and California sea lions.¹⁰⁰

The plant and animal life on the site was healthy, despite the 1998 El Niño effect. Most of the seafloor plant life had reached maximum growth. Coralline algae were abundant in shallow water. These algae need abundant sunlight for photosynthesis and are confined to shallow, usually clear water. Sponges were more numerous than would usually be found on scattered rocks because of the increased dark surface area created by the wreck. Sponges, as filter feeders, have no need for sunlight. Competition with algae excludes sponges from well-lit rock surfaces and confines them to sides and under surfaces of rocks. Mollusks, such as red abalones (*Haliotis rufescens*) and gaper clams (*Tresus nuttallii*), were also numerous. Clams were easily located on sandy floors by their siphons emerging out of the sand. We found the seafloor rocks populated with numerous red abalones, a great number of them over nine inches long. In abalone, size correlates with age and the large sizes noted suggest lack of predation. James Barry, Senior State park ecologist, noted in 1987:

The red abalone appears to be more abundant at the wreck site than in other similar environments within Fort Ross Cove. This is curious, in that the cove, including the site, is subject to heavy sport diving.¹⁰¹

The presence of numerous abalone and large lingcod indicates that sport divers may overlook the site as a food source. Its location may be the cause, since diving the wreck site requires a long swim from shore.

The team also found a healthy population of limpets, sea cucumbers and purple sea urchins, and giant rock scallops in deeper water (forty feet at least). Sunflower seastars were found at all depths. Sea anemones were abundant and several varieties exist, such as white-frilled anemones over the washrock in 30 feet of water or more and proliferating anemones in the twenty-feet to thirty-feet zone. The pink proliferating anemones bud out and the small anemones can be found close to the surface, attached mostly to kelp. Kelp also provides shelter and food to shrimps, snails and blue rockfish. Pacific rock crabs hide behind the ship's bollards and Monterey turricates grow in the sand towards the southwestern end of the drive shaft.

The wreck provides a habitat for strawberry anemones and orange cup coral. These species usually attach themselves to vertical surfaces. They are rarely found in coves such as Fort Ross, because the surf dislodges them from rocks; however here the wreck provides support and shelter for them. In addition to supporting anemones and coral, the *Pomona*'s boilers provide a safe haven for juvenile rockfish.

The shipwreck contributes to increased biodiversity due to three factors: it provides an increased surface area for attachment of fixed plants and animals, it provides multiple substrates (steel, iron) for attachment of fixed plants and animals, and the turf attracts grazers, which attract pelagic fish.

The diver who looks inside nooks and crevices will find much sea life within the small area contained by the wreckage. Although fish life appeared healthy, colleagues who dove the site in prior years noted that the schools were smaller. Nevertheless, two forty-inch lingcod live around the wreck, as well as a huge cabezon, and some greenlings (hiding under pipes). The rockfish were so numerous that the team once recorded three or more per square meter across the entire wreck site. Kelp perch were recorded at the shallow end of the wreck. Finally, small nudibranchs - *Hermisenda* and sea-clown - were abundant and found at all depths.

The following tables represent a non-exhaustive list of the various life forms recorded on nine dives during the August 1998 survey.^{1,2}

Table 9: Fish & Plants

Fish	Plants
ling cod (<i>Ophiodon elongatus</i>)	bull kelp (<i>Nereocystis leutkeana</i>)
kelp greenlings (<i>Hexagrammos decagrammus</i>)	palm kelp (<i>Postelsia palmaeformis</i>)
Painted greenling (<i>Oxylebnius pictus</i>)	feather boa kelp (<i>Egregia menziesii</i>)
Vermillion rockfish (<i>Sebastes miniatus</i>)	red coralline algae (<i>Calliarthron tuberculosum</i>)
Cabezon (<i>Scorpaenichthys marmoratus</i>)	cobalt sponge (<i>Hymenamphista cyanocrypta</i>)
Corraline Sculpin (<i>Artedius corallinus</i>)	red volcano sponge (<i>Acanus erithacus</i>)
kelp bass (<i>Paralabrax clathratus</i>)	
kelp perch (<i>Brachyistius frenatus</i>)	
Quillback rockfish (<i>Sebastes maliger</i>)	
blue rockfish (<i>Sebastes mystinus</i>)	
Copper rockfish (<i>Sebastes caurinus</i>)	
wolf-eel (<i>Anarrhichthys ocellatus</i>)	

Table 10: Invertebrates

Invertebrates	Invertebrates
decorator crab (<i>Loxorhynchus crispatus</i>)	Monterey turnicate (<i>Styela montereyensis</i>)
Pacific rock crab (<i>Cancer antennarius</i>)	Pacific giant (gum boot) chiton (<i>Cryptochiton stelleri</i>)
Northern kelp crab (<i>Pugettia productus</i>)	Lined chiton (<i>Lepidochitona lineata</i>)
Purple sea urchin (<i>Strongylocentrotus purpuratus</i>)	Rock scallop (<i>Hemites giganteus</i>)
Red abalone (<i>Haliotis rufescens</i>)	Barnacle (<i>Balanus nubilus</i>)
Blue top snail (<i>Calliostoma ligatum</i>)	Limpet (<i>Diodora aspera</i>)
Monterey turnicate (<i>Styela montereyensis</i>)	California sea cucumber (<i>Parastichopus californicus</i>)
Sea clown (<i>Triopha catalinae</i>)	Warty sea cucumber (<i>Parastichopus parvimensis</i>)
Hopkin's rose (<i>Hopkinsia rosacea</i>)	Tube worm (<i>Diapatra ornata</i>)
orange cup coral (<i>Balanophyllia elegans</i>)	Feather duster worm (<i>Eudistyla polymorpha</i>)
rose anemone (<i>Tealia piscivora</i>)	Bat star (<i>Patiria miniata</i>)
white-plummed anemone (<i>Metridium senile</i>)	Giant sea star (<i>Pycnopodia helianthoides</i>)
strawberry anemone (<i>Corvinae californica</i>)	Gaper clam (<i>Tresus nuttalli</i>)
aggregating anemone (<i>Anthopleura elegantissima</i>)	
proliferating anemone (<i>Eptactis prolifera</i>)	

The S.S. Pomona as an Artificial Reef

The *Pomona* shipwreck provides shelter to fish and support to encrusting animals. The species present in this ecosystem give the diver a good overview of Northern California plant and fish life. Since dive depth at the wreck site varies from twelve feet to forty feet, the scuba or skin diver can view species from two different life zones: the shallow water environment, close to Port Boiler, and the deeper water environment, close to the bow. The presence of the washrock by the middle two-thirds of the wreck area

encourages growth of underwater species because the breaking waves resemble an off-shore intertidal zone and therefore increase diversity.

Ecological Assessment

Systematic written lists of fish, plant, and other life were done for a given ecosystem: shallow-water, deeper water, and washrock. Each ecosystem was divided into sub-areas: in the shallow-water ecosystem, cave-like objects, such as inside the boilers, and large structures, such as outer boiler surfaces represented small ecosystems. In the deeper water, artificial areas of pipes and steel plates, and small objects such as bollards represented other subsystems. The washrock was divided into two zones: the surf-beaten ecosystem, and the protected shallow zone.

This biological listing should be repeated over the course of many years to evaluate potential effect of divers on the site.

Climatic Effects

The effects of different weather patterns are reflected in the abundance of marine life of California. Three biological assessments recorded over several years, are available for study: James Barry's recordings in 1987,¹⁰⁵ the team's assessment in 1998 and another in 1999. The 1987 assessment took place during a year of normal weather pattern, with water temperature averaging 50° F. in summer. In 1998 the water was warmer than usual because of "El Niño," and during the summer season water temperatures fluctuated between 50-57° F. The El Niño phenomenon caused numerous

massive storms that battered the cove during the winter of 1997-1998. These storms are probably responsible for poor kelp growth. As the kelp fronds anchor to rocks, they often break loose and wash ashore during strong storms. In August 1998, the giant kelp was just beginning to grow again. Bull kelp, stronger and better anchored, was more abundant. It can withstand larger waves and survived the winter well. The 1999 assessment recorded the effects of the phenomenon called "La Niña," with waters colder than usual (42-47° F.) By then, both species of kelp had recovered and were abundant, so much so, that it impeded navigation.

In 1987, James Barry noted that "The stalked turnicate (*Styela montereyensis*) is rare in the survey area." There were numerous stalked turnicates in 1998 and large numbers in 1999.

Barry also noted that "... the orange sun star (*Solaster stimpsoni*)... appears to be a slight range extension (reported as far south as Salt Point.)" but none were found in either 1998 or 1999.

Again, Barry wrote "a nudibranch (*Triopha maculata*) occurs on site, but was encountered only rarely." Numerous nudibranchs were found on the site in 1998. The presence of the Hopkins rose is quite exceptional because it normally is found in warmer areas, usually south of San Francisco. In 1999, greater numbers of this nudibranch were recorded.

Although the Sea clown nudibranch is usually found in Southern California where the water is warmer, the unusually warm water of the 1998 El Niño can explain the presence of this animal.

The effect of these different water temperatures can be seen in this varied marine life. During “El Niño” years, the California Current moves offshore and the Davidson Current runs north near shore. This results in northward range extensions for planktonic fish and invertebrate larvae and plants. These plants and animals mature over the next few years but the cold water prevents breeding and they die out. This explains the presence of warmer water animals, such as the Sea clown nudibranch. A few years later, these nudibranchs will die out and their numbers should decline. These weather patterns demonstrate how this environment is constantly changing and provide an interesting site for the diver as well as a potential research area.

What the Diver Can Find

Prior to a dive, a skin or scuba diver should receive some information about what to expect. Pamphlets, museum displays, and knowledgeable rangers can provide this background information. Such information encourages interest in the California marine life and prompts divers to protect the environment, rather than fish or carelessly disturb the site.

Divers visiting the *Pomona* wreck site can expect to find the following plant, invertebrate or fish life depending on the time of the year and ocean conditions:

- In cave-like areas (such as boilers), or facing north: cobalt sponges (which are a vivid blue).
- In sandy areas: tube worms, tube anemones, giant chitons, turricates, hermit crabs, gaper clams.
- Under overhangs: cobalt sponges, red abalones.

- In protected environments: purple sea urchins, juvenile rockfish (especially in boilers' tubes).
- On rocks and wreck surfaces: orange cup corals, strawberry anemones, rose anemone, bryozoan, feather-duster worms, and nudibranch egg masses.
- In high-energy areas, such as near the washrock: bull kelp, abalone.
- In shallow water: coralline algae.
- In deeper water: white-plumed anemones, sea urchins.
- In the water column, or attached to kelp: proliferating anemones, octopii, jellyfish, kelp crabs, purple-ringed top shells.

CHAPTER 4

DEVELOPING AN UNDERWATER PARK

By establishing a marine park, the *S.S. Pomona* and the marine life it supports will be better protected from damage by overuse and looting. This chapter describes the six steps necessary to create an underwater park. These are: 1) determine the boundaries of the proposed Underwater Park, 2) obtain a lease of that area from California State Lands Commission, 3) designate the *S.S. Pomona* as a Cultural Preserve, 4) nominate the *S.S. Pomona* to the National Register of Historic Places, 5) install buoys to delimit the park, and 6) monitor the site. Public outreach and divers' education will be discussed in Chapter Five.

Boundaries of the Marine Park

The *S.S. Pomona* is substantially intact and lies on a north-south axis, with its stern facing north towards the bluff at a 33° degree angle east from magnetic north. The area included in the site is an oval 300 feet long by 200 feet wide (Figure 21). The geographical axis follows the hull of the vessel. Based on these measurements, the *S.S. Pomona* covers an area of at least 60,000 square feet, or 1.377 acres.

The site boundaries are based on measurements taken while scuba diving and snorkeling, and from the underwater videos and photographs. The boundary surrounds

surrounds the hull wreckage, the bow wreckage, scattered debris and all isolated features (See Figure 22 for a map of the wreck area.) To determine the extent of the wreckage, objects the greatest distance from known points on the wreck were mapped. The main core of the wreckage is concentrated between depths of 17 feet to 60 feet of water. Based on these measurements, the *Pomona* area covers at least 40,872 square feet. The proposed underwater park of 60,000 square feet will present an area that is easy to represent on a map, and which will facilitate monitoring.

Obtain a Lease of the Area from the State Lands Commission

The California Department of Parks and Recreation currently leases the offshore area from the California State Lands Commission to the 18-foot contour below mean high tide level. Based on the previously described wreckage boundaries, the lease from the California State Lands Commission could be expanded to encompass the site. Since the wreckage starts at the 18-foot contour and reaches at least 60 foot deep, the boundaries could be expanded to the 120-foot contour to encompass scattered artifacts that have not yet been mapped. Leasing the area to the 120-foot contour would also present the benefit of incorporating the underwater park into the Fort Ross Underwater Preserve.¹⁰⁴

Underwater Cultural Preserve Designation

The land along the ocean shoreline at Fort Ross is owned by the State of California, under the jurisdiction of the California State Lands Commission. The state-owned marine lands extend from mean high tide to 4.8 kilometers (3 miles) out to sea.

Ninety acres of the Fort Ross property are currently listed as an Underwater Area. These lands are managed by the Underwater Parks Program Department, a division of the California Department of Parks and Recreation, under a 49-year lease from the California State Lands Commission. Though this step is not required to establish the underwater park, it is deemed beneficial and may be implemented at a later phase. When the park becomes an underwater preserve, it will continue to be managed by State Parks, while held in trust for the public by the State Lands Commission. As an underwater cultural preserve, the area becomes protected as follows under the Public Resources Code,

Section 5019.74:

Cultural Preserves consist of distinct areas of outstanding cultural interest established within the boundaries of other state park system units for the purpose of protecting such features as sites, buildings, or zones which represent significant places or events in the flow of human experience in California. Areas set aside as cultural preserves shall be large enough to provide for the effective protection of the prime cultural resources from potentially damaging influences, and to permit the effective management and interpretation of these resources. Within cultural preserves, complete integrity of the cultural resources shall be sought, and no structures or improvements which conflict with such integrity shall be permitted.¹⁰⁵

Establishing a cultural preserve requires two steps: performing an initial survey and discussing the park's potential at a public meeting. The classificatory decision is made by the Parks and Recreation Commission. The initial survey has already taken place and the required photographs, natural history notes, collection of material, and other scenic, cultural, biological, and geological features are well documented. The public meeting could take place at any time to review the preserve's potential.

Nomination to the National Register of Historic Places

The loss of cultural resources through looting can be limited by listing the *S.S. Pomona* on the National Register of Historic Places. Such designation will provide recognition of the wreck as an important element in our history and potential looters may refrain from collecting from a protected area. The *S.S. Pomona* wreck site is eligible for inclusion on the National Register of Historic Places because of the role the vessel played in California's maritime history. The *S.S. Pomona* is associated with events that made a significant contribution to the broad patterns of history, such as the expansion of trade on the West Coast. The vessel is associated with persons (J. T. Scott, marine architect) and entities (Pacific Coast Steamship Company) that made significant contributions to the maritime history of California. The *S.S. Pomona* also is an example of the then-new technology of triple-expansion, steel-hulled vessels. Hers was the first triple-expansion engine built on the West Coast. The *S.S. Pomona* was also the first steel-hulled coastal liner designed for this trade. Finally, the vessel has provided, and is likely to continue to provide, important archaeological data on this type of vessel given that her original plans have been lost.

Implementing Buoys and Moorings

Protecting the site from natural elements seems difficult, expensive, and unnecessary. The wreck has achieved equilibrium within its resting-place and the main potentially destructive element is the impact of boating and diving. Mooring and anchoring buoys may be installed to reduce these impacts to the wreck site.

Buoys should mark the *Pomona* shipwreck site, both to facilitate finding the site and to protect it from careless anchorage. In addition, a mooring buoy would permit small craft to tie to the buoy and avoid anchoring, as anchoring can seriously damage a wreck structure. At a minimum, there should be one mooring buoy acting as a marker buoy.

Because of the shallow depth of the site (17 to 45 feet) only small boats can access the site and tie to a mooring buoy. Small vessels have a shorter draft and less risk of breaking against shallow rocks. In theory, larger vessels could access the cove and anchor in deeper water, at the most southern location of the wreck. This option would make finding the site difficult for divers and require an additional, more expensive buoy (such as a Manta Ray) plus the permanent position of a chain from the buoy to the bow, leading divers to the site. The most frequent divers to the site use small craft such as kayaks or inflatable boats. Local dive shops may run trips to the site and six-person boats may be used for this purpose. In the case of small craft, a mooring buoy would be sufficient. By making the mooring buoy available for day-use only (from sunrise to sunset), commercial fishing or larger charter boats would be kept off the wreck. The buoy should therefore bear a "Divers only" logo to signal large boats that they should not use this buoy.

Installing a Marker Buoy

There are three components to a buoy: a floating device, a chain or line, and a means to attach to the sea bottom.

A marker buoy should indicate the location of the shipwreck. Two marker buoys should be used, indicating the axis of the wreck. One marker buoy should be located at the stern of the *Pomona*, while the other should be located at the bow. Simple and inexpensive devices can serve this purpose. The problem with marker buoys is that divers may use them for anchoring purposes. Installing mooring buoys instead, or displaying a "no anchoring or tying on" sign on the marker buoys should solve this problem.

Installing a Mooring Buoy

The purpose of a mooring buoy is to act in place of an anchor on a site. An anchor dragged on the bottom can do significant damage to the site and sedentary marine life each time the anchor is dropped and the chain swings. The person installing a mooring buoy system must consider factors such as: type and size of vessels using the system, fluctuations in water depth, wind changes, and seasonal changes.¹⁶⁶ The major components of a low-cost mooring buoy system that could support a 19' Boston Whaler-type boat in clement weather include:

- Buoy constructed from polyethylene plastic filled with polyurethane foam and treated with UV inhibitors.
- Mid-line float, to insure that during low tide the slack chain does not drag on the bottom.
- UV-treated polypropylene line that floats.

- Short chain with links of 1.5 inch in diameter, covered by a plastic cover (such as a garden hose) to reduce damage to reef. The chain should be tied to a structurally strong part of the wreck, such as the drive shaft.
- The buoy should bear the "California State Parks" logo, as well as the ship's name and its date of wrecking.¹⁶⁷

Buoy Maintenance

Foam buoys must be monitored monthly and replaced when necessary. In addition, these buoys should be removed during the fall before the winter storms and replaced in the spring. Mooring buoy chains may have to be replaced annually. This work should be performed at the beginning of the diving season in the spring.

The life span of a buoy is estimated to be 15 years, depending on the level of maintenance. Anchor lines deteriorate at different rates according to use and should be replaced when experienced personnel dictate.

To lower cost, installation and maintenance of buoys can be performed by divers. Club divers frequently engage in environmental activities and can easily see the benefits of sponsoring a buoy. These divers can install a buoy over the course of a weekend and sponsor a buoy removal and installation day in fall and spring. Park rangers may monitor the state of the buoy to determine when components should be replaced. They may also monitor weather conditions and advise club divers when it is time to remove or reinstall the buoy. The following schedule should be followed.¹⁶⁸

Monthly

- Inspect all buoys and lines for condition.
- Clean line of growth.

Every Three Months

- Inspect line and protective hose for wear. Replace if necessary.
- Inspect shackle for damage.

Every Six Months

- Remove or replace buoy and line.

Every Twelve Months in Spring

- Inspect chain and replace if necessary.
- Replace shackle pin to insure pin will not break.

Budget

A small marker buoy can be installed at very low cost. Club members can donate components such as foam components, chain, line, and cement. If the entire buoy setup must be purchased, the cost should run no more than \$100.00 per system, as follows:

Table 11: Itemized Cost of Marker Buoy

Item	Cost
13-inch polyethylene Mooring buoy	\$35.00
3/4-inch polypropylene buoy line UV treated, 100 ft.	\$25.00
Shackle, stainless steel	\$12.50
Chafing hose	\$1.60/ft

Mooring buoys are more expensive: a typical mooring buoy costs about \$250.00.

Monitoring and Research

Monitoring of the site (both archaeological and natural) should take place as an on-going process to ensure that the integrity of both the wreck and its environment are maintained. As noted in Chapter 3, the underwater park provides an opportunity for ecological monitoring and assessing the climatic effects on marine life. Ecological monitoring should strive to provide data on natural, seasonal, and cyclical changes that occur in the marine environment. The initial ecological monitoring program, taking seasonal variations into account, will establish a baseline of environmental conditions, which will allow comparison with subsequent monitoring. This will permit an assessment of diver impact and habitat manipulation.¹¹⁹ Protection of the archaeological site will allow research in the future when methods and equipment have improved.

CHAPTER 5

FORT ROSS UNDERWATER PARK MANAGEMENT PLAN

This chapter outlines a management plan for a Fort Ross Underwater Park and describes how the site can be incorporated within the Fort Ross State Historic Park. The goals of the management plan are: to assess the responsibilities of California Department of Parks and Recreation; to comply with Section 106 of the National Preservation Act; to act proactively in reusing the site; to educate the public; and protect the historic property. As stewards of the site, the agency's goals are also to look beyond the short-term needs to develop a long-range perspective.

Purpose of the Underwater Park

The purpose of the Fort Ross Underwater Park is to educate the public and to protect cultural resources and the ecology of the cove in the following ways:¹¹⁰

- Protect the natural, cultural and scenic resources of Fort Ross State Historic Park and Cove.
- Provide an opportunity to enhance the public's appreciation and understanding of the area's significant resources.
- Extend management control over significant cultural resources.
- Raise public consciousness of the *S.S. Pomona* shipwreck as a cultural resource.

- Raise public consciousness about the underwater ecology of Northern California.
- Provide the public with the maritime history of Fort Ross Cove.
- Present non-divers with a brief description of the site, via museum exhibits, brochures, video, slide display, and interpretive exhibits.
- Provide skin and scuba divers with an underwater map of the *S.S. Pomona*'s main features.
- Provide a safe area for new and experienced divers.

Protecting Historic Property

Limiting the impact of diving can protect the site. One of the best examples of California underwater park is Point Lobos, near Carmel. Divers can reserve diving days in advance and there is a limit of 15 diving teams per day. Each team comprises a minimum of two and a maximum of three divers. Reservations can be made by mail or electronic mail. The *S.S. Pomona* site is fragile enough that some limit may eventually be put into place if deemed necessary. Rangers can assess the site's carrying capacity by counting the number of divers in the first year, while examining the health of the reef. The condition of the steel plates on the wreck is of particular concern. As these are the most fragile pieces on the vessel, their deterioration would be a sign that the wreck is being overused. If this is ascertained, the number of divers per year should be limited. To estimate whether the site is deteriorating, rangers can use prior photographs of the site and compare them to the current state of the site. The Fort Ross Underwater Park would

benefit from following the same diving procedure as the Point Lobos State Park and consequently limit the number of daily divers.

Public Outreach

Managing the Underwater Park may require relying on outside sources for labor and funding. Consequently, the public may provide the necessary help once it is aware of the needs. The archaeological and historical information needs to be relayed to the public so that the public can become interested and desires to protect its resources. Park managers may use a variety of means to deliver the information:

- Sponsor “Maritime History Day” at Fort Ross Cove.
- Develop programs for educators.
- Reach diving clubs.
- Encourage ecological and archaeological monitoring, through the public and diving communities (for example, using the “Great Fish Count” annual census model of the West Coast of the United States.)
- Advertise the new Underwater Park and future research within the Park.
- Post park information on the Internet.

Access and Development

The site can easily support public use. An access ramp, changing facilities, picnic tables, toilets, and parking already exist at the cove, although parking is allowed only for loading and unloading. At the top of the bluff, near the Call house, a small display emphasizing the cove, its inhabitants, the colorful marine life, swimming and diving

safety, and the wrecked vessels would add to public enjoyment of the site. No other facilities are therefore deemed necessary.

Wreck Diving Logistics

There are three ways to locate the site of the *S.S. Pomona*.

1) The first method uses natural navigation. To familiarize yourself with the site, first walk to the bluff overlooking the two coves at the end of the road before it switches back and heads down the hill. From the bluff, you will see directly below you, in the water, a kelp bed, easily recognizable by its brown algae fronds. The kelp beds are thicker in summer and fainter in winter, but the outline always remains. Although the bed is quite thick, you can see how it projects towards the open seas in a thick line. At the end of this line, you can see the wash rock when waves pass over the rocks. The wreck site is located along this line, as kelp uses the remnant features of the wreck as anchoring devices. The bow is located behind the rocks.

Once you can recognize the wreck outline and go down to the beach, you will have to swim around the northwestern point, to the right of the beach. Once past the point, follow the outer edges of the kelp bed until you approach the washrock. Do not swim too close to the washrock as bigger waves may wash over it and you.

2) The second method uses triangulation. Follow the steps in the first method to familiarize yourself with the site. Once you are facing the bluff, you have to find the old timber chute. To find the chute, scan the edges of the cove, going from the outer rocks to

the bluff. Halfway down or straight north, you can see an old trail going down the cliff from the Call ranch to the water's edge at the old loading platform. Now you need to find the two telephone poles behind the Call ranch garden and line them up. Once you have found these two points, draw an imaginary line between the two (the two telephone poles, lined up, and the loading platform at the end of the chute) and position yourself at their junction. You will be located on the top of the drive shaft of the *S.S. Pomona*.

3) The third and last method uses GPS coordinates. Note that you must compensate for the GPS inaccuracies and that you may be off by 100 feet. The coordinates for the site are:

N 38° 30' 37.3"

W 123° 14' 46.3"

Interpretation

This section proposes ways to interpret the history of the *S.S. Pomona*, the maritime history of California, and the role of Fort Ross Historic Park as an educational center for the public.

Museum Exhibit

The Fort Ross Museum can present information pertaining to California maritime history and especially to the cove's role in that history. A separate exhibit room would be preferable, since the existing room focusing on the Russian Fort is already full. As visitors exit the existing exhibit room, the basic history of the Call ranch and the lumber

chutes is displayed. The Call house, located near the bluff, seems the most appropriate location to organize the *Pomona* shipwreck interpretive display. From the windows of the house, the loading chute and the washrock can be seen, providing a direct link to the material presented on the walls.

The exhibit room should present basic California maritime history as it relates to lumber and commerce, passenger traffic and the gold-rush boom and resulting immigration. Wrecks in the cove can be used to represent California's varied history, from sailing schooners to the steam era.

A small exhibit could be dedicated to the *S.S. Pomona* using archival photographs and the vessel's artifacts. Some emphasis should be placed on the role played by divers, first in looting the vessel, followed by cooperation with officials. The role of the agencies can be highlighted by describing how California archaeologists and other working parties (universities, fish and game, USCG and various agencies) all contributed to the success of the enterprise. Finally, the display should explain how the public can be active participants in the preservation of California history (for example, as club divers maintaining buoys).

In addition to the display, a video of the underwater site can be developed to present the historic role of the *S.S. Pomona*. This video can help non-divers to visualize the effects of time and looting on a site, as well as identify important features of the vessel. It would also highlight the rich ecological system and demonstrate how the wreck serves as nursing grounds for marine life throughout the seasons.

An automated slide projector can be used either in conjunction with or as an alternative to the video display. The same ideas can be demonstrated by a compilation of slides taken over the years at the site.

Finally, brochures should be available to the public in the Call house and near the exhibit. These brochures should summarize the maritime history and archaeology of Fort Ross Underwater Park and provide divers with information on making dive reservation.

Interpretive Panel

The interpretive panel should alert the public to the rich cultural record of the underwater environment. Refer to Appendix C (Form DPR38) for an outline of the format, text and pictures for the interpretive panel to be located on the bluff. This panel should be located across the road from the Call house, near the original loading chute. From this vantage point, visitors may observe the location of the *S.S. Pomona* shipwreck.

Three-fold Water-resistant Handout

This handout serves the underwater needs of skin or scuba divers and graphically presents the location of the main features of the wreck. The history of the wreck is highlighted on one side of the water-resistant handout, along with the wrecking process and historic photographs. The other side presents a map to help locate key features of the wreck, such as the boilers, bow, rudder, and machinery.

Safety Requirements

A vehicle must be available at all times to transport passengers and gear to the hospital or recompression chamber. In addition, a life board, a kayak, or preferably an inflatable boat with motor should be available to rescue divers at the wreck site. A motorized vehicle is preferable because of the considerable distance from shore.

A phone with posted emergency numbers should also be available for emergency calls. The phone booth at the Fort Ross Visitor's Center entrance may serve this purpose.

Emergency Procedures

The emergency procedures already in place at the site may be used. That is, procedures for rescuing skin divers and swimmers may be applied to skin divers at the *Pomona* site. Additional procedures should be considered for rescuing scuba divers and Fort Ross personnel should receive additional training for this purpose. Scuba diving injuries require the following type of training:

- CPR, first aid (already in place for skin divers and swimmers).
- Neurological evaluation (available through scuba rescue class).
- Scuba Rescue classes (how to perform a rescue and recognize signs and symptoms).
- Oxygen delivery classes (how to administer oxygen to potential hyperbaric patient suffering from DCS or arterial gas embolism).

This type of training will help potential rescuers perform the actual rescue in a manner safe for both patient and rescue personnel, evaluate the type of treatment, know

whom to call (hospital or recompression chamber), and how to transport a patient after providing first aid.

Emergency Phone Numbers

The following table lists several emergency phone numbers.

Table 12: Emergency Phone Numbers

Phone Number	Type
911	Direct phone to emergency services
707-423-3987	Travis Air Force Base Recompression Chamber
707-823-8511	Palm Drive Hospital 501 Petaluma Ave. Sebastopol, CA 95472
1-901-544-0555	US Coast Guard Search and Rescue 24 hr. hotline
1-919-684-4326	Divers Alert Network (Note: Collect Emergency calls accepted)

Safety Plan

A sample dive plan should be printed and distributed to divers of the site. The plan can be printed on the back of a brochure and be available at the bluff and near the dive site. In addition, park rangers should reinforce diving safety.

Conclusion

The site of the *S.S. Pomona* is important as a historical and archaeological resource and deserves to be protected. Designating Fort Ross Cove an Underwater Park will provide the means for California Department of Parks and Recreation to protect and manage the site, as well as present the public with one of the best examples of a 19th century passenger steamship. The cove can first be designated as an underwater park and

later as a cultural preserve if needed. Additional surveys should proceed to examine the rest of the cove and map the wrecks known through archival research to have sunk there. The entire cove should be surveyed to the 120-foot contour and protected before its cultural resources disappear.

END NOTES

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- ¹ Reports filed with the California Dpt. of Parks and Recreation, Sacramento, California: Fisher and Hunter, 1988; Simoulin, 1998; Beeker, 1999.
- ² McNairn Jack, and Jerry Mac Mullen, *Ships of the Redwood Coast*, 1960, p. 102.
- ³ Schwendinger Robert J. *International Port of Call: An Illustrated Maritime History of the Golden Gate*, 1984, p. 58
- ⁴ Schwendinger, 1984, p. 101.
- ⁵ Schwendinger, 1984, p. 47
- ⁶ Sheret, R. *Smoke Ash and Steam, West Coast Steam Engines*, 1997, p. 4.
- ⁷ Mains'l Haul: a journal of maritime history, Fall 1998, Maritime Association of San Diego, Vol. 34, No. 4, p. 14
- ⁸ Rawls, James and Walton Bean, *California: An Interpretive History*, 1998, p. 168.
- ⁹ Schwendinger, 1984, p. 95.
- ¹⁰ Rawls, 1998, pp. 177.
- ¹¹ San Francisco Maritime Museum Steamship Room Display, Exhibit Text.
- ¹² Cooper, Anne Pierce, *Taking the West Coast by Steam: The Pacific Steamship Company, 1876-1916*, 1987.
- ¹³ Although the original form of the S.S. *Pomona* may have been conceived by Irving M. Scott, his nephew, John Thomas Scott, was the firm's naval architect in the 1880's and may have drawn the *Pomona*'s plans. John was born in either 1864 or 1865. A marine

engineer by profession, he followed his uncles into the family business, becoming a superintendent of the Union Iron Works in 1895. J. T. Scott managed the operations at the shipyard until 1905, when he left to begin his own business in partnership with Robert S. and Joseph A. Moore. The Moore & Scott Iron Works started operation in 1905 at Hunters Point in San Francisco, then moved in 1909 to the site of W. A. Boole's old yard on the shore of the Oakland estuary. It was a very successful operation and continued to thrive as the Moore Drydock Company after Scott sold his interests in the late 1917. Scott's next venture was the short-lived Pacific Coast Shipbuilding Company, which he established in 1918 in partnership with his uncle, Henry T. Scott, at Bay Point, California (also called Port Chicago), to take advantage of the shipbuilding boom occasioned by World War I. J. T. Scott died in March of 1960 at the age of 96.

¹⁴ Historical Notes, Bethlehem Shipbuilding Collection P82-125A, Michael Lang

¹⁵ For detailed specifications, refer to Appendix B: Pomona Specifications.

¹⁶ Marine terms are defined in Appendix E: Glossary.

¹⁷ "The Record" 1906, Record of American and Foreign Shipping, American Bureau of Shipping.

¹⁸ There have been numerous ways to calculate horse power. HP is the the unit of power equal to that required to lift 33,000 lb. One foot in one minute. (5500 ft-lbs per second.)

Nominal horsepower NHP: Used in the Blue Book and government regulations. Gives a much lower number than other horsepower ratings. For years engine makers used this as it is independent of the steam pressure provided by the boilers. Lloyd's of London used NHP to record vessel information.

Indicated horsepower IHP: Used on most steam engines. Indicator diagrams are made from pressures taken on the individual cylinders by an indicator instrument. (Sheret: pp. 20).

²⁰ *The Morning Call*: July 22, 1888.

²¹ Refer to Appendix B for complete *Pomona's* specifications.

²² Norris, Robert and Robert Webb. *Geology of California*. 1990. p. 225.

²³ Norris: 1990. p. 206.

²⁴ Norris: 1990. p. 352.

²⁵ The source of the Cardiff and Franklin coal mines has not yet been identified. At this point, one Franklin, Illinois coal mine was located. There seems to be no Cardiff mine in the United States. State mining reports point to the fact that after 1900, most coal came to San Francisco as balast from ships coming from Australia or British Columbia. In addition, preliminary analysis of the coal recovered from the Pomona's boilers is anthracite, and therefore does not come from the West Coast (neither California, nor Oregon.) The coal has been sent to Denver for pollen analysis, in hopes of narrowing its provenience, thanks to Dr. Anderson from San Jose State University.

²⁶ SSFMM Blueprints Case 6D:1904.

²⁷ Sheret: 1997.

²⁸ Hunter & Fisher: 1989.

²⁹ *Mainl's Haul*: p. 16.

³⁰ *Mainl's Haul*: p. 16.

³¹ *Mainl's Haul*: p. 18.

³¹ *Mammoth's Haul*: p. 19.

³² Sheret: p. 14.

³³ Union Iron Works specifications: p. 60.

³⁴ *Pomona's* coal consumption blueprints.

³⁵ Tests were taken before and after the vessel was fitted with Howden's new system. The Pomona's results were used as a benchmark in future marine engineer's literature, as found in Reed's Marine Boilers.

³⁶ *Humboldt Times*: 1900

³⁷ Union Iron Works Vessels Specifications.

³⁸ Lloyd's records for electric lights, 1902-03.

³⁹ *Daily Alta*: July 1, 1889

⁴⁰ *SFC*: July 22, 1888.

⁴¹ *The Morning Call*: July 22, 1888.

⁴² *San Francisco Evening Bulletin*: July 30, 1888.

⁴³ *Daily Alta*: January 7, 1889.

⁴⁴ *Humboldt Times*: August 31, 1894

⁴⁵ *Humboldt Standard*: October 27, 1896.

⁴⁶ *Sail and Steam*, p. 265.

⁴⁷ Wallace, E. Martin. *Sail and Steam on the Northern California Coast 1850-1900*, p. 273.

⁴⁸ Wallace, p. 255.

⁴⁹ *Daily Alta*: January 14, 1889.

⁵¹ *Humboldt Times*: September 14, 1894.

⁵² Wreck reports, pp. 36, 77, 108.

⁵³ Wallace, p. 275.

⁵⁴ Record of Endorsement of change of master Vol. 1, 01.09.1886-03.31.1892.

⁵⁵ Wallace, p. 265.

⁵⁶ Record of Endorsement of change of master Vol. 2, 04.02.1892-06.30.1907

⁵⁷ Josiah Nickerson Knowles (1830-1896) was an interesting local who was famous as a captain. He kept a diary of his travels and from one of them, we know the history of his wreckage on Pitcairn's Island. On Tuesday, February 9, 1858, he sailed from San Francisco on the *Wild Wave*, a clipper of 1500 tons, with a crew of thirty and ten passengers. He was bound to New York, via Cape Horn, but struck a reef called "Oeno Island", just past the equator. He, his crew, and passengers made it to Pitcairn's Island. They were stranded there for fourteen years (*The Wreck of the Wild Wave*.)

⁵⁸ District Court Hearing.

⁵⁹ Tooker's 1975 lecture of Fort Ross history.

⁶⁰ Tooker's 1975 lecture of Fort Ross history.

⁶¹ Fort Ross Management Plan: 1976.

⁶² Tooker's 1975 lecture of Fort Ross history.

⁶³ *SFC*: March 19, 1908.

⁶⁴ Dr. Andersen opined that this was highly improbable, as the maximum recorded uplift after a 7.0 earthquake was two feet.

⁶⁵ The Maritime History of Fort Ross.

⁵ On her final voyage, the *Pomona* carried the following passengers and crew:

Pomona's Cabin Passengers List

Passenger	Passenger
Anderson, Mrs. W. N.	Fullevellen, C.H.
Anderson, N. E.	Gawnor, F. W.
Anderson, W. N.	Healy, Peter
Arson, A.	Hopkins, Francis. H.
Bavard, Mrs. R. E.	Jasper, S. A.
Bavard, R. E.	Joaquin, Joseph
Berry, J. F.	Loffouren, E.T.L.
Berry, Mrs. A. J.	Lopez, Joseph
Blochinger, E. A.	Matthews, P. M.
Brans, Letty Mrs.	McDonald, J.R.
Bulkeley, J. L.	McDougall, Mrs. J.C.
Burg, E. J.	Peck, Mrs. R. M.
Clayton, F.	Phillips, A. T.
Clink, Stephen, H.	Pourie, O.P.
Copeland, C.T.	Robles, Miss P.
Cornan, J. F.	Salland, S. A.
Cramer, C. A.	Smith, L. H.
Cuddyback, B.	Stanberry, A.
Didini, Mrs. P.	Tuttle, F.L.
Didini, P.	Tuttle, George
Emerson, E.	Waite, B. E.
Emerson, Mrs. E.	Webster, J. S.
Fetch, F. F.	Whipple, George
Fitch, H. Y.	Willison, J.
Flock, J.	
Flock, Mrs. J.	

Pomona's Steerage Passengers List

Passenger	Passenger
Adams, E. W.	Lorezzo, F.
Brockman, P.H.	Marcasci, A.
Buckman, Jennie	Matthews, Sam
Buckman, Mabel	McCarthy Timothy
Carpenter, J.	McCarthy, T.
Cipupoosh, F.	McCurdy, James
Copini, Giuseppe	McCurdy, wife

Cullinan, I.	McGeehan, C.
Davison, Rose	Montfredi, T.
Denmema, F.C.	Pioli, G.
Dunlap, G.	Pioli, P.
Fernandez, F.	Pirosi, P.
Fernandez, Mrs. F.	Seaward, H.
George, Henry	Silva, Manuel
Goodman, T.V.	Silva, Mrs. Manuel
Gulielmo, T.	Sosa, Marv
Herch, A.	Spoonamore child
Hervites, T.	Spoonamore wife
Ines, John	Ural, D.
Kule, A.J.	Vintrich, B.
Lang, E.	Vurnewich, A.

Pomona's Officers List

Officer
Captain Charles Swansen
Chief Engineer, John S. Clemmess
First Assistant Engineer Thomas Preston
Second Assistant Engineer Laurence Koch
First Officer James Carey
Second Officer Fred Hanner
Third Officer Charles Dane
Purser I. W. W. Brown
Chief Steward John McFariand
Boatswain George Brown

Note the majority of steerage passengers of Italian descent.

⁶⁶ *SFC*: March 18, 1908.

⁶⁷ *SFC*: March 19, 1908.

⁶⁸ *SFC*: March 18, 1908.

⁶⁹ *SFC*: March 19, 1908.

⁷⁰ *SFC*: March 19, 1908.

⁷¹ *Marine Digest*: 1971, p. 34.

⁷² LeBaron, Gaye. *The Humboldt Historian*. 1986.

⁷³ *San Francisco Call*: March 19, 1908.

⁷⁴ The two persons that sued were Anderson N. E. and Hopkins, F. A.

⁷⁵ *Humboldt Standard*: April 10, 1908.

⁷⁶ *SFC*: March 24, 1908.

⁷⁷ At this point, Captain Swansen returned to San Francisco after supervising the original work.

⁷⁸ LeBaron: 1986.

⁷⁹ Marine Digest, 1971, pp. 20, 34.

⁸⁰ Anonymous: 1971.

⁸¹ Allan, James. *Underwater and Terrestrial Magnetometer Survey, Fort Ross Cove Area*, 1991.

⁸² Foster, John W. *Schooners, Steamers and Spilled Cargo: A Preliminary Underwater Survey of Ft. Ross Cove, California*, 1981.

⁸³ Allan, 1991.

⁸⁴ Foster, 1981.

⁸⁵ Hunter and Fisher, 1989.

⁸⁶ Hunter and Fisher: 1989.

⁸⁷ Interview with Carlos Call: October 20, 1969.

⁸⁸ Hunter and Fisher, 1989.

⁸⁹ McKenzie, no date.

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- ¹ Dave Olson owns a dive shop in Walnut Creek.
- ² *Marine Digest*: 1971, pp. 20, 34
- ³ McKenzie interview with Carlos Call, March 11, 1962.
- ⁴ Underwater Science Program, Indiana University. *S.S. Pomona Shipwreck Project*. Fort Ross State Historical Preserve, California. April 1999.
- ⁵ Blackburn, Graham. *The Overlook Illustrated Dictionary of Nautical Terms*, 1981: p. 341.
- ⁶ Blackburn, 1981: p. 69.
- ⁷ A later company of the name Dohrmann Hotel Supply Company was first registered in San Francisco, CA in 1828, but the full name appeared on ceramic bases and never in conjunction with the name Nathan.
- ⁸ Indiana University, 1999: p. 9
- ⁹ Indiana University, 1999: p. 9.
- ¹⁰ State of California, Memorandum, John C. McKenzie.
- ¹¹ Fort Ross Management Plan, 1976.
- ¹² Barry, James. *Fort Ross Cove Shipwreck Study*, 1987.
- ¹³ Johnson, Myrtle Elizabeth and Harry James Snook. *Seashore Animals of the Pacific Coast*, 1967.
- ¹⁴ Barry, 1987.
- ¹⁵ Underwater Science Program, Indiana University. *S.S. Pomona Shipwreck Project*, 1999.
- ¹⁶ California State Park System, 1984, p. 18.

¹⁰⁶ Beeker, 1996.

¹⁰⁷ Beeker, 1999.

¹⁰⁸ PADI, 1996.

¹⁰⁹ Underwater Parks Master Plan, 1996.

¹¹⁰ Eglin Air Force Base Cultural Management Plan (no date) and Underwater Parks Master Plan: 1996.

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NA National Archives. Federal Records Center.

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- "Records of surrender of vessel documents 1867-1910." NA, San Bruno. California.
- "Tonnage abstracts 1882-1911." NA. San Bruno. California.
- "Unofficial memoranda- Record of wreck reports." NA. San Bruno. California.
- "Wreck reports 01.22.1892-09/19/1935." NA, San Bruno. California.
- "Wreck reports 01.22.1898-12.31.1932." NA. San Bruno. California.
- "Master Carpenter Certificate." NA, Washington D.C.

Oller, M. P. Details of Porthole Frame recovered 3/16/1974 from Ft. Ross cove by divers. State of California. Memorandum. Photocopy. Fort Ross State Historic Park Library, Jenner, California.

Scott, Irving Murray Jr. Papers, 1899-1943. Accession N. 735. JPS. San Francisco, California.

Scott, John Thomas Papers. 1888-1921. Accession N. 735. JPS. San Francisco. California.

APPENDIX A**HISTORIC SITE RECORDING**

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD UPDATE

Primary # CA-SON-1704H
HR#

Trinomial
NRMP Status Code

Other Listings
Review Code

Reviewer

Date

Page 1 of

*Resource Name or #: S.S. Pomona Shipwreck

P1. Other Identifier:

*P2. Location: ☐ Not for Publication ☒ Unrestricted

*a. County: Sonoma

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad: Fort Ross (unsectioned Muniz Rancho) Date: 1978 T8N ; R13W ; % of % of Sec MDBM; B.M.

c. Address: 19005 Coast Highway 1

City: Jenner

Zip: 95450

d. UTM: Zone: 10 ; 478560m E/ 4262280m N

e. Other Locational Data: Coordinates 93mmS 15mmE Elevation -17' to -55' BSL (MLLW)

Approx. 100 yd. offshore of Fort Ross Point, inside Fort Ross Cove, within perennial kelp canopy of cove. Extends from the 25' to 60' bathymetric contour and is oriented linearly from stern to bow NW-SE.

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries) Vessel is hull flattened to less than 5' above natural seafloor along the majority of its remains. Drive shaft of 95' is intact, with steering gear, crankshaft, rudder, bearings, connecting rods and pistons still connected together. Three boilers and hundreds of square feet of steel frames, sheeting, and piping are major indicators of wrecksite. Kelp grows profusely on seasonal basis. Bow section is west of washrock over which the vessel is broken and lays at a depth of 40' to 55'. This section usually remains free of kelp. Surge conditions often limit access to either section of shipwreck. Ship sank on its starboard side and numerous wreckage is apparent to NW of primary wreckage area.

Wreckage scattered over approximately 1.377 acres.

*P3b. Resource Attributes: HP23 Ship

*P4. Resources Present: ☐ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☐ Other (Isolate, etc.)

P5a. Photo or Drawing Pomona at Eureka

P5b. Description of Photo: (View, date, accession #)
San Francisco Maritime Museum, Collection SAFC, accession # E2.8,188p

*P6. Date Constructed/Age and Sources: ☒ Historic Constructed in June 1888 by the San Francisco Union Iron Works.

☐ Prehistoric ☐ Both

*P7. Owner and Address: Within the Underwater Park component of Fort Ross State Historic Park. State of California, Resources Agency, Department of Parks & Recreation, Sacramento, CA 94296. Under management of California State Lands Commission.

*P8. Recorded by: (Name, affiliation, and address) Marianne Simoulin

San Jose State University
132 Palm Ave. San Carlos, CA 94070

*P9. Date Recorded: June 24, 1999

*P10. Survey Type: intensive

August 1998, student team and faculty from Maritime Science program at Indiana University, San Jose State and Sonoma State, and staff from California Dpt. of Parks & Recs. conducted one-week scuba diving survey of Pomona. Survey continued as needed during fall 1998 and spring 1999.

*P11. Report Citation: A Shipwreck Mapping and Recordation Reconnaissance of the Remains of the Steam Ship S.S. Pomona (Jack Hunter, Franklin Fisher, John Foster) Submitted to State of Ca. Dept. of Parks & Recs. 1988

Interim Report on the S.S. Pomona (Marianne Simoulin) Submitted to State of Ca. Dept. of Parks & Recs. 1998

Masters Thesis anticipated completion December 1999 "Recommendations for the development of an underwater reserve at the S.S. Pomona shipwreck site" (Marianne Simoulin) Submitted to State of Ca. Dept. of Parks & Recs. 1999

*Attachments: ☐ NONE ☐ Location Map ☒ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record

☒ Artifact Record ☒ Photograph Record ☐ Other (List):

OPR 523A (1/95)

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary # CA-SON-1704H
HRIS

PHOTOGRAPH RECORD

Trinomial

Page 1 of 1

Project Name (Assigned by recorder) S.S. Pomona Shipwreck

Year 1900

Camera Format: Unknown

Lens Size: Unknown

Film Type and Speed: Unknown

Negatives Kept at: San Francisco Maritime National Historic Park

Year	Exp./Frame	Subject/Description	View Toward	Accession #	Collection
1908	Unknown	<u>Greenwood salvaging Pomona</u>	Front (bow)	E3.8,156(n)	SAFR
	Unknown	<u>Pacific Coast Steamship Co. steamers</u>	Warfside	A12.4748n	PCSS, SAFR
1888	Unknown	<u>Pomona in stream at Santa Cruz on first voyage</u>	River	D7.2,165pl	David Dickie Coll.
	Unknown	<u>Diver Young on ladder forward of pilot house</u>	Pilot house	E3.9,060 (n)	SAFR
	Unknown	<u>Pomona at Eureka</u>	Warfside	E2.8,166p	SAFR
1908	Unknown	<u>Pomona with Greenwood</u>	Front view	E3,295 (n)	Pomona
	Unknown	<u>Pomona in Humboldt Bay</u>	Port side view	E7.6,885 (n)	Season Coll. SAFR
1908	Unknown	<u>Pomona sinking and passengers, life saving boats</u>	4 fuzzy plates	E3.23,623p	Mercedes Pearce Stafford Coll.
	Unknown	<u>Painting of Pomona on Humboldt Bar</u>	Ocean	E72.318pl	SAFR
	Unknown	<u>Pomona on warf at Eureka</u>	Stern	E2.22,815pl	SAFR
1908	Unknown	<u>Greenwood working on Pomona</u>	From stern	E39,061p	SAFR
	Unknown	<u>Pomona under way</u>	Side view	D7,6885p	SAFR
	Unknown	<u>Pomona at Humboldt Bay</u>	Close-up	E7.7,817p	SAFR
	Unknown	<u>Pomona in SF bay</u>	Very far	B11,29,814n	SAFR
	Unknown	<u>Pomona under way</u>	Good	E7,6895	SAFR

APPENDIX B**S.S. POMONA SPECIFICATIONS**

Official Number: 15444

Official Letters: KFHC

Hull No : 9

Keel Laid: October 6, 1887

Launched: May 26, 1888

Trial Trip: July 21, 1888

Maiden Voyage: July 29, 1888 to Wilmington (New San Pedro)

Length: 230'

Breadth: 33'6"

Depth of hold: 16'

Number of divisions:

 In Length: 14

 In Depth: 4

Max. displacement: 1455 tons

Draft (empty):

 Forward: 7'11"

 Aft: 12'1"

Draft (loaded):

 Forward: 10'8"

Aft: 13'6"

Tonnage:

Gross: 1264.08

Net: 951.79

Decks: 3

Masts: 2

Engine: triple-expansion reciprocating steam engine

Cylinder diameter sizes:

High Pressure: 56"

Intermediary Pressure: 34"

Low Pressure: 23"

Horsepower when built:

Main engine: 1020 HP

Auxiliary engines: 58 HP

Horsepower after adding Howden's force draught system:

Main engine: 1288 HP

Auxiliary engines: 84 HP

Boilers: 2 Scotch boilers

Propeller: single screw (one blade) with a pitch of 16'6", diameter of 10'5".

APPENDIX C
CALIFORNIA DEPARTMENT OF PARKS AND RECREATION
FORM DPR 38

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

District # CA-SON-1704H

Reg. #

INTERPRETIVE WORK REQUEST

OIS #

District

Fiscal Year

Unit

Region

Page 1 of 2

Resource Name or #: Pomona Shipwreck Display

Pre-Planning

1. Project Name/Description

Interpretive Panel describing the maritime coastal history of California and the role of Fort Ross Coves in local trade. The interpretive panel faces the wreck of the S.S. Pomona, located directly in front of the visitor's exhibit.

2. Within scope of general plan, interpretive prospectus?

Prospectus summarizing the history of California maritime history, the role of Fort Ross cove, as well as the history of the S.S. Pomona will be available at the Call house and at the museum.

3. Purpose

a. Why is the project needed?

The project is needed to identify the location of the cove and the coal chute within the cove, demonstrating the role of the the Call ranch. Also will directly point at the wreck of the Pomona and help visitors visualize events that took place within the cove.

b. Identify audience (be specific):

The project is geared towards non-divers and divers alike. Non-divers will be able to appreciate a part of the maritime history that they otherwise not be involved in. Underwater pictures of the local marine life and the wreck of the Pomona will reinforce knowledge gained by reading the text. Skin and scuba divers will be able to see the location of the wreck and realize what awaits them underwater, thereby increasing safety.

c. Questions the audience should be able to answer after the experience:

- The role Fort Ross cove played in California maritime history.
- The dangers of sea fearing on our coasts.
- The processes of loading cargo from shore to ships.
- The history of the Pomona and how it wrecked in the cove.
- The type of marine life that may be encountered in this location.
- The remains of the ship after 90 years underwater.

4. Project Themes

The Pomona wrecked in Fort Ross cove in 1908, a cove that was an example of a doghole port and was important in the role of California trade.

a. Overall theme (angle/point of view):

The interpretive display will be located directly in front of the Call house, across the road, facing the ocean. There is a small trail leading to the original coal chute and the display can be located at the end of the trail. It will be facing the wreck of the Pomona and will provide a good point of view onto the last coal chute.

b. Sub-themes:

- Wrecks in the cove
- Lumber and trade

5. Why is this medium the most effective method to convey the theme?

This medium is the most effective tool to provide the public with a direct view of both the cove and the shipwrecks. It will add visual effects to prior readings in the Call house, or will spark interest in the wandering person.

6. Describe how this project affects the exisitive interpretive setting.

This project complements the display at the Call house, directly across the road. The effect on site will be minimal, requiring only 6 posts in the ground. It will be made of a 3-part panel. The center panel will be made of plexiglass and will map the location of the Pomona through the transparent medium. The left panel will summarize the history of both cove and wreck. The right panel will present pictures of commonly-found marine life at the site.

7. Other guidelines which need to be considered:

☒ CEQA ☐ Coastal Commission ☐ Technical Services Review

Funding/Staff time

8. Who will complete work?

The project will be completed by volunteers, contractor, and Fort Ross staff.

9. Estimated District staff time to complete:

40 hours (including 4 hours to put the display up)

10. How will it be staffed?

11. How will it be maintained?

The unit should require little maintenance if at all. Periodic checks to ensure that it can sustain heavy weather and that the material is not fading should be sufficient.

12. Estimated cost of material:

Under \$1000.00

DPR 38 (8/88)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

District # CA-SON-1704H

Reg. #

INTERPRETIVE WORK REQUEST

OIS #

District

Fiscal Year

Unit

Region

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Resource Name or #: Pomona Shipwreck Display

13. Assistance required from region:

Staff with experience with such units.

14. Assistance required from OIS:

RESOURCES

Available artifacts:

Use of the receiver pipe.

Available pictures:

Marine life pictures (see C. Honek)

Pomona pictures (see M. Simoulin)

Archival pictures (SFMM)

Contacts that may be helpful:

Marianne Simoulin

Charles Beeker

John Foster

Chuck Honek

APPENDIX D
NATIONAL REGISTER OF HISTORIC PLACES

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

**NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM**

=====

1. Name of Property

=====

historic name **S.S. Pomona, Shipwreck**

other names/site number **CA-SOW-1704E**

=====

2. Location

=====

street & number **Fort Ross cove, off Fort Ross Historic State Park**
city or town **Jenner** vicinity **Fort Ross Historic State Park**
state **California** code **CA** county **Sonoma** zip code **95450**

=====

3. State/Federal Agency Certification

=====

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ____ nationally ____ statewide ____ locally. (____ See continuation sheet for additional comments.)

Signature of certifying official

Date

State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (____ See continuation sheet for additional comments.)

Signature of commenting or other official

Date

State or Federal agency and bureau

USDI/NPS NRHP Registration Form
 S.S. Pomona
 Sonoma County, California

Page 2

=====

4. National Park Service Certification

=====

I, hereby certify that this property is:

___ entered in the National Register _____

___ See continuation sheet. _____

___ determined eligible for the _____

___ National Register _____

___ See continuation sheet. _____

___ determined not eligible for the _____

___ National Register _____

___ removed from the National Register _____

___ other (explain): _____

 Signature of Keeper Date
 of Action

=====

5. Classification

=====

Ownership of Property (Check as many boxes as apply)

___ private
 ___ public-local
x public-State
 ___ public-Federal

Category of Property (Check only one box)

___ building(s)
 ___ district
x site
 ___ structure
 ___ object

Number of Resources within Property

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

Number of contributing resources previously listed in the National Register 0

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.) **N/A**

USDI/NPS NRHP Registration Form
 S.S. Pomona
 Sonoma County, California

Page 3

=====

6. Function or Use

=====

Historic Functions (Enter categories from instructions)

Cat: **Commerce/Trade**
Transportation

Sub: **Business**
Water-related

Current Functions (Enter categories from instructions)

Cat: **Recreation and Culture**
Landscape

Sub: **Outdoor Recreation**
Underwater

=====

7. Description

=====

Architectural Classification (Enter categories from instructions)

Other: **Steam Ship**

Materials (Enter categories from instructions)

foundation **N/A**

roof **N/A**

walls **N/A**

other **Metal: Steel Hull**

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

=====

8. Statement of Significance

=====

Applicable National Register criteria used to qualify the property for National Register listing)

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

USDI/NPS NRHP Registration Form
S.S. Pomona
Sonoma County, California

Page 4

- individual distinction.
☒ ☐ Property has yielded, or is likely to yield information important
in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.)

- ☐ a owned by a religious institution or used for religious purposes.
☐ b removed from its original location.
☐ c a birthplace or a grave.
☐ d a cemetery.
☐ e a reconstructed building, object, or structure.
☐ f a commemorative property.
☐ g less than 50 years of age or achieved significance within the
past 50 years.

Areas of Significance (Enter categories from instructions)

Archaeology: Historic-Non-aboriginal
Maritime History
Transportation
Commerce

Period of Significance 1888-1908

Significant Dates 1888, 1894, 1908

Significant Person **Scott, Irving Murray**
(Complete if Criterion B is marked above)

Cultural Affiliation **N/A**

Architect/Builder **Scott, I. M. / Union Iron Works (San Francisco, CA)**

Narrative Statement of Significance (Explain the significance of the property or
one or more continuation sheets.)

=====

9. Major Bibliographical References

=====

(Cite the books, articles, and other sources used in preparing this form on one
or more continuation sheets.)

Previous documentation on file (NPS)

- ☐ preliminary determination of individual listing (36 CFR 67) has been
requested.
☐ previously listed in the National Register
☐ previously determined eligible by the National Register
☐ designated a National Historic Landmark

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 S.S. Pomona
 Sonoma County, California

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___ recorded by Historic American Buildings Survey # _____
 ___ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

___x State Historic Preservation Office
 ___ Other State agency
 ___ Federal agency
 ___ Local government
 ___ University
 ___ Other

Name of repository: _____

=====

10. Geographical Data

=====

Acreage of Property **1.377 acre**

UTM References (Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing	Zone	Easting	Northing
1	10	478560m	4262280m	3	___	___
2	___	___	___	4	___	___

___ See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

=====

11. Form Prepared By

=====

name/title **Marianne Simoulin/Graduate Student**

organization **San Jose State University** date **January 1999**

street & number **132 Palm Ave** telephone **(650)592-1172**

city or town **San Carlos** state **CA** zip code **95070**

=====

Additional Documentation

=====

Submit the following items with the completed form:

Continuation Sheets

USDI/NPS NRHP Registration Form
 S.S. Pomona
 Sonoma County, California

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Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.
 A sketch map for historic districts and properties having large acreage
 or numerous resources.

Photographs

Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

=====

Property Owner

=====

(Complete this item at the request of the SHPO or FPO.)

name **State of California, under management from California State Lands
 Commission**

street & number **100 Howe Ave. Suite 100 South** telephone **(916)574-1900**

city or town **Sacramento** state **CA** zip code **95825**

=====

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

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(8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

**NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET**

Section 7 Page 1

**S.S. Pomona
Sonoma County, California**

Narrative Description

Summary

The S.S. Pomona was the first steel-hulled coastal liner built for the Pacific Ocean. Built in San Francisco by the Union Iron Works in 1888 under the architectural supervision of Irving Murray Scott Junior, the vessel was 225 feet long, 33.5 feet wide and 16 feet deep. Based out of San Francisco, the S.S. Pomona served mainly the San Francisco to Eureka route, used primarily to deliver goods, passengers and mail. She now lies broken by her bow in a boulder-strewn stratum in the middle of Fort Ross Cove, California.

Historic Condition

The S.S. Pomona was launched in June of 1888. She was one the first steam ships to use a triple-expansion engine on the West Coast. To comply with federal and local regulations and receive a certificate of operation, she had to submit to yearly inspections. The boilers were inspected for their pressure and all relevant information provided to Lloyd's of London. There were few changes made to the ship during her lifetime: some engine work in 1894 when the boilers were fitted with Howden's forced draught system (Records of the US Customs Services,) and some boilers repairs in 1904.

On March 8, 1908, while en route from San Francisco to Eureka, she struck a submerged pinnacle off Monterey reef, approximately one mile south of Fort Ross. Attempting to beach the S.S. Pomona on Fort Ross cove, Captain Swansen hit a washrock that lay in the middle of the cove and water started to pour into the holds. The ship lay stranded on the pinnacle until November 1908 when she finally sank.

A year after her sinking, she was declared a menace to navigation and was twice dynamited. Due to the explosion, a boiler was projected northwest beyond the stern. Today the S.S. Pomona's hull and machinery are fairly complete and remain at the exact site of their sinking.

Specifications

The following description of the S.S. Pomona is based on the Lloyd's of London insurance records from 1890 till 1908, supported by blueprints from the National Maritime Museum of San Francisco.

The S.S. Pomona had three decks and two masts, a plain head, a round stern, and a steel hull. There was a system of heaters for the passenger's cabins, as well as an electric lighting system. She carried two anchors and chains, four metallic lifeboats, and four life rafts.

The S.S. Pomona was registered in 1890 under certificate number 150444 as a

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**NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET**

Section 7 Page 2

**S.S. Pomona
Sonoma County, California**

'SCSRP', which is a Screw Steamer with some repair. Lloyd's records registered her at 1264 gross tons, 867 net tons, 952 underdeck tons, three cylinders, and 188 NHP (nautical horse power.) The dimensions of her three cylinders were recorded at 23.5", 34.25", and 56" (inches in diameter) respectively, with a 36-inch stroke. She was 225.0 feet long with a beam of 33.5 feet, and a draft of 16.0 feet.

Propulsion

Powered by a three-cylinder steam engine of 1250 horsepower, she could achieve a maximum speed of 15.5 knots (Case 6D 1554, 15950, 15951.) The steam was generated by coal combustion in two circular Scotch boilers with brick-lined furnaces for heat refraction. This drove the single propeller, 10.6 feet in diameter, with a 16-foot pitch (Osbourne 1941; Scott J. accession N. 735; Scott I. Accession N. 735; Sheret 1997; Union Iron Works 1916; Wallace 1983). In addition to the three-cylinder engine, the steam powered several auxiliary donkey engines and the dynamo. The Pomona carried a set of sails as backup propulsion. To support the sails, the vessel was equipped with two iron masts, bowsprit, and main yards and secured with steel standing rigging.

In late 1894, the S.S. Pomona engine was refurbished with Howden's forced draught system and this greatly increased her speed. A fan was installed between the firebox and the chimney to move the spent smoke up and increase the heat of the coal fire (Scott J. Blueprints 1894). Before the modification, an average trip took her 19.87 hours and after the modification, it took only 18.25 hours, all the while using less coal. She gained close to 300 horsepower after the modification. From then on, the S.S. Pomona became the fastest steamer running trips along the West Coast and gained her reputation as being 'The pride of the fleet.'

Overall appearance

On her launching day, a huge crowd had assembled on dock and referred to the S.S. Pomona as a floating palace. The San Francisco Chronicle often used the adjectives "fast, elegant and favorite" when writing about the S.S. Pomona. She was painted white above the water line, and black beneath the water line and her name was contrasting with white letters on the black background. Although the original plans could not be located, we can assume that she followed the construction plans of similar ships, such as the Peru, and thus her decks and railings were made of wood. According to the Union Iron Works Vessel Specifications document, all large vessels such as the Pomona had two masts, one funnel, a double-bottom, six watertight bulkheads and machinery and boilers placed about amidship. Her three decks were registered as "1DkSpardk&Awngdk", which means that her lower first deck was made of steel, her second deck was a Spar deck, and her upper deck was an Awning deck. The upper deck was surrounded by a white poop deck rail. There were three portholes on either side of the wheel house. Inside the vessel, there was a social hall as well as a dining saloon, and first-class cabins for 200 passengers. "The main dining room was

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(8-86)

CMB No. 1024-0013

United States Department of the Interior
National Park Service

**NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET**

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**S.S. Pomona
Sonoma County, California**

separate from the coffee shop, and each comprise the full width of the ship. These were fitted with expensive hardwood panels which exhibited superb craftsmanship."

Since the original plans of the vessels were lost, we have no more information on her appearance, description of the pilot house or cabins. Archaeological investigation may be our only means of recovering further information on the S.S. Pomona.

Current Condition

Location

The S.S. Pomona lies in Fort Ross Cove, California, in between 17 and 40 feet of water, on a north-south axis. Fort Ross Cove is located at latitude 38, approximately 90 miles north of San Francisco. When she hit the washrock, on March 18, 1908, the S.S. Pomona broke her hull and her stern sank first. Most of the ship listed to starboard, where she now rests. Her bow was pinned on the washrock for six months until the first winter storms washed her bow into deeper water. Her stern is pointing north towards shore, at a 33-degree angle. The stern is in shallow water, in approximately 17 feet of water at mean tide. Her bow faces the open seas and is located in deeper water, in about 40 feet of water. The entire 95 feet of the drive shaft is intact, along with all three connecting rods, the rods, a piston, the rudder and her two boilers. A boiler is located northwest of the rudder, due to previous dynamiting of the shipwreck. The hull and ribs of the S.S. Pomona are visible in situ and the southern part of the hull rests against big boulders. The gear machinery is also intact and the crankshaft, is intact in situ.

Condition

Most of the bow fell over in deeper water and this kept it in good condition as it is protected from the surf. Overall, the main features of the S.S. Pomona are easily identifiable, once one is used to separate marine growth from artifacts. Her steel hull and sheeting, as well as machinery are well preserved and have remained stable since their sinking. Although the hull is broken in two by the bow, it is easily recognizable and most of the ribs are still attached. Most of the machinery, such as the auxilliary engine, the two boilers, and machinery are still intact. The drive shaft is intact is still connected to the rudder, connecting rods, and pistons. Despite its time under water, the vessel still retains its historic integrity.

Site description

Fort Ross Cove deflects most westerly swells, protecting the S.S. Pomona from further damage since her sinking. The bottom substrate is gently sloping towards the open ocean in the outer bay. To the west side of the bay, the bottom is deeper and served as anchoring for ships loading lumber and goods in the late

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(8-86)

- OMB No. 1024-0018

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1800s. To the north, approaching the bluff, the bottom becomes too shallow to dive unless there are no swells. The washrock is visible at low tide and during periods of heavy swells when waves break at its highest point. There is a groove in the washrock made from the sliding of the bow. The underwater terrain is composed of boulders, on which marine life takes hold. Bull kelp is visible from the surface and grows thick during the summer months. It is later ripped to shore by the first heavy winter storms. This underwater terrain encloses objects that fall within it and consequently the S.S. Pomona has not moved much. It sank in water deep enough to be mostly unaffected by storms. The S.S. Pomona is located far enough from the beach that is it not affected by erosional processes.

Material

The surface of the steel frames and plating is encrusted in coralline alga (bryozoan) and supports heavy bull kelp (*Nereocystis leutkeana*) growth, but all items are in excellent condition. Brass items, such as pipefitting, or copper tubing have developed a green tarnish, which prevents marine growth. Some thin sheets of steel, such as those lining the outside of the boilers, have started to rust. Their condition is extremely good, despite being submerged in salt water for 91 years and being located in an area of intense wave activity.

Artifacts

A good number of artifacts remain today despite various salvaging attempts.

In March 1908, the contracted salvaging company (T. P. Whitelaw) recovered some winches, ropes, windlasses, anchors and chains, davits, ventilators and compasses, blocks, sundry mattresses and sheets. Both wooden planks bearing the name of the S.S. Pomona were removed in 1908. One of them was given to the Call family (who helped rescue the Pomona's passengers) and is now located at the San Francisco Maritime Museum.

Sport divers have recovered portholes of various sizes, shapes and condition, one thirty foot section of anchor chain, one brass steam gauge, one ceramic dish, two turn buckles, one drain cover, one fire valve, one wooden roller, one Clow's pin and one knife. In 1971 sport divers donated a single porthole to the Fort Ross museum.

Some artifacts that were recovered in a 1998 survey include a leather shoe, a brass coat hook, bricks from inside the boilers and coal that was used for fuel, ceramic, bottles, and valve fittings. Small brass or copper objects were also recovered to prevent further looting. All 1998 recovered pieces are located at the Fort Ross library. These artifacts were found lying on top of the wreck while mapping was in process and no specific effort was made to find artifacts. Additional artifacts may be found lying underneath or inside the wreck, especially if special attempts to recover them is made. There is therefore potential significance of finding numerous buried remains at the site, as

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subsequent dives to the site brought more artifacts to our attention. On our last dives in April, we located a heavy brass valve inside boiler number 3.

The intact drive shaft of the Pomona lies exposed on sand, at the exact place of grounding 91 years ago. The drive shaft measures 12 inches in diameter and is made of solid bronze. It extends almost 60 feet from the boiler aft to the rudder. A large ring gear and three bearings are in place, as well as two connecting rods. The drive shaft is quite long and from its length and location, we can tell that it displayed one of the most recent type of engineering, since older vessels' drive shaft were much shorter and located closer to the stern.

To starboard of the drive shaft, the crankshaft, flying wheel, and a steel vent lie in situ. Artifacts recovered from this area include a brass valve and ceramic plate fragments. The steering assembly comprising an eight-spoked wheel and shank is located starboard 15 feet north from the engine. Measurements of the gear housing are 5 ft. long, 5.1 ft. wide, and 1.6 ft. tall.

The rudder is still intact, though the propeller itself was salvaged by Whitelaw in 1908.

Moving north, a boiler lies in 17 feet of water, 29 feet from starboard stern at 230 degrees from magnetic north. This boiler was projected north when the ship was dynamited. It contains two internal fireboxes that go all the way to the south end. The front chamber measures 2'6" and is full of bricks. The bow end of this boiler contains a furnace and ash window, upside down. On either side of these windows, there are two inspection hole handles with dog stays. These could have been used to open a small door to inspect inside the boiler and one would turn the handle to open the door.

East of the rudder, one can find single and double-bollards, used to securing lines on a deck. At this point, three single bollards and five double-bollards have been mapped on the wreck.

Midship we find two boilers. The first boiler is located in situ, near the engine. The second boiler could be a third boiler or an auxiliary heater as its ash window, coal-stoking window and pipes suggest.

On port side, numerous wires, mast pipes, and rigging lies near the hull.

The winch is located starboard of the baseline, off by the bow in 34' of water. It is close to the anchor chain retainer. Winches on the Pomona may be left over from sailing days and used to pull heavy cargo on board, such as the car that was on deck at the time of sinking.

The capstan is located forward, starboard of the bow. The capstan is used for

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turning ropes attached to heavy objects such as anchors and large sails. (Blackburn, 1981:69). Since the S.S. Pomona did not possess sails anymore, we can assume that the capstan was used to lift the anchors.

The cargo hatch is located forward by the bow, at the edge of the ship's breakage point. The cargo hatch was usually found on deck along the centerline of the vessel. It was used for loading and unloading bags of mails and other pieces of cargo. Its current location may be due to displacement of objects when the vessel broke in two. It was originally covered with canvas.

A mast stay is located starboard of the baseline. It is located 6'4" away from the double-bollard at 150-degree angle looking from the mast stay to the bollard. It has two arms with cleats in them.

A possible anchor chain holder is located starboard of the bow, 30' from the tip of the bow. It is located at the 8-meter mark, that is 18 feet from the bow and it is near a winch.

A scupper, or possibly a lamp base is located starboard of the baseline. It is cemented to the stratum and resemble a bullhorn, or lamp base. Various efforts to remove it from its base have failed.

A valve spilled from within boiler #3 and was found near the firebox. It has been left in situ after being photographed. It is extremely heavy and must be made of brass (it is yellow, bears no marine life and has no patina.)

A white ceramic bowl was left in situ and covered with a piece of loose steel plating. Numerous attempts to remove it from its stratum failed. It is located starboard, 5' from Boiler #one at a 40 degree angle.

The following artifacts were recovered from the site and are currently awaiting curation at the Fort Ross museum:

A ceramic plate fragment was recovered starboard behind the flywheel, 35 ft. starboard of datum (which is the NE corner of Boiler #1). Its is .4 inches thick. The diameter of the fragment is 1.5 inches. It is a fragment of a lion rampant on top of label.

A base of glass bottle was recovered port by boiler number one. Its inner is 1.12 and its total diameter is 2.5. It is made of clear green glass, with two embossed numbers on its base: 1425 and 102.

Two bricks were recovered from the firebox of Boiler number two. Both are embossed with the word Carnegie. Carnegie is the name of a brick manufacturer located in Hollister, California. The factory collapsed with the 1906 earthquake, indicating that the bricks on the Pomona were from an earlier date

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than 1906. The first brick has glazing on one side and is 1.6 inches thick and 4.10 inches wide. This brick was found near boiler number one, located at the end of the port side, towards the end of the boiler. The glazing may be due to repeated heating inside the furnace. The second brick was found 8' from boiler number three. It measures 9.3"x4.10" and is 2.9" thick.

Three samples of coal were recovered from the firebox of Boiler number three. Their location seems to indicate that they spilled from the boiler, as they were located 8' from boiler number three, on the starboard side of the ship. They were found lying together with an assemblage of bricks at a 330-degree angle. The largest piece of coal, compressed from its time underwater, is 2.8 long, 1.8 wide, and .14 thick.

A brass or copper valve fitting was recovered starboard, 2' 3" from the drive train and 12' 4" away from the end of the drive train. Its dimensions are: 5.8 long, 3.2 wide, 1.9 thick.

A leather shoe sole was located portside of the Pomona close to the north end of boiler number three. Stitching holes are still apparent. It is 11.14 inches long and 3.12 wide. Spacing between stitching is .1 inch. The sole is currently submerged in salt water while awaiting curation.

A brass porthole was donated to the Fort Ross museum by skin divers and its exact provenience has been lost. It was recovered on 3/16/1974 from a depth of less than 20 feet and some 200 yards or so from shore (State of California, Memorandum, John C. McKenzie). Its temporary accession number is 207-495. Its condition is delicate and parts, including the glass, are missing.

A brass coat hook was recovered starboard of the baseline. Its dimensions are 3.2 high and 2 wide.

A steam pipe was recovered off Boiler #1 and is made of copper. It is 5 ft. tall and ¼ inch thick.

The purpose of this project was to determine the ship's current condition and will facilitate further work. From this project, we discovered that the ship was more intact than was previously thought. For example, newspaper articles report that all the engines of the S.S. Pomona were salvaged in 1908, and this proved to be erroneous, since we located most of the engine, pistons, and rods. We were also surprised to find numerous smaller artifacts, when we believed that the effect of time and the rough seas, in addition to previous looting would have depleted the S.S. Pomona of most non-structural artifacts. Finally, the presence of three boilers on the ship led us to re-interpret the blueprints and we concluded that the third boiler was a donkey engine, which could have been used to generate electricity on the ship.

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Statement of Significance

Summary

The S.S. Pomona is eligible for National Register listing under several criteria. Under criterion A, the S.S. Pomona is associated with events that made a significant contribution to the broad patterns of our history, such as the expansion of trade and immigration to the West Coast of the Americas. Under criterion B, she is associated with persons and entities that made a significant contribution to the maritime history of California: the San Francisco Union Iron Works, J.M. Scott, the Pacific Coast Steam Ship company. Under criterion C, the S.S. Pomona represents the new technology of triple-expansion, steel-hulled vessels. Under criterion D, the S.S. Pomona has yielded and is likely to yield important archaeological data on triple-expansion, steel-hulled vessels and maritime commerce on the West Coast of the United States. Her areas of significance are archaeology (of steam vessels in the late 1880s), engineering (of steel hulled, triple-expansion engines), maritime history (expansion into the West Coast), transportation (of mail, passenger and cargo), and commerce (competition between steamers).

The S.S. Pomona is a perfect example of a triple-expansion steam engine schooner. She was the second triple-expansion engine built in the U.S. and on the West Coast. The S.S. Pomona was also the first steel-hulled coastal liner built in the West Coast.

1- Criterion C: S.S. Pomona as Shipbuilding Innovation

The S.S. Pomona was the first steel hulled coastal liner built on the West Coast of the United States, the second vessel to use a triple-expansion steam engine, and one of the first vessels to use electric lighting throughout the decks and staterooms.

The S.S. Pomona was a steam-powered, single-screw vessel. Steam engines made navigation much easier, especially in rough sea waters such as the Western Coast of the United States. The westerly winds blew sailing vessels dangerously close to shore and steamers had the ability to counteract this problem. The number of accidents diminished with the advent of steam engines so much so that

The first triple-expansion engine built in the United States and certainly the first on the West Coast was found on the S.S. Premier and was built in 1886 by the Union Iron Works of San Francisco. The S.S. Premier was fitted with this new design because a Canadian company chartered her construction with British standards. The same type of engine was used in the Union Iron Works' next project: the S.S. Pomona. At this point and afterwards, most Union steamships were fitted with triple-expansion engines. In meeting what were essentially British specifications, the Union Iron Works moved to the forefront of American marine engine builders. By 1899, or eleven years after the S.S. Pomona was built, the triple-expansion engine became the international standard for ocean

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going vessels and would only be superceeded in cargo steamers by turbine engines.

Steel hulls were found better than wooden ones because the vibrations from the engine damaged the hulls, which often developed leaks.

Steel was also stronger than iron and therefore fared better in case of collision. The S.S. Pomona survived three collisions before her sinking, in which she suffered only minor damages while the ships she hit were either badly damaged or sank.

The engines of the Pomona are mostly intact and remain in situ. The boilers are in good condition, the connecting rods, tie rods, crankshaft and drive train are all present and still connected together. One piston is still attached and present, and although two pistons are missing, the piston in situ is a great representation of the workings of the engine.

Electric Lighting and Heating System

An independent engine ran one of Edison's patent dynamos, capable of burning 172 sixteen candlepower incandescent lights which were distributed all over the ship, one in each stateroom and lighting the decks. Each stateroom also contained an oil lamp to be used in case the electric light should not work.

The S.S. Pomona was equipped with a heating system, composed of pipe coil radiators supplied with steam from the auxiliary steam system and drained through traps to feed and filter tanks. The radiators were fitted in the living quarters, bath and wash rooms. Every stateroom was heated by steam, which could be turned off and on at will.

Criterion B: S.S. Pomona and the San Francisco Union Iron Works

In 1849, Peter and James Donahue established the first iron casting foundry in California, Union Iron and Brass Co. It became successful very quickly. In the 1880's, the company, having changed ownership, was then managed by Irving M. Scott, who advanced the idea of developing steel shipbuilding on the Pacific Coast. The S.S. Pomona was built by the Union Iron Works as the first steel ship by Irving Murray Scott, a leading figure in the shipbuilding history of California. The history of the Union Iron Works serves well to symbolize the industrial boom and culture of technology in 19th century California.

S.S. Pomona and the Pacific Coast Steamship Company

The Pacific Coast Steamship Co. was the largest firm in coastal trade from its inception in 1876 until it was sold in 1916. The company had its origins in a partnership of Goodall and Nelson, who began running small coasters from San Francisco in 1860. In 1872, Senator Charles Perkins joined the firm and in 1875 bought the Pacific Mail Company coastal fleet, increasing the PCSS vessel number to fourteen steamers. Although not exactly a monopoly, it seems that PCSS had control over the Pacific coast trade.

The S.S. Pomona was considered the "Pride of the fleet" of the Pacific Coast

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Steamship Company.

Criterion A: S.S. Pomona as landmark in maritime history

Steam schooners using triple-expansion engines were built to run as far North as Puget Sound. These vessels evolved into the distinctive schooner hull form, with a heavy rounded stern designed for easy maneuvering alongside a dock. This was practical along the coast where most steamers took loads of wood, and the S.S. Pomona did carry lumber. The majority of these vessels were built in Northern California, Oregon, or Washington and towed to San Francisco to have their engines installed. Many were fitted with passenger accommodations. Before the railroad system was fully developed, they served the needs of coastal communities for both supply and transport. The City of Topeka was the last passenger steamer vessels on the San Francisco-Eureka-Coos Bay-Portland run. Once the highway was built, steam vessels for cargo and passengers traffic were put out of use.

Smaller wooden hulled steamers were used for shorter runs, while steel vessels were used for longer trips, such as Alaska and Puget Sound. The S.S. Pomona was the first steel hulled coastal liner built after 1887 in the West Coast. Prior to 1887, all steel vessels were built in the East Coast.

In 1889, the S.S. Pomona sailed once a week on Wednesdays. From October 1895 until October 1896, she made ninety-two voyages, without missing a single trip. It seems that she may have increased her trip's frequency as competition and business arose. She made the round-trip between San Francisco and Eureka in four days average, carrying cargo and passengers along the coast. In 1895, she was praised for being the fastest steamer along the coast, with average speeds of 13½ knots per hours over the previous hundred and thirty days. She was able to face strong winds, even when other vessels were stuck at port. There were numerous other steamers running the same course, many of which sank or collided. Such vessels were the Humboldt, the San Benito, the City of Chester, the Eureka, the Gipsy, etc.. On 3/25/1897, with captain Doran running the ship, there was a competition between the Humboldt and the S.S. Pomona. Both ships made the trip from Eureka to San Francisco in less than 15½ hours, but the S.S. Pomona won by 4 minutes.

Transportation

The S.S. Pomona served both as a passenger's ferry and as cargo transportation. From Eureka back to San Francisco she carried raw products and semi-finished products such as lumber, shingles and doors, and farming goods including apples, butter, carrots, tobacco and cigars, fish and salmon, currants, bitters, potatoes, peas, eggs. She also traded forest products such as deerskins, leather, wool, and hides. From San Francisco to Eureka, she carried manufactured goods, passengers, and mail. On the day of her last voyage, the S.S. Pomona was carrying a Model T Ford, destined to Vancouver. It seems that it was the first time the Pomona was carrying a car.

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Criterion D: The archaeology of the S.S. Pomona

The first salvaging attempts were made in 1908, immediately after her grounding. The Pacific Coast Steamship Company (PCSS) did not own the S.S. Pomona anymore, but Lloyd's of London, together with a wrecking company, called the Coast Wrecking Company. T. P. H. Whitelaw was commissioned to lift the S.S. Pomona off the rock and recover any goods and machinery. The contractor kept seventy five percent of the value of the recovered goods and could have kept sixty percent of the value of the vessel if successful. The divers of those days used hard hats and were tethered to the mother ship, breathing compressed air. Their heavy armor suit and the short breathing line restricted their movements underwater and limited their scope. Whitelaw brought back anchors, mattresses, sheets, but could not lift her off the bottom. Later on that year, she was declared a menace to navigation and blown up by dynamite.

It would be decades until sport divers visited her again. In the 1959, she was visited by skin divers who recovered portholes, brass keys, teacups, the ship's whistle and two anchors. With the advent of scuba (Self-Contained Underwater Breathing Apparatus,) divers could swim freely underwater, unrestricted by the old umbilical cords. Skin and scuba divers were mostly interested in sport fishing, but as they discovered shipwrecks, the interest grew into a sport. It became fashionable to display anchors and portholes in one's house. Sport divers recovered portholes and goods from the S.S. Pomona, which have not been located at this point.

California State Parks undertook the first official underwater survey in 1984. Using a magnetometer, John Foster and his team located magnetic anomalies in Fort Ross cove. David Buller was commissioned to list all shipwrecks of Sonoma and Mendocino country and through library research, identified the wreck of the S.S. Pomona in Fort Ross cove.

In 1994, James Delgado prepared the first underwater map of the S.S. Pomona. This map located and measured the drive shaft and rudder.

In August 1998, California State Parks and Indiana University led a joint comprehensive survey of the S.S. Pomona. Her complete outline was mapped, containing the hull, bow boilers, drive shaft and rudder. From the spread of debris, the location of the wreck was determined. The S.S. Pomona lies on her starboard side. Numerous artifacts have been identified that help tell her story: bollards, masts, scuppers, etc. This research has helped understand how steam schooners were constructed.

Fort Ross Historic State Park

The location of the S.S. Pomona is culturally significant as she rests in a cove within a Historical Park. Her potential for interpretation is increased as Fort Ross is an important archaeological and cultural site. Fort Ross visitors today are interested in local history and being listed on the National Register would provide an opportunity to teach marine history. The S.S. Pomona tells the

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story of a different time period, from 1888-1908, a period that follows the selling of the Fort by the Russians in 1841. Together with the gold rush, the *S.S. Pomona* encapsulates a very important time of California history. Divers have to enter the park to access the cove and this would make access and control of the site easier. The *S.S. Pomona* can be reached by small inflatable boats or kayaks, launched from the beach. Park rangers patrol the beach on a daily basis and control the taking of fish and abalone. It would be easy to control the number of divers accessing the site and ensure that no artifacts disappear from the wreck site. Small fees could be collected to contribute to the wrecks' interpretation and maintenance.

3- Conclusion (Shipwreck integrity)

The *S.S. Pomona* is archaeologically significant for its integrity of location (she sank in a cove used for commerce), design (hull, craftsmanship were maintained), setting (she is in the water), materials (design and construction were maintained), workmanship, feeling and association. Although most of the cargo was lost in 1908, the shipwreck itself is mostly intact, at the exact place of grounding. Machinery, boilers, rudder, extensive steel hull remains are some of the diagnostic features capable of yielding extensive data for addressing a wide variety of anthropological research questions.

The *S.S. Pomona* may yield information on steel shipbuilding on the West Coast of the United States.

Documentation of *S.S. Pomona* indicates no major transformations in machinery, hull, and rigging throughout her twenty-year career. Her boilers were refurbished in Seattle in 1904 to compensate for loss of pressure. The *S.S. Pomona* is capable of yielding significant data on triple-expansion engines, Scotch boilers, steel hull design and construction, and other engineering features of the 1880s.

Since her plans have been lost, as well as the master's carpenter certificate, data can be recovered only through archaeology on the site. Further measurements of her piston, or auxilliary engine could bring to light the number of additional engines that were in use to run the *Pomona*.

The *S.S. Pomona* was a civilian vessel, serving the needs of communities when there was no other means of transportation for goods or passengers until the avenue of the railroad in the 1920s.

The *S.S. Pomona* is a significant cultural resource which allow us to develop an anthropological perspective of engineering, transportation, trade and maritime commerce along the West Coast of the United States in the late 19th and early 20th centuries.

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Verbal Boundary Description

The S.S. Pomona is substantially intact and lies on a north-south axis, with its stern facing north towards the bluff at a thirty-three degree angle. The area included in the site is an oval 300 feet long by 200 feet wide. The geographical axis follows the hull of the vessel. Based on these measurements, the S.S. Pomona area covers at least 60,000 square feet, or 1.377 acres.

Boundary Justification

The boundary for this site is based upon measurements taken from scuba diving and snorkeling, as well as underwater video and photography. The boundary comprises the hull wreckage, the bow wreckage, scattered debris and other isolated features. The site is fairly stable and enclosed within boulders. Most of the site is exposed, with coralline algae and bull kelp growth covering most of the site.

APPENDIX E

GLOSSARY OF TERMS

Term	Definition ^{III}
Aft	To or at the stern (the rear end of the vessel.)
Awning Decked Vessel	This type of vessel has a continuous upper deck of light construction and the sides completely enclosed above the main deck.
Beam Boiler fire tube	The measurement of a vessel from side to side at her widest part. A boiler in which the smoke and combustion gas goes through tubes to heat the surrounding waters.
Bollard	A stout vertical post used for securing the lines by which a ship is moored. If found on board, they often appear in pairs sharing the same base, which is fixed to the vessel rather than being an integral part of the vessel.
Boom	1) A wooden spar to which a sail attaches at its bottom edge. 2) A spar set out from the side of a ship to hold a smaller vessel tied to the boom from banging into the ship. 3) A barrier erected across the mouth of a river or harbor, often consisting of logs tied together and floating on the surface.
Bowsprit	The spar which projects over the very front of a vessel. Its purpose is to provide a support, as far forward as possible, for the lines which support the mast. These lines are called forestays.
Bulkhead	A bulkhead is a watertight partition built across the vessel, from one side to the other. It may be wither longitudinal or transverse (most merchant ships use the later.) Transverse bulkheads support the decks, provide rigidity to the frames, and subdivide the vessel into compartments.
Capstan	An upright cylindrical device found on deck along the centerline of a

Term	Definition ^{III}
	vessel. The capstan is used for turning ropes attached to heavy objects, such as anchors and large sails.
Crosshead	A connecting part between the piston rod and the main connecting rod.
Deck	The nautical equivalent of floor. A vessel may have one or more decks. While not all decks may extend the whole length of the vessel, a deck always reaches from one side to the other.
Dock	The walls or jetties at which vessels may be berthed.
Dockyard	The place where ships are built, kept, and repaired. Usually only naval dockyards have facilities for building ships, merchant ships being built in shipyards.
Donkey Engine	An auxiliary engine used for providing power for winches and cranes and other purposes when the main engines are not operating, as, for example, when a large vessel is in port and not under way.
Draft	The depth of water a vessel needs in order to float.
Keel	The lowest member of a ship's framework. In metal ships the keel is formed by the lowest continuous line of plates.
Main Yard	The yard (a horizontal spar from which the sails are hung) found on the mainmast.
Piston valve	A piston-shaped valve used for regulating steam and exhaust in the cylinder.
Poop deck	A short, raised deck at the very back of the vessel, built on top of the quarterdeck.
Port	1) A harbor or haven – a place where ships may come to the land and load and unload. 2) The left-hand side of a vessel, when one faces to the front.
Porthole	A name meaning a circular window in the side of a vessel.
Propeller	The rotating device, which propels a boat, powered by an engine, through the water. At first propellers commonly had only two blades and were often very long and thin.
Rig	The general term for the type of spar and sail arrangement of a ship.

Term	Definition ^{III}
Scantling	The dimensions of a frame used in shipbuilding.
Schooner	A sailing vessel of two or more masts. the prevailing rig of which is fore-and-aft.
Screw	A nautical alternative for the word propeller.
Shipyard	The place where merchant ships are built, kept, and repaired.
Smoke box	Airtight space at the end of the boiler where waste combustion gases are sent to the stack. Also known as uptake.
Spar	The general name for all wooden masts, yards, gaffs, booms and other wooden supports found on a sailing ship.
Spar Decked Vessel	This type of vessel is constructed with the scantlings above the main deck heavier than in an Awning Decked Vessel. but not so heavy as in a Three-Decked Vessel.
Standing Rigging	All the ropes, lines, and wires which support the masts of a sailing ship.
Starboard	The right-hand side of a vessel, when one faces to the front.
Stern	The back end of the vessel from which it is steered.
Yard	A horizontal spar from which the sails are hung. The yard is hung from the mast at midpoint.

APPENDIX F
PHOTOGRAPHS AND ILLUSTRATIONS

Figure 1: S.S. *Pomona* in Santa Cruz Harbor

Note the furled sails on the ship. The *Pomona* originally carried sails for use if her engine quit. The sails were removed once steam operation was considered safe. The vessel is photographed in Santa Cruz, on her maiden voyage in July 1888.¹¹²

(Photo courtesy of the San Diego Maritime Museum)

Figure 2 Call Ranch Residence, Fort Ross, California

Note the *Pomona* board sign hanging. Mercedes Call is standing on the front porch.

(Photo courtesy of the Fort Ross State Historic Park Library)

Figure 3: Nelson & Perkins, Admiral line & PCSS Advertising

This 6' display poster was produced by the Pacific Coast Steamship Company to
advertise the great routes of the Company.

(Courtesy of the San Francisco Maritime Museum)

Figure 4: The Union Iron Works at the Potrero Docks, San Francisco, circa 1885.

This engraving shows the Union Iron Works.

(Courtesy of the San Francisco Maritime Museum)

Figure 5: Triple-expansion Engine, San Francisco, California.

This one-fifth life-size model is similar to the Pomona's triple-expansion engine.

(Courtesy of the San Francisco Maritime Museum)

Figure 6: A Reo Automobile on a Raft

This automobile was recovered from the S.S. Pomona and floated back to shore three days after the accident.

(Photo courtesy of the Fort Ross Historic Park Library)

Figure 7: The Salvaging Event

The *S.S. Pomona* is resting on a washrock in the cove. The *Greenwood* (on the right) is involved in an attempt to salvage the wreck.

(Photo courtesy of the San Francisco Maritime Museum)

Figure 8: The *Pomona* entering the Humboldt Bay

The *S.S. Pomona* crosses the Humboldt Bar on her way to Eureka or Hookton.

(Photo courtesy of the San Francisco Maritime Museum)

Figure 9: The *Pomona* at Eureka

This photograph shows the *S.S. Pomona* docked in Eureka, California circa 1905.

(Photo courtesy of the San Francisco Maritime Museum)

Figure 10: Port Hole

This brass porthole was recovered on the *Pomona* by skin divers in the early 1960's.

(Photo courtesy John W. Foster)

Figure 11: Receiver Pipe

This copper-brass main engine receiver pipe connected the portside to the starboard side boiler. Its flange was a composite.

(Photo by the author)

Figure 12: Shoe Sole

This 11 inch leather shoe sole suggests it belongs to man's. The even stitching indicates the sole was machine sewn.

(Photo by the author)

Figure 13: Natural Concretion

This concretion is made of residue from coal combustion. The two holes match the spacing of bolts in the furnace.

(Photo by the author)

Figure 14: Probable Scupper

This unidentified object is probably either a scupper, or a lamp base.

(Photo by the author)

Figure 15: Fort Ross Coves

This aerial photo shows the two Fort Ross Coves.

(Photo courtesy Robert Schwemmer)

Figure 16: Fire Brick

This life size Carnegie brick was recovered in the firebox of the *S.S. Pomona*.

(Drawing by Indiana University team)

Figure 17: Ceramic Sherd

This life size ironware sherd was recovered near the starboard boiler.

(Drawing by Indiana University team)

Figure 18: Coat Hook

This life size brass coat hook was recovered near the auxiliary boiler.

(Drawing by Indiana University team)

"AWNING DECKED VESSEL" THIS TYPE OF VESSEL HAS A CONTINUOUS UPPER DECK OF LIGHT CONSTRUCTION AND THE SIDES COMPLETELY ENCLOSED ABOVE THE MAIN DECK.

Nº 8

"SPAR DECKED VESSEL" THIS TYPE OF VESSEL IS CONSTRUCTED WITH THE SCANTLINGS ABOVE THE MAIN DECK HEAVIER THAN IN AN "AWNING DECKED VESSEL" BUT NOT SO HEAVY AS IN A "THREE DECKED VESSEL".

Nº 9

Figure 19: Types of Decks

These two drawings (copied from Lloyd's of London Register of Shipping)

illustrate two types of decks found on the *S.S. Pomona*.

Figure 20: Project Location Map

This California coast map depicts the location of Fort Ross Cove.

Figure 21: Detailed Location Map

This map shows the proposed boundaries for the underwater park.

(Sonoma County Quad Sheet, USGS, 7 ½ min)

Figure 22: Site Plan

The site plan on the next page shows the extent of the wreckage as well as specific features of the wreck. The plan was drawn following the August 1998 survey.

(Courtesy of Indiana University)

Figure 23: Brass Valve Fitting

This life size brass valve fitting was recovered near the starboard boiler.

(Drawing by Indiana University team)

Figure 24: Bottle Base

This embossed, green bottle base was recovered near the starboard boiler. It is green and embossed with two numbers. It is drawn here life size.

(Drawing by Indiana University team)