Maritime Museum of San Diego

MAINS'L HAUL

Vol. 51: 1-4 Winter/Spring/Summer/Fall 2015

$15.95

A Journal of Pacific Maritime History

1542 SAN SALVADOR 2015



Re-creating Juan Rodríguez Cabrillo's San Salvador





Photo by Jerry Soto

Maritime Museum of San Diego Board of Directors 2015

Kenneth Andersen, Chairman
Douglas Sharp, Vice Chairman
Ben Clay, Secretary

Dennis Burks
Robert Clelland
Robert Dilworth
Wayne Donaldson
William Dysart
Iris Engstrand
Frederick Frye
Gary Gould
Wayne Hanson
Francis Holian
Patricia Hsieh
Michael B. Jones
Erich Lathers
James Lonergan
Charles MacVean
David O'Brien
Himanshu Parikh
John Reid, Jr.
Jon Schmid
Kenneth Stipanov
Charles Wurster

Ex Officio
Raymond E. Ashley, President/CEO
Sharon Cloward, Port Tenants Association Representative
Steve Andres, Docent Chairman
Susan Baird, Ships Maintenance Crew Representative

MAINS'L HAUL EDITORIAL BOARD
Raymond E. Ashley, Ph.D.
President & CEO
Jim Cassidy, Ph.D.
U.S. Navy Civilian (Retired)
Filipe Castro, Ph.D.
Texas A&M University
Iris H.W. Engstrand, Ph.D.
University of San Diego
Mark G. Hanna, Ph.D.
University of California, San Diego
Captain Bruce Linder, USN (Ret.)
Executive Director, Coronado Historical Association
Carla Rahn Phillips, Ph.D.
University of Minnesota
David R. Ringrose, Ph.D.
niversity of California, San Diego, Emeritus
Alex Roland, Ph.D.
Duke University
Timothy Runyan, Ph.D.
East Carolina University
Kevin Sheehan, Ph.D.
San Diego State University

MAINS'L HAUL is published by the Maritime Museum of San Diego, wind and weather permitting, aboard the ferryboat *Berkeley*.

MAINSAIL HAUL—An order in tacking ship bidding, "Swing the main yards."

Maritime Museum of San Diego Vol. 51: 1-4 Winter/Spring/Summer/Fall 2015

MAINS'L HAUL

A Journal of Pacific Maritime History

Recreating 1542 SAN SALVADOR 2015

2 
Raymond E. Ashley, Ph.D.
From the Helm

4 
Louis Guassac, Kumeyaay Historian, Mesa Grande Band of Mission Indians
Kumeyaay and the Ocean

10 
Raymond E. Ashley, Ph.D.
California's Origin Story

14 
Carla Rahn Phillips, Ph.D.
Pacific Exploration in the Early Sixteenth Century


16
Iris Engstrand, Ph.D. and Harry Kelsey, Ph.D.
Juan Rodríguez Cabrillo and the Building of *San Salvador*


34
Douglas Sharp, *San Salvador's* Naval Architect
Envisioning The Ship: The Beginning of a Journey


70
Susan Sirota
Museum Vice President
San Salvador Bringing Adventure, Discovery, and History to Life

78 
Photo Essay
Building *San Salvador*
It Takes a Village

vibrant culture vibrant city
Commission for Arts and Culture
City of San Diego
Financial support for this publication is provided by the City of San Diego Commission for Arts and Culture.

Unified Port of San Diego

Smithsonian Affiliations

Subscribe to *Mains'l Haul* by joining the Maritime Museum of San Diego.

Members also receive a newsletter and other benefits.
To subscribe, comment, or submit articles to this peer-reviewed Journal, visit the *Mains'l Haul* pages at **www.sdmaritime.org,** email: editor@sdmaritime.org or write to *Mains'l Haul*, Maritime Museum of San Diego, 1492 N. Harbor Dr., San Diego, CA 92101.

Our mission is to engage members and the public in the study of maritime history, while promoting scholarly research. Articles are indexed for researchers worldwide at **www.sdmaritime.org** under Publications, *Mains'l Haul*, and in *America: History & Life and Historical Abstracts*. ISSN# 1540-3386

Editors Neva Sullaway, Iris H.W. Engstrand, Ph.D.
Art Director Tony Enyedy **Printer** Crest Offset Printing Company

ISBN 0-944580-37-8

FROM THE HELM

By Ray Ashley, Ph.D.

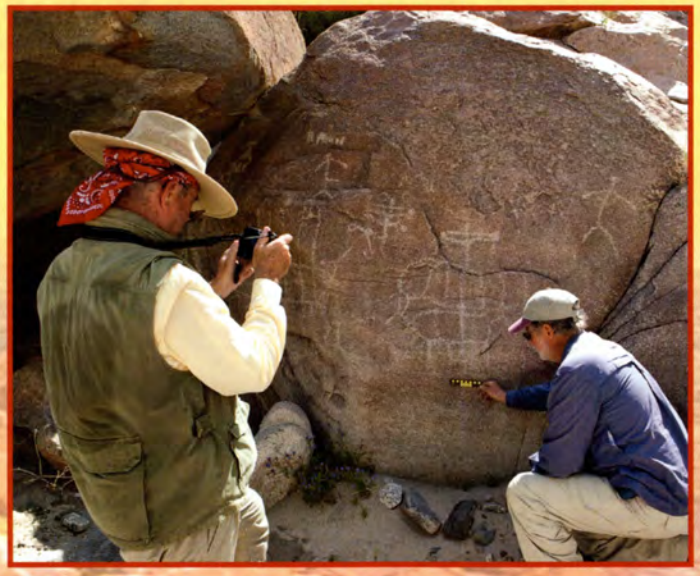
President and CEO,
Maritime Museum of San Diego

This issue of *Mains'l Haul* has been a long time in preparation, awaiting the day when we could finally announce within these pages that we had launched the galleon *San Salvador*. Accordingly, each paper presents a different perspective on what that event means. As with most powerful symbols, the ability of *San Salvador* to project multiple and complex meanings is one of her most intriguing assets.

Kumeyaay historian Louis Guassic provides a glimpse of the people Cabrillo first encountered when he sailed into the protected harbor—the geographic expanse of their language and culture, their relations with neighboring peoples, and their sophisticated understanding of land use and sea resources in sustainable ways that extend back thousands of years. Even if unspoken within his paper, one cannot avoid the foreshadowing of that *first contact*, the depth of their loss and with it, the scale of adversity over which they would eventually triumph.

Centuries later, that moment of first contact began to emerge among more recent peoples as an Origin story for San Diego, eventually for all of California, and perhaps one day it will be considered one of the great voyage histories that locates the origins of America itself. For historians Carla Rahn Phillips, Iris Engstrand, and Harry Kelsey, the return of *San Salvador* also returns us to her place within the historical narrative, midway through the heroic phase of the great Age of Exploration. With his small fleet, Cabrillo attempted to define the Pacific's northern mystery and crack its code of the winds—a precursor to Pacific oceanography and establishing a global trade route.

Sent on a voyage into the unknown, mystery yet remains *San Salvador's* most telling attribute. There are many mysteries surrounding the life of Juan Rodríguez Cabrillo and, accordingly, many unknowns surrounding the ship that in her own time was more frequently called *Juan Rodríguez* than *San Salvador*. Penetrating the mystery of what she was really like, how she was constructed, and how one might faithfully evoke her shadowy sixteenth-century presence from a time when there were no accurate depictions and no naval architects, was perhaps the ultimate challenge for a naval architect five centuries later. Herein, Doug Sharp recounts in narrative detail the extensive research and conceptualization that gave *San Salvador* form within a world governed by present-day material limitations, regulatory agencies, and economic realities. He also presents in equal measure, the technical challenges that in the end were overcome not only by analysis and design, but by the dedication and skills of professional and volunteer shipwrights and the community at-large who contributed all of the resources to build her.



Photos by Maggie Walton and Ted Walton

Archaeologist Dr. Jim Cassidy and Museum President Ray Ashley consider the images in the rock canyon, before measuring and documenting the captivating drawings. The research team agreed these rock petroglyphs could indeed be interpreted as depictions of sailing ships. It is not hard to imagine that within this sacred landscape, the Kumeyaay might have left symbols on petroglyph panels conveying the changing cosmic events they had seen as they made their seasonal migration from the coastal regions to their fall and winter residences in the mountains northern reach of the Sea of Cortez.

Finally, the launching of *San Salvador* is merely the transition between one set of perspectives, one state of being, to the next. Ships are built to accomplish various endeavors; there are high expectations for *San Salvador*, and none more so than in her future role as a sailing classroom for tens of thousands of school children annually.

Susan Sirota has been our Museum's Educational Director over many years and for nearly all of that time we have been building *San Salvador*. As a powerful symbol with many meanings, *San Salvador* is equally potent as an immersive interpretational tool—a living time machine. In her paper, Susan explains the evolution of our approach as to how that power might be exercised within the pedagogical context, and how the experience of walking *San Salvador's* decks, feeling her heel to the wind, and hearing the rush of water and the creak of timbers will be as transformational to generations of young explorers ahead as the experience of building her has been for our entire institution.

In summary, why did we build this ship?

All of the papers herein have their answer to that question to which we could add countless more, each offering its own particular facet. But to pose the question differently, in keeping with *San Salvador's* mystery, I'd like to return to an image we've used many times in presentations and publications—the haunting composition of ships hewn into the face of a rock within a remote canyon of the Jacumba desert. Considering the many hours of effort it took native artists to produce their own representation of something like *San Salvador*, we might well ask: Why did *they* do that?

We can't presume the specific use to which those images were put by their maker, anymore than we can presume that they are truly images of Cabrillo's ships. We can, however, surmise from the human record that as with any example of representational art, the artists attempt to capture attributes of the thing portrayed for some purpose, either out of aesthetic, religious, or social sensibilities. When the depiction is an object, the act of artistic replication, in some measure, appropriates the power of the object. Whether it was an object of unimaginable technology that appeared without warning, only to disappear over the horizon, or an object from an exotic past that we have imagined but have never seen or experienced; some objects are transformative in their ability to challenge accepted understandings about who we are and provoke a confrontation with the unknown.

Was their depiction the rendering of such an object?

Is it *ours*?



Photo by Carlynn Ashley

Kumeyaay

Introduction

For thousands of years the Kumeyaay have occupied an area approximately seventy-five miles north and south of the international border separating the United States and Mexico. Prior to the arrival of Shoshone speakers from the Utah area, Kumeyaay and Chumash people shared areas north of the San Luis Rey River. Kumeyaay use of the Ocean areas was both permanent and seasonal during the early periods (12,000 – 9,000 BCE). Kumeyaay relied on the Ocean areas for sustenance and living. During this period of time, the land provided an abundance of food resources, as well as a warmer climate during these periods.

Winter for the Kumeyaay was the time to leave the high mountain areas and travel to the Ocean from the mountains by following the rivers.



Mortars such as this have been found in San Diego County in shallow rocky reefs, near lagoon mouths, kelp beds and within the heads of the La Jolla Submarine Canyon.

From "The Holocene Maritime in San Diego County, by Patricia M. Masters, Ph.D., Mains'l Haul, Vol. 47:1&2, Winter/Spring 2011, pg. 53.

Kumeyaay oral history speaks of these times and is embedded in the oral traditions and songs used by Kumeyaay today. Many artifacts have been found along the coast. Mortars and bowls have been found extensively from Tijuana to Point Conception.

Approximately 100 sites have been found and identified with a variety of characteristics. The areas that exist today along the coast are actually the inland areas of the earlier period.

It is the desire of the various local Bands who have for generations shared the Ocean areas until the time of contact, to remember the Kumeyaay and their traditional Ocean lifestyle conditioned by the environment.

Winter for the Kumeyaay was the time to leave the high mountain areas and travel to the Ocean by following the rivers. Summer and Fall were the times when Kumeyaay/Luiseño families stayed in the Ocean areas. It was traditional that Kumeyaay never made claim to Ocean areas and they were always shared by the Kumeyaay clan.

According to Kumeyaay traditional oral history, the Luiseño to the north were aggressive people, but they did not battle over use of areas. Rather an effort was made by Luiseño men to marry Kumeyaay women, moving Luiseño families to a new clan. These types of



& the Ocean

By Louis Guassac, Kumeyaay Historian, Mesa Grande Band of Mission Indians



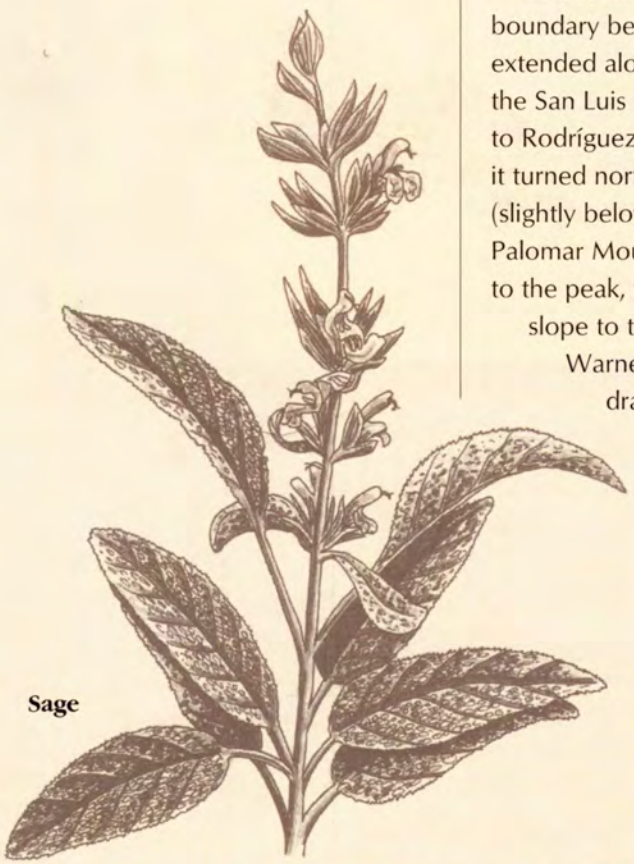
inter-relations were repeated over time and this effort moved into Kumeyaay and Chumash areas. Today we share our aboriginal territory with Luiseño people, and in regard to ancient remains that are older than two thousand years, Luiseño people advise Kumeyaay about the find.

Ocean lifestyle for the Kumeyaay was practical and a learning experience, perfecting the use of resources from the Ocean, as well as the ceremonial use of creatures from the Ocean, especially abalone, of which there was an abundance. Abalone was used in an important ceremony for Kumeyaay. They worked on certain shells for themselves and also for trading purposes. Kumeyaay/Luiseño often used the Ocean resources and even made trips to the islands just west of the mainland, now known as the Coronado Islands. Kumeyaay/Luiseño use of the Ocean was active during the contact with first Europeans. Spanish accounts from the first contact period tell of Kumeyaay use of their tule reed canoes, going far offshore, out of sight of land.



Several early observations recorded by the Spanish missionaries, circa 1769, noted that the natives fished far out to sea in rafts made of tule.

In *Her Autobiography—An Account of Her Last Years and Her Ethnobotanic Contributions,* **Delfina Cuero identified many plants used by the Kumeyaay. Among them was sage, commonly found along the coast today. Called "Kuchash," Delfina explained:** *Grind leaves and use fresh as poultice on ant bites or boil and use for tea when ill; boil and bathe in it for measles. It was dried and used as a tobacco for smoking also.*
(Shipek, ***Cuero*** **1991)**



Sage

Kumeyaay Use of San Diego Bay and Point Loma

The Kumeyaay occupied Southern California and Northern Baja California for more than 10,000 years before the arrival of the Spaniards in 1769.

The Kumeyaay northern boundary began at the coast, extended along the crest south of the San Luis Rey River, then inland to Rodríguez Mountain. From there it turned north across the river (slightly below Henshaw Dam), up Palomar Mountain's southern slope to the peak, then down the eastern slope to the low divide crossing Warner's Valley and to the drainage divide north of the San Felipe Valley. The boundary followed this divide across the southern end of Salton Sea to the sand dunes west of the Colorado River, then south to meet the river below the present Mexican border. The boundary then ran southwest to the Pacific along the mountain divide south of Santo Tomas Mission.

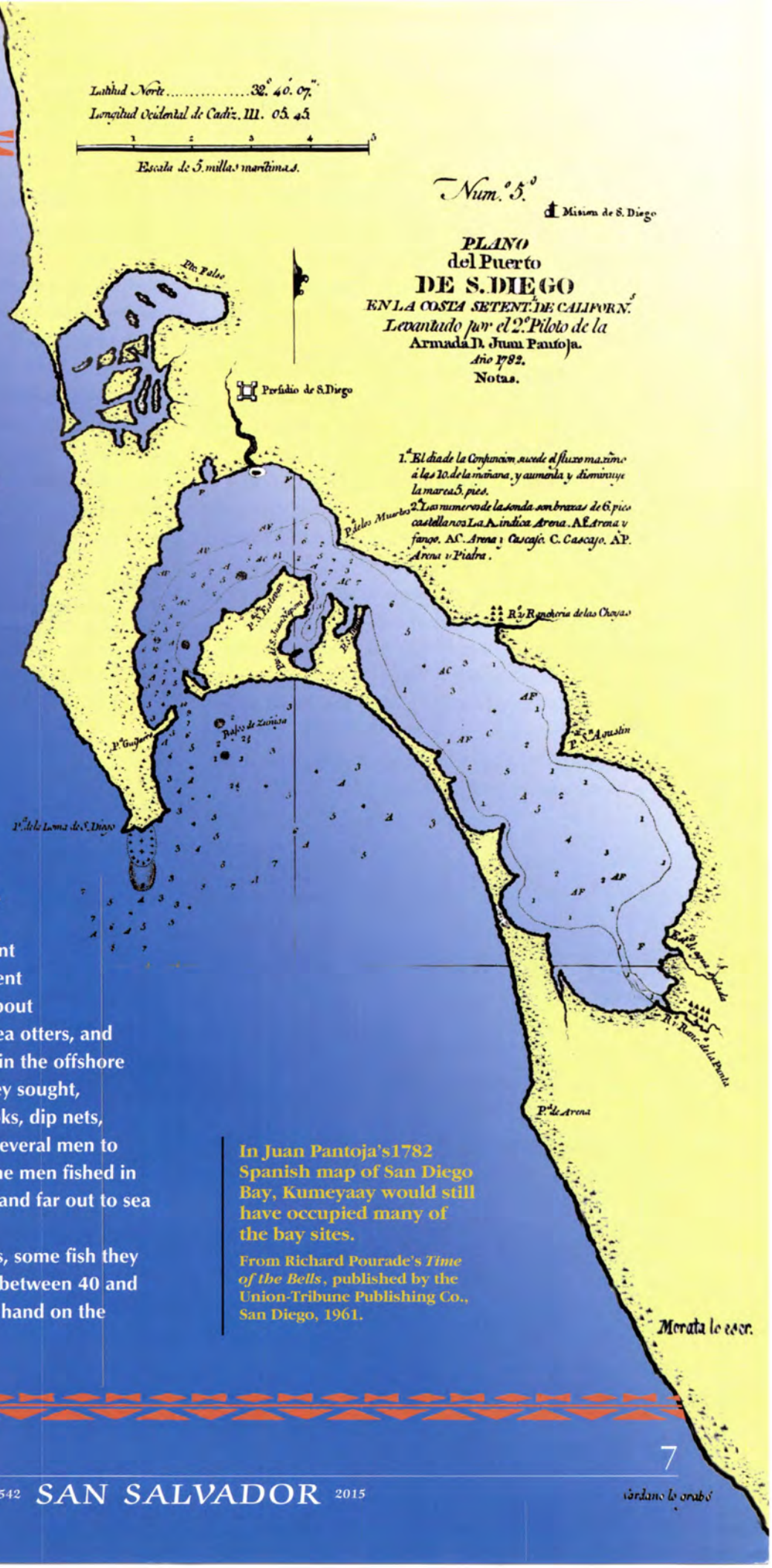
San Diego Bay, the largest bay, was on the north central coast of the Kumeyaay nation. Kumeyaay visiting from inland used it heavily for fishing, both by the local bands with permanent homes around the bay, and it was occasionally visited by traders from the Colorado River and beyond (Quechan, Cocopa, Mohave, O'o'Tam, Paipai) and whoever Kumeyaay married.

Spanish records state that the men fished in the bay, in the kelp beds near shore, and far out to sea in the small tule craft.

Traders from northern neighbors also came: Cupa, Cahuilla, and Kawhaay (Luiseño), among others. Kumeyaay deemed it "national (federal lands)" [the areas now called] Point Loma, Mission Beach, the Strand and Silver Strand, including Coronado and North Island. This meant that all Kumeyaay bands—coastal, mountain, and desert came regularly for fishing and shellfish harvesting. They participated in the harvest of foods and medicinal plants above and on tidelines, and offshore of Point Loma. All participated in the harvest and in the controlled burning of land along the Point to increase food supplies for humans and animals. They also experimented by planting desert and mountain food and medicinal plants at the coast and on Point Loma.

Kumeyaay fished from dugout canoes or reed balsa canoes, and from the shore. In the bay, they speared dolphins, seals, giant sea bass and other large fish. They went by canoe to the Coronado Islands (about seventeen miles offshore) for seals, sea otters, and bird eggs. They also regularly fished in the offshore kelp areas. Depending on the fish they sought, Kumeyaay used spears, lines and hooks, dip nets, fish traps and large seines that took several men to manage. Spanish records state that the men fished in the bay, in the kelp beds near shore, and far out to sea in the small tule craft.

According to the Kumeyaay elders, some fish they had formerly caught in the bay were between 40 and 200 pounds. They caught grunion by hand on the



In Juan Pantoja's1782 Spanish map of San Diego Bay, Kumeyaay would still have occupied many of the bay sites.

From Richard Pourade's *Time of the Bells*, published by the Union-Tribune Publishing Co., San Diego, 1961.

beaches, and used nets and weirs for small fish. They fished the bay and harvested plants and shellfish from the mudflats between Point Loma and Old Town until about 1910. They also speared seals both for their meat and for their fur. Sealskin was the preferred rear apron of the so-called double apron type of skirt worn by the Kumeyaay women and girls.

The Kumeyaay always gathered shellfish from bay shores. As mud flats grew near shore, they dug in the mudflats at low tide for shellfish and a "mudworm" as they called it. In the mud tidal area between Cosoy (Presidio and Old Town areas) and at the edge of Point Loma that graded into land, various salt marsh plants were regularly gathered for food, medicine, and for salt. Many roots plants were dug, some taken, the clumps were divided and reset so all would continue to grow and expand. Spanish records also note the digging of shellfish for food. They describe the coastal houses as made of the marsh reeds. The Spaniards also noted the abundance of game birds in the marsh areas, migratory ducks and geese, as well as local species in the marsh. Doves and quail were at the marsh edges. All of these were used by the Kumeyaay.

By 7,000 years ago, the bay existed with marshes forming near river mouths. The Kumeyaay lived on or near the present shoreline, with sites on Point Loma and around the bay. Due to the early development of San Diego and the lack of archaeological research until recently, little is known about the coastal sites from 9,000 to 1,700 CE. Later sites, such as many large villages seen by the Spaniards, were abandoned with no recovery of archaeological data, in contrast to documentary data. As Juan Rodríguez Cabrillo's ship, *San Salvador*, entered the bay on September 28, 1542, the Kumeyaay were undoubtedly there, observing, and wondering what the strange aberration was approaching them.

Notes:
For the complete article and source materials, see Louis Guassac, Kumeyaay Historian, "Kumeyaay and the Ocean," in *Mains'l Haul,* Vol. 47:1&2, Winter/Spring 2011.



Courtesy Cabrillo National Monument Foundation, National Park Service
Illustration by Richard Schlecht

Louis Guassac is a member of the Mesa Grande Band of Mission Indians, one of eighteen federally recognized Bands in San Diego County. Of the eighteen Bands, twelve are known as Kumeyaay/Diegueño Indians. Guassac has worked with the tribal communities for over twenty years and has been elected by the Mesa Grande Band of Mission Indians to the position of Kumeyaay Historian. In this capacity, Guassac has worked closely with the late Dr. Florence Shipek, whose landmark work researching the Kumeyaay has expanded our modern-day understanding of the prehistory and history of the Kumeyaay. He has also worked closely with Dr. Patricia Masters of Scripps Institution of Oceanography.

While maintaining his livelihood as an electrician and electronics technician, Guassac has been an independent consultant to the Sycuan Band of Kumeyaay advocating for Tribal Government self-sufficiency. He has also served as Executive Director of the Base Realignment & Closure Act (BRAC), constructing the Master Plan for community reuse and evaluating environmental issues, ultimately framing a 500 million dollar proposal for the reuse of the San Diego Naval Training Center (now the thriving community of Liberty Station).

Currently, Guassac is the tribal coordinator for the Kumeyaay Border Task Force and is responsible for resolving issues related to "pass and re-pass" for Baja California Kumeyaay. Among his ongoing special projects, Guassac works in several areas of Kumeyaay/Diegueño Unity, and he has established the first Kumeyaay/Diegueño Land Conservancy as a 501(c)(3) nonprofit organization.

As Juan Rodríguez Cabrillo's ship, *San Salvador*, entered the bay on September 28, 1542, the Kumeyaay were undoubtedly there, observing, and wondering what the strange aberration was approaching them.



California's

On September 27, 1542, lookouts on three Spanish ships working their way slowly up a barren coastline sighted a distinctive wooded promontory to their north. Its aspect seemed to indicate a good anchorage, perhaps even a harbor. They confirmed this impression by sailing into it the following day and anchoring in the calm water beneath the headland, adjacent to a little sand and cobble spit that offered good landing. Having just crossed into uncharted waters, the advent of so fine a harbor may have seemed an auspicious discovery as well as a convenient one. Perhaps it was the precursor to great undertakings.

Several weeks later, the surviving members of the expedition would not have thought that event auspicious. By that time the leader of their expedition, a man of action and letters who had survived countless dangerous adventures, was dead. The explorers had not found China or the kind of winds that would suggest a direct route or return from the Far East. They had found no indications of any strait connecting this ocean to the Atlantic, no islands replete with pearls, no great cities,

When the small San Salvador entered the harbor the Spaniards called San Miguel, the galleon was perhaps the most powerful vessel in the Pacific Ocean.



In this 2001 painting by Gordon Miller, Cabrillo's *San Salvador* rounds Point Loma in 1542.
MMSD Collections

Origin Story

By Raymond E. Ashley, Ph.D.

no sources of silver or gold. Though the expedition had numerous encounters with the peoples who inhabited these lands, they did not seem members of complex and wealthy civilizations or proprietors of abundant resources. The ships had probed the empty ocean far to the northwest and had found only storms and death, neither of which held much value for the trading interests of the Spanish empire. So unpromising were the prospects of this new land that more than two centuries would pass before any Europeans could be tempted to establish a permanent settlement. The logs of the voyages, navigational information, first-hand accounts, and depositions would go missing from the historical record as would the flagship *San Salvador*, along with the only image ever painted of her. Even the names they had given to the places they discovered, such as the name they gave to that first harbor "El Puerto de San Miguel," would be changed. Having failed in all aspects of their mission save one—to return and report what happened—the voyage would have seemed a disappointment best forgotten.

What they could not have known was that they had indeed sailed into waters of great undertakings. Sixty-five years before the first permanent English settlement on the North American continent, eighty years before the *Mayflower* crossed a much smaller ocean to New England; Europeans sighted, charted, and made first contact with the native inhabitants of what would one day be the west coast of the United States. When the small *San Salvador* entered the harbor the Spaniards called San Miguel, the galleon was perhaps the most powerful vessel in the Pacific Ocean. It was this same harbor that would one day project a strategic concentration of





Bronze sculpture of the galleon *San Salvador* on display at Cabrillo National Monument.

Courtesy Cabrillo National Monument



U.S. naval power. The coastline might have seemed unpromising, but California which is bounded by it today, if ranked as an independent nation, has the world's eighth largest economy. All of these things, which from the vantage point of 1542 would have seemed so unlikely, came about in ways complex beyond imagining. Perhaps for the very reason that it was so preposterous and complex, we are drawn to that beginning as a way to explain, understand, and validate ourselves. From our vantage point, naturally, that beginning now seems equally as incomprehensible, alien and inaccessible. So much so that we have found only one certain means to take us to that strange shore, and, ironically, it is by the same means. For more than a century, with continuity and obsession, we have been conjuring in our commemorative imaginations that ship for which there are no plans, no precise dimensions, no images, and no known remains.

For more than a century, with continuity and obsession, we have been conjuring in our commemorative imaginations that ship for which there are no plans, no precise dimensions, no images, and no known remains.

Juan Rodríguez Cabrillo, whose flagship she was, is almost as enigmatic. We are not entirely sure when and why he came to the New World. Though he is frequently spoken of as Portuguese, this was derived from a somewhat ambiguous reference in a seventeenth-century compilation of Spanish voyages to the Indies by the historian Antonio de Herrera. Cabrillo's career was spent entirely in the service of Spain. We are not sure what the family name "Cabrillo" represents, as it was a name he gave himself toward the end of his life after he had acquired property and social standing to differentiate from all the other Juan Rodríguez's of his time. It is unclear where he learned the skills to build boats and ships, to navigate, or write reports. We don't know exactly where he died and though a cryptic artifact was found on Santa Rosa Island in 1901 that some people believe is his headstone—it is probably a fraud. We know he died in a wilderness far from home in mundane circumstances due to complications of either a broken leg or broken arm. And, of a life that was adventurous, dangerous, violent, and long by the standards of the time, he spent only his last eight weeks in California.

And yet, if one does an internet search of the name Cabrillo, it will likely turn up hundreds of things bearing his name: churches, schools, beaches, parks, freeways, streets, hospitals, hotels, colleges, aquariums, lighthouses, performing arts centers, shopping malls, residential complexes, retirement homes, marinas, yacht clubs, restaurants, daycare centers, and car dealerships. The second most visited National

Monument in the United States is located on the headland he once gazed upon in making his landfall and is named for him. A lonely windswept point on San Miguel Island has a monument to him, as do landmarks in every port in the state. His ship, the *San Salvador*, has appeared on the US 29¢ postage stamp, and can be found in art deco pictographs throughout Balboa Park, in the mural inside the Avalon Casino, in the outdoor atrium of the San Diego Municipal Complex, in the Santa Barbara Courthouse, and the center of the seal of the City of San Diego. The *San Salvador* sails in reconstruction as a children's media center in the Point Loma branch library and is the subject of artistic renderings of the voyage by fourth graders throughout the state. None of California's millions of residents, visitors, political leaders, celebrities, or artists in all of its history have managed to inspire so much willingness to identify a pivotal point in our history as this mysterious individual who first sailed into its unknown territory and then vanished into its landscape a few weeks later. Ironically, though few of the names he invented for the places he saw survived, the name he invented for himself trumped all of them. For whatever he was in his life: conquistador, patron, community leader, notary public, shipbuilder, navigator, explorer; he has clearly become something else now. His subsequent career transformed events he could never have imagined.



Cabrillo in Context:

Pacific Exploration in the

By Carla Rahn Phillips, Ph.D.



Illustrated are the Pacific voyages from Magellan/Elcano in 1520-1521 to Urdaneta in 1565. While Juan Rodríguez Cabrillo sought to examine the north Pacific coast in 1542, it was Andrés Urdaneta who deciphered how to sail eastward across the Pacific from Asia to the Americas. His discovery finally made it possible to develop trans-Pacific trade.

***Expanded from the* Times Atlas of Exploration**

Early Sixteenth Century

In the Age of Exploration

For the history of San Diego, Juan Rodríguez Cabrillo's 1542 voyage marks a beginning—the discovery of the magnificent bay that defines the city even today. Yet in a broader context, Cabrillo's voyage lies in the middle of what we might call the "heroic age" of global exploration. That age began with the voyages down the African coast and into the eastern part of the "Ocean Sea," the Atlantic Ocean, in the half-century before Columbus' historic 1492 voyage. Some historians would argue that the "heroic age" ended with the Magellan/Elcano westward circumnavigation in 1519-1522. Others would argue that the heroic age lasted until James Cook's accurate mapping of the Pacific Ocean in the late eighteenth century. The latter view is appealing, but I would argue instead that the heroic age of exploration lasted only until 1565, when Andrés Urdaneta figured out how to sail eastward across the Pacific from Asia to the Americas. Urdaneta's discovery finally made it possible to develop trans-Pacific trade, a goal that had eluded Magellan and every subsequent European voyage into the Pacific for four decades. After Urdaneta, however, Spanish merchants and mariners knew how to navigate in the Pacific, even though much of its vastness remained unexplored. Cabrillo's 1542 voyage—midway between Magellan and Urdaneta—lies within the heroic age of global exploration, when Pacific navigation was still largely unknown to Europeans. That is worth emphasizing because European explorers, mariners, merchants, missionaries, and settlers had long since domesticated the trans-Atlantic routes between the Old Worlds of Europe and Africa and the New World of the Americas.

The Pathway to California

Juan Rodríguez Cabrillo and the Building of San Salvador

By Iris Engstrand, Ph.D. and Harry Kelsey, Ph.D.

The conquest of Mexico, carried out between 1519 and 1521, perhaps more than Balboa's momentous discovery of the Pacific Ocean or Magellan's courageous voyage around the world, stands first in the direct chain of events that led to the discovery and settlement of California.[1] The gold, silver, and jewels of the Aztec empire naturally led the Spaniards to believe that other areas of Indian wealth must lie to the south and north of the Mexican capital of Tenochtitlán. The two decades following the initial Aztec defeat witnessed a series of forays into the Pacific that culminated with the voyage of Juan Rodríguez Cabrillo and the European discovery of what became known as the Bay of San Diego de Alcalá, on 28 September 1542.[2]

Cabrillo joins the Conquest of Mexico

Some details of the background and early life of Juan Rodríguez Cabrillo have come to light in recent years. Often described mistakenly as

The statue of Juan Rodríguez Cabrillo, honoring the first European presence along our western coast and offshore islands, stands atop Point Loma, San Diego, at the Cabrillo National Monument.

Courtesy Cabrillo National Monument Foundation

Harry Kelsey is the former chief curator of history at the Natural History Museum of Los Angeles County and currently a research scholar at the Huntington library. He is the author of several books including: *Juan Rodríguez Cabrillo; The Doctrina and Confesionario of Juan Cortés; Frontier Capitalist: The Life of John Evans; Sir Frances Drake: The Queen's Pirate and Philip II, King of England: Forgotten Sovereign.*

Iris Engstrand, Professor of History at the University of San Diego, specializes in the history of Spain, Spanish California, and early exploration of the Pacific Ocean. Her research interests range from Spain's role in the eighteenth century scientific enlightenment to San Diego's modern history. Among her publications are: *Spanish Scientists in the New World* (1981); *The San Diego Yacht Club: A History* (with Cynthia Dávalos, 2000) and *San Diego: California's Cornerstone* (1981, 2005). She serves on the Board of Directors of the Maritime Museum of San Diego and is co-editor of *The Journal of San Diego History*.

"a Portuguese navigator sailing under the flag of Spain," his career seemed to begin on the California coast. Cabrillo's original journal of exploration has not been found, but other documents, including a later copy of a journal, are housed in the Archives of the Indies in Seville. Documents in the Royal Audiencia in Guatemala give information about Cabrillo's service to Spain, his family and estates in Guatemala, and his activities in California. His surname, which in its correct form would be Rodríguez or Rodríguez Cabrillo, adds confusion to his nationality.

For the past century or so, a few writers have said he was Portuguese, but most historians now think this is an error.[3] The government, his family, his friends, and even his enemies treated him as though he were Spanish. Probably Cabrillo himself did not know who his parents were or exactly where they came from. Certainly he never mentioned their names in any official documents, as men were obliged to do when they gave sworn testimony.

Cabrillo's great grandson later said under oath that his illustrious ancestor came from Spain.[4] Cabrillo's friend Pedro de Ovid swore that he knew this was true, because he came with him in the army of Pánfilo de Narváez. Even so, many people accept the statement of the Spanish chronicler Antonio de Herrera, who wrote more than half a century after the explorer died. Herrera placed the word or name "Portugues" in his text.[5]

Capitulo III. Del viage, que hizieron dos nauios, que embio don Antonio de Mẽ doça a descubrir la costa de la mar del Sur, desde nueua España.

MEnos se descuydaua don Antonio de Mendoça de las cosas de la mar, porque no obstante, que los nauios, que auia embiado a descubrir la costa de nueua España, de la parte del Sur, auian padecido mucho, queria en todo caso saber lo que auia adelante, y para ello mandô aperçebir dos nauios, y nombrô por Capitan dellos a Iuan Rodriguez Cabrillo

1543

Iuan Rodriguez, Cabrillo va a descubrir por la mar del Sur.

Portugues, persona muy platica en las cosas de la mar. El vn nauio se nõbraua san Saluador, que era la Capitana, y el otro la Vitoria; yua por Piloto mayor Bartolome Ferrer, y tambien por Piloto Bartolome Fernãdez, y por Maestres Antonio Carrera, y S. Remo. Estando pues estos nauios a punto, salieron del puerto de Nauidad

From Spanish chronicler Antonio de Herrera y Tordesillas' *Historia General de los hechos de los Castellanos en las Islas y Tierra Firme del Mar Oceano* (4 volumes, 1601-1615), in which he mentions "Juan Rodríguez Cabrillo Portugues," in his historical account written more than half a century after the explorer died. Herrera's statement is at odds with modern historians' accounts.

Courtesy José Maria Gaztelú, Private Collection, Pamplona, Spain

Cabrillo's Life in the New World

The record of Juan Rodríguez Cabrillo's life begins in Santo Domingo in 1510 when, at the age of twelve, he landed in the New World. He later reached the Mexican coast as a crossbowman with the Pánfilo de Narváez expedition sent out by Governor Diego de Velásquez of Cuba to arrest and return Cortés to Cuba prior to his march against the Aztecs.[6] The Narváez expedition arrived too late to interfere with the siege of Tenochtitlán. Hearing of the governor's plan, Cortés left part of his army inside the Mexican capital under his second-in-command Pedro de Alvarado and returned to Vera Cruz to face the threat from his home base. Defeating the newly arrived Spanish force in a surprise move, Cortés won the Narváez soldiers to his side with promises of gold, and prepared them to attack the Aztec island capital.

Cabrillo thus became a part of Cortés' reinforced army and, because Alvarado had failed to contain the Aztecs, served through the bloodiest battles of the conquest. Cabrillo was placed in charge of building watercraft *(bergantines)* to cross Lake Texcoco in order to attack the Aztec stronghold. Following the defeat of the Aztecs, Cabrillo accompanied Pedro de Alvarado on the conquest of Guatemala and took up residency there. Bernal Díaz del Castillo recorded that Cabrillo ***was a good soldier in the Mexican campaign . . . who later, as a resident of Guatemala, was a very honorable person, and was captain and admiral of thirteen ships on Pedro Alvarado's behalf, and he served his majesty well in everything which presented itself to him . . . .*** [7]

Juan Rodríguez, who did not begin to call himself Cabrillo until after 1536, first engaged in farming in Guatemala on the estates granted to him by Alvarado in August 1524. He prospered as a horseman and ranch owner and received permission to look for gold in 1529. He and his friends Diego Sánchez de Ortega and Sancho de Barahona discovered that native Guatemalans in Coban mined gold from the streams within land that Cabrillo controlled. Over the next few years, Cabrillo heard tales of riches to the south in Peru, but in 1532 preferred to sail east across the Atlantic to Spain. In Seville, he courted and married Beatriz Sánchez de Ortega, the sister of his friend Diego and returned to Guatemala with his bride in 1533. The family settled on his vast estates, which by this time were producing corn, beans, and chile in addition to a cash crop of cacao. By 1536, Beatriz had given birth to two sons who were baptized and confirmed in the cathedral church of Santiago. The elder was named Juan Rodríguez Cabrillo, while the younger was called Diego Sánchez de Ortega after his uncle.[8] Cabrillo was respected as a man of means—an *hidalgo*—and was involved in considerable business and domestic affairs in Guatemala prior to his association with California.

Prelude to California: Cortés looks toward the Pacific

By 1522, Hernán Cortés had reached the Pacific coast at Michoacán in central Mexico and founded the port city of Zacatula. He ordered construction of four ships for northward exploration, but a lack of supplies and skilled labor slowed progress. Essential European items such as ironwork and rigging had to be transported slowly overland from Vera Cruz. Four ships were nevertheless completed by 1527, just in time to comply with a royal order sending three of them to the Moluccas to strengthen Spanish claims in the East Indies. By that year the crown had established the Royal Audiencia, a judicial body that served as a court of appeals and, in the absence of an executive, as an administrative committee of government. It governed Mexican affairs until 1535, when the Kingdom of New Spain became a viceroyalty and was placed under Antonio de Mendoza, the first Viceroy of New Spain and personal representative of the king. Cortés resented this check on his authority and sought new lands to conquer.

Exploring Baja California

In his exploration of the Pacific, it is thought that Cortés hoped to find both the golden island of the Amazons and the long-sought Strait of Anián, or Northwest Passage to the Atlantic, lying somewhere to the north of the Mexican coast. Cortés outfitted two ventures in 1533 and 1534 that touched on the shores of Baja California. The survivors of the second expedition reported that the natives of their newly discovered island were primitive savages, but had collected an abundance of pearls. Pearls alone gave Cortés sufficient incentive to plan his own expedition.

He was joined by a rush of volunteers who knew the captain's reputation for finding wealth.

Three vessels reached the Bay of La Paz on May 3, 1535. Cortés named the "island" Santa Cruz and founded its first settlement on the dry, rocky coast. Native hostility and a lack of food made it necessary for two ships to return to the mainland for supplies—one of these was wrecked in the Gulf of California—then called the "Red Sea of Cortés." On a second attempt to obtain supplies, only the ship that Cortés himself commanded made it back across the treacherous, stormy waters to La Paz. In the meantime, twenty-three of his men died of starvation on Baja California's inhospitable shore. Cortés took the one remaining vessel and returned to Mexico to get further relief. Finally, toward the end of 1536, prospects of success seemed so remote that Cortés sent ships to pick up the surviving colonists. Thus ended the first in a long succession of attempts to settle California.[9]



This distinctive map titled *T Gebiedt van Guadalajara Niew Mexico en Californie enz* (ca 1656-1665), by French cartographer Nicolas Sanson, supported the myth that California was an island—a misconception that continued well into the 1700s.

The Ulloa Expedition

In 1539 Cortés issued instructions to the final expedition that, under his direction, would pierce the mysteries of the north. His plans to return to Spain to solidify his territorial claims, however, kept Cortés from accompanying the voyage. Three vessels commanded by Francisco de Ulloa sailed from the port of Acapulco in July of that year; one, the tiny *Santo Tomás* was wrecked in the stormy waters of the Gulf of California before reaching La Paz. Ulloa's fleet, reduced to the 120-ton *Santa Agueda* and its flagship, the *Trinidad*, a 35- to 40-ton vessel not more than forty feet in length, left La Paz and headed across the choppy Red Sea of Cortés to the mainland shore. Ulloa cruised northward to the port of Guaymas, which he named *Puerto de los Puertos* (the Port of Ports), and farther on expected to find a passage around the "island" of California. Instead, the ships encountered violent tides caused by the Colorado River descending into the sea at the head of the narrow Gulf. The bleak shoreline, a lonely desert broken by stark mountains, offered few prospects for golden cities, so Ulloa turned southward, the first Spaniard to know that Baja California was not an island.

The two vessels rounded Cabo San Lucas by the end of January 1540, and then sailed up the western shore as far north as the *Isla de Cedros* (Island of Cedars) so named because ***. . . on the tops of the mountains therein, there grows a wood of these Cedars being very tall, as the nature of them is to be.***[10]



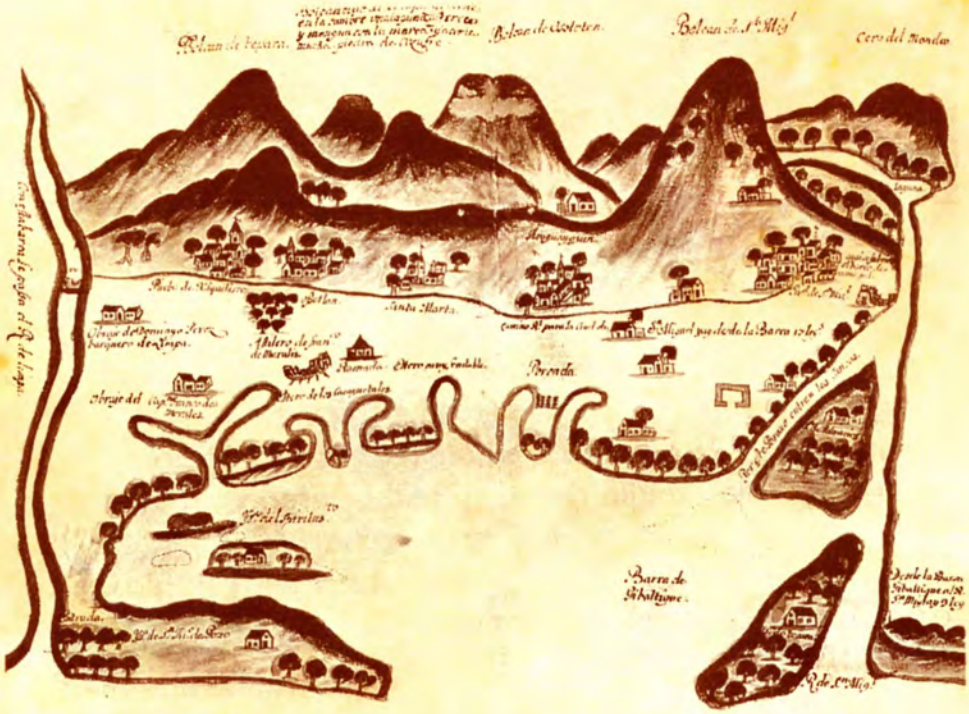
The map delineates what was known of the coast of New Spain (Mexico) and the peninsula of California prior to Juan Rodríguez Cabrillo's voyage to Alta California. This copy of the original (now lost), was published in 1770 by Francisco Antonio de Lorenzana in his *Historia de Nueva España*.

Courtesy the Huntington Library

After three months, Ulloa sent the larger *Santa Agueda* home and continued his explorations northward in the *Trinidad* to perhaps Point San Antonio, just south of latitude 30 degrees.[11]

Ulloa's revelation that Baja California was a peninsula aroused little attention and the "island" of California persisted on maps as late as 1784.[12] His expedition, the last with which Cortés had any official connection, nevertheless, faced severe storms to explore both the eastern and western coasts of the peninsula. Their discovery of an island of cedars compensated little for expected cities of gold. Disappointment was great and Cortés, angered at his lack of authority and frustrated by Viceroy Mendoza's constant opposition, had sailed for Spain in 1540. Cortés argued his claims before the royal court, but his lawsuits dragged on before an unmoved officialdom. Years of effort gave him little satisfaction and finally, in 1547, death claimed the unhappy Cortés, first of the Spanish explorers to open the way to California.[13]

Ulloa's revelation that Baja California was a peninsula aroused little attention and the "island" of California persisted on maps as late as 1784.



This seventeenth-century sketch illustrates the location of the shipyard at Girabaltique, a short distance up the river from the Guatemalan fishing village of Iztapa.

From Harry Kelsey's Juan Rodríguez Cabrillo, *p. 69, plate 11.*

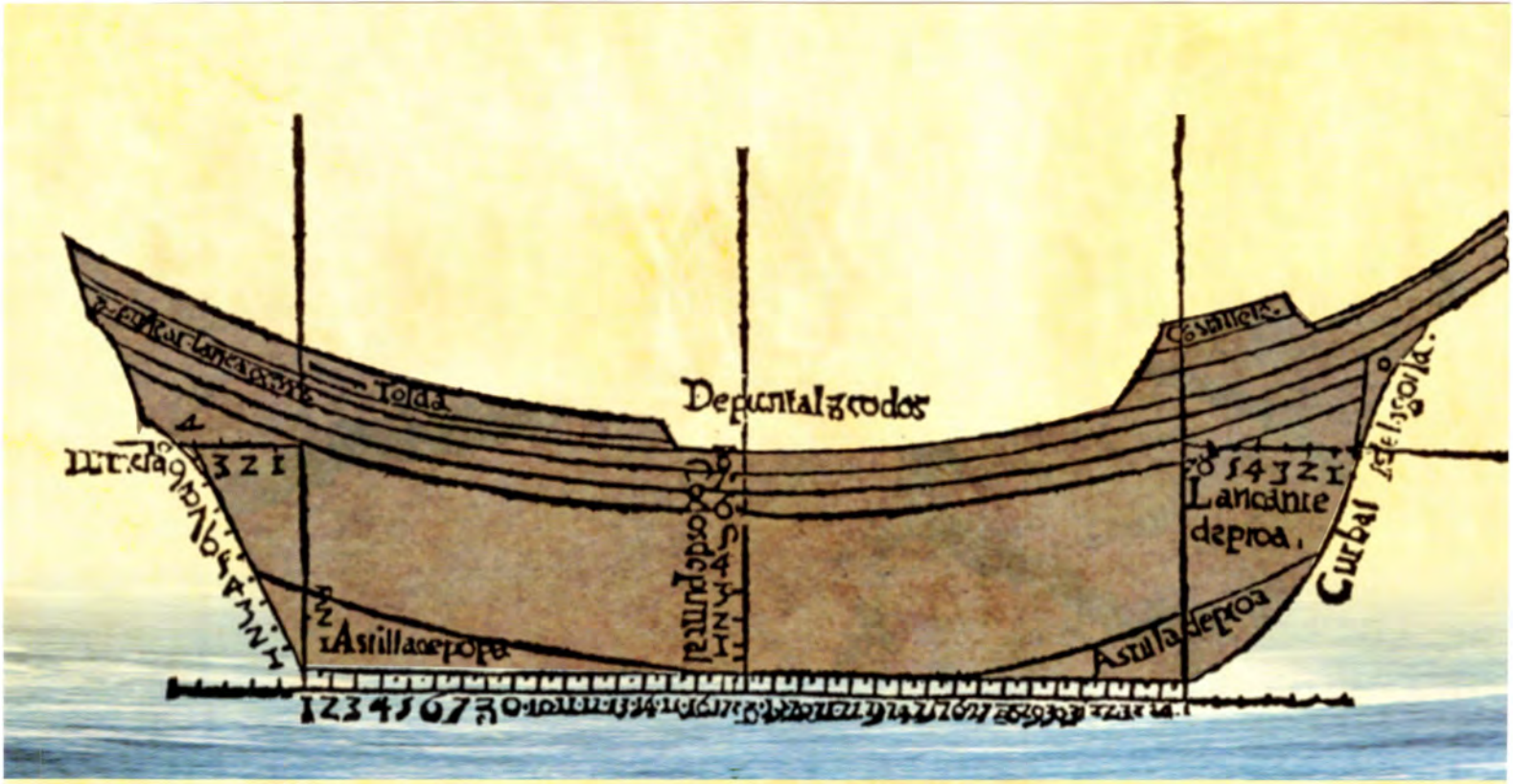
The Coronado Expedition

While Ulloa's voyage was still in progress, Viceroy Mendoza organized an ambitious, two-pronged land and sea expedition to find the fabulous Cíbola, a city of gold somewhere in the interior of the continent. His intentions was to claim the area for Spain. Led by the able Francisco Vásquez de Coronado, the land procession was launched in February 1540 from Compostela, near Tepic, with some 200 horsemen, seventy foot soldiers and nearly 1,000 Indian allies and servants. For the sea detachment, three vessels commanded by Hernando de Alarcón left Mexico in May 1540 with instructions to explore the upper part of the Sea of Cortés and make overland contact with Coronado's soldiers. During August and September, Alarcón explored the lower Colorado River, but a narrow canyon forced him to return downstream at a point south of Yuma, just short of touching California soil. Coronado's expedition returned from its journey across the southwest without finding the alleged golden cities or other signs of Native American wealth.[14]

Viceroy Mendoza, disillusioned by the meager results of Coronado's effort, resolutely turned to the sea with yet another plan to find the elusive Strait of Anián. Pedro de Alvarado, Governor and Captain-General of Guatemala, appeared at the port of Acapulco in 1540 with a fleet of thirteen vessels and offered his services to the crown for Pacific exploration. Close to Alvarado's right hand during the conquest of Guatemala stood Juan Rodríguez Cabrillo—navigator, horseman, captain of crossbowmen, and shipbuilder. When Alvarado became captain-general of the province stretching from southern Mexico to the boundary of Panama, he named Cabrillo to construct a fleet of ships that he could sail across the Pacific to the Spice Islands.

Building a Shipyard

About fifteen leagues (35 miles) due south of Santiago, where the river Michatoya meanders into the Pacific Ocean, lay the sixteenth-century Guatemalan fishing village of Iztapa. Little more than an open roadstead and partially blocked by a huge sand bar, it was still the best seaport on the coast of New Spain. The shoreline was steep, the tides fast and strong, and the channel in a state of constant change during flood season. The anchorage was so hazardous that two ships from Alvarado's first fleet were lost there during the winter storms of 1533.[15] The evidence indicates



This woodblock sketch shows the method used by Guatemalan shipwrights to compute the proportions of a ship's hull. The illustration is from the *Instrucción náutica* of Diego García de Palacio, who spent several years in Guatemala after the mid-sixteenth century.

that the main shipyard was located at Girabaltique, a short distance up the river from Iztapa. There was an abundance of good timber nearby, as well as pita fiber for making cables and rigging. Neighboring villages could provide food at low cost.[16]

Farther down the coast in present-day El Salvador was another port, equally open to the weather. This was Acajutla, seaport for the cities of Trinidad and San Salvador. Acajutla featured a dangerous reef across the entrance to the bay, and ships stopped there only at great risk. Yet, interior roads to the coast were so poor that Acajutla was the only port where Salvadoran cacao and other produce could be loaded for shipment to Peru and New Spain. In fact, this was the port where Juan Rodríguez Cabrillo rigged and loaded his ship *Santiago* in 1534, just before Alvarado seized the vessel for his own use.[17] Some additional outfitting of the ships bound for the northwest seems to have been made there.

Shipbuilding in the sixteenth century was more an art than a science. The outcome of any construction project depended as much on the skill and experience of the shipwrights and the availability of materials as on the wishes of the owner or designer. One ship captain complained that "some ships start in the yards as small ones and end as large ones, while others start as large ones and end up small."[18] Ships were seldom built according to plan, and no two ships ever came out looking exactly alike. In Alvarado's first fleet, one ship was a huge three hundred toneles, while the others were only half that size or less.[19]

Ships were seldom built according to plan, and no two ships ever came out looking exactly alike.

Building a Fleet

In order for Cabrillo to carry out his plans to build a new fleet, Indian *cuadrillas,* or work parties, were pressed into service, providing timber, iron, sails, cable, tar and pitch, and huge quantities of food for the shipwrights and those Africans and Indians engaged in producing raw materials.[20] It was difficult to keep the work running smoothly. Mayordomo (foreman) Alvaro de Paz found it to be nearly a full-time job locating and shipping the materials Cabrillo ordered for the project. Much of the timber was close at hand, but other supplies had to be brought from the interior provinces. Native workers were used to cut and trim timber, make pitch and rope, and work long hours to build the ships and galleys.[21]

Of the thirteen ships that eventually made up the armada, only a few actually belonged to Alvarado. Several of the vessels were owned by other Spaniards who hoped to make money carrying supplies for the expedition and selling trade goods up and down the coast. Cabrillo had built and owned his own vessel, named *San Salvador,* but usually called *Juan Rodríguez.*[22] There is abundant evidence that sixteenth-century ships flew the banners and ensigns of their owners and their religious patrons. Cabrillo's new ship "flew the banner of an *almirante* from the fore-topmast as *almirantes* of the sea are accustomed to do."[23] The vessel also flew the arms of Alvarado and later those of Viceroy Mendoza. The religious banner probably showed a crucifix and perhaps the words San Salvador.[24]

When Alvarado returned from a trip to Spain in 1539, he brought with him a royal commission as well as huge supplies of sails, rigging, ironwork, anchors and other materials for the fleet. These were landed at Puerto de Caballos on the Atlantic coast, and thousands of Indians were forced to build a road and carry supplies overland from the Atlantic to the Pacific. On his way home Alvarado stopped in San Salvador and reported to the historian Oviedo that he had built seven or eight ships on the Mar del Sur for a trip to the Spice Islands."[25] The entire fleet eventually consisted of thirteen vessels, of which seven or eight were built by Cabrillo between 1536 and 1540.

Although information is lacking on the exact details of the rigging, there is additional evidence about the rigging of the *San Salvador.* Luis González, a pilot on one of Alvarado's vessels, later testified as follows: ***Johan Rᵉ Cabrillo went in his own ship which flew the banner of an almirante from its foretopmast . . . and this witness spoke with his pilot and knew it to be his ship.***[26] Various references taken together generally meant that each of the ships, large and small alike, was square rigged. The foremast was rigged with a topmast. The mainmast, therefore, had to have a similar rig, and there must also have been a mizzenmast, perhaps with a lateen rig.[27] The two-hundred ton *San Salvador* was therefore the *almiranta,* and then designated by the viceroy and probably by Alvarado as flagship of the armada that was to go up the Pacific Coast.[28] Later it would be *La Capitana* because it was commanded by Cabrillo as Captain General.

Before the new armada left to sail up the coast of New Spain, Cabrillo took the *San Salvador* on a trading voyage to Peru. Depending upon the cargo that the ship carried, which may have included valuable horses, Cabrillo could have earned enough to offset the cost of building the ship, which amounted to four thousand *ducados.*[29] The trip to Peru also gave Cabrillo a chance to train his crew and prepare himself for a longer voyage of exploration to the north.[30]

When the new fleet was ready to sail from Acajutla, Alvarado and Mendoza agreed that a new harbor was needed to serve as home port for the fleet. Consequently, they sent Cabrillo to look for a new site, and within a week or two, he discovered a fine port.[31] For a few days the place remained nameless, being called simply "the port of Colima." Finally, Viceroy Mendoza landed there with his own vessels on December 25, 1540, so the port was called Navidad in honor of the Nativity of Our Lord.[32]



Noted are place names and locations that can be used as visual references for Cabrillo's Voyage of 1542-1543. Many of the place names, however, were changed by the seventeenth-century Spanish explorer Sebastián Vizcaíno. Miscalculations in latitude also created confusion for historians and geographers trying to align historical and modern place names and locations.

From An Account of the Voyage of Juan Rodríguez Cabrillo *(San Diego, Cabrillo National Monument Foundation)*

A Change in Plans

Once there, plans for the destination of the armada were changed. Construction of Alvarado's fleet had proceeded slowly as tools were scarce and Cabrillo, as master shipwright, insisted upon high standards of quality. When the thirteen ships were finally completed in 1540, Alvarado asked Cabrillo to join the expedition in his own *San Salvador* as admiral of the entire fleet.

By this time, however, Viceroy Mendoza and Pedro Alvarado had entered into a partnership, agreeing to share profits from the viceroy's overland expeditions and Alvarado's own expeditions to the Spice

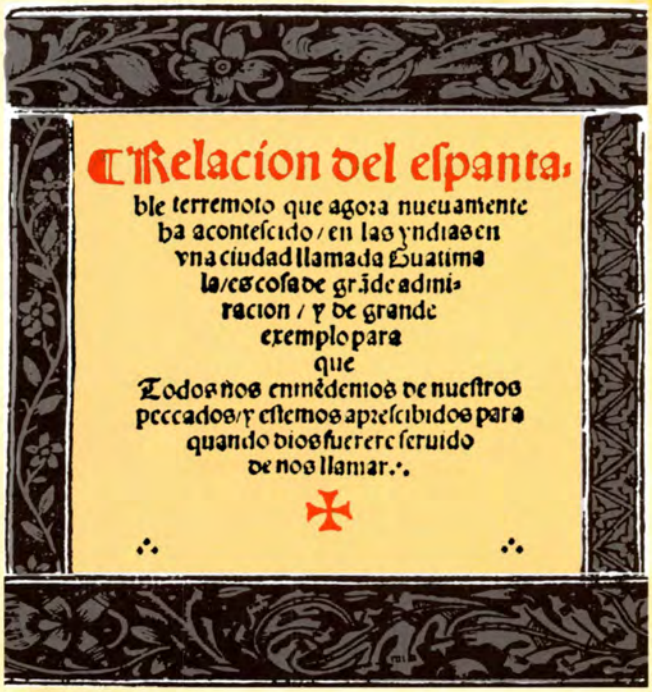
When the thirteen ships were finally completed in 1540, Alvarado asked Cabrillo to join the expedition in his own San Salvador as admiral of the entire fleet.

Islands. They planned to divide the fleet into two parts, one to investigate islands as far west as the East Indies, and the other to explore the North American Pacific coast, "until its end and secret were sighted." Just before departure, however, Alvarado left Cabrillo in charge of his ships while he helped the viceroy put down an Indian uprising known as the Mixton War. This battle, in 1541, ironically cost Alvarado his life—he was crushed to death under a falling horse.[33]

The untimely death of Alvarado created new problems and delays. Cabrillo returned to Guatemala, taking some of the ships with him. On the morning of September 11, 1541, only a few days after he had arrived, a devastating earthquake hit Santiago. Rain had drenched the land for days, and the earthquake sent tons of mud streaming down the side of a volcano overlooking the town. Cabrillo hurried to Santiago from Acajutla to find his home destroyed but his family unharmed. He spent the next several months building a home in the new capital, now called Antigua, and getting his family settled in their new surroundings. Cabrillo later wrote an account of the earthquake and the damage it had caused, signing it as Juan Rodríguez, *Escribano* (Notary Public).[34]

In the meantime, Viceroy Mendoza took possession of Alvarado's fleet and, showing high regard for Cabrillo, commissioned the Guatemalan captain general to continue the voyage northward along the Pacific Coast in search of the Strait of Anián. His fleet would consist of his own *San Salvador*, a galleon of about 125 by 25 feet, and *La Victoria*, a cargo ship of about 80 feet in length. The *San Miguel*, a small 30-foot vessel (*fragata*) suited for coastal duties, seems also to have been destined to accompany the expedition.

Cabrillo's expedition did not set sail from the Port of Navidad until June 27, 1542, with two and probably three of the vessels of Alvarado's former fleet


Relacion del espanta-
ble terremoto que agora nueuamente
ha acontescido / en las yndias en
vna ciudad llamada Guatima
la / es cosa de grãde admi-
racion / y de grande
exemplo para
que
Todos nos enmẽdemos de nuestros
peccados / y estemos apresçibidos para
quando dios fuere seruido
de nos llamar.

On 11 September 1541, the city of Santiago was devastated by an earthquake. A report of the earthquake was written by "Juan Rodríguez, Escribano." The earliest secular publication known to have been published in the New World was called *Relacíon del espantable terremoto que agora nuevamente acontecído en las yndias en una ciudad llamada Guatimala.*

From the Real Biblioteca de San Lorenzo de El Escorial, Spain

to explore the remote, uncharted areas of the North Pacific. The remaining vessels were dispatched to the Philippines under the viceroy's cousin Ruy López de Villalobos.[35] Cabrillo's goal, one that had inspired Cortés before him, was to find the Northwest Passage and a shortcut to Oriental riches. The potential rewards propelled Cabrillo and his fellow adventurers into unknown waters farther to the north than any yet sailed by European ships.

Sources for the Name of California

The *San Salvador* and *La Victoria* cruised northward along the west coast of Mexico, crossed the Sea of Cortés, and proceeded up the Pacific side of what Cabrillo knew as the California peninsula. The name California was already in use by 1542, but its first application, and by whom, remains a mystery.



Distinguished maritime artist, historian, and illustrator, Gordon Miller envisions Cabrillo's small fleet rounding the headland and sailing into the bay on September 28, 1542. In his second painting of *San Salvador, La Victoria* and the smaller fragata, *San Miguel*, Miller refines some of his earlier details of *San Salvador* presented in his richly illustrated book, *Voyages To The New World and Beyond*.

It came into existence about the time of Ulloa's expedition of 1539, but the exact time and, indeed, the exact reason for its appearance are still speculative. Most likely, the name was taken from the fictitious island of California featured by García Ordóñez de Montalvo in his novel *Las Sergas de Esplandián* published in 1508, which featured the beautiful Queen Calafia who ruled over her Island of California where Amazon women carried weapons made only of gold.[36]

The name California has also been attributed to other possible origins. It may have been a combination or derivation of Spanish or other European words. *Cálida* meaning hot or *cal* meaning limestone, may have been joined with *forno* (an old Castilian or Catalan form of *horno*) meaning oven, because the burning, desert lands of the peninsula resembled a hot oven, or the abundance of limestone suggested a lime-kiln. Further possibilities are *kalifon*, Hispano-Arabic for large province; *Calafia* a female form of Caliph; *cala* (Spanish for cove) and *fornix* (Latin for vault or arch); and finally, the name may have been chosen "because an Irishman, who was traveling, said that the island

Spain's first visitors to San Diego, called "Guacamal" by the natives, set a precedent of friendly treatment that was followed with few exceptions during the entire Spanish occupation of the territory.

looked like the one where Calpurnius (Califurnio), the father of Saint Patrick was born." [37] Until more definite proof of the word's origin is found, all these choices have merit. Nevertheless, the name selected by Ordoñez for his island of Amazons located very near the Garden of Eden still holds the most widespread support.

Cabrillo's ships entered the Bay of Ensenada, Baja California, on September 17, 1542. The expedition remained in port five days and then continued on, covering from fifteen to twenty miles daily. Within three days they sighted the three Coronado Islands, called by Cabrillo *Las Islas Desiertas* (Deserted Islands) and placed at 34 degrees latitude (about 2 degrees too far north). From these waters the Spanish seamen noticed the smoke of coastal Indian fires and, as they approached the mainland, saw a promising green valley backed by high mountains. On September 28, 1542, the feast day of San Miguel, Cabrillo headed the *San Salvador* and *La Victoria* into San Diego Bay, dropped anchor on the lee side of Point Loma, and formally discovered Alta (Upper) California—as distinguished from Baja (Lower) California.[38]

Cabrillo's San Miguel

The Spaniards stepped ashore and were greeted by friendly Indians whom Cabrillo described as "well built" and clothed in animal skins. The admiral bestowed the name of San Miguel Arcángel (St. Michael Archangel) upon his newly discovered "closed and very good port," but it was changed sixty years later by Sebastián Vizcaíno, the Spanish navigator who chose to honor San Diego de Alcalá instead. Canonized as St. Didacus in 1588, Franciscan Brother Diego's name had become popular in naming ships, forts, and ports during the early seventeenth century. Vizcaíno entered the bay in his flagship *San Diego* on November 12, 1602, the feast day of San Diego de Alcalá.[39]

Three Indians timidly approached Cabrillo's ship, indicating by signs that they knew of other similarly dressed white men, carrying crossbows and swords, traveling far inland. Cabrillo understood from their gestures that these strangers (probably a detachment from Coronado's expedition) wielded lances from horseback and had killed many Indians. For this reason the California natives were afraid, but the Spaniards gave them presents and calmed their fears. When Indians wounded three seamen on a night fishing party near the shore, Cabrillo ordered his crew not to fire on them but to win their confidence. Spain's first visitors to San Diego, called "Guacamal" by the natives, set a precedent of friendly treatment that was followed with few exceptions during the entire Spanish occupation of the territory.[40]

Sailing from San Diego after six days' rest, the expedition sighted the Channel Islands of San Clemente and Santa Catalina. Since the harbor at San Miguel had inadvertently been given the name of the smallest ship in the fleet, these two islands were named La Victoria and San Salvador, after the other two ships.

Off Catalina the Spaniards saw numerous Indians dancing and shouting on the shore, making signs for them to land and sending a canoe to approach the ships. When the sailors went ashore, some of the women ran away, though they quickly returned. After this, as the report has it, "They felt very secure, the Spaniards, the Indian women, and everyone.[41] Though Cabrillo named the Island San Salvador and took formal possession in the name of the king, the men of the fleet called the place Isla Capitana or Juan Rodríguez.[42]



The Voyage Continues

The ships then headed toward the mainland and Cabrillo sighted the bay of San Pedro (his "Bay of Smokes"); they continued a course along the coast and visited the Indian fishing village that Cabrillo called ***Pueblo de Canoas***. Despite winter storms and adverse winds, they reached an area near San Francisco Bay by mid-November. After exploring the coast and islands, Cabrillo returned southward and by Thursday, November 23, 1542, reached the ***Islas de San Lucas, at one of those called Posesión.*** This was no doubt the one now called San Miguel, where there is a small harbor (Cuyler's Harbor) with a narrow entrance. The fragata *San Miguel* was leaking badly so the sailors on board hauled the small vessel ashore and began to repair the damage. Because the small harbor opens to the north, and the heavy swells that accompany the prevailing northwest winds at that time made it a treacherous anchorage, the two other ships probably did not remain long but sought shelter farther south.

The Catalina Connection

The island called ***Limu*** in the narrative is said to contain eight towns (though ten names are given). It is a close neighbor to the islands of Ciquimuymu (or ***La Posesión***) and Nicalque, probably Santa Cruz. Limu is the one now called Santa Catalina, the island that Lázaro de Cárdenas and Francisco de Vargas referred to as ***la isla Capitana***. They referred to it as the most important island discovered on the expedition and the headquarters for all the fleet. They indicated that Cabrillo brought his fleet back to San Salvador (Catalina), which was also called La Capitana since the *San Salvador* was the flagship. To further confuse the naming of the island, it was also "one of the islands called la posesión."[43]

Nevetherless, Santa Catalina was the logical place to spend the winter because the harbor was protected and the Spaniards had previously established good relations with the Indians. Unfortunately, the Indians were not happy to see their return and began a series of running battles with them. Vargas recalled that

all the time the armada was on the Isla Capitana the Indians there never stopped fighting us. Some time toward the end of December, Cabrillo sent a party ashore for water, and the Indians attacked. The soldiers, outnumbered, called out to the ship for help. Cabrillo himself decided to rescue them; he quickly gathered a relief party and rowed ashore in one of the launches. ***As he began to jump out of the boat,*** wrote Vargas, ***one foot struck a rocky ledge, and he splintered a shinbone.***

Later, in 1560, Cabrillo's son said that his father had a broken leg, while another narrative (that of Urdaneta) reported that he broke his arm close to the shoulder. It is possible that he broke both his arm and leg in the fall.[44]

Wherever the site of the injury, gangrene had severely complicated Cabrillo's injury by the end of December, finally causing the captain's death on January 3, 1543. The crew buried their leader on the barren, windswept island of La Posesión, also called La Capitana. ***Because he died here,*** wrote Cárdenas, ***the island retained the name Capitana,*** although some referred to it as the ***Isla de Juan Rodríguez.***[45]

Shifting winds and sands have covered all traces of the grave. An archaeological expedition on Catalina Island in 1894 uncovered some interesting possibilities. Other digs on San Miguel, Santa Rosa and elsewhere have revealed no evidence of Cabrillo's burial place. Cabrillo's final words reflected the spirit of the early Spanish explorers. He instructed his chief pilot, Bartolomé Ferrer, not to give up their projected reconnaissance of the northern coast. The two ships again sailed into the open sea and made their way northward against heavy gales. Finally, driven dangerously near the shore at a point somewhere near the Oregon boundary, they prayed for protection and were saved by a sudden change of wind. The expedition's journal describes few recognizable landmarks, making their exact course difficult to follow, but leaves no doubt about their courage in facing the perils of unknown waters.[46]

Cabrillo's crew, weakened from exposure and scurvy, responded gratefully to Ferrer's order to return home. Separated in storms, the crew on each ship feared that the others were lost, but they finally reunited off Cedros Island. They reached the port of Navidad on April 14, 1543, carrying with them the sad news of Cabrillo's death and the discouraging results of their discoveries. They had found no Strait of Anián, no fabulous Indian civilization, no weapons of gold from an island of Amazons—nothing to enrich or even excite the expectant viceroy of New Spain. And they had not reached the Spice Islands.[47] The three vessels were refitted in Navidad and sent to Peru...few of the men and none of the ships ever returned.[48]

Pasadena Daily Evening Star, September 13, 1894

CABRILLO'S BONES

Alleged Discovery of the Skeleton of the Spanish Adventurer



THE MYSTERIOUS SKELETON OF SANTA CATALINA.

For years an interesting dispute has been going on between Santa Barbara and Santa Catalina, Cal., as to which belonged the honor of furnishing the last resting place for the bones of Juan Cabrillo, the Spanish adventurer who discovered the island and harbor of Santa Catalina three hundred or so years ago.

A recent event, however, seems to throw the burden of proof on Santa Barbara. The matter has been kept secret for some time, says the San Francisco Examiner, but the facts are that a grave was found on the island of Santa Catalina that was so evidently that of some person of importance that the discoverer notified the owners of the island and the remains were taken out almost complete. The body was evidently buried with as much pomp as circumstance would permit. The head was laid to the north, and in it was a heap of shells beads, cut with great labor from the shells found on the beach, several beads of abalone being among them. Near by was a fine stone mortar and pestle, an Indian paint pot and various objects which it was customary to bury with the dead as a part of the ceremony. There was also an ax of Spanish design or shape, with the broad blade common 300 years ago; also a knife. These has been carefully wrapped in cloth which has long since disappeared, as had also the wooden handle, but the texture of the cloth was still to be seen on the ax. Near one of the hands was a round copper button, similar to those used by the Spanish gallants, and various articles common to the Spanish of long ago. From the care evidently taken at the burial it would appear that the deceased was a person of distinction.

It is believed by the advocates of the Cabrillo theory that the body was buried there by the crew of the vessel, and that the friendly natives, wishing to show their respect, deposited in the grave a number of objects according to their custom.

Notes

1 Vasco Núñez de Balboa crossed the Isthmus of Panama due south to discover the existence of the Pacific Ocean, which he named the Mar del Sur (South Sea) on 28 September 1513. Ferdinand Magellan, a Portuguese navigator sailing for Spain, commanded a fleet of five ships with 237 men on a voyage to circumnavigate the globe from 1519 to 1521. Only one ship, *La Victoria* commanded by a Spaniard, Juan Sebastián de Elcano, with 18 men returned to Spain. Magellan was killed by natives in the Philippines.

2 See Harry Kelsey, *Juan Rodríguez Cabrillo* (San Marino: The Huntington Library, 198) for a complete biography. James Nauman, ed., *An Account of the Voyage of Juan Rodríguez Cabrillo* (San Diego: Cabrillo National Monument Foundation, 1999) summarizes Kelsey's work and adds a number of illustrations in color. Herbert E. Bolton, *Spanish Exploration in the Southwest, 1542-1706* (New York: Charles Scribner's Sons, 1916), 80-86, includes an English translation of a summary account.

3 Cabrillo's birth place is known to be (present-day) Palma del Río, Spain.

4 Sworn testimony of Gerónimo Cabrillo de Aldana, 4 December 1617, stating "My paternal grandfather, Juan Rodríguez Cabrillo, came to the New World from the Kingdoms of Spain in company with Pánfilo de Narvaez," AGI, *Patronato* 87, folio 36v.

5 Antonio de Herrera y Tordesillas, *Historia General de los hechos de los Castellanos en las Islas y Tierra Firme del Mar Oceano.* 4 volumes. (Madrid: Imprenta Real, 1601-1615), Chapter 3, Book One, pp. 112-113. Also *Descripción de las Indias Occidentales* (Madrid: Nicolás Rodríguez Franco, 1730), decada 7, libro 5, capitulo 3, p. 89. The reference reads: "…. Named as Captain of those [two ships was] Juan Rodríguez Cabrillo Portugues, a person well informed about the characteristics of the sea." Correa, who was a Portuguese mariner, but not so noted, may have commanded the brigantine *San Miguel* since its crew was headed by a master. Bartolomé Ferrer was from the Levantine (eastern) coast of Spain and as Chief Pilot was second in command.

6 After Cortés had been commissioned to lead an expedition to follow up the previous voyage of Juan de Grijalva along the Yucatan peninsula by Velázquez, the Cuban governor became suspicious of Cortés's motives given the number of ships and men that he had hired. Believing that Cortés might not return, Velázquez issued an order of arrest and attempted to detain him in Santiago, but Cortés left anyway.

7 Bernal Díaz del Castillo, *Historia Verdadera de la conquista de la Nueva España* (Madrid, 1632); reprinted 3 vols. (Mexico, D.F.; Pedro Robredo, 1939).

8 Kelsey, *Juan Rodríguez Cabrillo,* pp. 62-63. No birth records exist, but there are several legal documents in the Archivo General de Indias, *Justicia,* that give evidence of this information.

9 See Maurice G. Holmes, *From New Spain to California by Sea:* 1519-1668 (Glendale: Arthur H. Clark Co., 1963) and W. Michael Mathes, *The Conquistador in California:* 1535: *The Voyage of Fernando Cortés in Baja California in Chronicles and Documents* (Los Angeles: Dawson's Book Shop), 1973.

10 Holmes, *From New Spain to California by Sea,* 83.

11 See Dora Beale Polk, *The Island of California* (Spokane: Arthur H. Clark Co., 1991), 155.

12 The myth persisted to the degree that Ferdinand VI of Spain issued a Royal Decree in 1747 proclaiming: "California is not an Island." See Polk, *Island of California,* 326.

13 See Lesley Byrd Simpson, ed. and trans., *Cortés: The Life of the Conqueror by His Secretary Francisco López de Gómara* (Berkeley: University of California Press, 1964).

14 Pedro de Castañeda, *The Journey of Coronado.* Translated with an introduction by Donald C. Cutter (Golden, CO: Fulcrum Publishing, 1990); Herbert E. Bolton, *Coronado on the Turquoise Trail: Knight of Pueblos and Plains* (Albuquerque: University of New Mexico Press, 1949).

15 Letter from Diego García de Palacio to the King, 8 March 1576, in E.G. Squier, *Collection of Rare and Original Documents and Relations concerning the Discovery and Conquest of America* (New York: Charles B. Norton, 1860), 32, 107.

16 There seems to be some uncertainty about the location of Girabaltique. Henry Raup Wagner in *Spanish Voyages to the Northwest Coast of America in the Sixteenth Century* (San Francisco: California Historical Society, 1929), 571, thought it was another name for the port of Acajutla, but Iztapa is probably a better guess.

17 Squier, *Rare Documents,* 38-40, 108; Juan Rodríguez, statement made ca August 1541, AGI, Justicia 280, fol. 25.

18 Juan Escalante de Mendoza, "Itinerario de navegación de los mares y tierras occidentales," MS in the Biblioteca Nacional, Madrid, fol. 36. The author lived in Guatemala and Honduras and wrote his manuscript in 1575.

19 Alvarado to the King, 1 September 1532, reprinted in *Libro Viejo,* 282-83. There is some question about his use of *tonel,* which he seems to interchange with *tonelada.* A *tonel* is equivalent to 2 pipas or casks, each holding about 125 gallons.

20 Antonio de Remesal, *Historia general de las Indias Occidentales y particular de la gobernación de Chiapa y Guatemala.* Edited by Carmelo Saenz de Santa Maria (Madrid: Ediciones Atlas, 1964): 201, 245-46; Alvarado to the Real Consejo, 20 November 1535, in *Colección de documentos,* ser. 1, vol. 24, p. 241.

21 Alvaro de Paz, testimony given 15 December 1563, AGI, *Justicia* 290, fol. 81v, 20 May 1559; AGI, *Patronato* 62, fol. 3-3v; letter from the Indians to the King, 15 March 1547, AGI, Guatemala, 52.

22 Testimony given in August 1541, AGI, *Justicia* 280, fol. 25v. In addition to their religious names, Spanish ships were commonly called by the names of their owners or masters. In Alvarado's fleet, the *Diosdado* was owned by Antonio Diosdado and the *Figueroa* by Santos de Figueroa, etc.

23 Diaz del Castillo, *Historia verdadera,* chap. 149, p. 330.

24 Kelsey, *Juan Rodriguez Cabrillo,* 69-70; Testimony of Luis González, 28 April 1560. AGI, *Justicia* 290, fol. 63v.

25 The fleet is described by Gonzalo Fernández de Oviedo in his *Historia general y natural de las Indias, isles y Tierra Firme del Mar Oceano* (Madrid: Imprenta de la Real Academia de la Historia, 1853), 4:20, 23, and by Alvarado in his letter to the King, 28 March 1541, *Colección de documentos,* ser. 2, vol. 2, pp. 1-3. Alvaro de Paz, mayordomo for Alvarado, also confirmed the number. See his testimony of 20 May 1559, AGI, Patronato 62, fol. 3v.

26 Testimony of Luis González, 20 April 1560, AGI, *Justicia* 290, fol. 63v.

27 See Bjorn Landstrom, *The Ship: An Illustrated History* (Garden City, N.Y.: Doubleday & Co., 1961), pp. 112-113.

28 Testimony of Luis González, 20 April 1560, AGI, *Justicia* 290, fol. 63v.; statement by Juan Rodríguez Cabrillo, ca. August 1541, AGI *Justicia* 280, fol. 25-26.

29 A *ducado* in 1500 was worth about $4.00 according to a study made in 1941 by J. Villasana Haggard, author of the *Handbook for Translators of Spanish Historical Documents* (Austin: University of Texas, 1941). It is extremely difficult to place a value on Spanish gold coins of previous centuries because of the variables depending on new discoveries made from time to time.

30 Testimony of Ginovés (Gines) de Mafra, 2 September 1540, AGI, Justicia 280, fol. 25-30; Testimony of Juan Rodríguez Cabrillo, August 1540, AGI, Justicia 280, fol. 25v.-16.

31 Kelsey, *Juan Rodríguez Cabrillo*, 83-113

32 Arthur S. Aiton, *Antonio de Mendoza: First Viceroy of New Spain* (Durham, NC: Duke University Press), 146, note 19.

33 Iris H.W. Engstrand, "Seekers of the Northern Mystery," in Ramon Gutierrez and Richard Orsi, eds., *Contested Eden* (Berkeley and Los Angeles: University of California Press, 1998), p. 83.

34 Nearly half of the residents of the city of Santiago were killed including the governor, Alvarado's family, and 600 Indians. The account written in 1541 by Juan Rodríguez is called *Relación del espantable terremoto que agora nuevamente acontecido en las Indias en una ciudad llamada Guatimala.* Facsimile reprint in Ramón Menéndez Pidal, ed., *Colección de incunables Americanos*, 1: no page numbers. See Kelsey, *Juan Rodríguez Cabrillo*, 90-91. Most authorities attribute the *Relación* to Cabrillo since there was no one else in the city named Juan Rodríguez.

35 Ruy López de Villalobos commanded a fleet of six ships, including the *Santiago* as the flagship, and headed for the Philippines on 25 October 1542. After extensive exploration of the area and having named several islands *Las Islas Felipinas* (The Philippine Islands) for Philip II of Spain, López de Villalobos and his men were driven out by hostile natives. They fled to the Moluccas but were imprisoned by the Portuguese. López de Villalobos died in a prison cell on 4 April 1544, although more than one hundred crew members survived and were sent to Lisbon. Some thirty, including Ginés de Mafra who produced a manuscript on Magellan's circumnavigation, chose to remain. It was published in 1920.

36 The volume written by García Ordoñez de Montalvo, called *Las Sergas de Esplandián* or *The Deeds of Esplandián* was a fifth volume in the popular stories of chivalry in a series about Esplandián's "father" Amadis of Gaul. Ordoñez edited the first edition of *Amadis of Gaul* under the name Garci Rodríguez de Montalvo. In later editions he used Ordoñez. *Las Sergas de Esplandián* was published by Jacob Cromberger in Sevilla between 1508 and 1510 and was widely read by seafaring mariners.



37 Donald Cutter, "Sources of the Name California," *Arizona and the West*, (1961): 233-244.

38 Cabrillo's original log or journal has not been found. See note 42.

39 Herbert E. Bolton, ed., "Diary of Antonio de la Ascensión," *Spanish Exploration in the Southwest:* 1542-1706; W. Michael Mathes, *Vizcaíno and Spanish Expansion in the Pacific Ocean:* 1580-1630 (San Francisco: California Historical Society, 1968). Kelsey, *Juan Rodríguez Cabrillo*, 144, reports that Guacamal was the name the Indians gave to the Spaniards.

40 Herbert E. Bolton, ed., "A Summary Account of Juan Rodríguez Cabrillo's Voyage," *Spanish Exploration in the Southwest:* 1542-1706, 23.

41 Ibid., 24.

42 AGI, Patronato 290, fols, 68-72v. Kelsey, *Juan Rodríguez Cabrillo*, 150, 228.

43 One of the islands called Limu in the narrative of Lazaro de Cardenas and Francisco de Vargas is the one now called Santa Catalina.

44 Ibid., 25. Kelsey, *Juan Rodríguez Cabrillo*, 158. Geaves Kenny, a yachtsman with many years' experience sailing and anchoring in the Channel Islands believes that a skillful navigator/captain who had spent several months in the Channel Islands would not have chosen to spend December and January on San Miguel, but would have returned to a protected harbor on the lee side of Catalina, most likely at the Isthmus. Personal interview, 20 August 2008.

45 There have been attempts to locate any archaeological evidence of Cabrillo's burial place on Catalina, San Miguel, Santa Rosa and perhaps other islands, but so far no remains have turned up.

46 The lack of information because of Cabrillo's missing journal is explained by Kelsey, *Juan Rodríguez Cabrillo*, pp. 112-115. The first summary account was prepared in 1543, and contains only eight folio pages. For an analysis of authorship of this "log" see *ibid.*, 168-70.

47 Details of the journey have been taken from several accounts of the voyage compiled after 1543. Possible authors include Juan León (1543) and Andrés Urdaneta.

48 Kelsey, *Juan Rodríguez Cabrillo*, 161, 163.

Juan Rodríguez Cabrillo in the Age of Exploration

1488 Bartholomew Diaz of Portugal reaches the Cape of Good Hope, calls it the Cape of Storms, and turns back.

1492 Castilian conquest of Granada completes the *reconquista* of formerly Muslim Iberia by Christian states. Muslims are placed under Castilian control and Jews are expelled from Spain.

1492 Christopher Columbus, sailing for Spain, makes landfall in the Bahamas.



1493 Pope Alexander VI divides the New World between Spain and Portugal by the Papal Bull *Inter Caetera.*

1494 La Isabela, first permanent European settlement still extant, is founded by Columbus on the island of Hispaniola.

1494 Treaty of Tordesillas gives Portugal exclusive rights to explore south and eastward of Iberia and Spain exclusive rights to explore westward. A Line of Demarcation is drawn around the world to separate the Spanish and Portuguese spheres.

1497 First of three major exploration voyages under Vasco da Gama—he sails to India via the Cape of Good Hope, opening the trade route to the Portuguese.

1498 Columbus discovers the coast of South America on his third voyage.

1499 Italian navigator Amerigo Vespucci explores northeastern coastline of South America.

1500 Pedro Alvares de Cabral lands and takes possession of Brazil for the Portuguese as the part of South America lying east of the line of demarcation. Cabral sails around Africa, discovers Madagascar and continues to India.

ca 1501-1535 For more than 30 years the Casa da India (one of several in a line of Portuguese organizations since the 1400s that managed Portuguese trade in overseas goods) maintained a royal monopoly on the spice trade.

1503 The Casa de Contratación, Spanish counterpart to the Casa da India, collected all taxes and duties, approved all voyages of exploration and trade, maintained all information regarding trade routes and new discoveries, issued passports, licensed captains and administered commercial law. As such, the Casa de Contratación managed the *Padrón Real* (for which there was a Portuguese counterpart, the *Padrão Real).* The official master Spanish chart was used as a template for the charts present on all Spanish ships during the 1500s. It was highly classified and no version of the original has ever been recovered.

1505 Portuguese first visit Ceylon.

1507 Cartographer Martin Waldesmüller produces a world map naming the newly discovered lands "America" after Amerigo Vespucci.

1507 Portuguese led by Alfonso de Albuquerque invaded the Strait of Hormuz (between Persian Gulf & Gulf of Oman).

1508 Vespucci appointed "chief of navigation" and trains new navigators for ocean voyages under the Casa de Contratación.

1508 Garcia Ordóñez de Montalvo—in his novel *Las Sergas de Esplandián* featured the beautiful Queen Calafia who ruled over her Island of "California" where Amazon women carried weapons made of gold.

1509 In the Battle of Diu, the Portuguese armada under Almeida defeats the Egyptian fleet and captures their vessels, solidifying a Portuguese stronghold on the Indian Ocean trade route.

1510 Albuquerque establishes a permanent Portuguese colony at Goa on the Indian continent.

1511 Portuguese capture the Straits of Malacca.

1511 Diego de Velásquez establishes a Spanish settlement in Cuba and begins the conquest of the island.

1513 Vasco Núñez de Balboa leads the first European expedition across the Isthmus of Panama—first European to glimpse what he calls the Mar del Sur, later named the "Pacific" Ocean by Magellan.

1519-1521 Governor Velázquez of Cuba dispatches Hernán Cortés on a reconnaissance mission to mainland Mexico. Cortés' army defeats the Aztecs and claims the territory as New Spain with its capital at Mexico City.



Juan Rodríguez Cabrillo in the Age of Exploration

1519-1522 Ferdinand Magellan leads a Spanish expedition to circumnavigate the globe. He is killed in the Philippines and the surviving 18 men out of 237 complete the journey in *La Victoria* under Juan Sebastián de Elcano.

1522 Knights of St John's stronghold in Rhodes captured by the Ottomans under Suleiman the Magnificent.

1522 Portuguese establish themselves in the Moluccas at Ternate and Tidore—the fabled "Spice Islands".

1523 Juan Rodríguez Villafuerte founds Acapulco which later becomes the eastern port of the Manila galleons.

1524 García Jofre de Loaísa's ill-fated expedition ventures as far as the Moluccas (Spice islands).

1527 Cortés funds voyage led by Álvaro de Saavedra to find Loaísa—both voyages fail to find a route back across the Pacific.

1530s-1540s The principal mapmakers in the Casa de Contratación continue work on the *Padrón Real;* they include Alfonso de Santa Cruz, Sebastian Cabot and Pedro de Medina.

1532 Francisco Pizarro begins the Spanish conquest of Peru.

1535 Portuguese begin to establish themselves in Macau.

1533-34 Cortés sends ships under Fortun Jiménez across the gulf to Baja California.

1535 Antonio de Mendoza becomes viceroy of New Spain. Cortés crosses Gulf of California to enter the Bay of Santa Cruz (La Paz) claiming Baja California for Carlos V.

1533-34 Cortés sends ships under Fortun Jiménez across the gulf to Baja California.

1539 Under the commission of Cortés, the Spanish explorer Francisco de Ulloa voyages north along the west coast of Mexico. Upon reaching the head of the Gulf of California, he names it the "Red Sea of Cortés." He would eventually sail around the tip of Baja California, sailing as far north as Isla de Cedros, recognizing Baja California as a peninsula.

1541 Francisco Vásquez de Coronado explores the upper part of the Sea of Cortés and lower Colorado River, continuing through the Southwest as far as present-day Kansas.

1542 Cabrillo's fleet reaches the Port of Navidad, but Alvarado is killed fighting in the Mixton War. The viceroy sends Ruy López de Villalobos across the Pacific to establish a Spanish foothold in the East Indies. He is captured by the Portuguese and dies in prison.



1542 Juan Rodríguez Cabrillo, sailing for Spain, commands the first European fleet to sail along the West Coast and to the Channel Islands, reaching as far north as Point Reyes in Northern California.



1543 Copernicus postulates sun-centered universe in his book *De Revolutionibus.*

1543 Three Portuguese sailors arrive in Japan.

1545 Pedro de Medina publishes *Arte de navegar.*

1546 Flemish geographer Mercator describes Earth's magnetic poles and in 1569 uses a projection in which one could lay out a line of constant bearing between any two points and sail it as a course.

1565 Spanish settlement established in Florida at San Agustin.

1565 Andrés de Urdaneta, having sailed on the Loaísa expedition, accompanies Miguel López de Legazpi who sets out to conquer the Philippines. Urdaneta discovers the return route across the Pacific along the Japanese current.

1571 López de Legazpi founds Manila in the Philippines for Spain. Manila becomes the Spanish headquarters in the Far East.

1571-1815 Manila galleon trade spans the Pacific and completes Spain's long sought westward link to China.

1571 Battle of Lepanto—The Holy League, a coalition of the Republic of Venice, the Papacy, Spain, the Republic of Genoa, the Duchy of Savoy, the Knights Hospitalers and others, decisively defeat the main fleet of Ottoman war galleys. This turning point protected Rome from invasion and prevented the Ottomans from advancing into Europe, signaling the end of Turkish supremacy in the Mediterranean.

1572 First printed in 1572, *Os Lusíadas,* a Portuguese epic poem by Luís Vas de Camões, offers fantastic (in the Homeric sense) interpretations of the discovery voyages of the 15th and 16th centuries. Central to the epic nature of the poem is Vasco da Gama's narration of the history of Portugal.

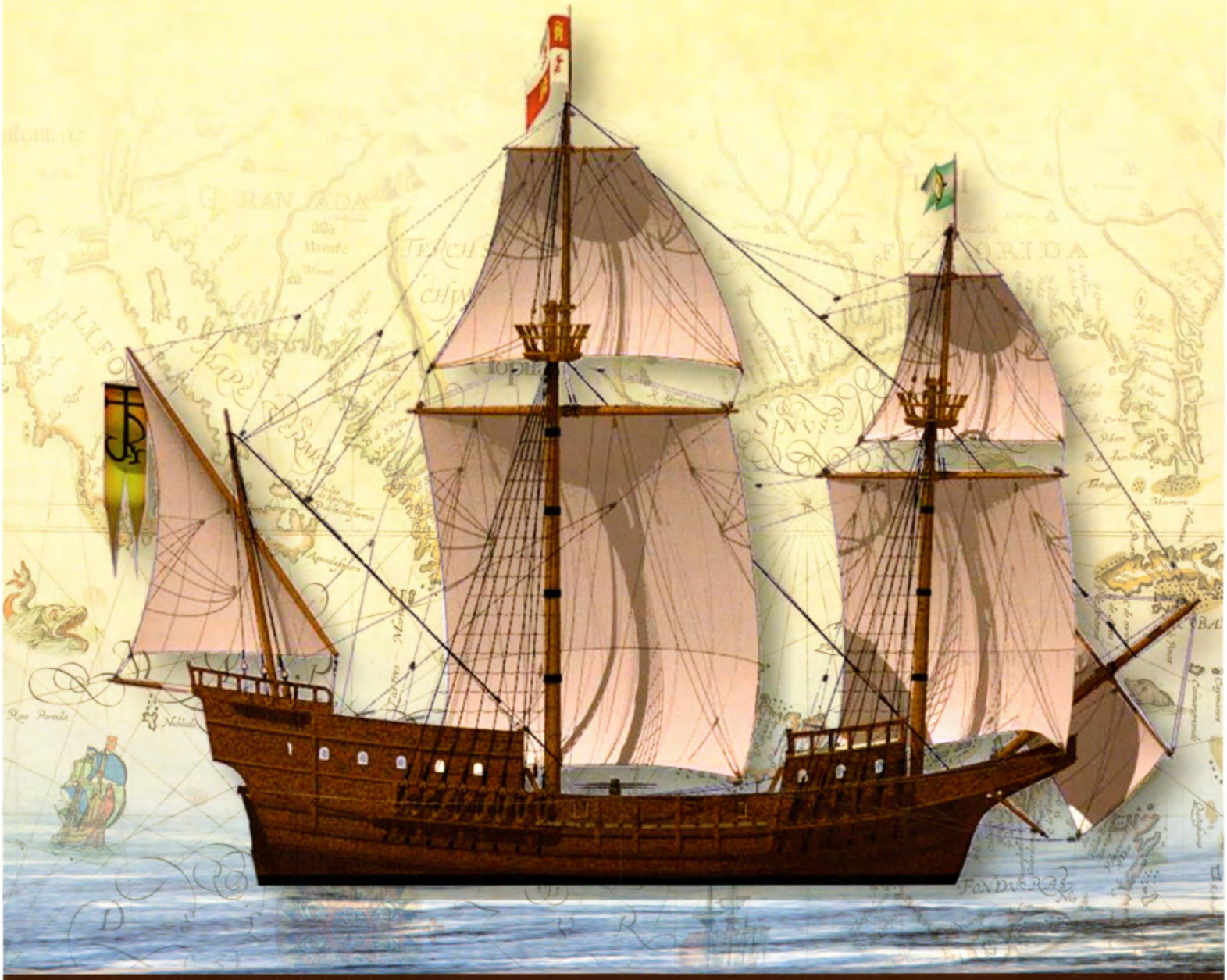
1577-1580 Francis Drake, sailing for England, circumnavigates the globe. Anchoring somewhere on the west coast of North America, he claims land he calls Nova Albion, north of San Francisco, for England.

1580-1640 Portugal and Spain are united under Philip II of the Spanish Hapsburgs, but their empires are administered separately.

ENVISIONING THE SHIP

The Beginning of a Journey

By Douglas Sharp, *San Salvador's* Naval Architect



Naval Architect Douglas Sharp designed the sixteenth-century galleon *San Salvador*, and has worked closely on every phase of the building process. Having grown up sailing in San Diego, Sharp has raced locally and offshore for many years. He graduated from UC Berkeley in 1977 with an MS in Engineering/Naval Architecture. He has been involved with yacht design and engineering since 1973, and he has been president of the Sharp Design Group of Yacht Design and Engineering companies since 1985. Aside from his international business obligations, Sharp found the time to design and assist in the building of *San Salvador*, while maintaining a position on the Maritime Museum of San Diego's Board of Directors. For his research, design and extraordinary skills in bringing the sixteenth-century Spanish galleon into the twenty-first century world, Sharp was knighted by the King of Spain and presented with the much revered *Decoracíon de la cruz de Oficial de la Orden de Isabel la Católica* by the Ambassador of Spain to the United States, His Excellency Ramón Gil-Casares.

September 2007

I have a phone message from Dr. Ray Ashley, President of the Maritime Museum of San Diego. He wants to discuss a "little something" with me: "The Museum is contemplating building a ship to add to our collection of historic vessels and we want it to be a community project, built in San Diego with our own resources. The ship is to be as accurate a representation of Juan Rodríguez Cabrillo's *San Salvador* as can be envisioned and will be used to form the beginning point of the story of exploration of the Pacific that our fleet represents. There are no extant plans, no detailed descriptions nor known depictions; we have a vague notion of type and dimensions, and the ship will need to be certified to carry passengers for hire when it goes into service... think you want to participate?"

So started my involvement with the project to build the Spanish galleon *San Salvador*—the start of an incredible journey. What originally was just going to be a wee bit of consulting to help with the Coast Guard certification part of the project soon turned into a journey emotionally and educationally (fortunately not physically), akin to the voyages of discovery of the original ship and the ships along the same developmental line that preceded and followed her. This wonderful journey that started with just the barest understanding of what I and the Museum were going to take on with this project—virtually from scratch—expanded through time and space to include all of the training and disciplines of project organization, design, naval architecture, and small craft construction that I could bring to the process, as well as newly acquired interests for me and our design/construction team in researching the historical background and development of Spanish ship design lineages and construction techniques, development of significant ship features resulting from usage and experience in their times, and myriad period details. Along the way our team had a large dose, by necessity, of development of shipyard management techniques, professional and volunteer labor management, construction financing and fundraising skills—all thrown in just for good measure. All of my and the team's journey in this odyssey of a construction project, from a blank sheet of paper and an empty parking lot to a fully functioning representation of a sixteenth-century Spanish galleon, is encapsulated in the answers to these often asked and deceptively simple questions: How was this specific ship brought to life from the first inception of the idea to build her, how do the particulars of her appearance, size and details justify the representational claim and how did the Museum in its collective wild imaginings ever think it could pull off such a project?

There are no extant plans, no detailed descriptions nor known depictions; we have a vague notion of type and dimensions, and the ship will need to be certified to carry passengers for hire when it goes into service...think you want to participate?

The project kicked off in early 2009 with a gathering at the Museum of the panel and other interested parties with relevant opinions and an intensive two-day review of sources of information and knowledge surrounding the origins of the ship and the historical background of Cabrillo's life and final voyage.

A Story to be Told

It has been said that every picture tells a story. We, particularly mariners, all like to tell stories. But in the desire to tell a specific story with vivid detail and bring it to functional life, how better than with a physical representation, a tangible object that is in nature and scope sufficient by itself to portray essential elements of the story? A representative object so arranged as to elicit an immediate emotional response stimulating both curiosity and imagination and the desire for more information. A representative object that would form a platform from which further exploration and expansion of the narrative could be launched and at the same time incorporate the story existing before and leading up to the materialization of the object. This is what grew from the many years of discussion within the San Diego maritime community and through the deliberative process at the Maritime Museum of San Diego leading up to the project. What the Museum ultimately wanted and the San Diego community would certainly benefit from is a grand physical representation of "the story", the Spanish galleon *San Salvador.*

Of course, in order to build a proper object representative of "the story", one must have a steady grasp of what "the story" to be told is and how the object will properly promote and support the story narrative. In the case of the proposed project, the story to be told would be the Voyage of Discovery of Juan Rodríguez Cabrillo and his first entry into San Diego Bay in 1542 (he called it "San Miguel") and ultimately the legendary Origin story of our region. The story is also of ships and men and the sea, the romance and grit of early exploration in the Pacific and the expansion, by land and by water, of Spanish/European culture and technologies in the New World. The chosen representative object would be construction of a ship with the definition of specific size, type, arrangement, construction, sail plan and finish details key to properly framing the story narrative in scope and historical perspective.

First Vision of the Ship Forming the Curve of Knowledge

Setting out to discover the details the design/construction team needed to produce the information necessary to build the ship, a starting point was formed by way of some beginning resource information. As this project had been in the works in our community in prior years, there was a notional set of plans and a ship model as a draft proposal commissioned by the Port of San Diego, dating from the very early 1990s. For technical and historical support the Museum staff gathered together a panel of distinguished historians, nautical archaeologists and specialists in Spanish history of the sixteenth century chaired by Carla Rahn Phillips, Ph.D. (University of Minnesota).

The project kicked off in early 2009 with a gathering at the Museum of a panel and other interested parties with relevant opinions and an intensive two-day review of sources of information and knowledge surrounding the origins of the ship and the historical background of Cabrillo's life and final voyage. Clarification of issues to be addressed in many areas concerning design and finish of the ship gave the team a positive starting point from which to proceed. In this instance, the notional plans and model from an earlier look at the project represented a

Attendees at the *San Salvador* mini-Conference spent several days in January 2009 discussing and analyzing the design and building of *San Salvador*. Farthest left: Maritime Museum's Captain Chris Welton, Engineering Dept. Head; (forward) Captain Eric Speth, Maritime Program Manager at the Jamestown /Yorktown Foundation; Ann Collins, Writer/Photographer; (to her left) Dr. Carla Rahn Phillips of the University of Minnesota; and Bob Munson, historian at Cabrillo National Monument; and (standing behind them) Dr. Timothy Runyan of the Maritime Heritage Program (NOAA).



Photo by Ted Walton

ship from a later period than our designated reference timeframe and more to Elizabethan English ship proportions and aesthetics than to Age of Exploration Spanish ship, and so would not specifically support our particular story. It would, however, serve to give useful direction as to how our ship might have looked in comparison. Consensus among the panel pegged the original *San Salvador* as an early Spanish merchant galleon of approximately two hundred toneladas, a volume measurement of the hull calculated from the internal length, breadth and depth of the ship. Further evidence of the ship's type came from a description by Gonzalo Fernandez de Oviedo of a fleet of thirteen ships built in the New World in 1535-1540, on the west coast (believed to be in the region of modern Guatemala) and including "the three galleons each of more than 200 toneladas" one of which, the *San Salvador*, was believed chosen by Cabrillo for his 1542 expedition northward. And even more corroborating

Front Row: Dr. Iris Engstrand, University of San Diego; Dr. Ray Ashley, President and CEO of the Maritime Museum of San Diego; Captain Bruce Linder (USN, Ret.); Neva Sullaway, Editor, *Mains'l Haul* and Chris Frost, immediate past chairman of the Board of Directors, MMSD. Sitting behind the wheel is Dr. Filipe Castro of Texas A&M and farther aft Robert Schwemmer, Channel Islands National Marine Sanctuary (NOAA). Additional Board Members including *San Salvador's* Naval Architect, Doug Sharp, and MMSD staff (not pictured) attended the Conference.

Photo by Maggie Walton, MMSD

evidence of the ship-type was believed to have come from Cabrillo's orders as commander of the expedition fleet (*San Salvador*, *San Miguel* and *Victoria)* that *San Salvador* was about a hundred feet long (modern measurement translation), with a high sterncastle and lower forecastle. She had a slim hull—about twenty-five feet of beam—a square stern, and a good deal of taper or tumblehome from main deck to the



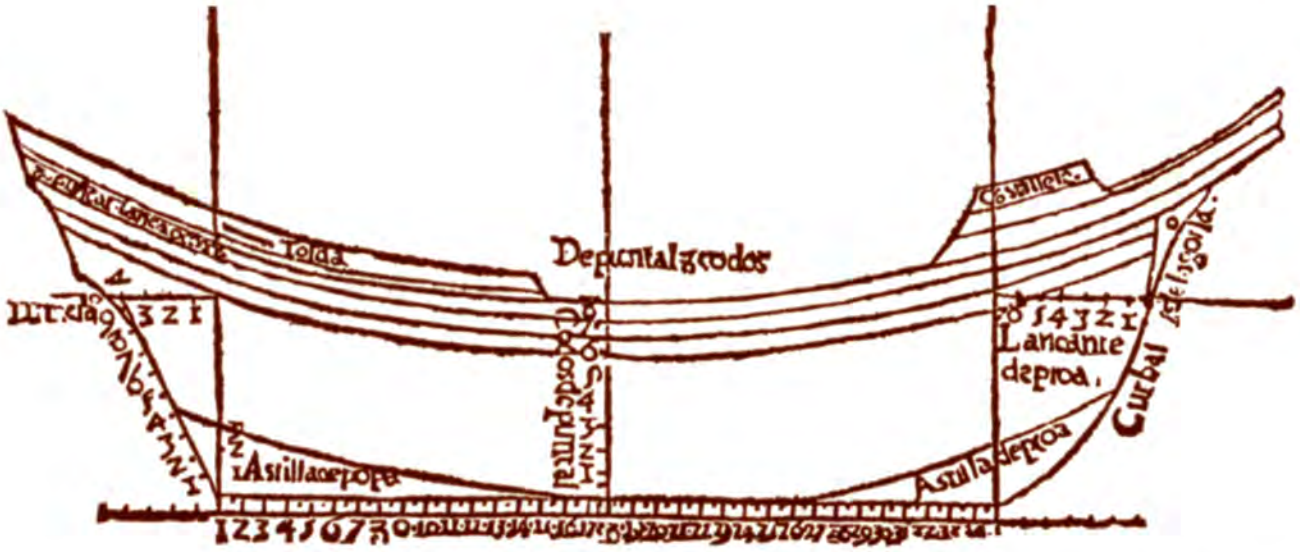
An iconic view of the classic carrack design by Flemish Renaissance painter, Pieter Bruegel, the Elder, c.1560.

top of the sterncastle. We knew then our starting point was a ship nestled in the developmental line of caravel—carrack—galleon (or an early representative in the line of galleon development); ships designed with the aim of performing long ocean voyages, with sufficient capacity in the hold to carry adequate quantities of supplies outbound and, hopefully, trade goods back. Armed with this information as a starting point, the team set out on two parallel lines of research and design development intended to converge eventually in the production of the ship with the precise specifications to be the ideal object to represent the story and, additionally, to be able to financially support her place in the Museum fleet.

On the research side, the idea was to start with the composition of an informational timeline—a curve of knowledge so to speak—wherein our ship could be located in time and aesthetic and functional detail.

The first pathway of research, perusing the historical record, was new territory for me as my prior interests had been limited to the study of the technical development of yacht design/construction, and some casual reading regarding World War I and World War II warships—all late nineteenth and twentieth century history. The development of ship design prior to and immediately following the construction of the original *San Salvador* was uniquely lacking in specifics, as most information regarding ship construction details in those times was passed verbally through generations of builders with no written records left behind and few independent observers capable of recording processes and details. More familiar with a format depending on engineering depictions, written documentation or to-scale drawings, an entirely new line of informational resources had to be pursued by me and the team to start forming a picture of our specific ship. With great fortune, our team was blessed with the help of many individuals familiar with the techniques of ferreting out sources of historical information and our pathway forward in this effort was made easier for that. From a personal standpoint, starting from scratch in

Studies in nautical archaeology provided some fine examples of ships of the same historical period and immediately following that shed light on various aspects of construction and use.

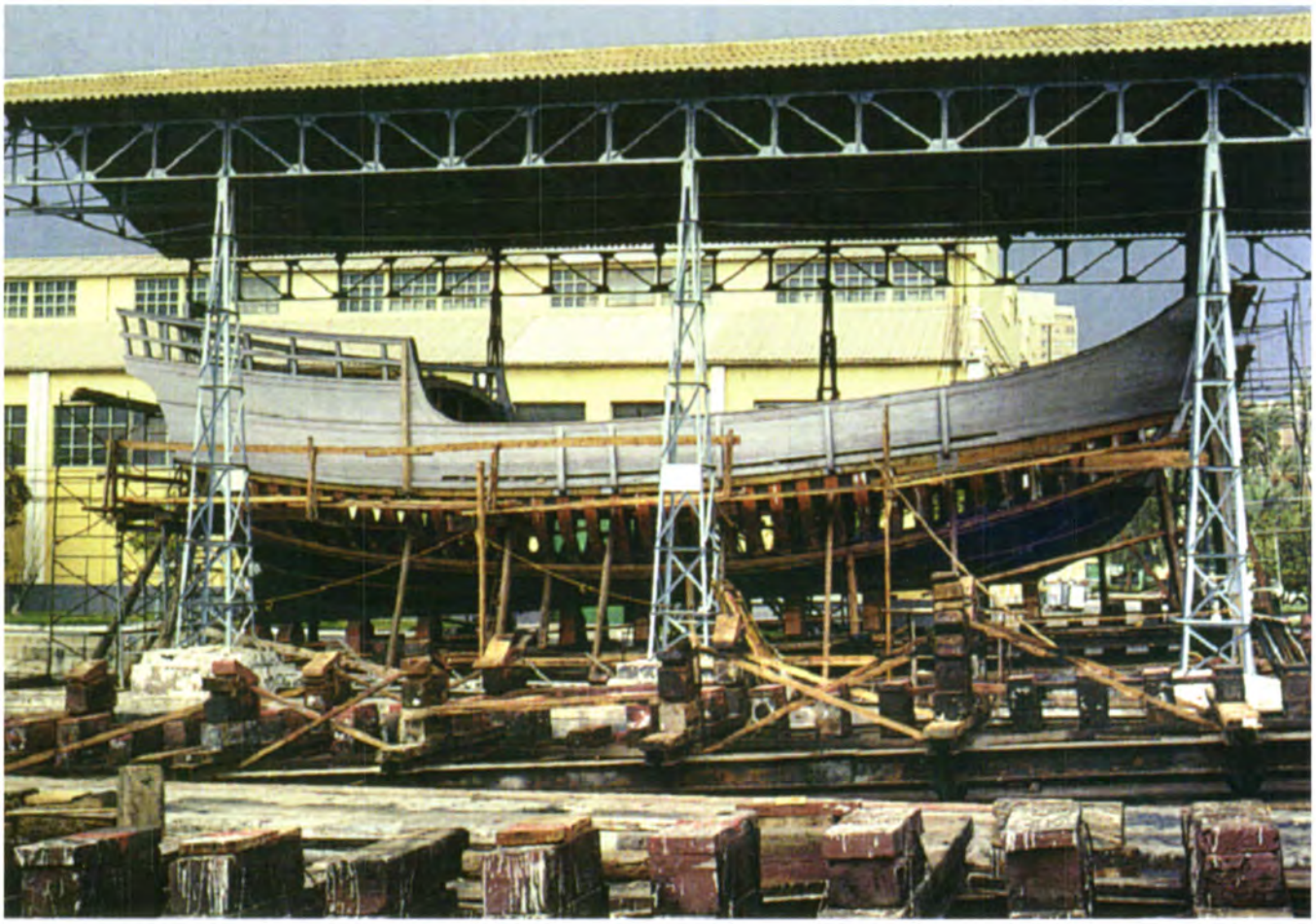


This woodblock sketch shows the method used by Guatemalan shipwrights to compute the proportions of a ship's hull. The illustration is from the *Instrucción Náutica Para Navegar*, 1587, by Diego García de Palacio, who spent several years in Guatemala after the mid-sixteenth century.

this endeavor without built-in prejudices was a blessing in disguise as I was able to look at the amounts of historical information and proffered opinions available with the innocence and desire of a student-beginner, and several promising lines of source materials soon developed.

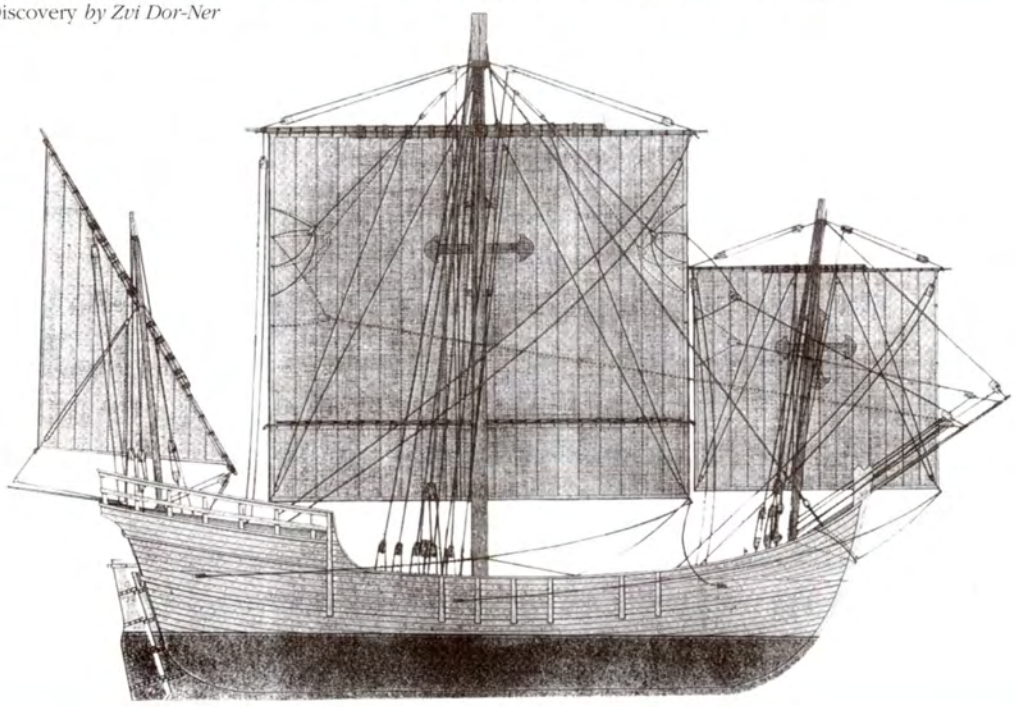
Studies in nautical archaeology provided some fine examples of ships of the same historical period and immediately following that shed light on various aspects of construction and use. *Mary Rose*, an English carrack from about 1554 in Portsmouth, England; *San Esteban*, a Spanish galleon from about 1554, studied in the waters off Padre Island, Texas; *San Juan*, a Basque whaler from 1565, excavated in shallow water, Red Bay, Labrador; *Nossa Senhora dos Martires*, a Portuguese nau from 1606, studied in the River Tagus, Lisbon, Portugal and *Vasa*, a Swedish warship from 1628, recovered from the waters of Stockholm, Sweden; all yielded many important construction and arrangement details by way of the excellent research and reports associated with the archaeological and preservation activities. In the same way, and heavily dependent on the direction and input from the panel of historians and period experts, a resource library of pictorial information was built. This library included depictions of period artifacts such as lintel carvings, votive models, period-produced paintings, etchings and carvings, artwork and notations from nautical charts dating from the period of interest, sketches and descriptions taken from Spanish state texts and private journals, pictures of preserved artifacts in various nautical museums, and contemporary artists' impressions (such as Breughel, Visscher and Van de Veld). The depictions were referred to often during the process of working up a picture of the ship and provided scale and proportion as well as hints as to use and detail.

Published treatises that we could find on the theory and practices of English, Dutch, and Spanish ship construction and operation from the discovery period by contemporary authors were thoroughly combed for information regarding the shape, look, construction, rigging and finish of a ship of the type we had in mind. Of particular note was the work of Diego Garcia de Palacio, *Instrucción Náutica Para Navegar*, published in 1587, a very early printed manual on Spanish ship construction, operation, and navigation that yielded much valuable information on size and form as well as specifics on spar and sail proportions, rigging, outfitting, manning, and navigational requirements of ships of *San Salvador*, or early galleon type. Much information was gleaned from papers and reports by modern authors, including members of our team and advisory panel covering, in general, European and, in particular, Iberian Peninsula and New World ship design and construction in the fifteenth through sixteenth centuries.



The replica *Niña* while under construction at the Spanish Navy's Cartagena yards (early 1990s).

From Columbus and the Age of Discovery *by Zvi Dor-Ner*
Photo by Zvi Dor-Ner



***Niña's* blueprint shows her rigged as a caravela redonda—square sails on the main and foremasts, and a lateen sail aft.**

From Columbus and the Age of Discovery *by Zvi Dor-Ner.*

Courtesy of Sociedad Estatal para la Ejecución de Programas del Quinto Centenario, Madrid

Comparison of the modeled details of construction and rigging from many models of different national origins and periods, when added to all other lines of information, gave us not only a feel for contemporary design ideology, but also an ethnic and archetypal developmental detail timeline from which to draw.

We also found that the historical ship community was not lacking in opinions regarding details about these ships of interest to us and was more than willing to share their viewpoints with little or no prompting from us. Scale models of ships, both contemporary and modern interpretations, were reviewed extensively to give clues to the look and feel of our ship, its details of fit, finish, and rigging.

There are many fine collections of small models of ships with examples from many periods in the history of ship development, ranging from the crude to the exquisite in detail, and with eye-witness detail or later interpretation. Comparison of the modeled details of construction and rigging from many models of different national origins and periods, when added to all other lines of information, gave us not only a feel for contemporary design ideology, but also an ethnic and archetypal developmental detail timeline from which to draw.

Several full-size modern interpretations were chosen for study: *Niña*, a representation of 1490 Portuguese Caravel (Caravela Redonda) launched 1991; *Duyfken*, a replica of a 1595 Dutch East India company merchant ship launched 1999; *Mayflower II*, a replica of a 1605 English merchant ship launched 1956; *Susan Constant*, a replica of a 1605 English merchant ship launched 1956 and a new replica launched 1991; *Batavia*, a replica of a 1628 Dutch East India Company merchant ship launched 1995 and *Kalmar Nyckle*, a replica of a 1625 Dutch Pinnace—armed merchant ship launched 1997. The study of these representative ships and replicas was important for our team as a means of forming an idea of how to properly mold the telling of our story by understanding how they told theirs. As such, the particular examples were chosen not so much for their specific details, but for how those details contributed to the message imparted to the observer, how they brought out emotional and intellectual responses, and because these ships are living, working examples of the shipbuilding arts rather than static displays. The choice of these examples further allowed review of the research, design, and construction details of each ship plus the well documented set up and build effort supporting each project.

In the period when the original was built, knowledge of the details of ship construction, arrangements and rigging was normally passed through familial connection in regional shipbuilding areas, or shared among shipbuilders with common cause during times of state expansion or conflict. Design was based on a conception of the finished shape and dimensions held in the shipwright's head. These were established from proportional formulas developed from experience and keyed to the length of the keel. Construction techniques were based to a large degree on regional prejudice and available materials, but the construction process followed a general pattern of laying the keel, then stem and sternposts, followed by erection of the transverse main frame (generally the maximum section of the hull) and fairing the hull form by eye forward and aft, sometimes applying various formulae for "raising and narrowing," dictating the change in shape of the frames going away from the main frame. Written documentation or records of shipbuilding efforts from the fifteenth and early-mid sixteenth centuries are elusive.

Full documentation of builds, application of theoretical principles in ship design and standardization of techniques and proportions did not really arrive until well through the eighteenth century. Without access to a direct line of passed knowledge, the *San Salvador* team had to nail down the particulars of the design of our ship by coalescing all of the information gleaned from the sources outlined above into a timeline populated with ship construction, arrangement, and rig details—a curve of knowledge so to speak, along which *San Salvador* could be located at the right time and place reflecting her origin and unique place in the development of Spanish ship design. In parallel to placing the ship in aesthetic and technical detail at the right time and place historically, the team also had to provide proper visual and technical documentation in modern context and from which the ship could be built and certified.

Note the construction sequence of *San Salvador* as was probably followed in Guatemala in 1539-1540, beginning with the laying of the keel, then attaching frames, then continuing with decks, sides and hull.

Courtesy of the Author

Parallel Visions of the Ship: Sixteenth Century meets Twenty-First Century

Integrating the vision of a sixteenth-century sailing ship with the requirements of a twenty-first century passenger-carrying sailing ship was an interesting adventure for our design and construction team—a true modern day Voyage of Discovery. It was perhaps fortunate for the *San Salvador's* original builder that the strictures that applied to our design and construction, as necessary to comply with modern requirements, were not present in mid-sixteen century New Spain. On the other hand, if Cabrillo had been allowed access to the type of tools, skilled labor, superior materials and many centuries of trial and error in ship design/construction development at our disposal, the original ship would certainly have been more robust, safer and assuredly longer lasting. The galleons of *San Salvador's* time routinely did not last much longer than three to five years and most likely did not sustain well when subjected to the rigors of operations at sea. Our requirements heading into the project were far more demanding with modern-day regulations regarding the safety of the vessel, arranging for carriage of passengers at sea, dictating a full certification process (Code of Federal Regulations Title 46-Subchapter T), under review and



inspection by the United States Coast Guard, plus a defined minimum fifty-year useful life as the basis for our design considerations. Further, we were charged with developing an authentic ship representing in appearance and performance the closest we could possibly come to consensus opinion of the original. It was to be built in a manner accurately reflecting historical precedence for a ship of this period, size and type, with full public access during the process and utilizing a home-grown labor force in our own local purpose-built shipyard.

The formal technical design process started with the formation of a digital hull surface model with significant dimensions as determined by our consultants panel and our team's research efforts. As luck would have it, the dimensions of length, width and depth matching a mid-sixteenth century galleon-shaped vessel of two hundred Spanish tons (toñeladas) measurement worked out in our modern admeasurement system for internal volume to be close to one hundred gross tons. In view of the eventual qualification for the certification level we were after, it was imperative that our vessel would be below one hundred gross tons in the U.S. standard admeasurement system. We were off to a good start, but the trick in naval architectural design is to balance external shape and aesthetics, distribution of immersed volume, displacement and centers of flotation with internal volume, structural and outfit requirements, distribution of weight and centers of gravity. This is an iterative process tracking many moving parts of the design simultaneously, vastly aided by modern computer technology. For this effort we utilized a suite of interlinked digital modeling, drafting, engineering and hydrostatics programs that allowed us to massage the shapes and volume/weight distributions while constantly updating the projected floating stance of the vessel, the fore and aft trim, and the transverse stability characteristics of the proposed design. Estimates of overall weight and distribution of weight started with an historical basis and were subject to constant adjustment as new data was acquired and the overall design of hull, structure, systems and rig coalesced, with the weight tracking effort eventually lasting the entire length of the design and construction project. The hull lines taken from the base digital model were at the same time worked with the aesthetic outline, main and upper deck rail lines, internal main and upper deck lines, and first notions of the exterior appearance with rig in place of the finished vessel. The basis digital model was likewise used to assess comparisons of overall characteristics, dimensions and proportions with the other researched vessels, to make a start on internal and external space arrangements and to take the first step on the pathway of producing a detailed set of visual and technical documents for use in the construction and certification of the ship.







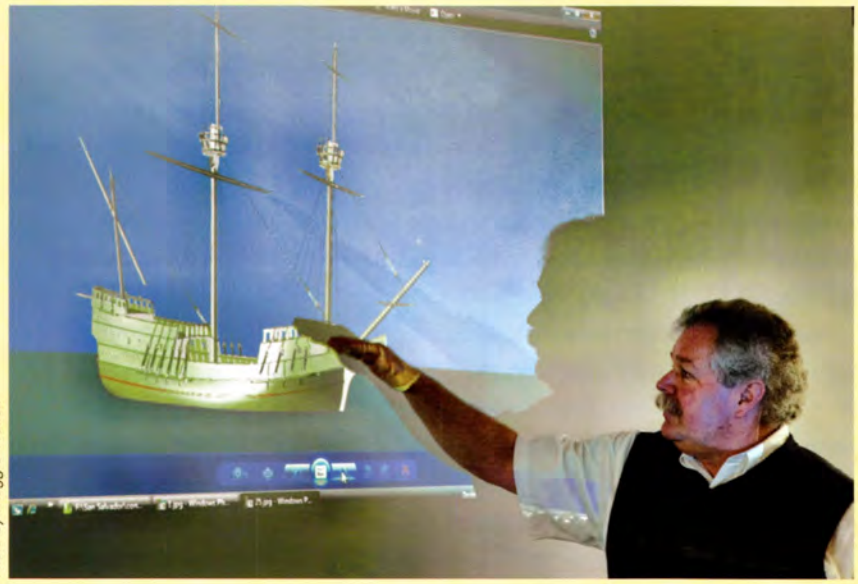
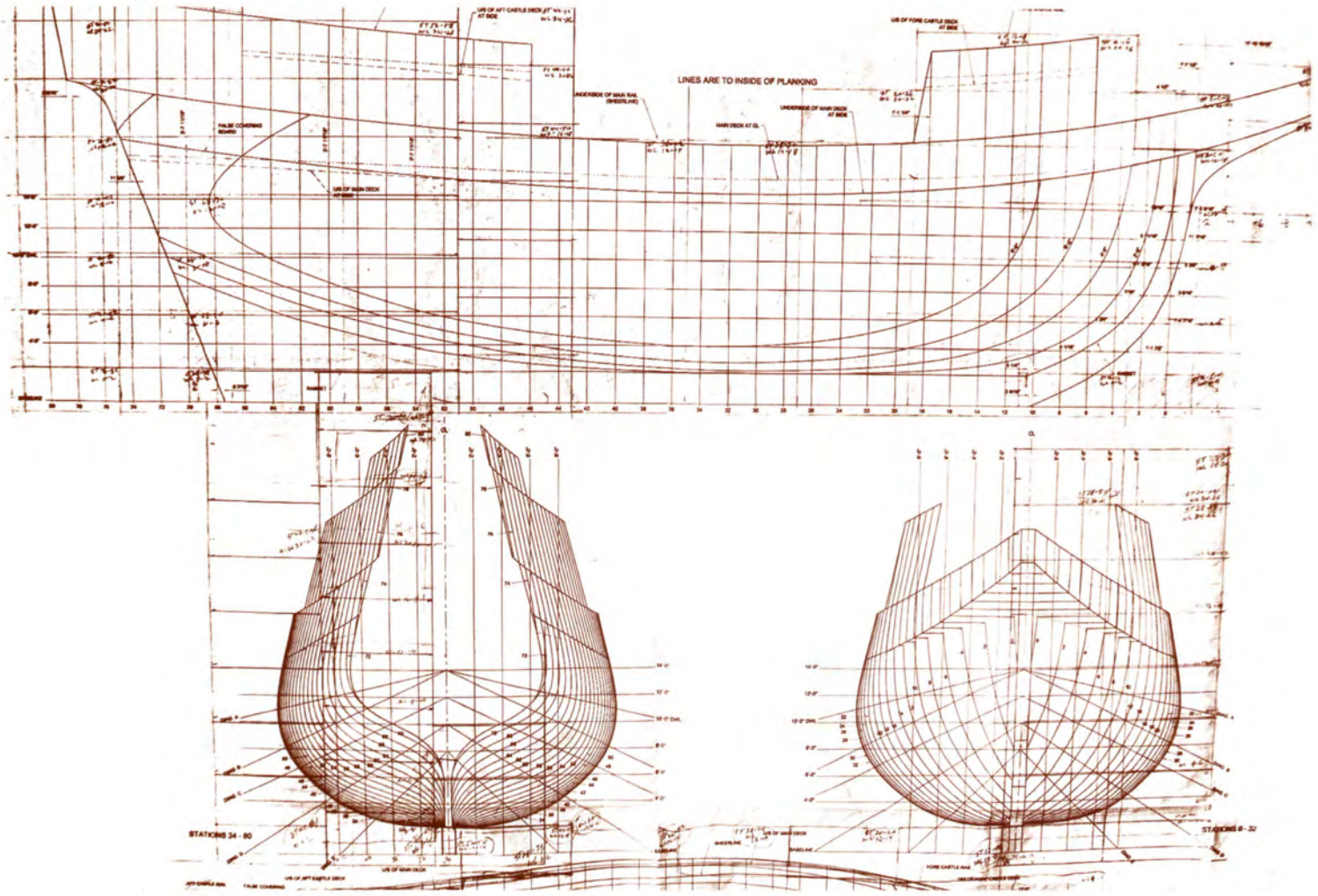


Photo by Maggie Walton

Naval Architect Douglas Sharp made countless presentations as *San Salvador* progressed through her design stages. Reworking details was an integral part of the process.

The documents necessary for submittal to the U.S. Coast Guard for review/approval and for construction of the ship were made in complimentary order and consisted of a set of 2-D engineering drawings and sketches showing all parts of the shape and appearance, arrangements, construction, fastening details of parts, mechanical, piping and electrical systems, ballast arrangements, sail and rigging plans plus supporting engineering documentation in the form of calculations summaries, reports and in-depth analyses. After intensive discussion with our shipwrights regarding details incorporated on the drawings and in the general build scheme, the plans were submitted to the Coast Guard for the review and approval process. Arrangements and systems were reviewed locally; structural, sail and rigging plans were sent to the Marine Safety Center in Washington, D.C. After modification to comply with Coast Guard review comments and their final approvals matching the many and rigorous requirements, the plans were released to the shipwrights for their use as guidance for the construction and outfitting of the ship. Fitting to our modern context and the requirements for certification, structural plans were prepared using scantlings (dimensions and spacing of various individual structural members of the hull, decks and superstructure) derived from *Lloyd's Register of Shipping: Rules and Regulations for Yachts and Small Craft 1979 - Wood and Composite Hull Construction* (per specific direction of the CFR), interpreted and extended by calculation to cover the size and weight of the proposed ship. The various drawings with information relating to safety, deck arrangements and mechanical/piping/electrical systems were prepared and annotated following the exacting specifications delineated in the relevant sections of the Code of Federal Regulations, Title 46, Subchapter T. The drawings defining the spars, sail and rigging plans were prepared with the spar and rigging sizes adapted to the requirements of *Germanischer Lloyd's Rules for the Masting and Rigging of Sailing Ships*, 1997 (as agreed with the Marine Safety Center), from the spars, rigging and sailplan proportioned to the Palacio 1587 instructions and ultimately aligned with the stability requirements for our ship per the relevant parameters of 46 CFR-Subchapter T.





Above: **The set of two-dimensional line drawings, once approved by the Coast Guard, where released to the shipwrights for their use as guidance for the construction.**

Below: **The continuation of the three-dimensional projection of the ship profiles the various stages of construction.**



Very special attention was given to ballast arrangements and thru-keel fastenings by the Coast Guard in their review of these submitted details. Although not the same as a modern external ballast keel arrangement independently bolted to the exterior of the hull, a future requirement of our certification will be the periodic removal and inspection of the silicone-bronze "keel bolts," used to tie the external lead ballast blocks to the underside of the keel and the keel with the floors and keelson above. With the construction of the vessel laid out as cross-frames sitting atop the keel, and keelson sitting atop them, the keel bolts and heads on the top of the keel would be inaccessible from the inside. This necessitated a design whereby the bolts could be drawn out from underneath the ship and external ballast, but securely locked and torqued up against heads buried deep inside the vessel with no wrench access possible. In similar manner, the tie bolts through the keel, floor-frames and keelson holding the backbone structure together received rather close scrutiny with heads buried in the keel inside the external ballast. In both instances, lively interaction among our team and with the Coast Guard resulted in bolts of proper size and fit arrangement that not only met the stringent requirements of the certification regulations but, we believe, resulted in a superior structure that will best meet the fifty-year life expectation as well. Further special attention in the plan submittal-review-approval process was placed on the materials used in construction, fastening, ballasting and rigging the ship as well as the basic build scheme and processes to be followed. For both the local U.S. Coast Guard and our design/construction team, the construction of a sixteenth-century Spanish galleon to modern context and certification regulations was previously undiscovered territory.

A wooden sailing ship can be characterized as a collection of individual sticks sailing in close formation. The structure, a combination of longitudinal, transverse and vertical load-carrying members, composed of natural cellular-fibrous materials and various fastening and adhesive schemes designed to keep them in that close formation, is a beautiful symphony of working parts each contributing its portion to overall strength and stiffness, but none able to carry a significant portion of the load alone. Naturally, the strength and stiffness of a wood piece flows with the grain structure and is primarily a function of the density of the species (with some variability taken into account due to the physiology of trees and the environment in which they have grown). In a wooden sailing ship a variety of grain structures and densities coupled with the suitable natural shapes and sizes available have to be designed into the construction scheme.

The selection and use of pieces to be chosen, shaped or cut from the raw materials is ultimately dependent on location and orientation in the assembled structure, thus has it been for centuries. For example, the keel, keelson, stem and sternposts require long straight-grained high strength

The beginning of framing as seen looking forward and looking aft.

Photos by Maggie Walton



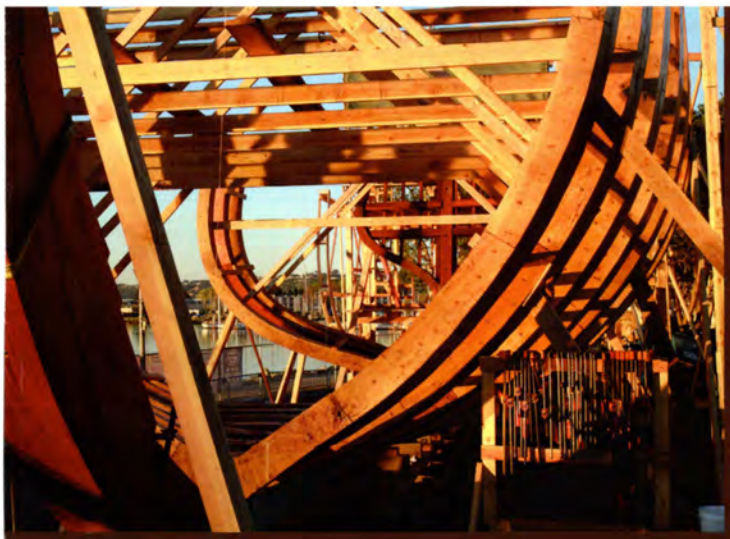


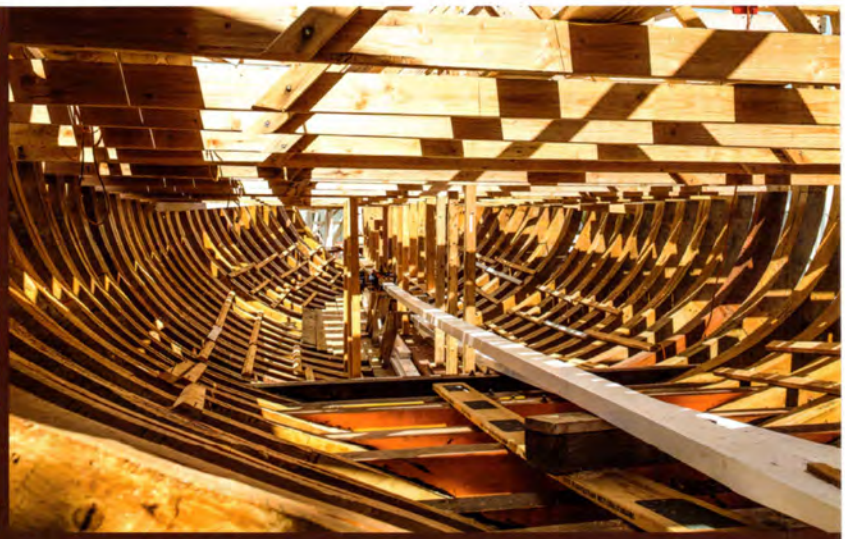
A wooden sailing ship can be characterized as a collection of individual sticks sailing in close formation.

pieces to match their location, longitudinal orientation and relatively high load-carrying requirements. Further, as these parts of the structure tend to be low in the hull, heavier woods are tolerable. For these, tropical hardwood species—Angelique, Purpleheart, Apitong, Greenheart, Sapele and African Mahogany—that grow tall and straight with close-grained dense wood are ideal. Hull frames with transverse orientation and large amounts of curvature, but still requiring high load-carrying capacity, want tough dense wood species with grain structure flowing along the curve, such as from shorter spreading trees with plenty of variety in growth shapes (compass timber) like Live Oak or White Oak (both straight, and timber and shapes obtainable from the same tree). English Oak and Spanish Oak could have been used also, but are inferior to American varieties. Deck beams and longitudinal carlins, carrying load in relatively straight orientations and generally located higher up in the ship (main and upper decks), can be found in a nice straight-grained but lighter wood species such as Douglas Fir. Knees (the ship has lodging, hanging, and standing), were traditionally sourced using Hackmatack (Tamarack or Eastern Larch) with the shapes cut to specified sizes from the base of the tree using the bole and the root where the grain naturally flowed around the ninety-degree turn. Hull and deck planking requires long, straight, relatively fine-grained and stable timbers of moderate density and fair bending capability such as Pine and Fir species. Black Locust, fine-grained, hard and smooth, was used for pins and trunnels traditionally. The original *San Salvador* was most probably built with local-sourced, readily available materials and so would have been constructed with a combination of Mahogany (most likely the Honduras Mahogany family), Spanish Cedar, Cieba (or Kapok) and assorted other lesser species as commonly found in the general construction area. For our ship the choice of materials based on the ratios of density to scantlings, and thus strength to weight, as well as quality and quantities available, price and delivery logistics, were all equally important considerations. Finding the needed quantities of natural wood species materials within the Central American area of original construction had an exceedingly low chance of success due to modern logistical, political and, ultimately, cost concerns. As a result of this, an effective chain-of-supply sourcing mechanism, taking advantage of modern communications technology with farther than regional reach, was pursued.

This sequence shows preparations for bending the bilge stringer.

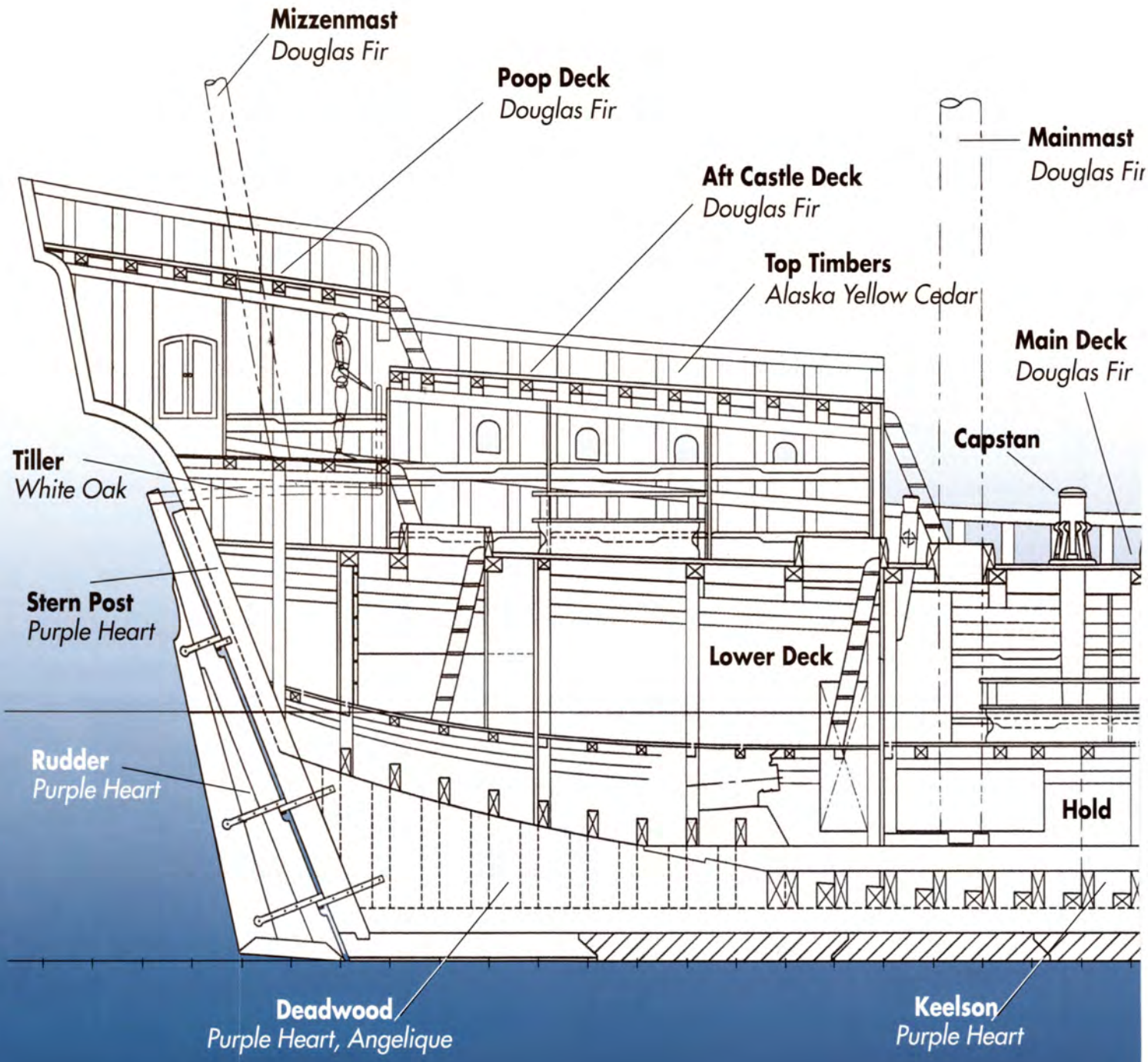
Photo by Jerry Soto





This cut-away architectural drawing shows the interior detail of *San Salvador*. Naval Architect Douglas Sharp illustrates the woods used in each part of the ship.

Historically, the crew would have lived, worked and eaten on the main deck, while the two levels below the main deck were for stores, cargo and animals. Extra ballast was taken aboard in the form of stone and sand ballast placed in the lowest part of the ship.



San Salvador Specifications:

Flag: U.S.
Rig: Spanish Galleon
Homeport: San Diego
Sparred length: 114′ 7-5/8″
LOA: 93′ 6-3/4″
LOD: Main Deck—75′ 6″
LWL: 72′ 8″—full load waterline
Draft: 10′ 0″—full load waterline
Beam: 25′ 1-1/2″ - maximum
Rig height: 82′ 2-3/4″—main topmast cap
Freeboard: 4′ 10-1/2″
Sail area: 4160 [square feet]
Displacement: 206 L. tons—full load waterline
Tons: 98.2 Gross Registered Tons
Power: 2 x 280 hp Diesel
Hull: Wood

Terminology Guide

Sparred length - The length between the extremities of any spars that overhang the bow or the stern of a vessel, such as a bowsprit or a boomkin.
LOA- Length overall. The length between the forwardmost and the aftermost points on the hull of a vessel.
LOD - Length on deck. The length between the forwardmost and the aftermost points on a specified deck measured along the deck, excluding sheer.
Sheer - The fore-and-aft curvature of a vessel's main deck from bow to stern.
LWL - Length on the waterline. The length between the forwardmost and the aftermost points on a vessel's waterline.
DRAFT - The depth of water required to float a vessel.
BEAM - Width of a vessel at its widest part.
RIG HEIGHT - Maximum height of rig above waterline.
FREEBOARD - The vertical distance from the waterline to the freeboard deck, usually measured amidships.
FREEBOARD DECK - The uppermost deck that is designed to be watertight.
GRT - Gross registered tonnage. The volume, expressed in units of 100 cubic feet to the ton, of a vessel's total enclosed spaces below the weather deck and enclosed spaces above the deck including the bridge and accommodations.
HULL - (Material)

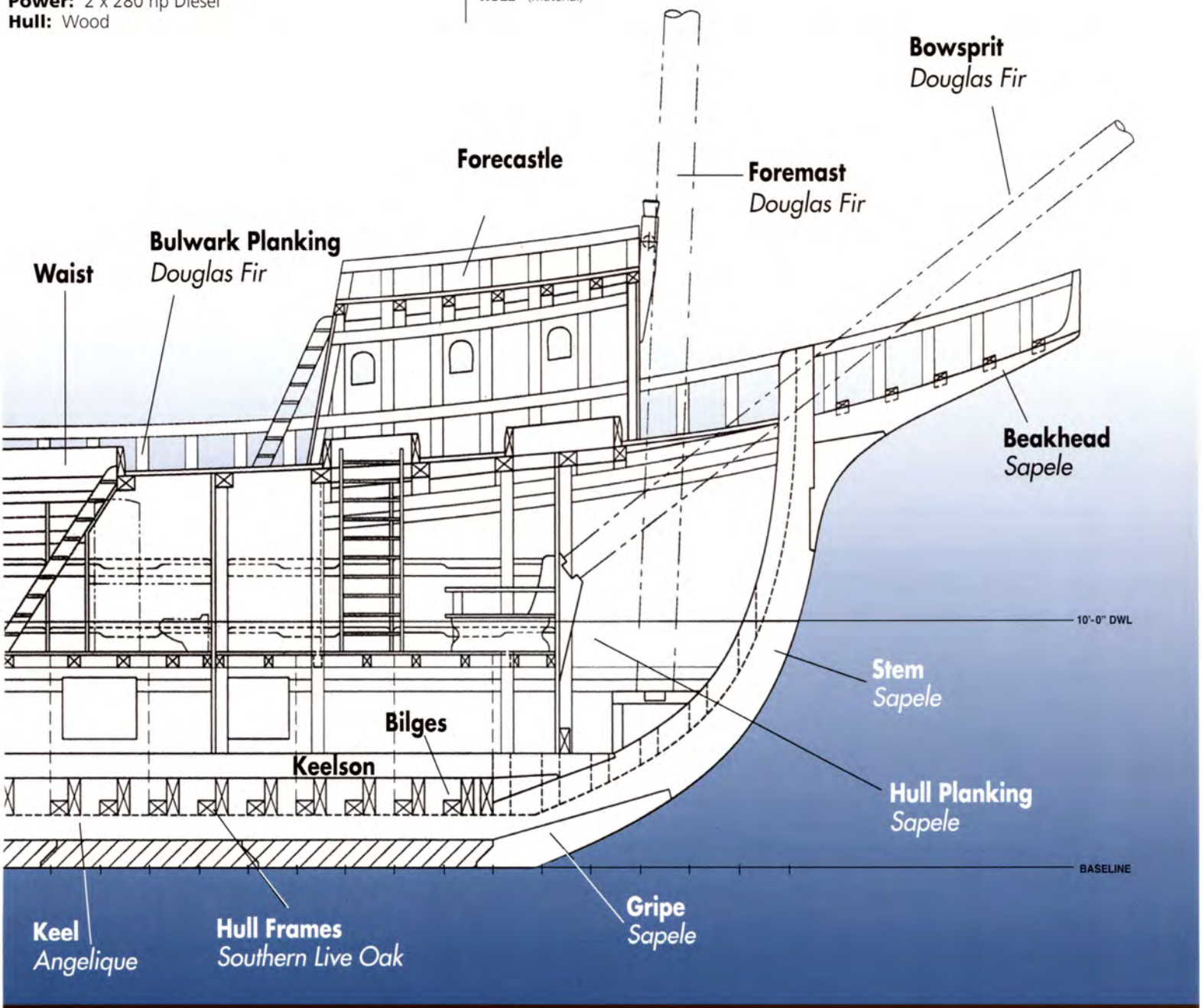




Photo by Jerry Soto

New arrival of flitches of Sapele planking.

The applied force necessary to source the raw wood construction materials called for by design parameters in appropriate quality and adequate quantity was produced in a collaborative effort involving the design team, the build team and master shipwrights, the shipyard management teams (pro and volunteer), outside brokers and suppliers, the Museum staff and the Coast Guard. The world of natural materials supply, particularly for historic representations, moves to its own rhythm and has its own multiple personalities—finding the right stuff most consistent in quality and adequate in quantity is a matter of persistency in tracking down best sources and luck in timing—finding just the perfect pathway for purchase and delivery. We found that most wood suppliers don't normally judge their products in terms of strength and density, so many hours of research went into vetting proffered species in terms of strength and stiffness acceptability for specific applications in the various structural locations of the ship, even before the quality and quantity aspects came into play. We had to be mindful of the specific requirement in the scantlings rules that allowed no heart center or sapwood in individual structural elements that affected the size, type and quantity of timber we would need in various applications in the ship.

Workability, acceptance of adhesives and finishes, plus some environmental concerns were also considered in judgment of the suitability of some of the proffered species. Juggling the elements of cost, availability, logistics and suitability for each of the density-driven species deemed proper for scantlings and complete structural layout, the collective team settled on the following: Angelique, Purpleheart and some Apitong for keel, keelson, deadwood, sternpost, floors and special pieces like the rudder and capstan; White Oak for tiller and small parts; Southern Live Oak for double sawn frames; Sapele for built-up stem, hull planking, rail caps and trim; Douglas Fir for deck framing, superstructure planking, deck

Unsawn frame futtocks.

Photo by Maggie Walton



The rough flitches are laid out in preparation for sawing.

planking, longitudinal hull stringers/clamps/shelves, bulkhead stiffeners, bulkhead plating, hull pillars, spars and small parts; Alaska Yellow Cedar for superstructure framing (top timbers); Hackmatack for hanging and lodging knees; Black Locust for trunnels; and in a nod to modern convenience, weight and cost, Marine Grade Plywood for watertight hull bulkheads and non-tight superstructure bulkheads. Coupled with the ongoing efforts to find and procure the natural materials, much work went into the logistics of shipping the materials to the build site, receiving and storing them. Wood packages came in the form of bundled cut timbers or planks (Douglas Fir, Yellow Cedar), bundles of dimensional cut pieces (Hackmatack) or flitches (the trunk in natural form, sliced to rough thicknesses and with heart center slice and bark removed—Sapele, Live Oak), weighing on average two to three thousand pounds and as much as six thousand pounds per bundle or flitch. Receiving involved developing the ability to move the heavy loads from the transporter, assessing each bundle and individual pieces, marking them (for where they would eventually be used in the ship) and storing them in projected order of use. Wood materials, the building blocks of the ship, were in constant motion around the building site as they were received, rotated through selection and ordered storage, moved through marking, shaping and the production area and thence into the ship. And with this neat symphony of wood materials in motion, the complimentary effort to supply the various materials on time for shaping, joining, adhering, preserving and finishing had to be coordinated.



Photos by Maggie Walton

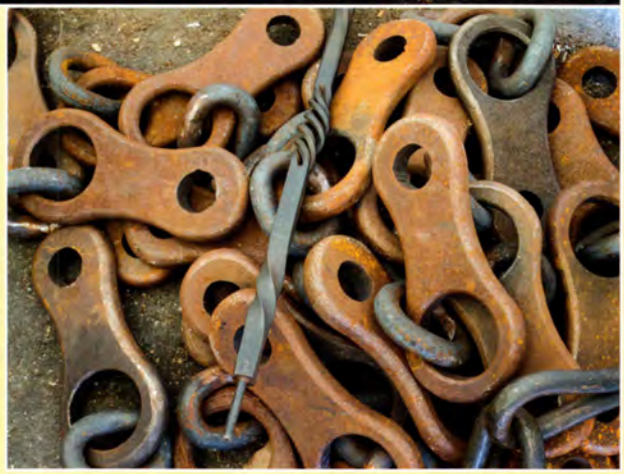


Bob's Crane Service did all the heavy lifting.



Photos by Maggie Walton

Above:
The untrimmed frames are prepared for laying-in.



Right:
A sampling of the rigging parts (staples) that along with the chains and straps anchor the main, fore and mizzen deadeyes.

In order to assemble and keep the ship's gathering of wood materials sailing in formation for an extended length of time, a large and diverse number of fasteners, adhesives, sealants, caulking materials, preservatives and surface finishes need to be applied. The amounts of these "consumables" needed for the ship construction is astonishing when considered. The decisions regarding type, material, density, size, coverage area, protective abilities, adhesion and sealing capabilities, have major consequences in weight, cost, logistics and for construction management, beside the overriding consideration of longevity of the assembled structure. For example, in an early decision the design/construction team decided to standardize all metal fastenings diagonal strapping, threaded-end rods, thru-bolts, lag bolts, carriage bolts, wood screws, staples, peened-head bolts, washers, nuts (hex and square) and nails—to silicone-bronze for strength and longevity. This of course drove the construction management team to find sources of supply for all of these fasteners or a means to make them ourselves when simply not otherwise available with adequate quantities and price points for supply just as we needed and could afford them. Not an easy or inexpensive decision considering the value of this type of metal material in the market today. Ultimately, the ship will have on the order of four tons of silicone-bronze fasteners distributed throughout the hull and decks. The chains, staples and straps anchoring the main, fore and mizzen deadeyes to the hull are a notable exception to the choice of bronze material as fasteners because these on the original would have



Photos by Maggie Walton

Above: **A legion of people volunteered to help build *San Salvador*. Pictured are Mrs. Laura Hueso (wife of State Senator Ben Hueso) and their son who generously donated their time with other Urban Corps volunteers to work on the historic replica ship.**

been wrought iron, sourced from Spain, carried across from the Caribbean side and forged/blacksmithed at the build site. Thus, to tell our story we chose steel distressed to appear as worked iron. The sealants and preservatives used to extend the life of the shaped and assembled wood, and thus the ship, were not available to Cabrillo when the original was built. It is an assured thing, however, that he would have used them if they had been! A diverse collection of these substances including tar, artificial red-lead, shellac, synthetic and natural marine bedding compounds, specially formulated synthetic adhesive sealers, saturating epoxies and standard epoxies and fillers, epoxy-based and urethane-based paints were applied to the parts of the ship during assembly to seal, protect and preserve the structure. These various pastes, liquids and mixes were subject to shelf life considerations and had to be sourced in quality and sufficient quantity to match the tasks immediately at hand and in the natural progression of the build process. Supply of them became a consistent ongoing effort for the management team, persisting throughout the project.





Face masks and tennis balls were among the top safety items needed when working around the ship.



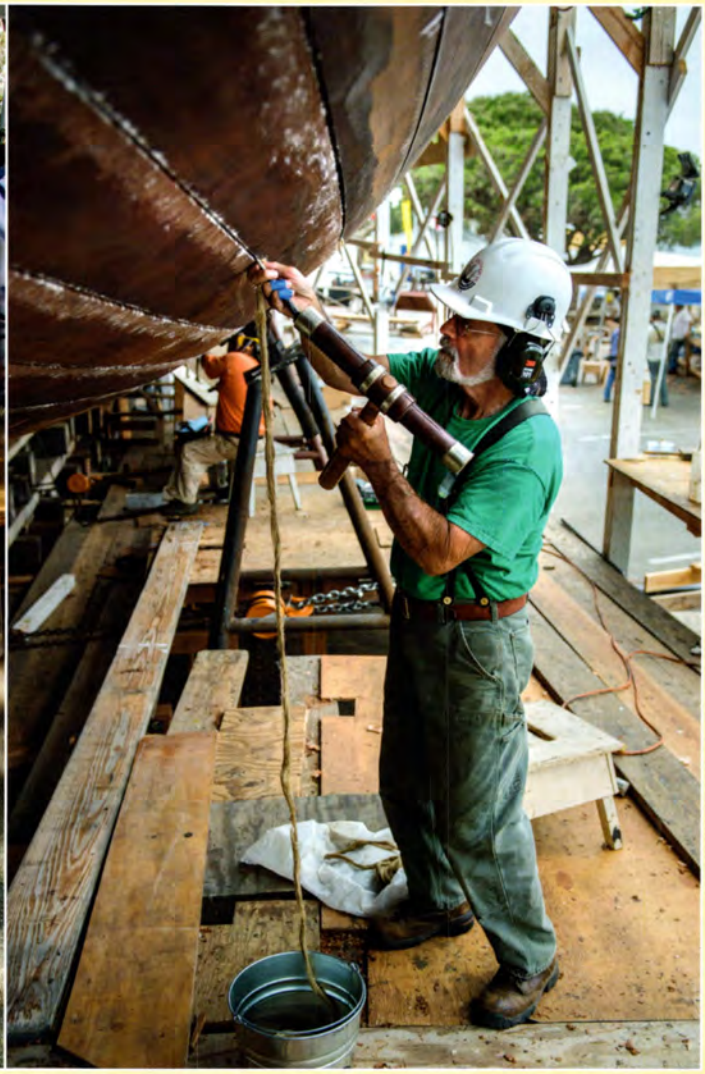


Photo by Maggie Walton

Photo by Jerry Soto

On the left, Master Shipwright Frank Townsend teaches oakum spinning. Volunteer Steve Kessler flew down from Oregon regularly to assist in the building process. He is pictured wielding the caulking mallet.

Traditional methods for caulking the immersed hull and upper deck seams requiring quantities of spun cotton and oakum were adopted; the oakum required manual spinning to prepare for installation and had to be anticipated in the design. The caulked seams in each specific water-affected area—decks, hull topsides between waterline and main deck, hull bottom—were then sealed with an adhesive-sealer compound, specifically formulated for the type of wood and above or below water location and covering surface finish to be applied over. As a side note, the relatively thin fir planking on the ship's sides above the main deck proved to be too unstable with the plank seams dry-joined and merely caulked in the traditional manner and these seams were eventually splined (thin wood strip epoxy-glued in each seam) then filled with adhesive-sealer to appear the same as the traditionally caulked seams.

In a similar fashion, once assemblies were reasonably complete the surfaces exposed to sun cycling and humidity changes needed finishes applied sufficient to protect the wood from ultraviolet degradation, as well as too-rapid drying and moisture cycling. Much emphasis was placed on what the finished look of the vessel was to be and mindful that the original would most likely have been mostly coated

with tar or left bare in many places—in sort of a universal rough, dark, muddy-gray livery in service. When the project started, the team wished to represent the original rough, dark, finish and did not intend to have by design a yacht-like or bright natural finish on the wood surfaces above the waterline. It became painfully obvious, however, in a relatively short period of time that the lack of any finish (that is, leaving the wood bare of any coating), or a dark-colored finish on the dried Douglas Fir exposed to the San Diego sun promoted too much movement within the wood and affected the alignment of the individual plank edges along the seams due to heat accumulation beneath the surface. For purposes of longevity and maintenance of the ship, a clear light urethane finish with UV-blocking properties was found for exposed surfaces of the hull and rail caps on the outside and a heat-reflective opaque finish for inner main deck surfaces application. Below the waterline, a special formulated multi-coat, multi-step, application system from sealing and priming the bare wood up to anti-fouling finish was worked out with the supplier and sourced in the time frame and quantities as needed. When all was finally reckoned there were on the order of two and one-half tons of paint, adhesives, sealers and preservatives applied by hand, mostly volunteer, to the ship's hull structure during the construction process—all to be included in the overall design weight of the ship. And this weight, added to that of the fastenings, structural members, mechanical systems components, rig and rigging and general outfit items, represents about sixty-seven percent of the ship's overall deadweight, the remainder thirty-three percent being in fixed ballast.

A clear light urethane finish with UV blocking properties was applied to exposed surfaces to help protect and maintain the ship.



Photo by Maggie Walton

Doc Anes and Vince Sandina assist in the caulking process. Having worked in his father's boatyard from age eleven, Vince (below) has accumulated a solid sixty years worth of practice.



Photo by Jerry Soto

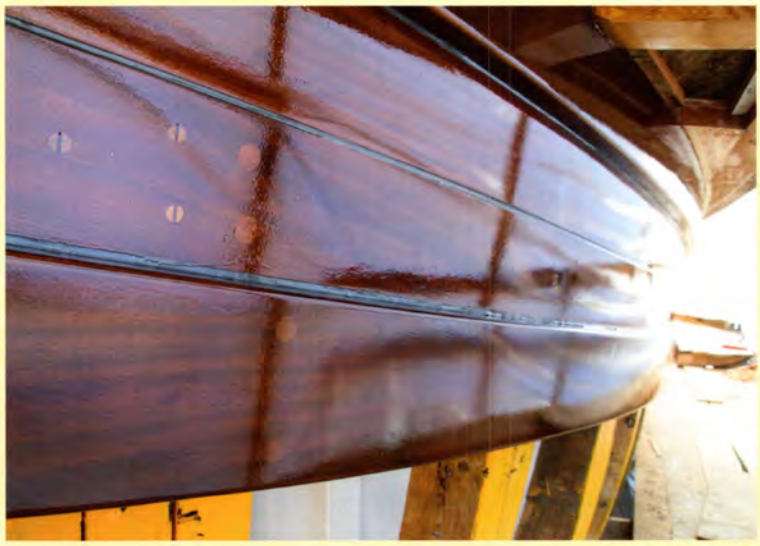


Photo by Maggie Walton



Photo by Maggie Walton

Pictured is a single cast ingot for internal placement. UTC Aerospace Systems not only donated the lead but also assisted in the casting of each weight.

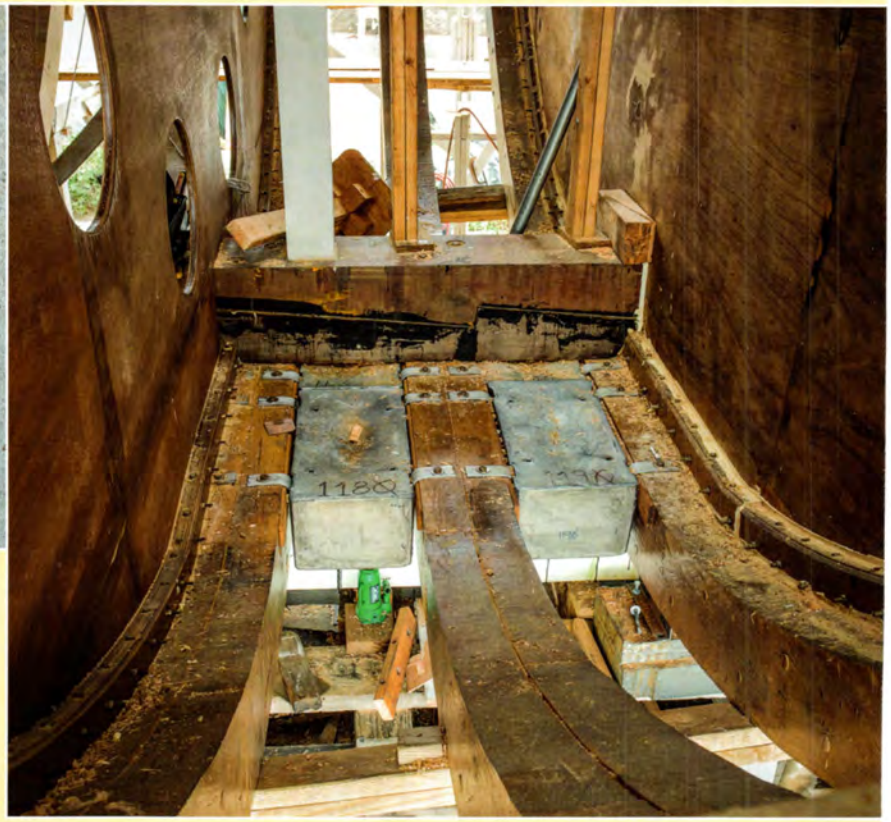
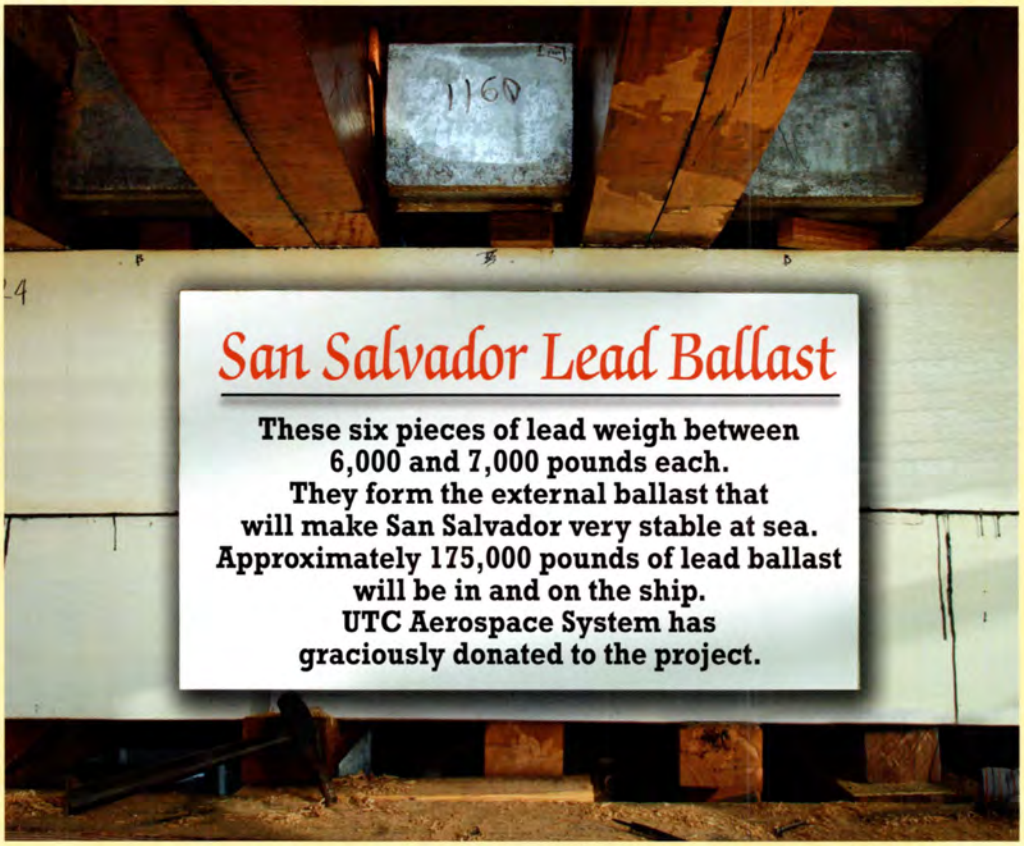


Photo by Jerry Soto

A modern-day representation of a mid-sixteenth century sailing ship operating in the twenty-first century regulatory environment is subject to very special consideration when it comes to stability and seakeeping abilities on the open ocean. That special consideration for us came in the form of a series of critical requirements outlined in the Code of Federal Regulations (CFR) to which the vessel would have to comply for certification to carry passengers. The stability of any vessel is reckoned in terms of the ability of the vessel to return to vertical, or right itself, when subjected to an upsetting, or heeling force. Such heeling forces can come from shifting or off-center weights, flooding in the hull, side waves, wind force on the sails or any number of variations and combinations of these. Resistance to heeling forces, or righting forces, comes from characteristics of the immersed hull shape working in conjunction with the vessel's weight and vertical center of that weight. For many centuries the influence of hull shape, vertical distribution of weight and sail area on the stability of the ship, was only known through empirical development and intelligent guesswork or feel.

In the balancing act of shaping the hull to look and feel like a Spanish galleon and matching with the anticipated overall weight versus arranging all of the components going into the structure arrangements, systems, rigging, sail plan, outfit and finish of the vessel that contribute to the distribution and amount of overall weight, the one key control element that the designer has in reserve to influence where the weight is centered is in the addition of ballast. Traditionally, ballast was carried internally in the bilges, or lowest points in the hull of sailing ships and was composed of whatever heaviest materials were readily available and convenient. Since early ships were built convenient to where they could be launched, on a beach adjacent to a river or on a river with direct access to the sea, it is reasonable to assume that ballast would have primarily been river or beach stones—smooth, rounded, ideal for packing into the odd spaces found between and around the ship's

framing in the hull. Ship's stores, weapons, and ammunition, stored in the hold would have contributed to lowering of weight center, but obviously would become less effective as the voyage progressed and these items were consumed. A twenty-first century installation requires a rather greater amount of ballast weight condensed into a more compact space to meet the stricter contemporary requirements, necessitating a denser application than traditional river stones and consumables. Hence, we needed a source of lead and a means of shaping the lead to fit our application.



San Salvador Lead Ballast

These six pieces of lead weigh between 6,000 and 7,000 pounds each. They form the external ballast that will make San Salvador very stable at sea. Approximately 175,000 pounds of lead ballast will be in and on the ship. UTC Aerospace System has graciously donated to the project.

Photo by Maggie Walton

Through a bit of careful design and serendipitous donation of materials and complimentary services to mold the materials, the team was able to put in place a lead ballast system that consisted of a combination of external ballast in large cast pieces to fit the bottom of the keel (and in keeping with the traditional appearance of the ship), cast ingots to fit into the spaces between the transverse frames above the keel and below the keelson and cast plates to fit above the frames and on top of the keelson between the deep frames in the main hold area. At present the combination of pieces is: external ballast 17 tons (fixed), between-frame internal ingots 18 tons (fixed) and internal cast plates approximately 23.5 tons (to be adjusted for final trim and location of center of gravity). As a measure to make the bilges nice and neat, eliminate pockets that could hold water, eliminate spaces hard to get to that would accumulate dirt and debris and provide sump areas for drainage, the spaces between transverse floor-frames, above the keel and to the level of the bottom of the keelson, were filled with poured tar. Although not a solution with historical precedent, the poured tar provides a beautiful flat and smooth finish on the inside, preservation of the covered wood in a place traditionally subject to degradation via held fresh water and, of importance so far as the weight and center issues, further augments the ballast system with four and one-half tons of additional weight very low in the ship. The final adjustments to the amount of internal ballast plates is determined after the ship is launched and an as-built stability determination is made. This final stability determination was made with the ship complete and rigged, so of course the distribution of weight in the spars and rigging, located high in the ship, along with windage aspects of the spars and sail plan are critical factors to balance with the ballast installations and integrate in the overall design of the ship.



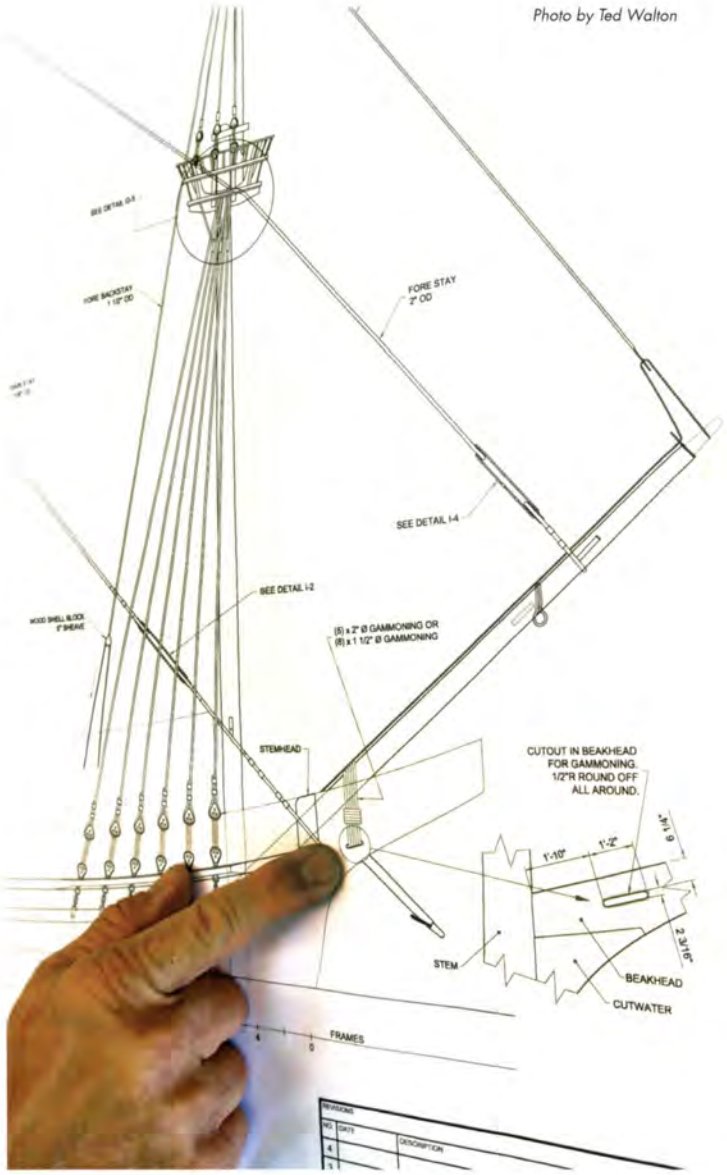
The 3-D rendering of *San Salvador* shows the galleon under sail, while the accompanying 2-D sail plan and rigging schematics (on pgs. 63 and 68,) show each traditional detail that needed to be engineered to modern specifications.

From the waterline and upward, the ship had to appear and operate in a mode as close to the conception of the original as possible and, in addition, comply with the already long and growing list of regulatory requirements to which the project was subject. In order to accomplish this, the rig and rigging of the ship was a matter of much scrutiny and deliberation by the design/construction team. The rig and rigging design, determination, and acquisition of the most appropriate materials for the various rigging applications aboard the ship and planning of the process for preparation and installation was split into four significant parts: masts and spars, interior mast steps and exterior hull attachments, standing rigging and running rigging. The masts (fore, main and mizzen) and spars (bowsprit, main yard, main top yard, fore yard, fore top yard, spritsail yard, mizzen lateen yard, foresail boom and boomkin) and appurtenances (main and fore tops, caps, cleats, stops) were all sized to historically representative proportion and dimension following Palacio's 1587 Treatise and research indicators, followed by sizing to the scantlings, driven by the choice of solid Douglas Fir as the construction material and *Germanischer Lloyds* and CFR requirements. In the end, the sizes to match load-carrying requirements coordinated with historical proportions nicely. In consideration of overall weight and vertical center of gravity for the rig, the construction scheme of solid Douglas Fir timber for the masts and spars was not as comfortable as built-up hollow Cedar or Spruce, but primarily the cost, longevity and appearance considerations of the one versus the other, respectively, drove our conclusions. The team did briefly (very briefly) consider wood veneer-covered carbon fiber spars but the cost and fear of this unknown territory in rigging a traditional sailing ship this way caused this particular discussion to be dropped in short order. Further, neither the design/construction team nor the U.S. Coast Guard plan review personnel assigned to our project had considered this

type of rig or sizing of spars previously in a regulatory format, so quite a bit of conservatism on both the submittal and approval sides crept into the final sizing of all the spars as well as the arrangements for stepping them in the hull. A modern sailing ship rig with thin-walled high-strength spars, supported by high tensile steel shrouds, will transmit loads into and through the hull structure in a much different manner than our weight-heavy solid masts and relatively stretchy natural-fiber shrouds. Attention to detail and choice of materials for the design of the steps for masts, bowsprit and boomkin, the mast partners on the main and poop decks, plus the hull chain wales, or channels used to position the fixed anchor points for the shrouds at the hull, centered on proving the weight-carrying and load distribution capabilities of the pieces while maintaining the correct representative proportion and aesthetics of the period. The mast steps for main, mizzen and fore masts, as well as the channels for these masts thus developed appeared tremendously oversized, massive in fact, until installed in their proper places on the ship—and then they became works of art in their own right, just right in looks, proportion and feel. Too bad the main and foremast steps are buried below the lower deck and thus out of sight! But the look and proportions of the wide channels on the exterior of the hull, together with the shroud anchoring chains and deadeye-lashing system for the shrouds, contributes to a major portion of the mid-sixteenth century aesthetics of our galleon.

The design development of standing rigging—that portion of the rigging system that is fixed in place and primarily functions to hold the masts in vertical transverse and fore/aft alignment and transmit driving forces generated by the sails to the hull, was again a combination of arranging the pieces to represent the story of mid-sixteenth century construction and matching regulatory requirements of the twenty-first century. The standing rigging system is composed of two basic elements: shrouds (transverse) and stays (fore/aft) and the means of their attachment at the shroud or stay ends. The size, layout and number of shrouds and stays for each mast and top mast plus size, proportions and arrangement of the deadeye

Photo by Ted Walton



adjustment system (our modern equivalent is the turnbuckle) at their terminal ends was attained through the various research avenues followed by the design/construction team, concentrating on working from later period known details backward to what those details should have been in the period when the original *San Salvador* was built. Development of total and individual elements within standing rigging systems through the ages of ship evolution was well illuminated with anecdotal evidence, but our modern regulatory authority needed more rigorous engineering to prove the legitimacy of the proposed design. Fortunately, the modern equivalent of the original forged iron straps,



Photo by Jerry Soto

Bob Wilson, Mike McDermott, and Mac McQuinn prepare the deadeyes and shrouds that will support the masts.

chains and spikes anchoring the shrouds to the hull via the deadeye sets could be formed with much higher strength and longer-lived steel with coatings to both preserve and make it appear to the observer as the original forged iron. The sizes of these parts, to fit the context of the ship surrounding them, were proved easily by calculation to be more than adequate to meet the modern requirements for strength and lifespan.

The natural materials, wood and hemp, used in the original deadeyes, shrouds and lashings was another matter, generating strong scrutiny from the Coast Guard and a strenuous effort by our team to source and prove the materials proposed for use in our modern-day interpretation of the ship. Of course, there was plenty of Live Oak and Purpleheart, both good dense woods with close grain structure, in pieces large enough to form the deadeyes and hearts (an open form of deadeye resembling a stirrup shape) left from other parts of the ship's construction. These materials when worked into the required shapes and sizes, and finished with natural linseed oil preservatives, have the appearance and "feel" to be properly representative of the story the ship. The shrouds and stays had to be sourced in a material that would meet the agreed breaking strength parameters of *Germanischer Lloyd's* rules and match the visual dimensions as interpreted from the team's research. This became quite the task for the team as laid-rope materials, commonly available in the market, were found for the most part to be engineered for other purposes and have aesthetics not matching up to our desired effect. Most higher strength ropes were too costly and just plain didn't look right for our application, while low strength natural-looking ropes in our cost range were mostly too large and heavy for our use when paired up with our strength requirements. After much consideration and cycling through manufacturers worldwide at least a half dozen times each (giving the team a thorough knowledge of rope terminology and uses), the team settled on a material called hempex that matched all of our parameters for size, breaking strength, lay, percentage of stretch under load and appearance. The cost for the lengths and sizes we needed was greater than we had hoped, but four out of five isn't bad! The three lower masts, bowsprit and boomkin were stepped in the ship and partially rigged with shrouds and stays for her launch. This is different from traditional methodology wherein the ship was bare of spars and rigging when launched. To do this properly, the standing rigging shrouds and stays are first installed on the masts with terminal deadeyes ready to match up with the corresponding deadeyes anchored at the hull channels (shrouds) or next preceding mast (stays). In order to ensure the correct lengths on installation, the masts were temporarily placed in the hull (level on the building ways) on their respective steps, aligned to true fore/aft and athwartship and the shroud lengths and proper offset angles for deadeye and chains alignment measured. The shrouds are made up in pairs, as normal during the period of interest, each pair (four pairs each side at the main, three pairs each side at the fore, a pair plus one each side at the mizzen) a single length looped around the mast at the top and seized

Photo by Jerry Soto



Tony Hughes and John Kerley fashion the deadeye blocks at the spindle shaper. This specialty shaper was supplied by Con Slack after he closed his carpentry/construction business in Escondido. This act of generosity was quite a windfall for the workers at the build site.

and terminated with a deadeye at each free end. The terminal deadeyes are then lashed to the lower (or fixed) deadeyes by means of lanyards for tensioning. In conjunction with the standing rigging and spars development, the layout of the running rigging—that part of the rigging system that controls the movement of yards and trimming of the sails—was an exercise for the team in the practical confirmation of the various runs and routing of the control lines for the spars and sails. This provides the greatest mechanical advantage and accurate lead without interference with other running or standing parts. Of course, at the same time, the object of the design was to provide a rig that accurately envisioned the layout, look and performance of the original ship's rigging system—at least to the team's best level of understanding of what it might possibly have been.

Volunteer "Deadeye" Bob Letson strikes a pleasant pose after all the hard work of shaping and finishing the deadeyes.





Photos by Maggie Walton





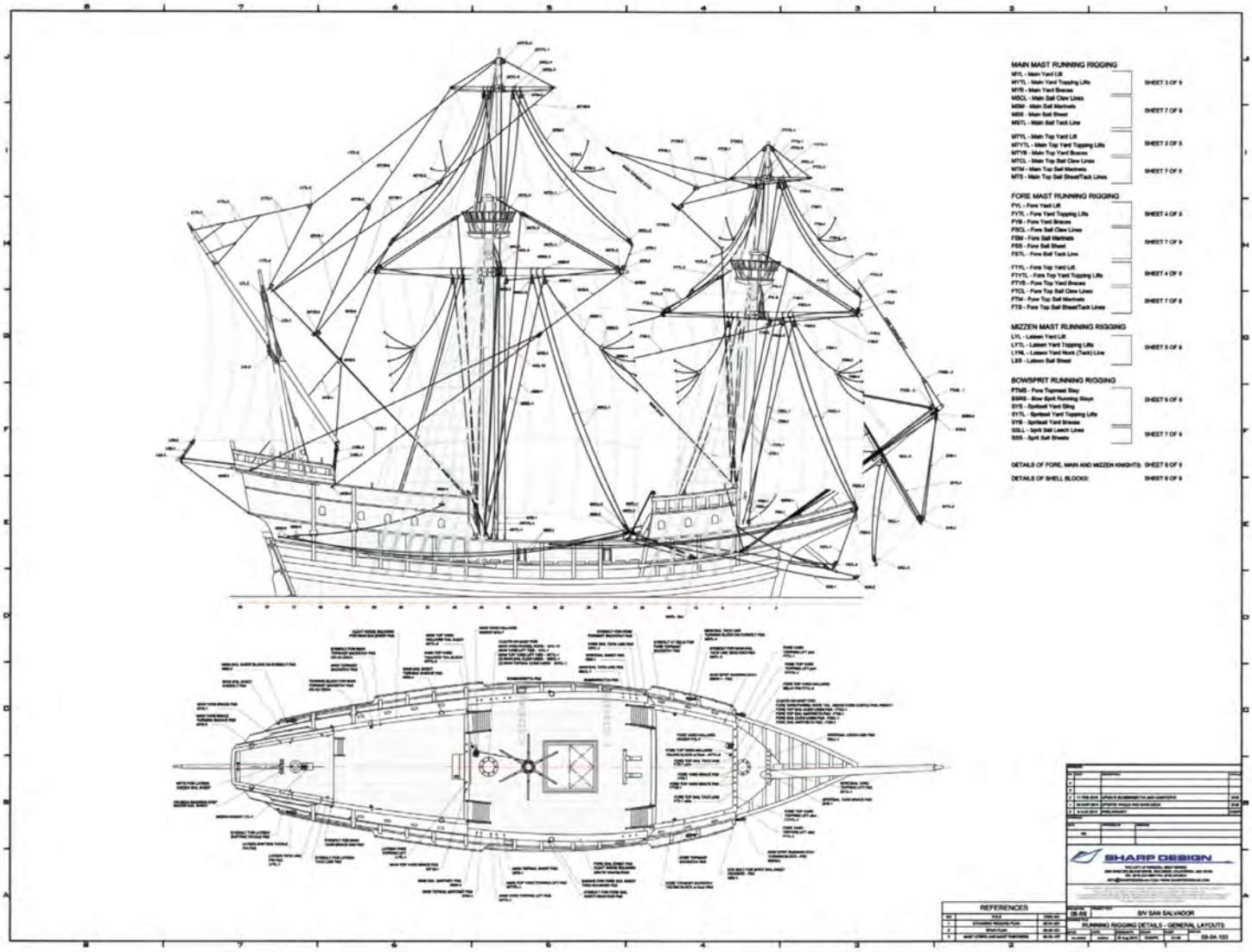
The dry fit of the masts and take-off of standing rigging measurements allowed us to get a visual reference on the rig, vet the proportions and fit, and then also set in motion planning of the complementary running rigging layout.





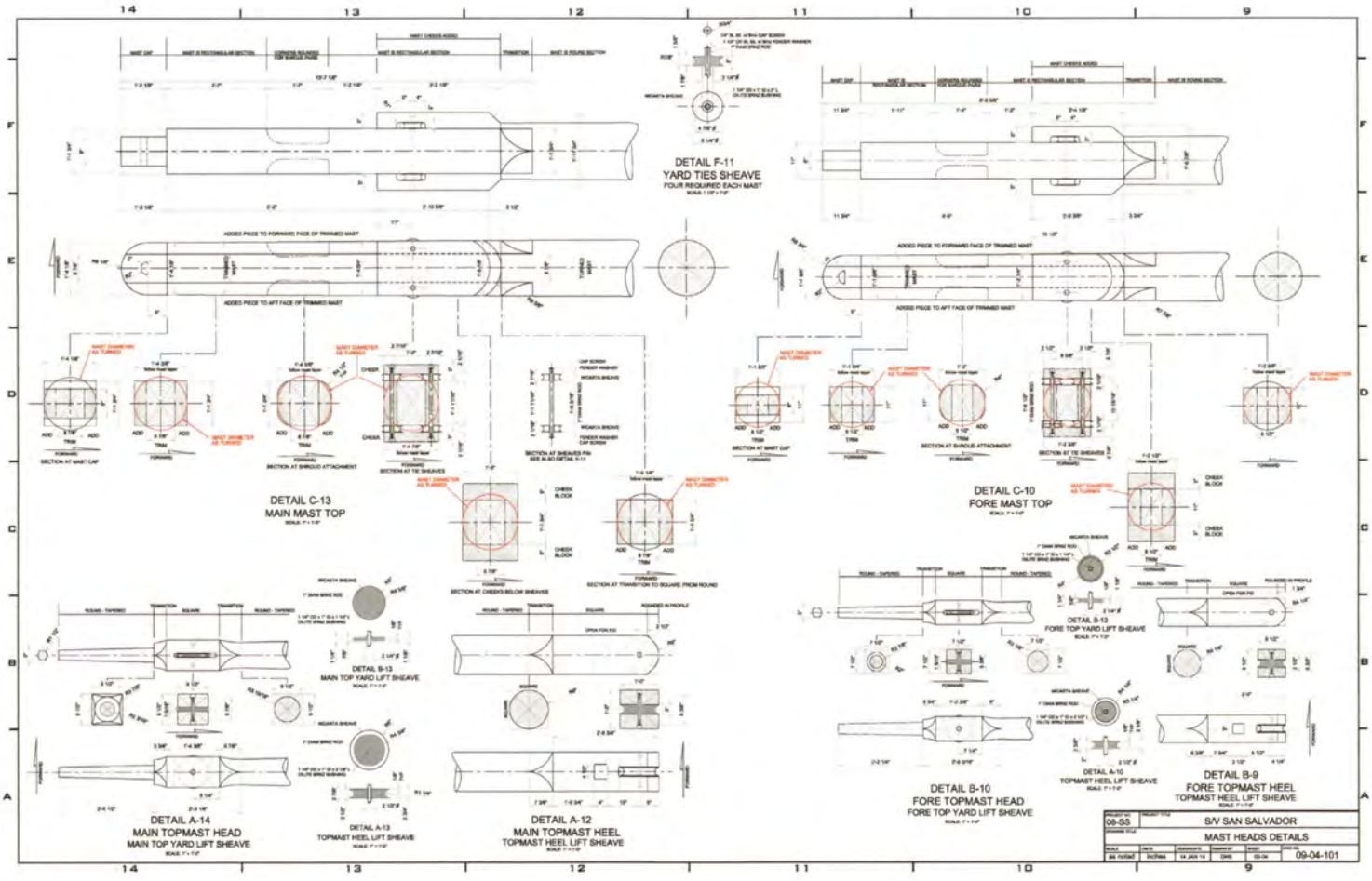


All Photos by Jerry Soto



From the picture formed via the team's historical reference data, it was clear that there was great variation in the details of the running rigging systems of ships of the period based on national, regional and individual preference, availability of materials and other factors, as well as variability in the interpretations of observers and recorders of such data. It is quite conceivable that for many centuries the details of the running rigging layout of individual ships went, in large degree, according to the dictates of their masters and crew, albeit with ethnic prejudice and hard-won experience as guidance. The team had a starting point with rig information gleaned from our "curve of knowledge" and input from consultants, but we had to use liberal imagination and intelligent sleuthing to work backward and forward and separate Spanish from English and Dutch details, as well as put a pin in the exact point in time of the rig development for our 1540s Spanish galleon. To incorporate the ideology of the period and articulate a vision of the rig, the 3D model in prior use for hull, structure, spar and aesthetics development was digitally rigged (all masts, tops and spars, sails, standing and running included) and dynamically activated in order to check the set of the sails, swing and travel of the yards, travel of various running components, entry and exit angles of running components to fixed points in the system, potential interference points between running and standing components and to verify aesthetics of the whole from a variety of viewer's angles and perspectives. Each component of the spars and sails running rigging system has a unique and specific purpose and is also subject to the need for multiple degrees of freedom free of interference with fixed parts of the ship and standing rigging.

The following motions with lengths of travel and practical limits of deployment were studied for the yards and their controlling running rigging: main and fore masts—four crossed yards with vertical lift (ties, halyards, vertical and leveling function (topping lifts), attachment at mast (parrels) and horizontal rotation (braces): mizzen mast—one lateen yard with vertical lift (ties, halyard), yard peaking arrangement (topping lift), attachment at mast (parrels) and control of rotation around the mast for tacking the sail (nock lines): bowsprit—one spritsail yard with linear translation along the spar via slings and trim tackle, and topping lifts and braces to control the vertical and horizontal angle. The fixed foresail boom, for lead of foresail tack lines, and fixed boomkin, for lead of mizzen sail sheet, were also appraised with the model. As well, the sails were accurately included in the model and assessed for freedom of motion and interference, maximum and minimum set angles, sheet and tack line geometry and arrangement of auxiliary sail handling controls, such as in/outhauls, clew lines and martnets. Of special note: the setting, reefing and furling of sails in Spanish ships of this period was done primarily through raising and lowering the yards on which they were set, with the crew reaching the spar or sail working on either the deck or in the main/fore mast tops. The rigging and sails were modeled to reflect this operational mode and thus maintain the ship handling actions as close to our interpretation of the original as possible, to give future crews a true early-Spanish galleon experience and aid in the telling of this part of the story. It remains to be seen whether in practice twenty-first century crews will perform ship handling actions in the same way as the sixteenth-century sailors, considering the main and fore yards will likely be rigged with footropes and the sails rigged with buntlines in a nod to more modern sensibilities.



Stepping forward, a series of two dimensional interlinked guidance drawings were prepared for the construction team using information from the rigged 3D digital model and fully detailing all the many parts of the running rigging system. This series of drawings started with an overview of the total rigged ship with all parts identified, each with a unique number indicating sail or spar location and control function, and systematically stepped through a logical sequence of rigging, starting with spar lift arrangements, passing through yard bracing and rotational controls, sail dimensions and attachment details, sail handling arrangements and attachments to spars, sail sheeting and tacking arrangements with attachment to the ship and cleat/belaying details. Details for each of the knights—posts anchored to the deck at the foot of each mast with multiple sheaves forming the standing part of the halyard arrangement for each of the main, fore and mizzen lateen yards—included determining the number and size of sheaves to provide adequate purchase ratio with the paired halyard block plus size and orientation of the post for proper alignment with the ties and the heaving crew. The details of anchoring the posts to the ship's structure also had to be considered and detailed for construction guidance. In a similar manner, all standing and running parts of the yard controls were sized and located with attachment details at fixed ends, lengths determined, and their fair lead to specific belaying station laid out. In keeping with period accuracy, the end attachment details of yard controls were made with spliced or seized eyes to yard ends, spliced or seized ends at stays (fore yard and top yards braces, spritsail yard topping lifts) or spliced eyes to ring bolts at the hull (no shackles anywhere in the system). The sails—main course and bonnet, fore course and bonnet, main top, fore top, lateen mizzen and spritsail—were laid out in 2D panels and the details of their various attachment points—earrings, cringles, lacings (laskets), robands, and their locations on the sail together with turning block arrangements at clew and tack corners were indicated.

The various sail controls—sheets, tack lines, nock lines, clew lines, martnets—were sized and located with attachment details at fixed ends, at the leech, foot or head locations and at turning blocks on the spars and sail clews, their lengths determined and their fair lead to specific belaying stations or cleats laid out. Special attention was given to working out the arrangements for unlacing (drawing the laskets) of the main and fore bonnets from their respective courses and shifting the sheet, clew line and tack line blocks for these sails from the bonnet clews to the course clews. Sprinkled throughout the series of 2D drawings were specific size and details of the various turning and running blocks (one hundred twenty individual singles, doubles and triples and various line sizes from ½ inch to 1½ inch diameter), details of block strap arrangements (eight variations—single with tail, single with short eye, single long loop tail, eye and becket, pendant with eye, twin double end, single short eye with separate tail), attachment details (five variations—long loop with block passed through, short eye over spar end, short eye dead-lashed and the standing part tied to the becket, twin block strap hitched and seized, tail hitched to spar and tied at the short eye) and details of polished Ash block shells, micarta (chosen for toughness and machinability) sheaves and silicone-bronze pins with oilite bronze bushings for long lasting free-running operation under load. Other details addressed were: gammoning of the bowsprit to the beak, arrangement of the crowsfeet lateen yard topping lift, various end attachment detail, lashing and seizing details and belaying pins, sheaves, cleats locations and the system layout diagram. The belaying plan—locations of all the end belaying points for the various spar and sail controls—was laid out using the 3D digital model and 2D drafting, and incorporated all of the elements of proper lead without interference from line, spar or sail, grouping of functions at desired locations in the ship for most efficient crew operations and consideration of ergonomics of the crew tailing the control line from the belaying point. And thus we are assured that all of the deep visionary thought on the rig and rigging that ended up on 2D layout and detail drawings will work perfectly as drawn. That remains to be seen. When the ship is actively sailed, the picture will be finished. The thought components of the layout will be adjusted to reality, and the transformation from flat two-dimensional paper to multi-dimensional human action and a working ship will be complete.



Turning Vision to Reality—From the Mind to Sailing in Formation

Outlining a vision of what the ship might come to be on paper in written description and two and three dimensional drawings and images respectively is only a part of the story of envisioning the ship and bringing about a living, performing entity with its own unique persona. It is generally observed that ships have individual character (usually referred to in the feminine), when all is said and done, and in service they operate and perform according to the dictates of a uniquely endowed personality. From what source is the ship imbued with a singular charisma—a uniqueness of spirit that allows it to properly appear and act so as to represent the story it is to tell? The answer to that question is bound within the story of our journey to build the *San Salvador*. It is a story about all of the hands and minds that have and will have touched the ship in one way or another during her progression from that first spark of initiative to the days she will be handed to the care and safekeeping of the operations crew. It is partly a story of research into the genesis of the original ship, what made the ship what it was and the human circumstances surrounding her construction and voyages. It is mostly a story about capturing the imagination of a community to support the project with generous donations of time, talent and treasure; it is a story of perseverance through the highs and lows of accomplishing a major shipbuilding project with a homegrown talent pool and management structure; it is a story of the attraction of participation in a curious and unusual project for the times and area, and with it the discovery of personal skills within that were previously unknown and definitely unsuspected. And it is the story of the careful blending of all of these individual storylines together to accomplish the goal as first set out—to build an accurate operational representation of the Spanish galleon *San Salvador*.

Interwoven in the vision of the ship was the practical matter of providing the facility and human resources necessary to properly execute the guidance ideas and physically bring all to fruition. Without proper direction and thoughtful interaction of all in the design/management/construction teams, the drawings, calculations, notes, memos, meetings, instructions, "discussions" and myriad other forms of communicating, the desired result would be not much more than scratch marks on paper and forceful exhalations of air. The continuous interplay of idea-theory-history-engineering-practical application-technique-human dexterity and ingenuity and daily discovery of the skills within as applied to the molding of the ship, always with proper adherence to accomplishing that final goal, is what made the execution happen...and the vision become the reality. Also woven into the vision of the ship were the resourcefulness and saintly patience of those involved in overall management of the project, finding just the right facility in which construction would not only be a part of the telling of the story, but also a part of the character of the ship, finding



the financial resources to keep progress steady and allow for refinement of the vision as the project went along, while managing to keep all diverse interests in the construction of the ship on a steady keel, all moving parts working together beautifully. And finally, a critical element of the envisioning of the ship was the founding idea (some would use the word "insane" to describe this) that the organization—the Maritime Museum of San Diego—could actually pull this whole crazy effort off at all. But so we have, and the result of our journey thus far is the Spanish galleon *San Salvador*.

This photo by Jerry Soto pictures many of the core workers and volunteers who, over the course of the four-year construction, spent nearly 100,000 hours (2011-2015) building *San Salvador*. More than four hundred volunteers, from all over the country, were involved in the project.



San Salvador
Bringing Adventure, Discovery, and History to Life
The Learning Curve

By Susan Sirota, (former MMSD Education Director for 16 Years), Museum Vice President

In 2009, the Museum produced a journal titled: *Into the Unknown: The Historic Voyage of the San Salvador.* It focused on the Age of Discovery leading up to the 1542 voyage that would explore what is now California's coastline. That voyage would define a future Origin story for California. *Into the Unknown* also traced Juan Rodríguez Cabrillo's career as navigator, horseman, captain of crossbowmen, *San Salvador's* shipbuilder in Guatemala, and his subsequent voyage along the Pacific coast in search of the elusive Strait of Anían.

The 2009 journal produced sound research regarding the *San Salvador* and its voyage, and ultimately served as a prospectus of what was to come—the re-creation of *San Salvador* and the reshaping of the nation's Origin story via the sixteenth-century galleon's voyage.

As head of the Education Department in 2009, it was my job to articulate the importance of the ship in expanding and complementing our fleet, which informs thousands of visitors and students alike of our Maritime History. At the time, the Museum was



Woodcut Map by Sebastian Munster, 1544





Photos by Maggie Walton

embarking on its first series of teacher workshops funded by the National Endowment for the Humanities Landmarks of American History and Culture Award. Little did we know then the impact of the Museum's workshops, and how they would gel an ongoing and expansive educational journey whose breadth is reflected in the workshop theme: *Empires of the Wind: the Exploration of the Pacific West Coast of the United States.*

As the design and building of the ship got underway, an inevitable conclusion was realized—the Museum could fulfill its mission—***To serve as the community memory of our seafaring experience by collecting, preserving, and presenting our rich maritime heritage and historic connection with the Pacific world.*** In addition, the San Diego community can now see, feel and touch this history, maintaining the Museum's vision of "Living History."

Well before the completion of the ship, students and visitors were introduced to and immersed in *San Salvador's* lore—the certain magic of going back in time and imagining what it was like: what courage it took, what discomforts were weathered, what heroics emerged—the enormity of the Pacific pitted against the solitary pursuit of three small ships.

What was unimaginable then is real now for all of us to delve into and magnify against our modern-day world. To truly appreciate it, we must have a solid grasp of the Age of Discovery, why it spans a distinctive period of maritime and world history, where *San Salvador* truly lies in the matrix of international power-plays, and why the Pacific Coast's exploration has been minimized against the predominance of East Coast/Atlantic history in the nation's history books?

To date (2015), educational programming for *San Salvador* has taken several forms throughout her construction phase. First, the "Village" or building site, took on the role of interpreting the project at hand. Visitors and students were welcomed and encouraged to survey each facet of the build area, from the re-formation of the boulders found in the desert (below) with conspicuously ship-like drawings, possibly suggesting the first sighting of *San Salvador* by Native Americans, to the blacksmith's forging site, to panels explaining the art of shipbuilding and, most beautifully displayed—the impressive selections of woods that make-up the ship.



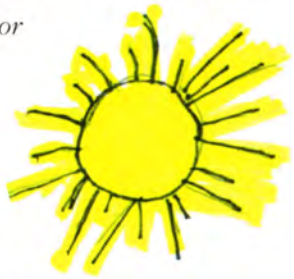




Photos by Maggie Walton



The build site functioned as an outdoor classroom, receiving visiting students and community groups for a variety of programs. From Scout troops to senior living centers, hundreds of guided tours at *San Salvador*'s build site took place while the ship was under construction. Depending on a group's specific interest, *San Salvador* has had an appeal that makes its ever-changing appearance a live demonstration. Students of Marine Archaeology discovered how we determined what *San Salvador* may have looked like; carpenter's apprentices examined the exotic species of wood utilized in her construction, and fourth graders, with the help of Cabrillo National Monument Rangers (below), learned about the explorer Juan Rodríguez Cabrillo and life in the sixteenth century.



Undeniably, *San Salvador* as an exhibit object embodied a moment of "First Contact" that set into motion a series of events that had life-changing consequences for the Native peoples who had lived in this area for thousands of years before Cabrillo explored the coastal waters. Imagining *San Salvador's* emerging presence on the horizon as the small fleet made way into the inlet challenges us to address issues of perspective and how we interpret our common history. Visitors to the build site were able to explore aspects of Kumeyaay life with attention to the construction of a traditional shelter, an Ewaa, and tule boats built by local Kumeyaay College students. Each of these modalities: work project, exhibit, classroom and object of provocation transformed *San Salvador* into a community resource.









Photos by Maggie Walton

Non-profit educational organizations like the Maritime Museum of San Diego provide educators with resources that are Framework appropriate, standard aligned and C3 strategic in design. *San Salvador* will not only be a floating classroom, but it will be an educational resource for those who may never walk on her decks. Building a statewide educational resource is not an easy task, especially in the wake of state and national educational reforms. To understand the state of the California History-Social Sciences and how we have planned for *San Salvador* to be a resource for teachers requires a brief description of the statewide educational reforms and how to navigate through them.

For the past six years, changes to the History Framework have been debated and drafts of these changes are anticipated to be published sometime in 2015 or 2016. Legislative action suspended development of the Framework in 2009, yet the California State Content Standards for History-Social Sciences have remained in place, but they are no longer State tested, which signaled to some teachers that "History" is no longer important in their curricula. College Career and Civic Life (C3) is a Framework developed by several Social Studies organizations and while not a set of standards, it was intended to help districts develop instructional strategies and practices that align with the broader goals of the Common Core State Standard movement that was adopted by the State Board of Education in the areas of English Language Arts and Mathematics. The California Common Core State Standards do contain reading and writing standards for History-Social Studies for grades 6-12, and these reading standards are meant to complement the specific content demands of the disciplines—not replace them. By using the *San Salvador's* education program, the Museum has created meaningful resources that educators can use both now and in the foreseeable future. At the same time legislative action suspended development of the Framework in 2009, the Museum received its first National Endowment for the Humanities Landmarks of American History and Culture award.

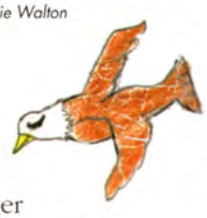




Photo by Ted Walton







The year 2015 marks the fourth NEH series of Teacher Workshops at the Maritime Museum. From demonstrations of traditional skills by Kumeyaay historian and teacher Stanley Rodriguez (top left), to mustering all hands aboard the Museum's Tall ship *Californian* (below right)**, the Teachers' Workshops offer unique and intensive courses delving into the Pacific vantage of American History.**

This grant gave the Museum the opportunity to reach out to a national audience of school teachers and to carry out week-long workshops about America's **Pacific** beginnings. The workshops' outstanding academic faculty consisted of local historians: Dr. Raymond Ashley (MMSD President), Dr. Jim Cassidy (U.S. Navy Civilian, Ret.), Dr. Steven Colston (SDSU), Dr. Iris Engstrand (USD),



Captain Bruce Linder (USN, Ret., Coronado Historical Association), Dr. David Ringrose (UCSD), Stanley Rodriguez (Kumeyaay College) and Dr. Kevin Sheehan (SDSU/MMSD). The in-depth workshops allowed us to begin examining the way American History is presented and to provide a complementary West Coast perspective, beyond the traditional East to West projection of the Atlantic world. This year (2015) marks the fourth NEH award the MMSD has received, and through the combined resources and talents of our NEH faculty and workshop participants, we now possess an invaluable cache of curriculum specific to the *San Salvador* and West Coast History. These lesson plans, as well as the presentations developed for the NEH workshops, are the stimulus for the creation of *San Salvador's* most ambitious educational resource, **Project EXPLORE.**





Photos by Maggie Walton

Project EXPLORE (*Experiential Learning Opportunity & Resource Enhancement*) is designed to be an online, multi-media space facilitating the investigation of the Age of Exploration with particular attention to *San Salvador*. Through a variety of media, including onboard distance-learning technology, still images, social media, downloadable curricula, lesson plans, and guided museum field trips, students at all levels will have the opportunity to gain an enriched understanding of daily life in the Age of Exploration, the socio-economic forces and technologies supporting voyages such as *San Salvador's*, and the legacy of such voyages in our present society. **EXPLORE** will place students and educators at the center of a rich resource that each can use to meet his or her own needs, beyond the current map of our statewide history debates and legislative entanglements. To date, we are still exploring how to fund all elements of Project **EXPLORE**, but we are confident that the overarching importance of the Project will generate intense interest and that interest will transition into financial support.

Since *San Salvador's* construction began, MMSD has been developing educational partners and working with an array of consultants: The National Park Service, San Diego County Office of Education, San Diego Unified School District, California State Parks and Recreation, NOAA, the National Endowment for the Humanities, and a collaboration of several consultants associated with Native American inclusion in the program evaluation and assessment. In addition, several hosting ports made up of regional educational institutions and museums in California are creating additional resources across a variety of media to meet the educational interests and needs of students and teachers addressing local and regional themes.

Each port *San Salvador* visits will have its opportunity to connect with its local history and the themes they deem important to their community. These statewide partnerships reflect the expansive appeal of using the sixteenth-century galleon as an educational resource well beyond our San Diego waters. If one combines *San Salvador's* physical impression and ability to visit many of California's coastal communities with **EXPLORE's** online capabilities, the overall footprint is potentially enormous, reaching audiences with or without access to the coast or to *San Salvador's* decks.

When *San Salvador* is not sailing or keeping school groups occupied, she will be accessible to visitors who can explore her decks and encounter what life was like aboard a sixteenth-century Spanish galleon. Through a series of text panels, ship models, artifacts, navigational instruments, charts and tools, visitors will weave through information that will prepare them for setting foot aboard the time machine. Once on board, visitors will be impressed by the sights, sounds and smells of the ship of exploration, feeling as though her crew had just stepped ashore. *San Salvador* will remain in this interpretative mode without the use of text panels to give visitors the most authentic experience while remaining true to Museum safety standards. With the help of volunteer docents and interpretative staff from the National Park Service and the Maritime Museum, we will be able to give visitors a totally immersive experience. After disembarking, visitors will have the opportunity to learn more about the ship's construction process, with attention paid to the process and people who helped build her. Plans for an additional Museum theater performance are being created with community partners, entitled "Voices from the Edge of the Map," which will introduce five historical figures from the



Cabrillo National Monument

Age of Exploration with the intention of engaging our audiences in a facilitated dialogue about what it means to be an explorer. It is our hope that *San Salvador* becomes the platform for developing and inspiring exploration.

San Salvador allows us to explore our American West Coast beginnings, our place on the map, while being able to provide a total immersion experience for visitors. *San Salvador*, in its original design, is the one purpose-built object that allows people to engage in the unknown, to take explorers to the edge of the map where outcomes were uncertain, unpredictable and in some cases unlikely. Our history—how history is taught to students at the Museum—strives to give students the sense that history is not just written but lived by people just like us. *San Salvador* should facilitate that concept for years to come.

The ship's keel was laid in April 2011— a public statement that symbolized that the lines of our ship were being cast off the dock, and we were all communally underway. Like Cabrillo, who built the original *San Salvador*, we likewise embarked upon a journey of discovery filled with surprises, setbacks, disappointments, first encounters, and random acts of good fortune. This ambitious project, more so than any other, reaffirmed the Museum's premise that the world we live in is not inevitable, and events can often seem unlikely to the people living in them.



Fourth Grader at Dailard Elementary in 2008, Richie Gonsalves skillfully captured his image of Juan Rodríguez Cabrillo.

Courtesy Cabrillo Festival Art Contest

Exploration involves taking great risks, making mistakes and learning from them, keeping an open mind, and maintaining trust. For some, once construction was finished and the ship was launched, their time with *San Salvador* was completed. For those involved with sailing the ship, we are about to embark on a new adventure. For those who are charged with maintaining the ship and implementing the educational programing that will take place on her decks, online, or at the various ports up and down the coast of California, the journey is just about to begin. *San Salvador* was the start of an ambitious project that took far more time, energy and resources than any of us imagined. But it was also the start of something much greater than the ship itself.

As long as the Museum's mission includes *Bringing Adventure, Discovery, and History to Life;* we will always need *San Salvador* to take us there.



Hilda Valdez, a fourth grader from Perkins Elementary in 2008, presented her lively view of Cabrillo's flagship, *San Salvador*.

Courtesy Cabrillo Festival Art Contest

Teacher Resources for the Study of *San Salvador*

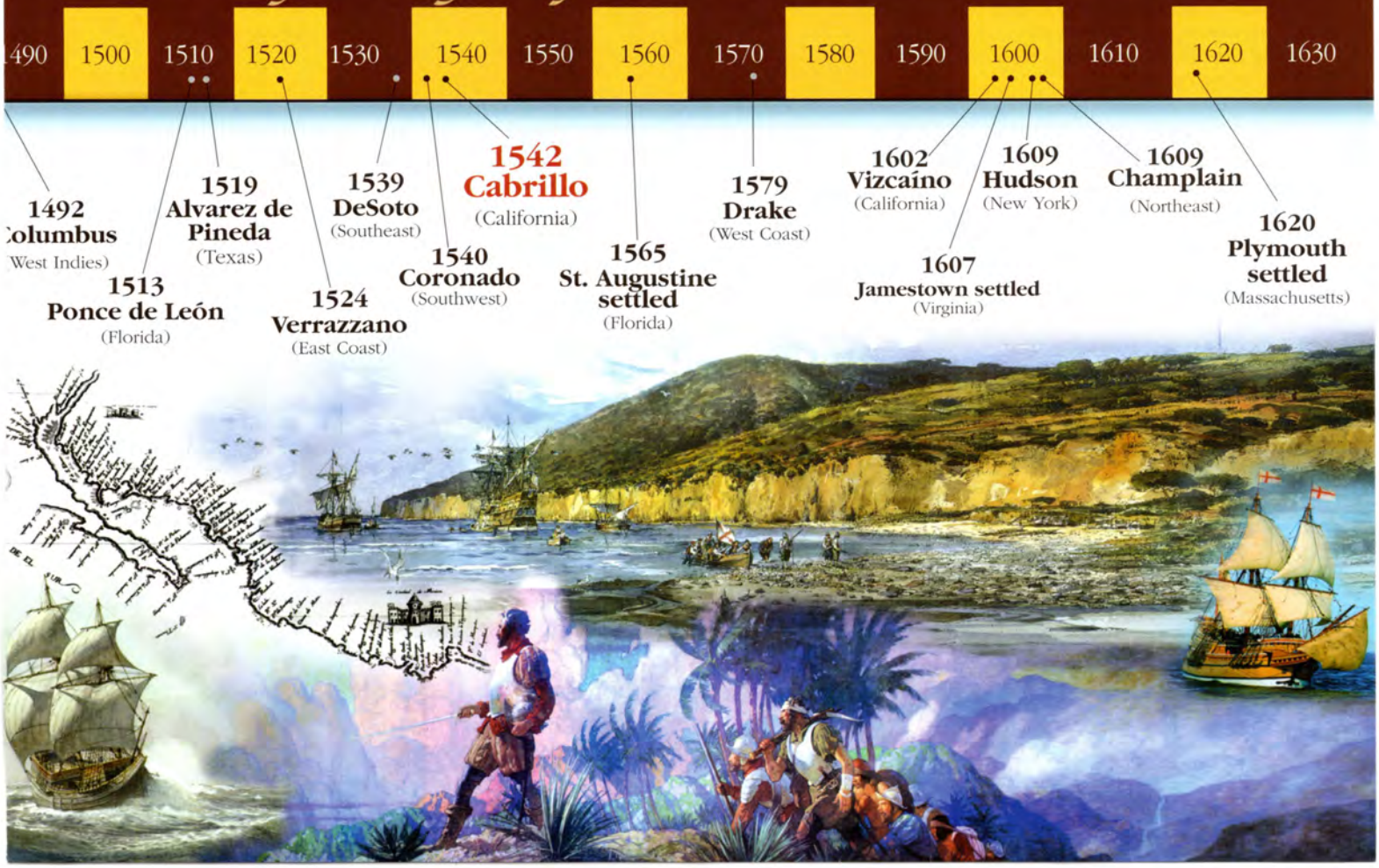
The voyage of explorer Juan Rodríguez Cabrillo along the coast of California in 1542, provides California and the United States West Coast with its Origin story—the first interaction of European explorers with indigenous peoples, the first time that California was plotted on the maps of the world, and the first hint of the multi-cultural society that California would become. The study of Cabrillo and his flagship *San Salvador* touches on a host of subjects that stand as the cornerstone of California History and Social Science studies.

California History-Social Science Content Standards K-12

The study of the voyage of the *San Salvador* provides rich ground for a host of instructional subjects in history including:

- The first European exploration of the coast of California.
- The first cultural interaction between Europeans and the well-established Native peoples of California.
- The importance of the evolving technologies including mathematics, astronomy, measurements in nature, navigation, map-making and weather, and how they assisted the worldwide exploration in the sixteenth century.
- The impact in California of the spread of Spanish culture, economy, and government.
- Cabrillo's voyage (1542) in the context of other explorations and settlements in the present-day United States including those of DeSoto, Ponce de León, Cabot, Coronado, Bering, and Hudson, and settlements in St. Augustine (1565), Jamestown (1607), and Plymouth (1620).
- The study and importance of early maps showing California as an island and an unexplored Pacific Ocean leading toward China and the Spice Islands.

Timeline of Early Exploration in the United States



Building *San Salvador* It Takes a Village

The *San Salvador* Village evolved slowly from an empty parking lot at Spanish Landing into a shipbuilding site, learning center, demonstration venue, special events locale and into a place where hundreds of thousands of visitors viewed, in absolute wonderment, the construction of the sixteenth-century galleon.



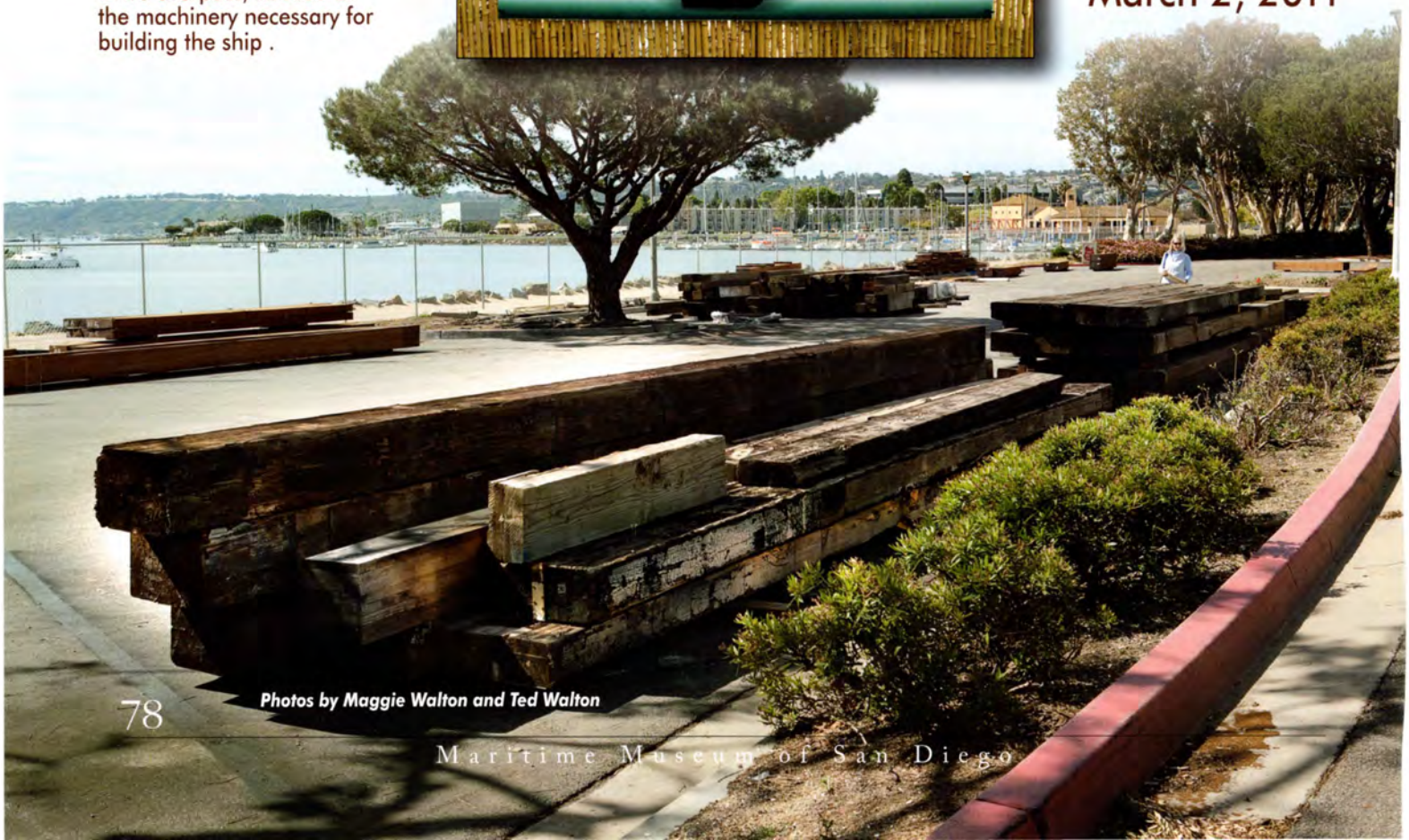




Above: Shows the process of lofting the offsets that created the correct curvature for the hull shape. The work station, hidden away under the North Harbor Drive overpass, housed all the machinery necessary for building the ship .

Above: Workers begin assembly of the ways in the parking lot.

March 2, 2011



Photos by Maggie Walton and Ted Walton







Above: Mayor Kevin Falconer, former City Councilman, pounded his initials into the keel of *San Salvador*, and all guests followed suit. The ship then sails with good friends and supporters forever remembered.

Above Left: Museum Curator Kevin Sheehan stands next to MMSD Master ship modeler Joe Bompensiero who has built four models of *San Salvador* over twenty years, tracking design changes. Congressman Scott Peters (then Port Commissioner) stands next to J. Craig Venter, founder of the Venter Institute, as they inspect the ship model with MMSD volunteer Dick Wold. Top Right: Cabrillo National Monument Superintendent Tom Workman stands with the Living History Program enactors.

Below Middle: County Supervisor Greg Cox, Chairman Anthony Pico of the Viejas Band of Kumeyaay Indians, Naval Architect Douglas Sharp and Museum President Ray Ashley form an indelible bond of partnerships in support of the enormous undertaking before them.

Below Right: Anthony Pico greets college professor and Kumeyaay Historian Stanley Rodriguez as he finishes his presentation—a shared knowledge of the "First Contact".





Keel-laying April 15, 2011

Many dignitaries, Museum members, staff and volunteers, Cabrillo National Monument staff and volunteers, leaders of the Kumeyaay community, along with members of the Press, celebrated the laying of the keel on April 15, 2011.



Photos by Maggie Walton and Ted Walton





Above: **The spectra of the keel-laying ceremony engaged many San Diegans.**

Above Right: **Professors Carla Rahn Phillips and Iris Engstrand contributed their expertise to the project, researching the historical details of *San Salvador*.**

Work begins in earnest. In the background the stem has just been set, as Don Davis trunnels on the horning stage.



Photos by Maggie Walton



Above: **Master Shipwright Peter Wilson shapes the transom frame.**

Right: **Pat Osborne planes the frame futtocks.**

October 2011





The framing required constant synchronizing of materials from delivery, to fabrication, to implementing, while the workers shared all the jobs of building the galleon.

November 2011

Photos by Maggie Walton







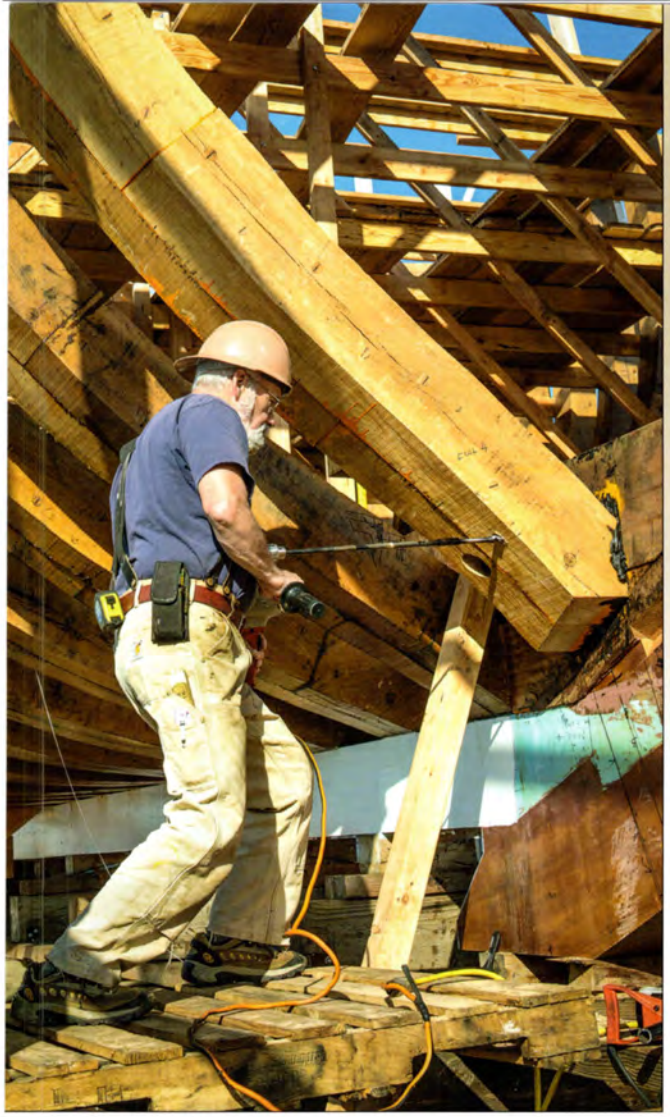


Photo by Jerry Soto

Shipwrights and volunteers work alongside each other. From sawing and planing to shaping every intricate part of the wooden ship, *San Salvador* slowly came to life.



Photo by Ted Walton





Photos by Maggie Walton

Below: Pictured are the original core of workers. The team would eventually lessen to a handful of workers, with the majority being volunteers—a necessity as the financial climate turned gloomy.

2012



Photo by Ted Walton





Photos by Maggie Walton



Photo by Ted Walton



The Urban Corps stopped by the Village to put in their time in support of the project. Over the four-year building period more than 400 volunteers joined the construction effort.

MMSD Volunteers, like Eileen Stevenson, pitched in their energy, skill and good humor, daily.



Photo by Jerry Soto

Above: Master Shipwright Frank Townsend caulks the deck planks using oakum he has spun by hand.

Below: Frank shapes the hanging knees.

Right: Under the hard press of summer sun, the workers plank the main deck, a painstaking process requiring monumental planning, patience and coordination of all efforts.

2012—2013



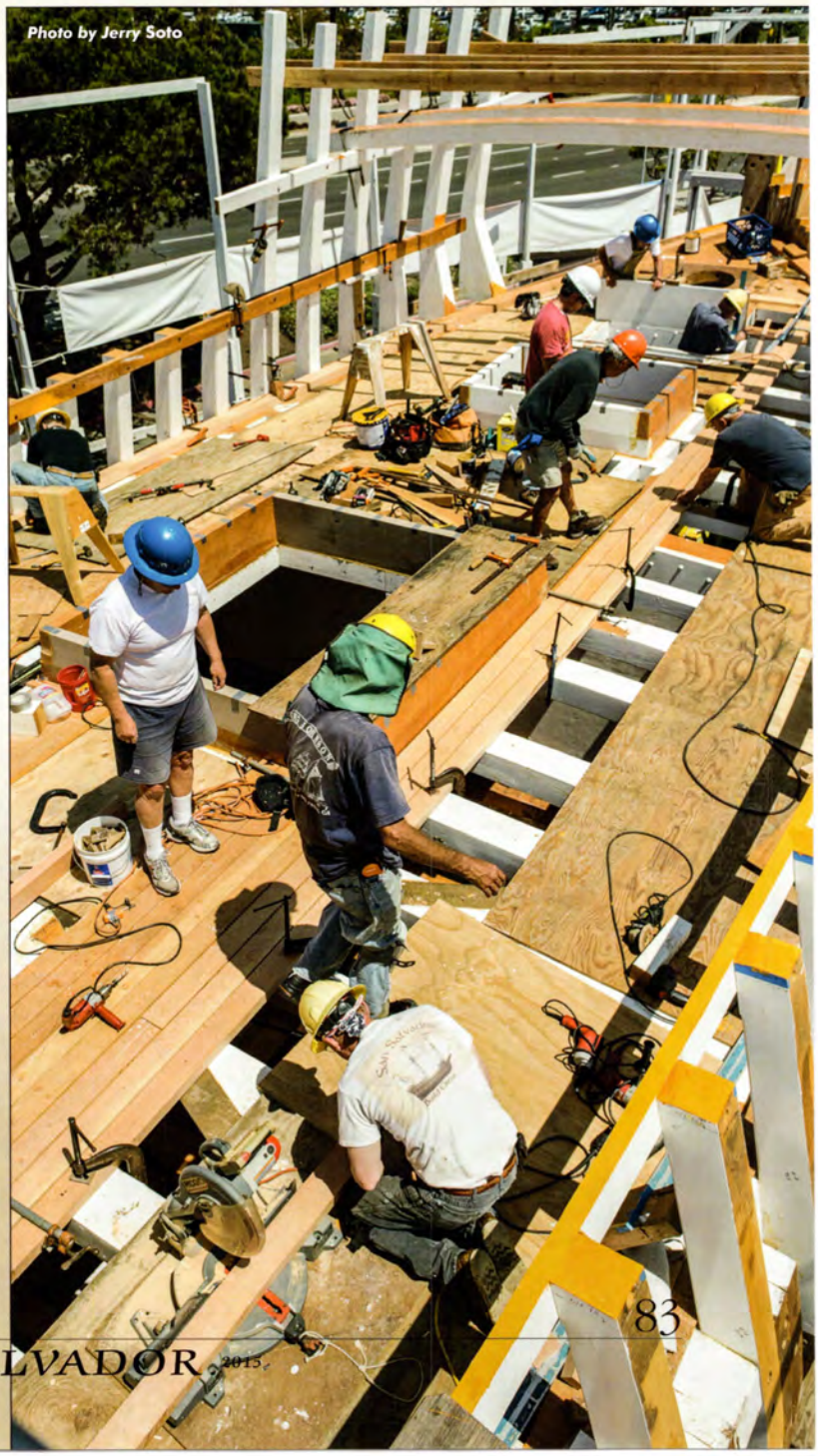
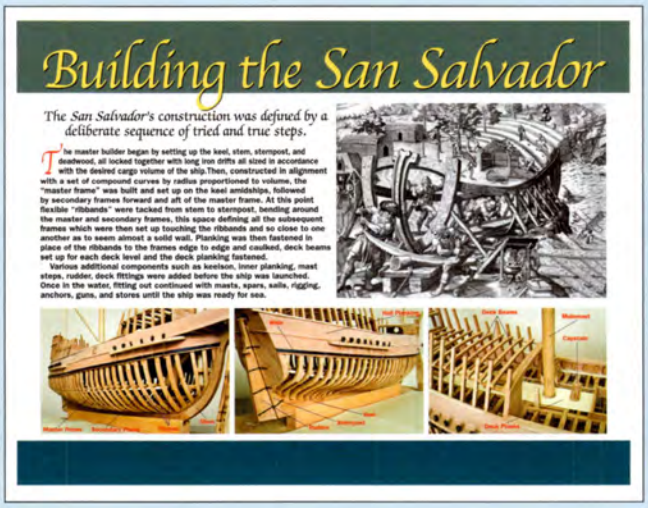


Photo by Jerry Soto

My story is simple. I wanted to build a boat next to my garage after I retired. After retiring, while visiting the build site, Labor Day 2012, it occurred to me that this could be the boat I was destined to build. The following Monday morning, I reported to the build site and began helping install the bulkhead at frame #60, followed days later by stiffeners, followed days later by cleats, followed weeks later by top timbers, followed months later by wales, followed months later by the foremast, followed months later by electrical work... and so it went.... In no time, and a few volunteer hours later, a ship evolved. An assembly of my few parts, with those of so many others, came together. It is easy to see individual parts of the ship from the hands and talent of so many dedicated people, formed for a larger purpose. From my perspective, San Salvador has become something much larger than I first envisioned. A ship much greater in purpose than I envisioned. A history worthy of being passed down to future generations. A time machine capable of bringing the past into the present and the present into the future. A tangible object to touch the imagination and excite so many yet to see—San Salvador.

—Ken Houseman (5,000 hrs. plus)
Retired Southern California Edison,
Operations Supervisor, San Onofre
Nuclear Generating Station.



July 2013

Ken stands far left: Second level from top deck

Photo by Ted Walton





Photos by Maggie Walton



Photo by Jerry Soto



Above Left: Volunteers, like Ken Cheney, arrived never knowing what the job of the day might be.

Above Middle: Dr. Carla Rahn Phillips worked on the ship whenever she was in San Diego. She chaired the historical advisory committee that researched and planned the construction.

Left: Master Shipwright Peter Wilson and Don Davis model their protective gear as Lynne Eddy (right) shows the grittier part of the job.



Above: Volunteers John Kerley and Dan McNaughton work on the upper deck house, while Mark Bracker (below) tends to driving in the spikes. Together these men totaled more than 10,000 hours of labor.

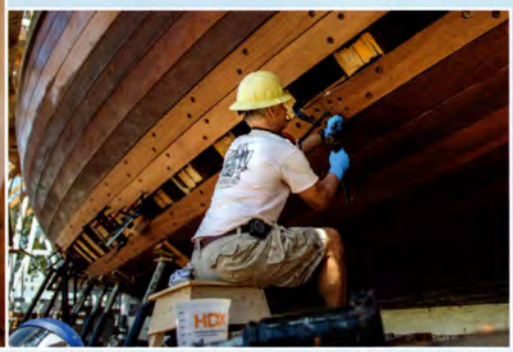


Photo by Jerry Soto

Behind the masks are men and women who have donated not just hundreds, but thousands of hours working on the historic ship of discovery. In turn, they discovered how to build a 16th-century galleon.

Working on the San Salvador was a great experience. It was wonderful working with all the trained craftsmen, and they were interested and willing to train us novices to the best of our abilities and interests. I am now an experienced tradesperson in painting! I have painted, and repainted, a large part of the interior of the ship. It's a great group of people to spend a lot of time with. We had fun get-togethers, including barbequed lunches....

— Lynne Eddy (1,000 hrs. plus)

December 2013

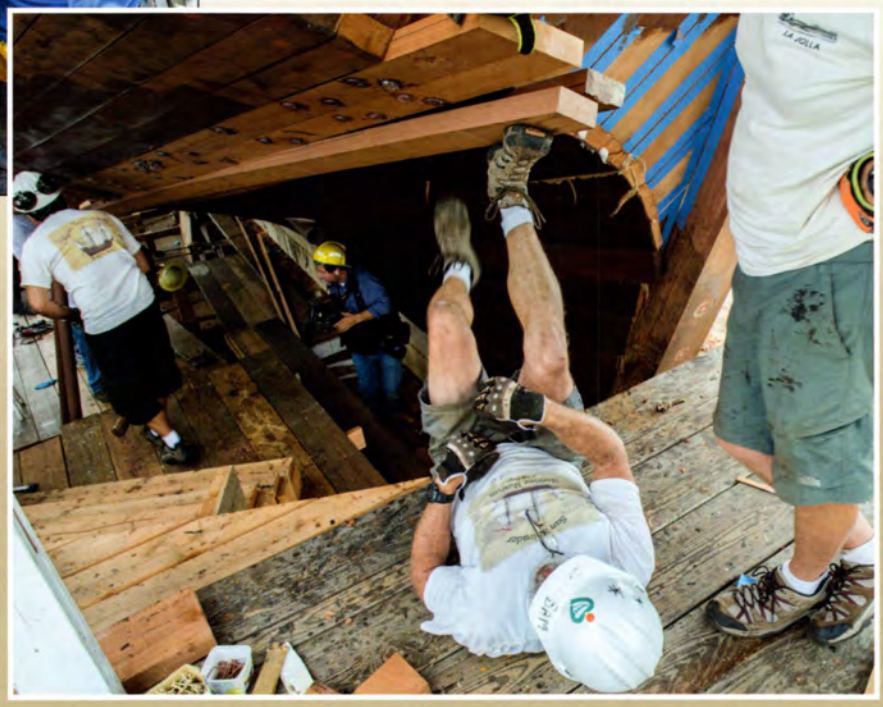


Photo by Maggie Walton



Photos by Jerry Soto





July 2014

An historic waypoint is reached as the final plank, the "shutter plank," is fastened to the hull of *San Salvador*. The plank is called the "shutter plank" because it shuts in and completes the hull. It is sometimes called the "whiskey plank" because its setting is cause for celebration.

May 30, 2014

Photos by Neva Sullaway





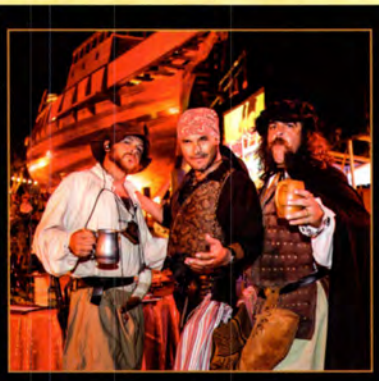
Photo by Jerry Soto



San Salvador's naval architect Douglas Sharp received the *Decoración de la Cruz Oficial de la Orden de Isabel la Católica* (Spain's symbol of being knighted), from the Consul General of Spain in Los Angeles, the Honorable José Luis Solano Gadea. Sharp was honored for his research and design of the sixteenth-century galleon. Looking on is the Ambassador of Spain to the United States, His Excellency Ramón Gil-Casares. After the ceremony Museum President Ray Ashley led a tour of the ship for the dignitaries and guests.

San Salvador FANDANGO

September 27, 2014



The *San Salvador* Fandango Gala provided a magical evening to celebrate the near completion of the ship, recognizing a date of immense importance—September 28, 1542—the date Cabrillo and his small fleet sailed into San Diego Bay (naming it San Miguel Arcángel).



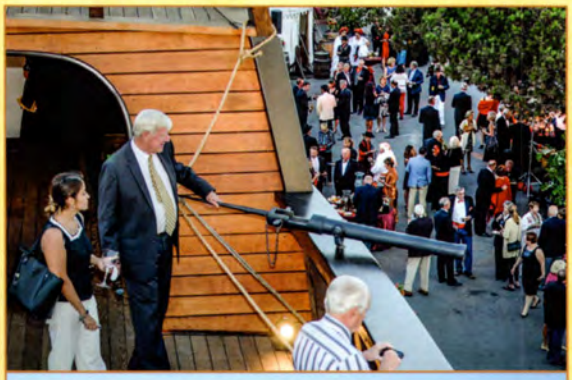


Photo by Mark Gallant



Photo by Neva Sullaway



Photos by Maggie and Ted Walton



Photo by Maggie Walton



Photo by Maggie Walton



Photo by Ted Walton



Photo by Ted Walton



Photo by Jerry Soto

MMSD Volunteer Coordinator Jeff Loman tests the bombardeta.

January 2015

Moving into the fourth winter at the build site, *San Salvador* came to fruition.

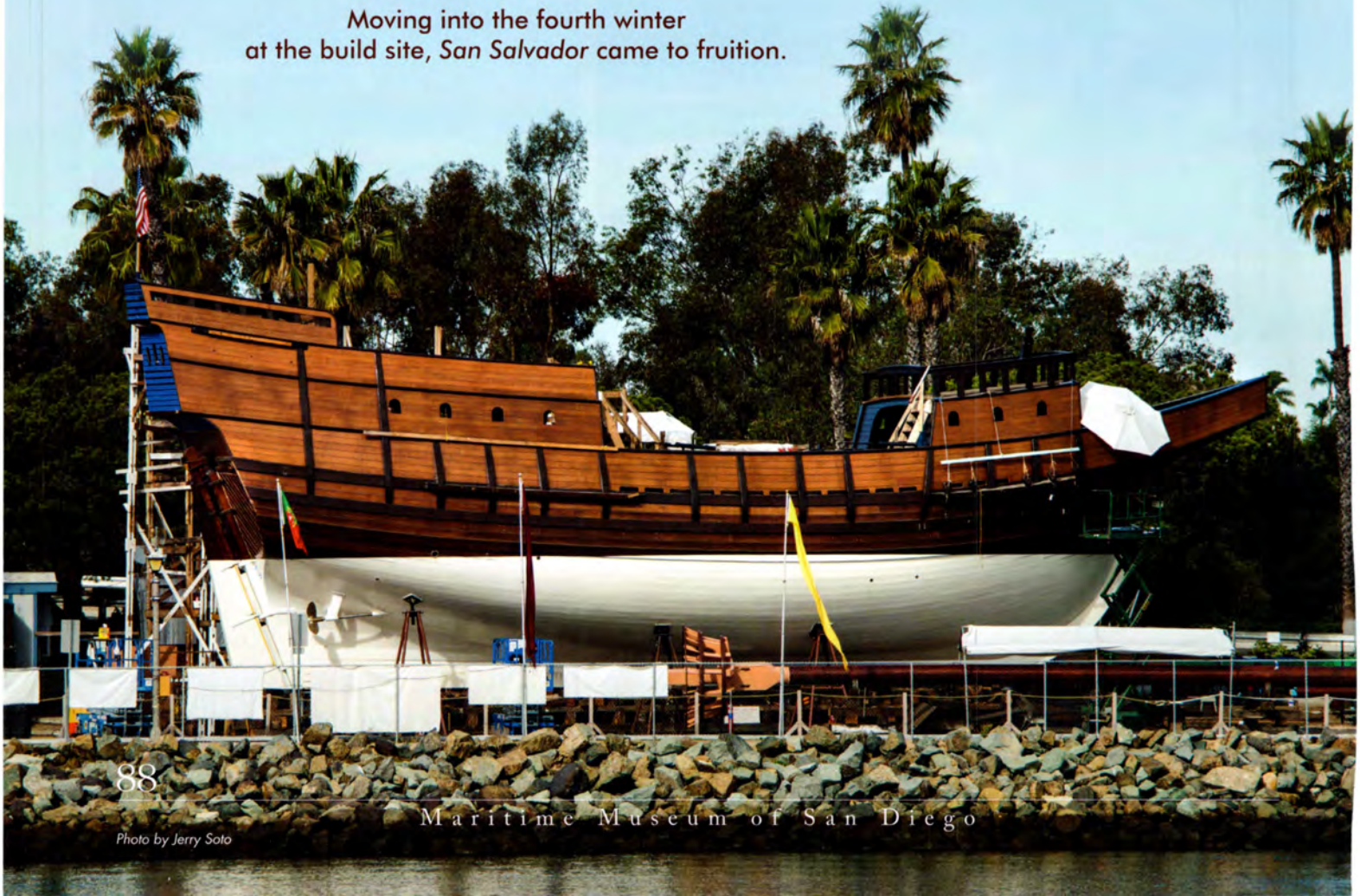
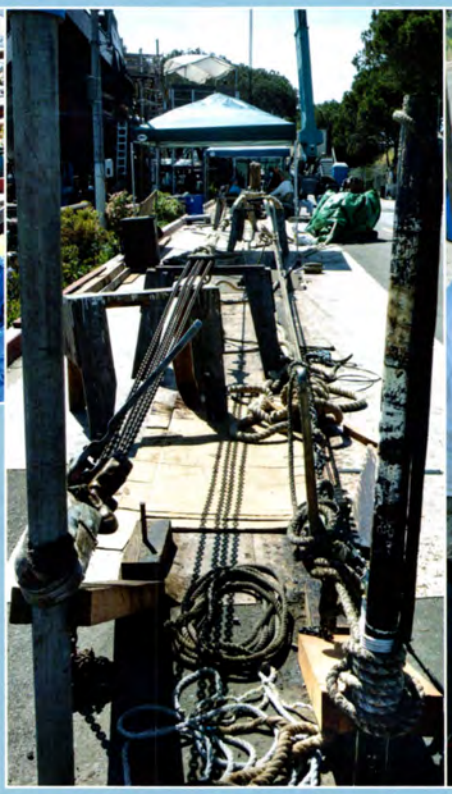
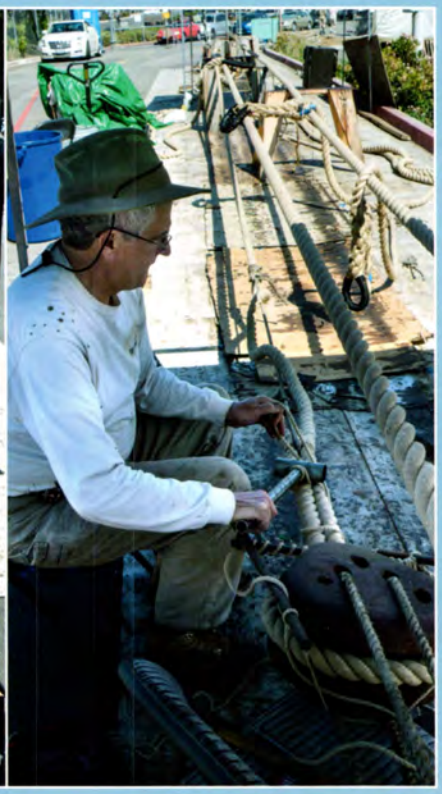


Photo by Jerry Soto







Above: **A knowledge of the traditional craft is an essential part of the work. Bob Seegmiller** (front left) **looks over the process of seizing the deadeyes with John Kerley (3,000 hrs. plus), Mike McDermott, and Bob Wilson (2,000 hrs. plus).**

Right: **All the while the crew made steady headway preparing each and every rigging facet for the ship—a complex matrix of shrouds, stays, lashings, lanyards, and deadeye adjustment systems—all designed to approximate the traditional look of the 16th-century galleon.**

When all was finally reckoned, there were two and one-half tons of paint, adhesives, sealers and preservatives applied by hand, mostly by volunteers, to the ship's hull structure during the construction process.

—Douglas Sharp,
San Salvador's Naval Architect

April 2015

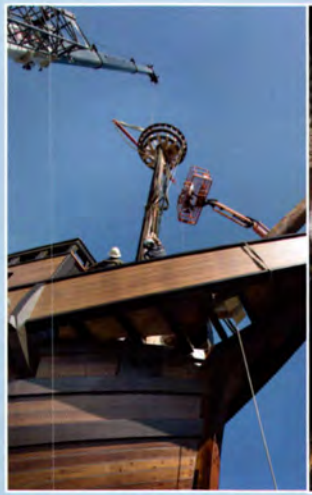


All Photos by Jerry Soto

June 2015



Photographer Jerry Soto documented the sequence of stepping the three masts.





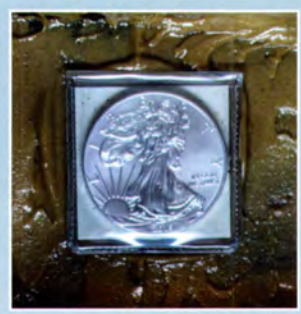


Of note is the traditional placement of a coin under the mainmast for good luck. Cabrillo National Monument graciously offered one of their museum treasures—a copper Maravedi from the Seville Mint in the name of Fernando and Isabel. Dated between 1479 to 1504, the coins from this era were in official circulation in the New World until 1545.









Above: A U.S. silver dollar was placed under the mizzenmast.







Peter Wilson supervises the stepping of the mizzenmast, while Joe Rocco (white shirt) and John Kerley maneuver it into place. Jack Mullen (blue helmet) stands by ready to assist.







John Kerley (above middle), Jack Mullen (above right) and Karen Kuzmiak (lower right) reeve lanyards to connect upper and lower deadeyes and hearts to tension the standing rigging (shrouds and stays) on the hull channels.



Left: Tadd Mannino, Karen Kuzmiak, and David Clark install the gammoning to secure the bowsprit.







otos by Jerry Soto







Photos left by Ted Walton



Right: Some impatient volunteers decided it was time to get *San Salvador* to water.

Photos right by Jerry Soto

The hoped for embarkation date was rained out, but work proceeded through the day and night to prepare *San Salvador* for her trip across the uniquely engineered ways. *San Salvador* was turned 90° from her construction angle of four years, toward Harbor Island's west basin. It then took several hours for Marine Group Boat Works' 40-wheeled hydraulic cradle to maneuver into place, bracing the hull as it went. The process was then reversed the next day as the ship, then fully mounted on the cradle made way toward the bay, with each set of hydraulic wheels lifting or lowering to accommodate the transport of the nearly 200-ton ship. The tide changed and the nerve-racking journey over Titan Steel girders to the barge was finally accomplished on July 22, 2015.







Above: *San Salvador* appears as an aberration as the morning light breaks through the clouds, illuminating the ship against the city skyline.

Photos by Neva Sullaway

July 22, 2015

Many longtime supporters gathered to watch the complex undertaking and celebrated the moment of *San Salvador's* movement seaward. Board of Directors: (left to right) Dennis Burks, Bob Clelland, Iris Engstrand, Bill Dysart and Maritime Museum incoming Vice President, Susan Sirota, share a communal sigh of relief and excitement for this long-awaited accomplishment.



Onlookers, including *San Salvador's* designer Doug Sharp, are relieved but anxious to get the galleon safely to the Marine Group shipyard in Chula Vista, under power thanks to Pacific Tugboat Service.

Photo by Ted Walton





Photos by Ted Walton

The sixteenth-century galleon's first encounter with an aircraft carrier (above), and the juxtaposition of San Diego city high-rises—unimaginable until these moments on July 22, 2015.



Photo by Jerry Soto



Master Shipwright Peter Wilson (left), Mike McDermott, Ken Houseman, and Don Davis take a well deserved moment to toast to the success of the first leg of *San Salvador's* journey to dry dock.



San Salvador's naval architect Doug Sharp, the Museum's Vice President and Project Manager, Mark Montijo, Museum President Ray Ashley share a photo op at Marine Group Boat Works before moving on to inspect the other Museum ships being worked on at the same time.

HMS *Surprise* (replica of a 1700s British frigate), *Medea* (1904 Edwardian steam yacht) and *San Salvador* (1542 replica of the Spanish galleon) create a ponderous historic maritime moment for onlookers.

KUSI's news crew was first on the scene to capture the experience for San Diego's nightly news.

Photos by Jerry Soto

SAN SALVADOR

May Good Fortune Follow Her Wherever She Sails







Photo by Molly McClain, USD

Port of San Diego Chairman Dan Malcolm (at the podium) congratulates Museum President Ray Ashley on the accomplishment of building the 16th-century galleon, and the importance of the historic ship for San Diego and California. County Supervisor Greg Cox and Chula Vista Councilmember Steve Miesen (far left) look on. Above Right: Mayor of Chula Vista, Mary Salas, remembered when the early hopes to build *San Salvador* in Chula Vista were dashed, and celebrated with the spectators the excitement of seeing *San Salvador* christened and launched in Chula Vista—Museum President Ray Ashley's hometown.



Photos by Maggie Walton



Photo by Neva Sullaway



Above: Carolyn Sharp helps guide the christening bottle of Spanish wine with Mrs. Daniel McKinney. The moment is heralded by the *Californian* firing her guns.

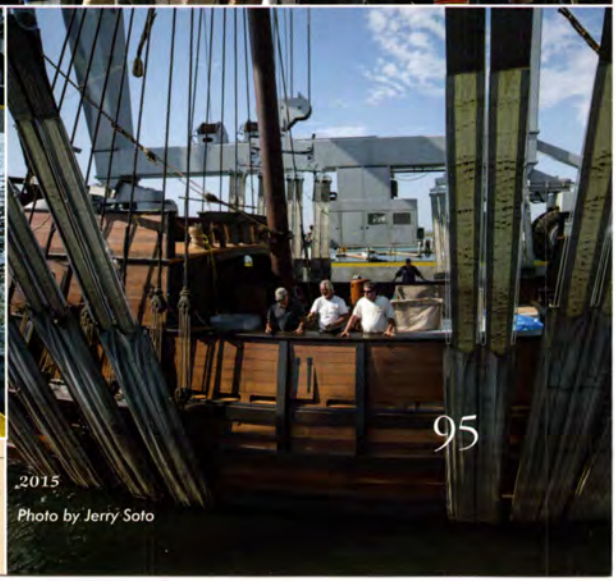
Volunteers John Kerley (left), Mary McQuinn, Nancy Hupp, Mac McQuinn, Eileen Stevenson and former project manager Bruce Heyman (in back), celebrate the moment.



Photo by Neva Sullaway







Photos by Ted Walton

Right: *San Salvador's* Naval Architect Doug Sharp shares the joyous moment with his wife Carolyn.

Photo by Jerry Soto

Thank You to our *San*

Rommel Alberto
Tony Fukutake Amezcua
Aage Andersen ★
John Andershonis
Marysa Andriola
Paul Anes ★
Dante Anthony
Bob Antigua
Frank Aspuria
Sally Ault
Danielle A. Austin
Lorenzo Bader
Douglas D. Bailey
Susan Baird
Jamie Bandon
Brett Barahura
Fred Bast
Irene Batch
Raul Becerra
Andrew Behr
Mike Bell
Kevin Bennett
Noah Bennett
John S. Benya
David Berg
Andrew Berk
Rita Better
Richard Bezman
Terry Blackledge
James Blacksworth
Ivan Blair
Kathi Blocher
Whitney Blocher
Kathi Blocker
Lorenzo Boder
Richard Bolt
Jupiter Bongolan
Michael Joseph Bonner
Stephen Boulanger
James A. Bourdon
Lewis Brackea
Mark D. Bracker ★★★
James Bregante
Tom Brill
Randall H. Brinton
Tom Britt
Kathi Brocher
Mark Brooks
Summer Brooks
Norman C. Brown
Rebecca Brown
Kevin M. Burke
Burt Burley
Rose Burley
Kevin Burns
Jeffrey L. Burton
Michael Butts
J Calli
Neil Camas ★
Robert Camp
Chuck Campbell
Kate Campbell-Shanahan
Carl Carrano
Joe Carter
Bill Carver
Marilyn Cassedy
Martin Cassel ★
Jim Cassidy, Ph.D.
Juan Chaidez
Diontay Chambers
Ariel Checo
Kenneth W. Cheney
Doug Christian
David S. Clark
Robert Clarke
Jonathan Cline
Greg Cobb ★
Jordan Cobb
Arthur L. Coe
Andy Coleman
Mira Corrao
Peter Corrao
Tiffany Corrao
Tony Corrao
Linden Courter
Jim Covell
Dylan Covey
Mike Cowdrey
Anne Cox
Allan Creekstar
Bert Creighton
Bryan Crews
Connie Danielson
Brian Danilowicz
Joseph R. Darlak
Charles Darragh
Julie Davidson
Brian J. Davies
Mike Davis
Karl DeGenor
Anthony Deleon
Larry Dirksen
Scott Donnelly
Daniel Dowdle
Paul Duffield
Jack Dunn
Denis Dupay
Lincoln Dutcher
Paisley Dutcher
James Easterly
Lynne J. Eddy ★
Frank D. Edwards
Daniel Edwards
Ronald Elder
Ray "Skip" Ellison
Peggy Erickson
Marquerite Ericksson
Tashina Evans
Rhett M. Faire
Wolfgang Faller
Sibylle Faller
Sarah Faxon
Dennis T. Ferguson
Paul Fiedler
David Figg
David Finney
Wayne Finney
Jeff Fish
Spider Fish
William Fisher
Pat Fitzgerald
Charles Fleetman
David Fleming
Bobby Foes
Martin Fogel
Samantha Foran
Tim Forney
Marcus Foudy
Floyd Fronius
David Frost
Tom Gadzala
Joseph Galli
David Garms
Glenna C. Garrett
Lauren Gaunt
Eric Gearhardt
Ann George
John Gillispie
Josie Gomez
Terence G. Goodbody ★
John Gottlieb
Nicholas Gottwald
Leslie Graney
John Greenwell
Michael Grimes
James P. Haddock
Sally Lynn Haggerty
William Hale
Mike Handforth
Jay Hanson
John Harrington
Shay Lynn Harrison
David Hartman
Mary Head
Glenn Hechinger
Michael Hernon
Mike Hervey
Bruce Heyman
Diane Heyman
Walter Hines
Brad Holderman
RADM Fran Holian, USN (Ret.)
Doug Holk
William Holmes
Leslie M. Holmes ★
Isabell Hopkins
Joseph Horvat
Ken Houseman ★★★★
Mark Hrossowyc
Alex Hrossowyc
Ben Hueso
Anthony Hughes
Richard Hughes
Jerry Hughs
Chuck Hukari
Chuck Hull
Frederic Humes ★
Lauralee Humes
Mark Hunter
Nancy Hupp ★
Carol Hupp
Rod Innes
Zosut Issa
Donald Jackson
Ardyce Jarvis
Barry Johnson
Pete Johnson
Shawna Johnson
Bill Jurel
Paul Kay
Aimee Kay
Dr. Bob Kaye
Michael Kaye
Duncan Kelley
Joe Keoughan
Dr. John Kerley ★★★
Dr. Stephen Kessler ★
Alvin Kinsel
Michael Kinsel
Emily Nicole Kinstler
Barry Klofstein
Sharon Klug
Steven Knapp
David Kolthoff
Stanislav Kurtukov
Shawn Larkin
Peter Lawrence
Trevor Laws
Jim LeBlanc
Janis Legzoint

April 2011 - May 2015

Salvador Volunteers

John Leighton ★
Robert Lemieux
Steve Lende
Robert Letson ★★★
Roy Lee Libby ★★
Christopher Linares
Mike Lingo
Penny Lingo
James Scott Lintott
Cory Litzam
Richard Lloyd
Seila Lockhart
Sherrill A. Lorch
Peter Louritzen
Eric G. Lunde
Joshua Lynch
Mr. and Mrs. Richard Lyons
Francesco Macagno
Lucia Macagno
Cornelius MacDonald
Tom MacSaveny
Ron Madsen
John B. Maichle
Christopher Malloch, MD
John P. Maloney
Tadd Mannino
Allan Marcus
John R. Marsh ★★
Joshua Marsten
Bethany Marsten
Rohan Marsten
John W. Martin
Kim Martinez
Roger Maurais
Neil McCarty
Robert McCrackin
Mike McDermott
Stephen T. McDonald
Mike McElhiney
Dale McGinty
Corby McLarney
Daniel McNaughton ★★★
Mac McQuinn
Mary McQuinn
R. Brad Mecham
Brianna Melgar
Denes Mendoza
Andy Meyer
Matthew Meyer
Walt Meyer
Peter W. Michael
Edward Miller
James Miller
Greg Miller
Julius Minsky

Don Mirkovich
Charles Mittman
Alan Mogliotti
Tony Moore
Philip Moore
Marshall Moore
Barbara Moreno
Erika Morgan
Frank C. Mowbray
Jeff Mudd
John Mullen
Alex Mylutt
Graham A. Nadal
Max Geroge Negus
David Nightingale
Hanan Nisan
Jason Nixon
Mike Nopper
Richard Novotny
Edward O. Noyes
Thomas A. Oberbauer
Alfred Odierno
Neal Olsen
Cassandra Ortiz
Dale Osborn
Luis Osorrio-Sanchez
Steve Ospal
Marion Otto
Lona Padua
Chris Paradis
Jessica Paul
John Pearsley
Ruth Peddy
Doris Peddy
Brian Pedersen
Pat Peikert
Richard Perrelli
Maria Perrelli
Don Perry
Robert Ray Peterson
Aleta Pharris
Gwen Phelps
Carla Rahn Phillips, Ph.D.
Michael B Phillips ★
Mark Phillips
Jim Pickens
Ken Pilkington
Christina Pogue
Peggy Poorman
John E. Popp ★
Patrick Poulin
Arthur Prior
Chloe Pryor
Dennis J. Quigley
Hamish Redford

Edward Reiger
Lucas Reilly
Susan Reilly
Robert Revell
Dr. January Riddle
Robin Rigby
Charlene M. Rights
Barbara Ring
Katherine A. Ring
Brenna Ring
Charlie Robertson
Joseph A. Rocco ★★★
Alberto Rommel
Philippe Rosier
Duncan Ross
Russell Rustin
Kurt Rustin
Richard Jeff Saar
Roberto Salas
Samuel Samples
Gabriela Santis
Amadeu F. Santos, MD
David Saponara
John B. Sauvajot
Kathleen Sax
Randy Schissler
Mark Schlesinger
David A. Schnell
Ekkehard Schorle
David R. Schuett ★★
Carl Scragg
Steve Sebastian
Bob Seegmiller
Sidney Seligson
Eric Shandler
Peter Sherwood
David J. Shortt
Sam A. Shragge
Jonathan Shulman
Dan Silberman
John Silberman
Tom Simmons
Charles Sizemore
Jason T. Skidmore
Donna Smith
Jack Sokol
Roger Solheid
Maria Antonieta Soto
Richard Spehn
William Speight
Roger Spencer ★★
Alfred A. Sprey
Marcus M. Sproll
David Stephens
Tim Stephens

Arthur Stevens
Robert Stevens
Gunnar Stevens
Eileen C. Stevenson
Tim Sullivan
Tim Surriva
George Rex Sutherland
Joseph L. Swagler
Albert M. Tamayo
James Thayer
Russell Thomas
Brendon Thornton
Meryle Thornton
Dr. Richard K. Thorpe ★★
Bob Torrance
Michael Towey
Andy Trevisani
Tom Turbyfll
Jack D. Turner
Richard Ugoretz
Noel Vance
Edgardo Vilas
Axel Vogt
Jon Von Blum
Marvin Wager
Denis N. Walker
Sherrie Walker
John Watson
Robert L. Watson
Thomas G. Webb
Brandon Welsch
Mathew White
Katrina Whitley
David Wilhelmy
Stanley Williams
Leandria L. Williams
Brendon Williams
Joseph Williams
Robert C. Wilson ★★
Eric Wilson
Patrice Wilson
Jim Winn ★
Donald Wolski
Laura Wolszon
Dick Wolszon
Alma Wong
G. Barry Worthington, Ph.D.
Jacques S. Yeager
Al Zlotnik
Jane Zodi
Robert Zodi
Roya Zoucer

★ notes more than 1,000 hours ★★ more than 2,000 hours ★★★ more than 3,000 hours ★★★★ more than 4,000 hours

Thank You to our *San*

$1,000,000 +

California Coastal Conservancy
Unified Port of San Diego

$100,000 — $999,999

A. F. (Mike) Dreves
Mr. and Mrs. Daniel McKinney
Ellen Browning Scripps Foundation
William and Kathryn Scripps Family Foundation
The Ahmanson Foundation
Price Family Charitable Fund
Star of India Auxiliary
Robert and Marion Wilson
Gambol Industries
Hervey Family Fund at The San Diego Foundation

$50,000 — $99,999

County of San Diego
Peter R. LaDow
CYMER Corporation
Tom and Kathryn McNiff
John P. Scripps Foundation
Anonymous Donor
Supervisor Greg Cox, County of San Diego

In-Kind Donors

UTC Aerospace Systems
SOS Metals
Garland and Mary McQuinn
Karen Sowell Dyer and Bruce Dyer
Bob's Crane Service
Rocky Cook
The San Diego Union-Tribune
San Diego Marine Exchange
Dependable Marine
Fleishman Hillard
Red Door
Douglas Sharp Yacht Design, Inc.
Yacht Design Engineering Services

$25,000 -- $49,999

US Bancorp Foundation
Bob and Laura Kyle
The Kelton Foundation
Walter and Jolene Andersen
The Daphne Seybolt Culpeper Memorial Foundation
John G. Rebelo and Sarah Marsh-Rebelo
Jim and Cathy Lonergan
John Zygowicz
Philip Gildred, Jr.
Las Patronas
Parker Foundation
US Bank

$10,000 — $24,999

Warren-Neely Foundation
Manish and Shital Parikh
Steven and Tomi Mueller
The James Irvine Foundation
Thomas and Jennifer Janes
Ryan Family Charitable Foundation
Estate of Esther J. Burnham
Dale A. Bowers
John and Nancy Todd
The Fish Market Restaurant, Inc.
The Rice Family Foundation
Cushman Foundation at The San Diego Foundation
Dr. and Mrs. Frederick Frye
Nicholas and Leslie Frazee
Doug and Carolyn Sharp
Jana Van Blaricom
Mary Lou Peterson
Bob and Chris Dilworth
Jack Sutphen
Lowell and Julie Potiker Fund of the Jewish Community Foundation
Wells Fargo Foundation
Richard and Christie Andrews
Marine Group Boat Works
Ray and Sue Carpenter /R.E. Staite Engineering, Inc.
Marion Allen

$5,000 — $9,999

The Tiedemann Foundation
Bob and Pam Plumbley
Jeanne L. Frost
Robert and Gail Bardin
Lynne J. Eddy
Anita and Daniel M. Brown
Gay Mickal Nay
Peter B. Clark and Ellen Brown
Frank C. White
David MacVean
Robert and Rebecca Clelland
Greg Cobb
DeFalco Family Foundation
Dr. J. Robert Beyster
USS *Midway* Museum
Charles and Ellen MacVean
Ken Stipanov and Julie Mebane
Bob and Barbara Sharp
The Samuel I. and John Henry Fox Foundation
Connie K. Golden
David and Susan Rockefeller
Mary McGuire
Malin Burnham
Gary and Gayle Gould
Hub International Insurance Services, Inc.
Thompson and Jane Fetter
Jim Sinegal
William S. Barnickel Foundation
San Diego National Bank
The Thursday Club Foundation
Travelers Insurance
Donald E. Hillman, Jr. and Rose Ninburg
Ayco Charitable Foundation
Maritime Institute

January 1, 2007 - July 20, 2015

Salvador Supporters

$2,500 — $4,999

CAPT Herbert Zoehrer, USN (Ret.) and Margaret Eske Zoehrer
Dr. Carla Rahn Phillips and Dr. William Phillips
Tom and Nancy Davidson
Philip and Heidrun Faulconer
Mr. and Mrs. Gordon T. Frost, Jr.
Dr. Bob Kaye
Dr. Iris Engstrand and Paul D. Engstrand
Betsy Sharp
Chris and Dale Frost
Gregory and Carol Gushaw
Dr. Jim and Chris Cassidy
Jacqueline Gillman
William and Sandra Dysart
Ben and Nicole Clay
David O'Brien and Dr. Paula Cordeiro
Alan R. Hunter
Sue Ebner
Dr. Bernard Eggertsen and Florence Nemkov
Garland and Mary McQuinn
George Hage
Ken Andersen and Melanie Potter
Ron and Dede Carlson
David Kipping
Legacy Bank
Dennis and Carol Wilson
Donald and Diane Sherman
Mary Lou Jefferson
Jack Zolezzi
Lori Fleet Martin and Michael Martin
Andrew and Corinne Dossett
Deron and Toni Bear
Barbara Ring and Katherine Ring
David Latham
Kathleen Evans
Myrt Cox
Robert P. Scripps
Rod Innes and Marysa Andriola
John & Paula Schmid
Raymond and Carlynn Ashley

$1,500 — $2,499

Lindy and Barbara Thomas
QUALCOMM Incorporated/Matching Gifts/Tiedemann/Matulich/Landquth/Dennison
Gurrera & Associates
George and Alison Gildred
Bill and Shirley Kimmich
Mercer
Paul K. Scripps Family Trust
John Reid, Jr.
Tommy Carroll
Kim and Marian Crosser
Keith and Mary McKinnon
Al Sorkin
Carol Mahl
Chris Welton
Dr. Gay McDonald and Jessica Teachworth
Jack McGrory
Jean E. Neisewander
Jerry Strauss and Sophia Kim
Clare and Loch Crane
Wayne and Sharon Hanson
William Fisher and Denise Sprague
Motorola Solutions Foundation
MJE Marketing Services
Larry and Lois Lewis
Pat Boyce and Debbie Fritsch
Peter W. Michael
Janet G. Kennington
Vanessa Ruiz
Marilyn Fulton
Ian Flatt
Laura Galbraith
Sandra Stengel
Mrs. Sandra Timmons
John and Susan Thompson
David S. and Margaret Clark
Fred and Jan Bast
Frederick and Mary Lou Harris
Matthew Schiff
Richard W. Geary
Richard and Jean Vilmure
Thomas Evons
Dr. and Mrs. Timothy Runyan

$1,000 — $1,499

Sandra Turner and Lewis Wheeler
Clifford H. Miller
Dennis and Sandy Burks
Kevin Kellogg and Mollie Glasser
Dr. Max and Esther Trummer
Mike and Penny Lingo
Russell Thomas
RADM Fran Holian, USN (Ret.) and Carol Holian
Irene Batch
Michelle Taylor
San Diego Miramar College/Dr. Patricia Hsieh
James Nystrom
Tom and Kris Kettenburg
Dr. Richard K. Thorpe
Sarita Fuentes
Collins MacVean, LLC
Daniel Smith
Jerry and Antonieta Soto
CDR Lawrence E. Oliver, USN (Ret.)
Neva and Steve Sullaway
John and Carol McKnight
Dr. John and Mary Kerley
Alan and Stephanie Tarkington
Cora Tarbox
Nancy Bierma and John Jenista
Marilyn J. Story
Nancy Dillon
Jerome Montgomery
Cabrillo Festival, Inc.
Jewish Community Foundation
J.W. Sefton Foundation
Mary Crowley
Anthony's Seafood Group
Angeles Leira
Ann Zeunges
Anita and Daniel Brown
Dr. David and Kathryn Ringrose
Don and Connie Loeschner
Enid P. Gleich
George and Cynthia Driver
Michael B. Jones and Valentina Wagner-Jones
Pamela Jensen
The Honorable Julia Kelety and CAPT Stephen Kelety, USN (Ret.)
Casa de Espana

Special Thanks to those who helped craft the Journey...

PHOTOGRAPHERS



Maggie Walton

Maggie Walton was raised in South Dakota where she received a B.S. in Art and became a high school art instructor for the Bureau of Indian Affairs. After moving to San Diego and being inspired by the adventure and beauty of *Star of India*, she signed on as volunteer crew in 1986, always with camera in hand. In 1998, she was elected to the Board of Trustees at the Museum and created the "Titanic History & Hollywood" exhibition. Maggie's personal experience as an extra in the awarding-winning movie inspired her highly praised exhibit.

Now on staff at the Maritime Museum as Exhibit Designer and Museum Photographer, she has been photographing and documenting the Museum's fleet of ships for twenty-nine years.

Prior to working full time at the Museum, she had a long career in fashion design, working for the Design Center in Old Town, and creating designs with colorful creations for Diane Powers at Bazaar del Mundo. She also designed for speciality boutiques throughout the Southwest.

Maggie is most proud of her family—her three children and two grandchildren.



Ted Walton

Ted's interest in photography began as a teenager in the chaotic times of the 1960s, seeing the world through *National Geographic, Life, Time* and *Newsweek* magazines. Following Liberal Arts studies at Louisiana State University, he studied photographic arts and science at the Brookes Institute of Photography in Santa Barbara, CA, receiving a B.A. degree in 1984. He has since lived and worked mostly in Southern California as a commercial photographer, specializing in illustrative portraiture, advertising, and product photography for national and international clients. Ted's photography can be seen on the walls of corporate offices in the U.S. and Mexico, and has appeared in local and national publications including: *San Diego Magazine, San Diego Home Garden, USA Today* and *The San Diego Union-Tribune*. Clients include the USPS, GSA, SDG&E, Sempra Energy, Phillips Lighting, Honeywell, Walmart, Zeiss Vision and the Maritime Museum of San Diego. When not photographing for clients, Ted and his wife Maggie spend their time hiking and photographing the beautiful landscapes of San Diego County and the Southwest.



Jerry Soto

Jerry Soto, volunteer photographer for the *San Salvador* Project, has created a gallery of thousands of photographs of the construction of the ship since April 2012, when upon a chance visit to the build site he fell in love with the project, signed-up as a volunteer and started photo-documenting the magnitude of the project undertaken by the Maritime Museum of San Diego.

Jerry is an enthusiastic member of the Museum and is interested in all things maritime. His passion for photography includes taking pictures of seacoast animals, nature, landscapes, and architecture. Jerry is the founder and past President of International Data Systems, Inc., a software warehouse management development company based in San Diego since 1990.

You can see the documented construction of *San Salvador* on Jerry's site at: jgsoto.smugmug.com





Photo by Maggie Walton

San Salvador Work Crew (2015)

Mark Montijo
Museum Vice President, Project Manager

SHIPWRIGHTS:

Peter Wilson Master Shipwright
Frank Townsend Master Shipwright

Doc Anes ⚓ David Burgess ⚓ Don Davis ⚓ Jim Davis
Eric Gerhardt ⚓ Terry Goodbody ⚓ Karen Kuzmiak
John McClure Mike McDermott ⚓ Chuck McGohey
Robert Phillips ⚓ Mike Reilly
Jeff Saar ⚓ Vince Sandina



Photo by Ted Walton



Photo by Jerry Soto

To *San Salvador* - May Good Fortune Follow Her Wherever She Sails



Photos by Maggie Walton

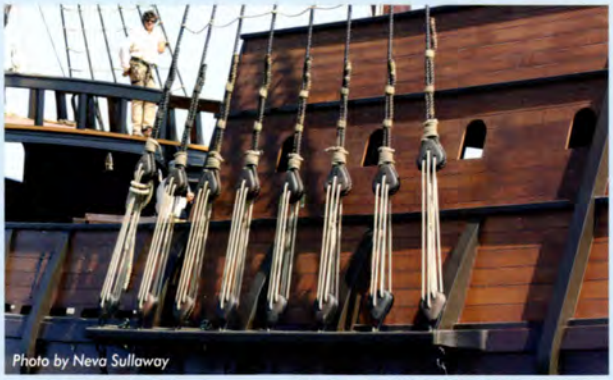


Photo by Neva Sullaway



Photo by Maggie Walton



Photo by Neva Sullaway

Captain Ray Ashley



Photos by Neva Sullaway

Good Fortune certainly sailed with *San Salvador* during the annual Parade of Sail, September 4, 2015. The commissioning ceremony followed *San Salvador's* celebratory excursion around the Bay.



o by Maggie Walton

Photo by Ted Walton

MARITIME MUSEUM
Star of India™
SAN DIEGO

Bringing Adventure, Discovery, and History to Life



sdmaritime.org