# Monterey Bay National Marine Sanctuary Submerged Cultural Resources Study: 2001

**Submitted by**
UAC
March 10, 2003

**Contract Principals**
Dr. Sheli O. Smith & Jack Hunter

UAC
Underwater Archaeological Consortium
PO Box 4338, San Luis Obispo, CA 93403

# Table of Contents

# Illustrations

***Figures*** ***Page***



***Tables*** ***Page***

# Acknowledgements

Each project takes an army of people to conceive, construct and carry through. During the course of this project in 2001 numerous individuals lent their expertise, assistance and help to UAC for which we are extremely grateful. In the arena of databases we would like to thank Kirk Walker of the State Lands Commission and the San Bruno National Archives for lending their expertise and time to the quest of fleshing out the MBNMS database. We would like to thank marine biologist Dr. Jim Barry and senior archaeologist John Foster of the California State Parks, as well as Deborah McArdle of the California Sea Grant Program for lending insight and understanding regarding the jurisdictions overlap and audiences of marine protected areas in California. A special thanks goes to Dr. Laurel Breece and her students in the Long Beach City College Maritime Archaeology Certificate Program for their assistance in constructing the divers questionnaire and the dive shop database.

# Section I: Introduction

The Monterey Bay National Marine Sanctuary Submerged Cultural Resources Study of 2001 focused on three aspects of the submerged cultural resources that reside within the protected waters of the sanctuary (MBNMS):

I. The expansion of the existing submerged cultural resources MBNMS database of reported vessel losses.
II. The construction of a questionnaire with regards to how the known shipwreck sites within the sanctuary are being visited and impacted.
III. A discussion of the theoretical survival of drowned and re-deposited prehistoric human activity sites upon the continental shelf.

The impetus behind acquiring information about recorded and postulated submerged cultural resources of the sanctuary is to provide management direction for future protection and enhancement of these resources. All cultural resources studies should begin with a review of pertinent literature to define a baseline of the submerged cultural resources potentially expected to occur within the study area. This study exclusively examines cultural sites now submerged under sanctuary waters, not on-shore sites occurring along the coast adjacent to the sanctuary.

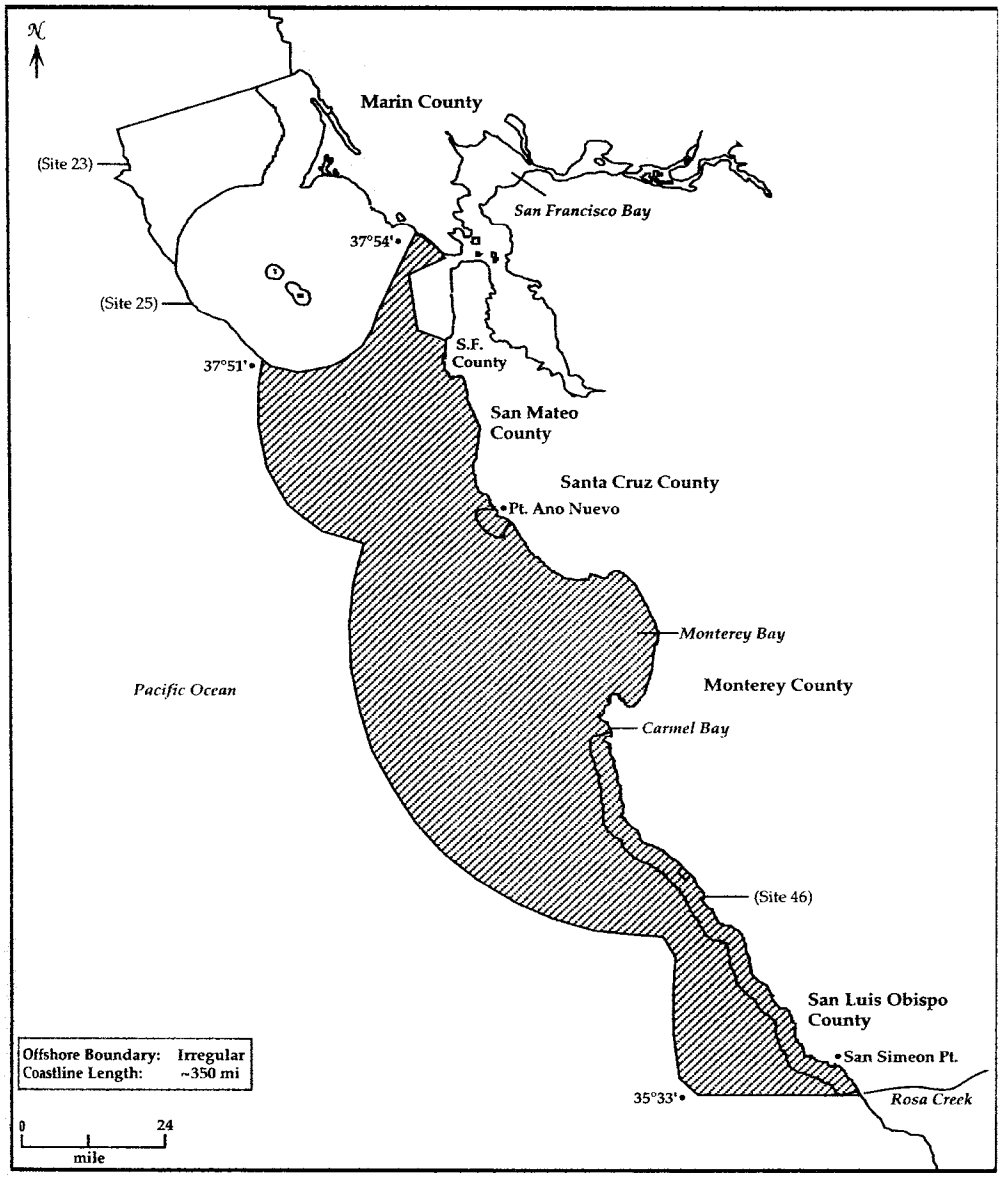
The sanctuary extends from Rocky Point in Marin county (37˚88'N/122˚628'W) to Santa Rosa Creek in San Luis Obispo county (35˚34'N/121˚06'W) and covers an area in the Pacific Ocean of 4,024 square nautical miles (MBNMS 2002, Topozone 2002) (**Figure 1**). The Cordell Bank Sanctuary and the Farallon Islands Sanctuary border the Monterey Bay Sanctuary at the north and an exclusion area along the San Francisco Pacific beaches borders the sanctuary to the east. The Monterey Bay National Marine Sanctuary does not extend to the Golden Gate or into San Francisco Bay (**Figure 2**). However, the sanctuary does include the inter-tidal beaches along the shoreline within the sanctuary boundaries.

It is important to note that a simple compilation of data alone would not necessarily further the management goals of the sanctuary. The MBNMS database discussed in Section III presents several ways in which the data can be sorted to produce a holistic understanding of the value and significance of submerged cultural resources. This report begins the process of managing the data to achieve greater use and understanding. The database is neither exhaustive for all potential reported vessel losses and known shipwrecks, nor complete in detail for each entry. This is simply a beginning that will allow sanctuary management and the public to appreciate the submerged cultural resources reported to exist within the sanctuary and points the way to further sustainable management.

This study was conducted in the traditional step-by-step method of: 1) obtaining information, 2) analyzing information and 3) interpreting information. This abbreviated statement of methodology does not reflect that beyond the simple compiling of a list, understanding the terminology and comprehending how to sort and utilize the data in


# Monterey Bay National Marine Sanctuary

Figure 2: Monterey Bay National Marine Sanctuary, Gulf of the Farallon Islands National Marine Sanctuary (site 25), Cordell Bank National Marine Sanctuary (site 23), and the San Francisco Bay exclusion zones. Note that the boundary coordinates vary slightly from published coordinates for Rocky Point and Santa Rosa Creek (McArdle 1997).



meaningful ways is much more complex and requires a higher degree of analysis with the topic. The trick, one we all try to achieve, is to take the complex data and sift it into understandable information clusters that can be used by people who have not involved themselves deeply in the subject matter. Just as fork length ratios might sound like dinner etiquette to a caterer, net tonnage ratios could easily be misconstrued as fishing terms to someone other than a maritime specialist.

Therefore it is important to understand that the methodology for a study like this is divided into distinct components or tasks from simple to complex. Data entry is the simplest task. Data entry was made easier by the database NOAA's ARCH that was previously constructed by the National Oceanic and Atmospheric Administration (NOAA), specifically to compile ship loss and shipwreck information (**Appendix C**). Each file within the database is capable of holding a variety of information, everything from the ship's name to the condition of the remains. At present there are 76 fields of information within each file that can be sorted and compared. Moreover, information can continue to be added to each file and there are infinite ways in which to sort the data. This study resulted in expanding the MBNMS database from 74 records to 463 vessels reported lost within the Monterey Bay National Marine Sanctuary (see **Table 1**).

Although it is the initial task of the project, collecting the data is not the simplest component. The researcher needs to know where to go to find the data. In the case of ship losses, inventories are continually compiled and published and the original or primary records are kept in archives around the country. The majority of primary records regarding ship losses that occurred in and around the Monterey Bay National Marine Sanctuary are kept in the National Archives at San Bruno, California. However, there are additional records in San Francisco archives, Sacramento archives and the individual towns along the coast. We focused on comparing the published inventories to the primary records at the National Archives in San Bruno. Like data entry this was time consuming and required multiple visits to the major repositories.

Once the archival data is located, the tasks become more complex. That is because the records are written in nautical jargon and the researcher must know how to interpret the information presented in the primary records, transforming the information found into consistent data that can be used in future comparative research. Section II covers the topic of historic ship losses, some descriptions regarding 19$^{th}$ century rigging arrays and other nautical terms so that the interpretive tools are more useful to the sanctuary management staff. We have provided a list of common nautical terminology as it is related to vessel descriptions to aid understanding of highly technical information.

The last and most complex task of the submerged cultural resources study is to analyze the compiled data, and craft tools that can be used for managing the cultural resources, and pointing the way for future studies. To assist us in deciding how the data should be sorted, we interviewed managers in all the regulatory agencies of California that are mandated to protect, enhance and interpret submerged cultural resources. From these interviews we found that the questions managers pose are fairly consistent. The

following seven questions represent the most common questions posed to us during our interviews:

1. How many shipwrecks are there and what is the most common type?
2. Where are these shipwrecks?
3. Who is the audience interested in looking at them?
4. Which shipwrecks are the most popular dive locations now?
5. Is there a list of the top 10 most significant wrecks along the coast that need to be protected?
6. How do we get the word out to the public?
7. Who's going to do all this?

With these questions in mind, we then took the database and began to sort it in ways that could help answer these questions and others that are equally beneficial. One example is presented in Section VI where specific information was sorted for comparison and presentation. In this example, "Reported Vessel Losses within MBNMS," lays out a simple alphabetical list of ship losses with other information that can easily be shared with the public in a web format (**Appendix D).** This example follows the guidelines already established in California by the State Lands Commission of their list of ship losses published on their website. It is one example of how the database can assist MBNMS management in "getting the word out to the public."

These questions and the results of our sorting led to more questions and made it clear that the database alone cannot answer all questions, especially those regarding audience and usage. Nor does the study of ship losses alone include all the critical topics associated with understanding submerged cultural resources. At this juncture, we turned our attention to the other two major tasks of this study: the questionnaire and discussion of prehistoric submerged cultural resources. Unfortunately, there is no single tool that answers all the questions. Management requires a tool kit with a range of tools. Thus, we set about building one tool that would gage specific audiences that use the resources, and another tool for projecting the probable occurrence of prehistoric habitation sites offshore.

Building on questionnaires already composed for the recreational dive community we sought out a partnership with California's newest maritime studies program at Long Beach Community College. Students in the program have constructed a questionnaire that will be hosted on the LBCC website and advertised in the free and widely distributed magazine *California Diver.* After constructing the questionnaire, we realized that a "one time" submission of the questionnaire would not be an effective tool for long range planning. Thus, as an ongoing project they will collect the responses to the questionnaire, make the findings available to all agencies managing submerged cultural resources, and provide the information on a future website. A copy of the questionnaire is included. Creating the tool establishes an important partnership and begins to lay a foundation for successful long range planning. For example, by sorting the ship losses by landmark and comparing that information to the diver responses of which areas are

dived most often, management allocations and interpretive projects can be more effectively tailored to the needs and pressures of the cultural resources.

We built the final tool from a wide array of archaeological, geological and oceanographical information. Combining the information on an easily understood map, projections can be made for potential offshore habitation patterns. This tool involves a complicated process, because although we conceive that prehistoric habitation sites exist offshore, our technology is not yet sophisticated enough to detect them. It is difficult enough to avoid missing subtle soil indicators and minute artifactual remains above the water. It is impossible with our current level of technology to detect them below the water under the seafloor. However, our inability to detect them does not mean they do not exist. Therefore, it is important to understand where the potential lies so that we can be ready to explore these sites when technology allows us to do so. In the holistic approach to submerged cultural resources we must consider that what were once the home sites and campsites of early explorers along the Pacific Coast are located in areas now inundated and thus very poorly understood. The impact to the reservoir of information regarding submerged prehistoric sites is rarely considered and only recently has begun to be studied. Consideration of these sites is critical if we are to avoid complete archaeological extinction of these sites before they are ever found.

The following sections are laid out in an order that generally corresponds to the history of maritime studies as a whole. The first thing people think of when they consider submerged cultural resources is ships, the last thing they consider is submerged habitation sites. Thus, we begin by offering a simple discussion of the terms maritime and submerged cultural resources, as well as audiences that impact and enjoy the submerged cultural resources. It is our intention to set the stage for more in-depth discussions of the different types of resources and the impacts that must be considered for the sustainable management of submerged cultural resources. The general discussion in Section I is followed in Section III, by the most easily recognized cultural resources, ships, and then in Section IV by the least understood cultural resources, submerged habitation sites. After presenting the information and sorting it in one way that is useful in managing, we present in Section V recommendations for management, future projects, and partnerships. We have focused on recommendations that are discreet and attainable and that will enhance the Monterey Bay National Marine Sanctuary's management capabilities and better integrate the overall management of California's submerged cultural resources.

### *Maritime and Submerged Cultural Resources*

The terms maritime and submerged are not synonymous, nor exclusive of one another. The maritime world encompasses things that float on the water, those that currently reside underwater, as well as activities and structures on the shoreline that support maritime subculture, the exploitation of marine resources and the use of water as a highway for transportation. Submerged cultural resources refer specifically to artifacts that reside underwater or have been washed onto the near shore. These include, but are not limited to inundated habitation sites, wharves, shipwrecks, and ship wreckage.

Together maritime and submerged cultural resources represent the human dynamic where people interact with aquatic nature in pursuit of human goals.

The scope of this study has been limited to a specific effort to investigate areas of potential inundated prehistoric habitation sites and shipwrecks within the boundaries of the Monterey Bay National Marine Sanctuary (MBNMS). Comparative studies regarding onshore activities and settlement patterns would certainly enhance the findings presented in this study and provide MBNMS management staff with a more holistic array of information on which to base the management of the sanctuary in terms of submerged cultural resources. However, this study provides a good beginning and can be added to and enhanced at any future time.

Moreover, we have not tried to ferret out all existing information on either of these two topics for that is an unattainable goal given the scope and limits of this contract and the nature of the types of information available. Rather we have approached ship losses and submerged prehistoric habitation sites in a manner so as to begin expansion of our understanding and point the way for further discreet projects that may be undertaken in the future. For example, each vessel listed among the losses potentially has registry papers, line drawings, entry and exit records for every port it visited, cargo manifests, captain's logs, passenger journals, photographs, charts, and mementos. This information is usually scattered and requires enormous effort and time to locate.

A point in case is that of the ship *Lucas*. In 1994, Nautical Archaeologist Paul Hundley of the Australian National Maritime Museum began a search for information on the *Lucas*. Over a period of several years and numerous trips to the US National Archives, Mr. Hundley found that the *Lucas* was lost on a voyage leaving San Francisco in 1856. During the course of this study we discovered the affidavit of Captain Daggett where he tells of the *Lucas* sailing out of San Francisco in 1856 and wrecking on the Farallon Islands. All but a few of the crew were lost. Thus, the mystery of the *Lucas*, is solved although many years after initiating the search.

Regarding the issue of prehistoric habitation sites, we must wait for improved technology. Once the technology is available, we should then be ready to utilize it. By building projection models now, we will be ready to start testing later, and we will be able to better project designated areas that merit future testing. Twenty years ago the technology to visit *Titanic* did not exist, today it does. Today the technology may not exist to detect offshore habitation sites that could dramatically change the history of settlement patterns of the eastern Pacific, but twenty years from now we may be regularly excavating sites offshore. The time to plan for that occurrence is now, not the day before our retirement parties.

It is important therefore, to keep in mind the larger picture of the maritime world and the wide array of information that can be continually added to the foundation of knowledge on which management decisions are made. Submerged cultural resources represent in some form, complete or fragmentary, the entire maritime world, from the first human interaction to present day.

### *Audiences of the Sanctuary*

Who are the audiences of the Monterey Bay National Marine Sanctuary interested in submerged cultural resources? This is a very complex issue since it brings into play all the various subcultures of the maritime world. Many of these constituencies do not speak the same technical jargon or even recognize that they are part of the human dynamic of the maritime world. Moreover, the categories for identifying diverse users are complex, and their interaction and impact on other parts of the marine sanctuary unclear. For example, many marine biologists do not consider their actions as part of the human dynamic of the sanctuary and therefore do not even consider how their research activities will or will not affect the submerged cultural resources of the sanctuary. When a scientist drags the anchor of the research vessel across a shipwreck, the damage is the same as if a commercial vessel, a naval vessel, or a recreational vessel dragged their anchor. Yet, rarely would any of these user groups agree that they should be lumped into the same target audience. The point is that there are a wide variety of audiences and there are many different impacts that they may or may not share. To define the audience therefore is fluid.

In regard to submerged cultural resources, it is important to define the types of resources, the different types of environment and types of impact. Then consider the user group of the maritime world and define how they will impact the resources. A quick cross-referencing will then define the more complex audiences and information than needs to be targeted to those groups. Resolutions to sustainable management are not necessarily linear. Yet, this does not mean that resolutions are unattainable or that the audiences are too complex to decipher. Once the audiences are better defined and respected for the power and social resources they can bring to the table of management, the sooner the goals and tasks of management will become more attainable.

Many of the recommendations for future research in Section V are based on better, defined audiences and better understood submerged cultural resources. It is essential to recognize the audiences and respect their strengths and their needs. It is equally essential to understand that we are all part of the maritime culture of coastal California and that our actions and decisions affect both the natural and cultural. Therefore, we argue that separating the natural resources studies from the cultural resources studies will ultimately fail, since it is humans conducting the studies and applying our own cultural biases to the conclusions. If we have the whole picture before us, integrating dynamic natural and cultural processes, we can make successful management decisions.

# Section II: General Maritime History of Area Encompassed by Monterey Bay National Marine Sanctuary

Colonization of the North American or Eastern Pacific coastline has been confirmed archaeologically to 13,000 years ago (Johnson 2001). People from Asia caught the Japanese Current and began to coast their way south along the Pacific shore of North America. Using paddled craft they were able to cover large distances rapidly and thus quickly migrate south. The coastline that they traveled is now submerged and so all physical trace of these peoples is masked or eradicated underwater. However, modern linguists trace the migration patterns of the earliest explorers through language groups or language families. Although many different dialects have been recorded for the peoples of North America at the time of contact with Europeans, these different dialects can be organized into a handful of language groups in North America (Wallace 1978). A majority of these language groups were present along the Pacific coast of North America at the time of European contact in the 1500s A.D. This is in stark contrast to the eastern portions of the North American continent where, one, perhaps two, of the language groups existed. Anthropologists believe that the existence of so many language groups along the Pacific coast reflects that early emmigrants populated the Pacific coastal areas first and that the region was so bountiful that many stayed. Those emmigrants that continued spreading out across the continent and into Central and South America took their languages with them eventually claiming specific regional territories for themselves.

While their cousins continued to migrate, the Pacific Coast North Americans flourished, setting up their own territories and regional cultures. Primarily they settled along the coast taking advantage of the abundant vegetation and sea life. Each culture developed many industries including fishing, boat building, and possibly agriculture. They traded up and down the coastline and were well established when Europeans began to visit in the 1500s.

Figure 3: Reed vessels were common among California cultures (Galvin 1971).

Although sporadic Chinese and Japanese contact may have occurred prior to the 1500s, it was not until the Spanish colonized Mexico that

outsiders regularly visited the eastern Pacific. European contact began in the early 1520s when Cortez turned his attention from the Caribbean to the Pacific. Balboa named the vast blue ocean Pacific in 1513. Within ten years Cortez established a shipyard at Zacateca (modern Acapulco) (McDougall 1993, Morrison 1974).

Figure 4: Galleons were used by all European cultures during the era of exploration (Radio Times Hulton Picture Library).

Even before Cortez moved into the Pacific there were widespread myths about an Island off the western coast of North America. In a medieval Spanish romance, an Amazon woman named *Califia* ruled the island (Cabo San Lucas Chamber of Commerce 2001). On ancient maps cartographers named the island for the mythical queen, calling it California. On these 15th century maps, all three modern states of California, Baja California Sur, Baja California, and Alta California are shown as an island. The myth was dispelled by the mid-1500s when the Spanish explorer Francisco de Ulloa explored the Sea of Cortez and confirmed that the land mass was attached. By the beginning of the next century exploration of the Pacific coast began. The Spanish explorer Vizcaino set out to find bays along the coastline that would be good locations for victualling or supply stations for the Manila galleon trade. He returned to Mexico with several locations that fit the needs of resupplying the galleons on route to Acapulco from the Philippines (McDougall 1993).

Spain, in 1697, finally implemented the plan for stations or maritime outposts along the Pacific coast. To accomplish this goal all three branches of Spanish society: the church, the government, and the military, cooperated (Cutter 1969). Together they established the Mission at Loreto in Baja California Sur. Slowly missions were established along the entire eastern coast of Baja and then at the extreme southern tip. It was very difficult to establish them on the western shore since the Spanish ships were not well adapted to go against the wind and currents. In the end, Spain went overland to the western shores of Baja California to establish ports.

In 1769, Father Junipero Serra set off on foot for the bay in Alta California that would become San Diego. Within six months, Father Serra and his followers had established a second mission at Monterey Bay. Between 1769 and 1830 the Franciscan order, in collaboration with the military, established over 20 missions

along the coast of Alta California. The mission at Sonoma, north of San Francisco, was the last of 61 missions established between Cabo San Lucas at the tip of Baja California and the town of Sonoma in Northern California. During the 126 years of mission building, all of the major ports of California were established, the majority of modern agriculture was initiated, and the trade routes commenced that later catapulted California into international attention.

By the 1840s Alta California was home to many nationalities; Native Americans, Mexicans, Spaniards, Russians, Hawaiians, and Americans among others. Surplus crops and hides were traded for finished goods. Traders and explorers regularly visited California and trade routes between Hawaii, China, Panama, Alaska, South America, and Australia were well established even though accurate maps of the Pacific did not exist. Mexico ruled Alta California from Monterey (Blodgett 1999). Then in 1848 gold was discovered at Sutter's Mill above Sacramento. Seemingly overnight California took center stage in the global arena. Prospectors began to arrive from around the world and the population of California swelled. Quickly entrepreneurs realized that the real gold was in supplying the needs of the growing population.

Figure 5: Fort Ross located north of the sanctuary was popular dog hole in the late 19th and early 20th centuries (courtesy of SHP Fort Ross).

The trade routes to China, Hawaii, Australia, Panama, South America, and the eastern United States that were already established became busier. To these routes new ones were added as the demand for lumber and wheat increased. Small landings sprang up all along the coast of California (Newell 1950, Sullenberger 1992). From San Francisco north came lumber and products from cattle ranches. From the Monterey area came fish and products from inland farms. Southern California supplied agricultural goods and oil products. To California came citrus, exotic woods, coal, finished goods, and people. It took vessels of all sorts and sizes to carry the goods that helped the burgeoning California prosper. A few types became signature styles as California reached out to the world of commerce. The lumber schooner and the clipper ship are closely associated with California's Gold Rush years (Chapelle 1982, Time-Life; Clipper Ships 1982). Both styles became famous because of their sailing qualities. The lumber schooner could negotiate the rugged coastline of California while the clipper ship set speed records over great expanses of the Pacific Ocean. The

merchants from the United States familiar with California and its bountiful natural resources, through the hide trade, lobbied to bring the area into the United States and control the gold fields (Blodgett 1999). In 1850 after US naval vessels sailed into Monterey Bay and took the Mexican capital, California joined the United States as the nation's 31st state. The state capital moved to Sacramento, while San Francisco remained the center of culture. Millions were made and lost as the youthful state gained power and recognition. Following the California Gold Rush, the 1852 Australian Gold Rush further sparked trade throughout the Pacific and world, and sustained boom economy of the Pacific (Bateson 1963).

When civil war erupted between the plantation driven states and the industry driven states, California had a chance to turn inward and develop needed infrastructure and intra-state trade routes. The maritime trade routes coupled with a growing network of rail made it possible to get the produce of the fertile Central Valley and the lumber of the Sierras to markets around the world faster. Neither war nor recession stopped the overall economic evolution of California and throughout the remainder of the century California continued to grow.

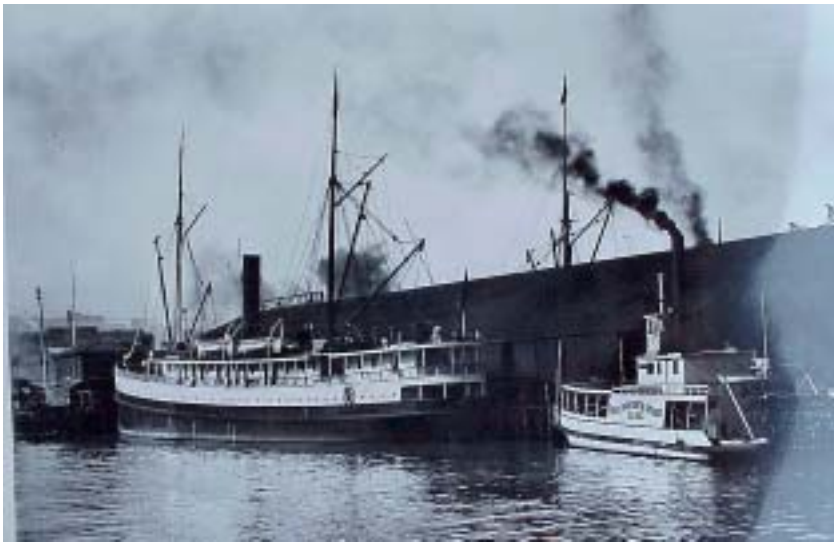


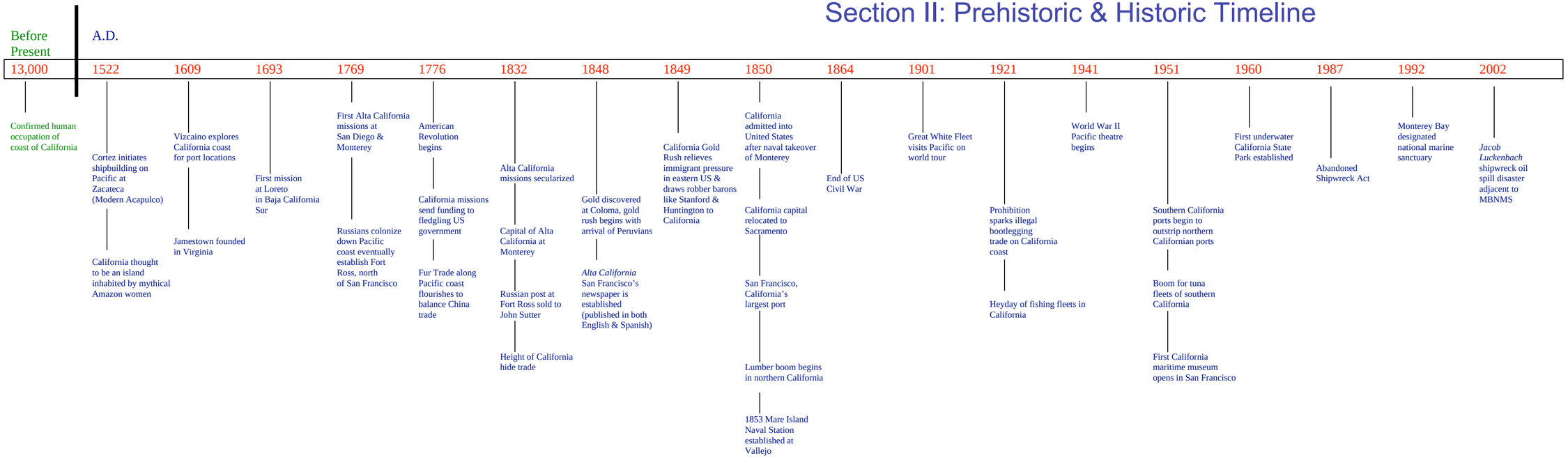
Figure 6: First coal then diesel and oil powered modern ships (courtesy of Porter Shaw Library).

The 20th century brought new products for California to trade. Oil became the black gold of the state. The most economic way to transport it was by sea. Tankers carried oil to refineries for processing and then around the world for consumption. Agricultural products, lumber and fish continued to be traded and exported by sea. Ships remained the major means of transportation. The port of Los Angeles soon outstripped the port of San Francisco in tons traded, but San Francisco and San Diego remained vital. However, as the century progressed, coastal trade declined (Newell 1950, Sullenberger1992). The small landings that once dotted the coast fell into disuse. Only the major ports flourished. Goods that had once traveled by smaller vessels moved via rail or truck. The disparity between vessel tonnages increased. Large ships became larger to improve the economic success of each voyage. The middle range tonnage vessels all but disappeared relegated to moving goods between third world countries and larger

ports. The smaller tonnage vessels became specialty craft mainly associated with fishing and recreation.

At the close of the 20th century large ships move around and across the Pacific in much the same manner as they did two hundred years ago. Yet, today the shipping lanes that run along the eastern Pacific are controlled in much the same manner as planes that fly globally along great circle routes. Controller stations are positioned along the Pacific Coast and hand off ships from one station to the next (Port of Los Angeles 2001). Annually, thousands of ships carry goods north and south through the waters encompassed in the Monterey Bay National Marine Sanctuary.

# Section II: Prehistoric & Historic Timeline



# Section III: Historic Submerged Cultural Resources

***What type of information is included in the MBNMS database?***
California's rich maritime heritage is recorded in a number of different ways. Vessel registry records, records of loss, and contemporary newspapers have recorded the disasters and catastrophes of the Pacific since 1848 when regularly published newspapers began. Prior to 1848, systematically kept records of ship losses and the accounts of the disasters were kept by the Missions of Alta California and the legal documents of the Spanish and Mexican governments. These records are sketchy at best and often reflect the political interests of the period. For example, in an early account of the Mission at San Juan Capistrano, a Franciscan priest describes the anchorage using the plural of the vessel type 'frigate' to explain where the ships were anchored. Yet, in the official record keeping of the mission only one vessel called each year between 1803 and 1806 (Nabergall, 1982:14-19). The difference between Father Palou's description of what he saw as he overlooked the harbor and what was reported to government officials is due to the fact that it was illegal for any nationality besides Spain to call on the Alta California missions.

For this reason our focus centered on the post 1849 documents that are readily available through the National Archives, publications, microfilm and museum collections (**Appendix A**). In addition, known compilations of shipwrecks, such as those created by the California State Lands Commission, as well as published lists by US Coast Guard, Gibbs, Berman and Pierson were consulted (Section VII Bibliography). We entered all information garnered from the search into the database format already in use by NOAA, called NOAA's ARCH.

If no salvage records were found, the vessel loss was entered. In addition, no attempt was made to discern whether or not the vessels reported as wrecked still exist within the sanctuary. Where data indicated that a vessel reported by more than one source as sunk, had been salvaged, the loss was entered but the subsequent salvage was noted on the record, so that any future confusion would be avoided. For instance several sources list the *Rosecrans* as sinking in San Luis Obispo county, however notation on the US Coast Guard records indicates the vessel was salvaged only to be lost a year later on the Columbia River bar in Washington state.

The Monterey Bay National Marine Sanctuary (MBNMS) database currently represents 463 reported losses located in Pacific waters directly within or on the border of the sanctuary. It would be presumptuous to conclude that all ships that have ever sunk in the waters now described in the sanctuary will ever be included in the database. For this reason, the MBNMS database is not exhaustive nor will such a database ever be considered complete due to the variables that attend disasters. There may be hundreds of vessels for which no written record exists, but whose archaeological remains lie within the Monterey Bay National Marine Sanctuary. Thus, it is important to focus on what we do know.

***How many ship losses are recorded?***
A CD is included in this report and contains 389 new entries to NOAA's ARCH database made during this study, as well as the corrections made to the 108 existing entries listed in the MBNMS database. To assist sanctuary staff in the integration of the new and corrected information the database exists in two sets. One set is a single file containing all 463 entries of the MBNMS database and in this report is referred to as the **MBNMS database**. All data sorts were done with this total file and all discussions address the total number of entries.

The second set includes the overall database and is segmented into three computer, database files designated by the letters A, B and C. The division criterion was whether or not the information existed prior to this study. The existing MBNMS database contains 108 entries of which 74 are reported losses located in Pacific waters within the five sanctuary counties of Marin, San Mateo, Santa Cruz, Monterey, and San Luis Obispo (**Figure 1**). **Shipwreck Database A** contains 70 files from the extant MBNMS database. These existing entries of the sanctuary were updated and corrected where necessary. Four entries of the 74 Pacific entries in the MBNMS database were unique and did not exist in any other database or document set we reviewed. These entries were separated into their own file designated **Shipwreck Database Set B**. A third database file was created for the 389 new entries found during the course of this study and this is designated **Shipwreck Database Set C**. The remaining 34 of the 108 entries within the existing MBNMS database represent either redundant records or reported losses that did not fall within the sanctuary and would not have drifted into the sanctuary (**Table 1**).

All wrecks on the Pacific side of San Francisco County including those located at the Farallon Islands National Marine Sanctuary or those reported along the San Francisco beaches in San Francisco County were included. Eight of the 463 ship losses reported in the database are located at the Farallon Islands. Ten of the 463 reported ship losses are located on the Pacific side of San Francisco County. This leaves 445 reported ship losses that lie within the jurisdiction or adjacent to the boundaries of the Monterey Bay National Marine Sanctuary. Losses located just to the north of the sanctuary in Marin County or just to the south of the sanctuary in San Luis Obispo County were added. The purpose of including both the San Francisco wrecks and those outside the sanctuary in Marin and San Luis Obispo counties is to aid researchers in quick exclusion of some wrecks. All of these entries have either general latitude and longitude coordinates attached or cite specific landmarks so that a quick overview of coordinates will reveal whether or not the wreck is in the sanctuary (**Table 1**). For example, the well-known loss of the *Nahumkeag* wrecked in 1849 has been cited as sinking in numerous places over the years; several of these locations are within the Monterey Bay National Marine Sanctuary. However, the true location of the wreck is Drakes Bay, which is just north of the sanctuary. The *Nahumkeag* has been included in the database along with the Landmark of Drake's Bay and the general latitude and longitude coordinates.

## Table 1: MBNMS Shipwreck Database Breakout

| | | |
|---|---|---|
| **2000 MBNMS Database Set** | **108** | |
| Redundant Records[1] | 10 | |
| Reported Losses within San Francisco Bay | 20 | |
| Reported Losses near or at Farallon Islands | 0 | |
| Unique reported losses found in no other database | 4 | |
| Known shipwrecks in exclusion beach zone | 10 | |
| Known shipwrecks within MBNMS boundaries[2] | 1 | |
| Known shipwrecks near or on sanctuary boundaries[3] | 2 | |
| Records included in 2001 database[4] | 74 | |
| | | **74** |
| **2001 Database Additions** | **389** | |
| Reported losses above 37˚88'N[4] | 35 | |
| Reported losses below 35˚34'N[4] | 4 | |
| Reported Losses at or near Farallon Islands | 8 | |
| Known shipwrecks in exclusion beach zone | 10 | |
| Known shipwrecks within MBNMS boundaries[2] | 1 | |
| Known shipwrecks near MBNMS[3] | 2 | |
| | | **389** |
| **New MBNMS Database** | | **463** |

[1]The loss of the *Virginia, Star of the West, Californian, Natalie, Bonita* and *Rhine Maru* were reported more than once in the 2000 MBNMS database.
[2]Known shipwrecks require DGPS locations that are repeatable. Only the dirigible *Macon* is known to rest inside the MBNMS waters.
[3]Known shipwrecks near the boundaries of MBNMS include the *Luckenbach* and the *Montebello*.
[4]Drift of shipwrecks within the sanctuary (e.g. *Point Arena*) is known to be at least 15 miles. The probability exists that a shipwreck could drift in or out of the delineated sanctuary when wrecking near the boundaries. Therefore ships reported lost slightly north or south of the sanctuary boundaries have been included. Due to the imprecise knowledge of specific location for reported losses and the ability to discount precisely known shipwrecks, the known wrecks of the exclusion beach zones and the reported losses of the Farallon Islands and Cordell Bank sanctuaries have been included in the records merged with the new findings. Also included are shipwrecks, reported beached, because although the sanctuary boundaries extend to the beach, in some cases fragments of the shipwreck may be embedded in the sanctuary seafloor (e.g. *Point Arena*).

***What does the data reveal in terms of* Types *of reported losses?***

The MBNMS database includes vessels ranging in a wide variety of *types*, sizes and methods of propulsion. This can be very confusing especially when terms can be interchangeably used generally or specifically and those same terms have evolved in meaning over time. For example, the term *type* has evolved over time and has been used both generally and specifically to describe vessels.

During the *Age of Sail*, (3,000BC to 1900) the term *type* could be used broadly to define the general use of a vessel. In broad terms, vessels typed as cargo carrying were referred to as *merchantman*, *lighters* or *barges*. Military vessels were generally typed as *naval*. In more specific terms type referred to the way the sails were arranged or the *rig* on a vessel, such as 'ship' or 'schooner.' All 'ships' have three masts with square sails set on the foremast and mainmast (**Figures 7 and 8**). All 'schooners' have fore and aft sails on their masts (see **Appendix B** for description of different *types* of *rigged* and *unrigged* vessels). Neither the general meaning nor the specific meaning of the term *type* gives explicit information about the shape of a vessel's hull, although the arrangement of rigging does indicate a date for the vessel and in turn point toward the form of the vessel's hull. For example, 'schooner rigs' were introduced in the 19th century and indicate a sharper hull form.

Figure 7: Ship Rig

Today, *type* is used in two general ways and one specific manner. The first use of the term harkens back to historic generalities of how the vessel is used, such as *tankers* for oil transport, *freighters* for cargo, or *trawlers* for fishing. Military vessels are still referred to as *naval*. Like the rigging typologies of earlier centuries, the general use typologies of the 20th century do shed some light on the form of a vessel and as a rule of thumb, the *type* 'ship' in modern understanding is separated from the *type* 'boat' by the simple rhyme "*a ship*

Figure 8: Schooner Rig

*can carry a boat, but a boat can't carry a ship*." In other words, the two *types* are separated by size and not function.

More specifically the use of the term *type* refers to the kind of fuel used in the propulsion of vessels, such as 'gas screw' or 'oil screw.' Thus, in the specific the term *type* still refers to propulsion whether the vessel is propelled by sail as in *rigged* vessels or by some other means of propulsion and is *unrigged* or carries no sails. Even here there are exceptions as in the type 'motor sail' or the earliest paddlewheel transoceanic vessels. The *fuel type* of a vessel is most commonly recorded in archival documents and unfortunately gives no indication as to the form or usage of a vessel. The specific exception to use of the term *type* is by *naval* vessels. 'Frigate,' 'aircraft carrier,' and 'battleship' are terms that do indicate hull forms, as well as function. For instance, a 'frigate' is a fast, sharp hull used most often for fast attack.

To avoid omission of the important transitional period between the *Age of Sail* and modern means of propulsion, we cannot overlook the *Age of Steam*. Between the 1850s and 1900 sail and steam evolved concurrently. However, eventually steam overshadowed sail and led to the modern age of propulsion. During the period of transition, terms like 'paddlewheeler' and 'steam schooner' were added to the various *types* of vessels. Initially these two *types* carried sails and a separate propulsion method of steam. Eventually, as steam became more reliable the *rig* was dropped but the *type* name remained. Thus there are 4 paddlewheel vessels reported lost in the sanctuary and 16 steam schooners (**Figure 8**).

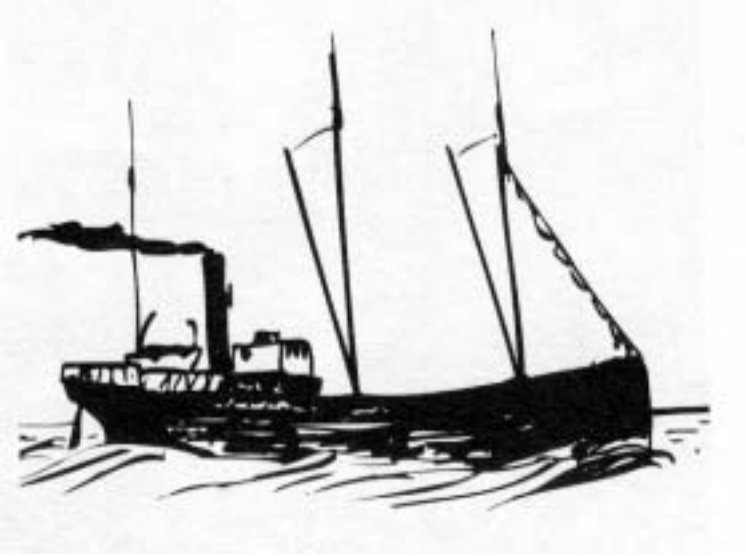


Figure 9: Steam Schooner

For purposes of discussion we will begin with the general meaning of the term *type* as used in both the centuries dominated by sail propulsion and the twentieth century dominated by oil derivative propelled engines. This easy division sorts the MBNMS database into only two categories, those vessels used commercially and those used for military purposes (**Table 2**). The table also indicates which centuries and thus, to which period of Californian history these vessels relate. Obviously, those types of vessels such as galleons, brigs, and ships could represent contact period archaeological sites and thus their importance, in the broadest sense of historical importance, is greater than 20$^{th}$ century steamers or freighters.

**Table 2:** Vessel *Types* Recorded in MBNMS Database of Vessel Losses and Sorted by General Use

| Commercial Use | Century | Naval Use | Century |
|---|---|---|---|
| Bark | 19 | Aircraft | 20 |
| Barkentine | 19 | Brig | 18 - 19 |
| Barge or Lighter | all centuries[1] | Corvette | 19 |
| Brig | 18 -20 | Cutter | 19 |
| Freighter | 20 | Galleon | 16 - 17 |
| Galleon | 16 - 18 | Launch | all centuries* |
| Launch | all centuries[1] | Patrol Boat | 19 - 20 |
| Pilot Boat | 19 - 20 | Ship | 16-19 |
| Schooner | 19 | Sloop | 19 |
| Scow | 19 | Submarine | 20 |
| Ship | 16-19 | | |
| Side & Stern Wheel | 19 | | |
| Sloop | 19 | | |
| Steamer | 19-20 | | |
| Tankers | 20 | | |
| Water Taxi | all centuries* | | |

[1] early forms of these vessels were rowed or sculled

In regard to the term 'type' as it appears in vessel registry records, the 463 MBNMS database entries represent a minimum of 24 vessel types including airships (**Table 3**). In this sort of the data, the terminology is a bit muddled crossing over between usage and propulsion and clearly reveals the difficulty in sorting by 'type.' For example, beginning around 1880 there is little differentiation between a cargo carrying vessel, a fishing vessel, a pleasure craft, or a military vessel if, the vessel was propelled by an engine and propeller. They are all listed under the 'type' 'gas or oil screw.'

In both of these sorts for 'type' a large number of vessels are concealed or wholly missing. The coast of California has been visited repeatedly since the first prehistoric emigrants came skirting southward on the Japanese Current. Some of these vessel types relate to those utilized by prehistoric mariners such as canoes, tomols, kayaks, beidarkas and Polynesian watercraft. Documented primarily through ethnographic research and contact period accounts, the losses of these types of craft are not recorded. In addition, there are a number of earlier contact period vessel types that due to the remoteness of the eastern Pacific may have been lost without record or accurate record of location. These could include junks, nàos, pinnaces, snows, brigantines, feluccas, and hermaphrodite rigs. The absence or concealment of these types in the written records skews any database on ship losses and makes the concept of an exhaustive database impossible. Yet, this does not make databases like the MBNMS Database unusable. It simply means that the information gleaned from the databases

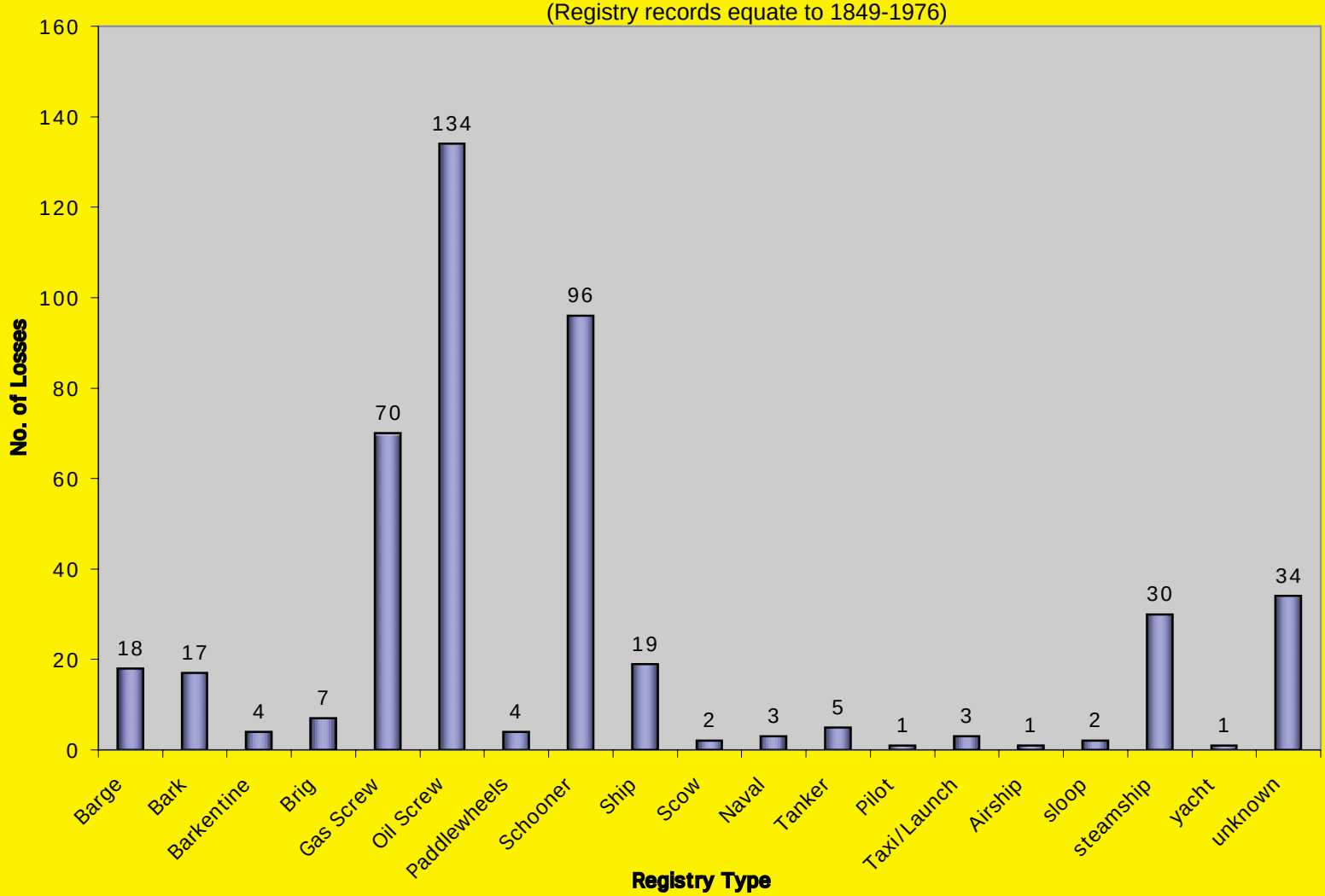
**Table 3:** Vessel Types Recorded in MBNMS Database of Vessel Losses and Sorted by Registry Types

| Type | Propulsion | | Century in Use | | | Functional Use | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Rigged | Unrigged | 18th | 19th | 20th | Commercial | Naval | Recreation | Educ. |
| Aircraft | | • | | • | • | • | • | • | |
| Bark | • | | | • | • | • | • | | • |
| Barkentine | • | | | • | • | • | | | • |
| Barge | | • | • | • | • | • | • | | |
| Brig | • | | • | • | • | • | • | | • |
| Corvette | • | •[1] | | • | • | | • | | |
| Cutter | • | • | • | • | • | | • | | |
| Dirigible | | • | | | • | • | • | • | |
| Freighter | | • | | • | • | • | | | |
| Galleon | • | | • | | | • | | | |
| Gas Screw | • | • | | • | • | • | • | • | • |
| Launch | • | • | • | • | • | • | • | • | |
| Oil Screw | • | • | | • | • | • | • | • | • |
| Paddlewheel | • | • | | • | • | • | | • | |
| Patrol Boat | | • | | | • | | • | | |
| Pilot Boat | • | • | | • | • | • | • | | |
| Schooner | • | • | | • | • | • | | • | • |
| Scow | • | | | • | • | • | | | |
| Ship | • | • | • | • | • | • | • | | • |
| Sloop | • | | • | • | • | • | • | • | |
| Steamship | | • | | • | • | • | • | | • |
| Submarine | | • | | • | • | | • | | • |
| Tanker | | • | | • | • | • | | | |
| Water Taxi | | • | | | • | • | | | |

[1]Certain types of vessels evolved from rigged to unrigged and therefore are noted as both.

must have supportive information. For example, we know from historical data that one of the largest surges of immigration into California occurred in the 19th century. The pressures of a booming population increased the demand for lumber and flour. At this same time the written record keeping for shipping improved dramatically. In the MBNMS database, through a sort by *type*, we found that sailing schooners far out-stripped any other sailing vessel of the 19th century (**Figure 10**). This is undoubtedly due to the schooner's exceptional, coastal sailing qualities. The fore-and-aft rig of the vessel gave schooners the ability to slide in and out of narrow coves known as 'dog holes' which dot the rugged California coastline. Protected within the dog holes were

Figure 10: Number of Reported Vessel Losses Sorted by Registry Type
Listed within the MBNMS Database
(Registry records equate to 1849-1976)



numerous landings from which lumber, cattle and flour were shipped. Schooners traded up and down the coast and were such a popular type that when steam overtook sail, the name schooner evolved into a type of vessel known as the steam schooner. Like its antecedent the steam schooner plied the coastal waters transporting raw materials from small landings to the major ports of the state. Together sail and steam schooners represent 96 of the 463 reported losses. The only other *type* to out number the schooner is the completely generic term 'oil screw.'

To summarize, when sorting the MBNMS database for *type* it is important to use supportive historical and technical information so that the data extrapolated is more useful. It would be injudicious to use the category of *type* alone to study the inventory of reported ship losses within the sanctuary. However, when the data is paired with historical information as to when these vessel *types* were popular and the qualities that certain types brought to commercial or naval purposes, the data does divulge important information. For submerged cultural resource management planning it is important to note that during the colonial period of California and the transitional period of sail to steam, schooners were the most prevalent *type* of vessel trading along the coast. Therefore, these are more likely to be found archaeologically than any other *type* of vessel lost in the 19th and early 20th century.

***What does the data reveal in terms of* Vessel Size *of reported losses?***

*Vessel Size* is a very specific indicator regarding the vessels reported lost in the sanctuary. All official registry records in the United States record the tonnage of a vessel. In maritime measurements the ton is a unit of weight known as the 'short ton' equaling 2,000 pounds. The only variance in the records is whether or not the number recorded is 'gross tonnage,' overall weight of the vessel and cargo combined, or 'net tonnage,' which is a calculated weight referring to the potential cargo capacity of the vessel. It is true that the formula for figuring net tonnage changed through time and was sometimes manipulated by mariners to lessen taxes levied on their cargos. Despite these variables *size* remains a very important indicator (**Table 4**).

In broad analysis, *size* and the shift from wooden vessels to iron and steel vessels correspond closely. Wooden vessels by the very nature of the material they were built from, could never reach the *size* their iron and steel hull counterparts did. Other natural dictates also play a role in the *size* of a vessel type as in the case of the schooner, where the primary role in trade for this type of vessel was to move goods between small isolated landings and large ports. Thus building material alone did not dictate the *size* of schooners, but was combined with the dictates of the restrictive coastal landings. For example, sorting the MBNMS database for high and low tonnage reveals that there is a 12-ton schooner and a 2477-ton schooner. However, even the largest schooner is significantly smaller than the larger steamships and tankers that reached over 8,000 tons. Moreover, the range is an important consideration when comparing schooners to other types. The smallest tanker reported is still over 60 tons larger than the smallest schooner.

**Table 4:** Predominant Registry Types of Reported Vessel Losses Sorted for High and Low Tonnage Ranges

| Type of Vessel | High Tonnage[1] | Low Tonnage[2] |
|---|---|---|
| Barge | 6500 | 12 |
| Bark | 2245 | 230 |
| Barkentine | 889 | 253 |
| Brig | 246 | 134 |
| Gas Screw | 3098 | 8 |
| Oil Screw | 692 | 8 |
| Paddlewheeler | 1275 | 182 |
| Schooner | 2477 | 12 |
| Ship | 2000 | 148 |
| Steamship | 7869 | 51 |
| Tanker | 8272 | 74 |

[1] In all cases the tonnage listed is taken from existing databases. Where possible tonnages were compared to ensure that the net tonnage was recorded.
[2] Very low net tonnages generally indicate fishing vessels or recreational vessels.

Another generalization that can be applied to *size* is in regard to trade routes. Generally, larger tonnage vessels trade between larger ports and/or make longer journeys. Within the range of tonnage in the 19th century, vessels like barks, barkentines and ships are bigger even at the lower end of the tonnage (**Figure 11**). They needed to be bigger to make transoceanic trade profitable. These vessels carried the bulk of cargo between California and the Eastern US Seaboard, China and Australia. This is still true today. Super tankers and large R class container ships make the longest voyages, while smaller tankers and freighters service smaller ports out of the larger ports.

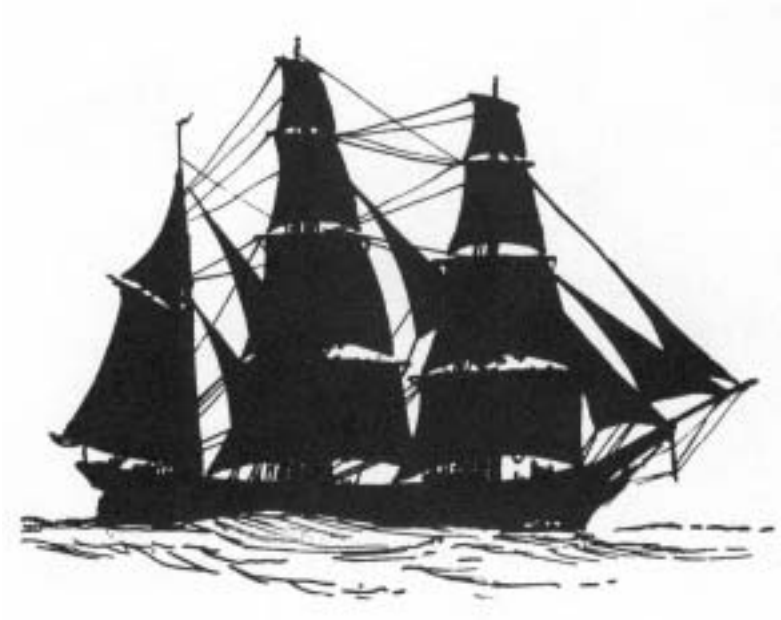


Figure 11: Bark Rig

*Size* may also help factor out some of the problems associated with 20th century record keeping where vessels are generally lumped under the categories of gas screw or oil screw without any indication of the vessel's function.

In general small tonnage fishing vessels went unregistered in the 19th century and only began to be regularly recorded after World War I. This skew in the data was first revealed when we noticed that the types 'felucca' and 'Monterey' were completely absent from the records. Through ethnographic and photographic evidence we know that there were large fleets of these types of small craft throughout the fishing communities that relied on the waters encompassed by the sanctuary. Some of them had to have sunk within the sanctuary. Looking at low range tonnages of the 20th century, there are 49 vessels of 15 tons or smaller registered as gas screw and 52 vessels of 15 tons or less registered as oil screw. Thus of the 271 reported losses for 20th century vessels, 101 or 37% were probably fishing vessels.

Like the category of *type*, the category of *size* has even greater potential when paired with other kinds of information. General trends such as the increase of tonnage that occurred with the transition from wood to steel is important, but more intriguing is the correlation in the 20th century between losses for smaller vessels and economic down turns. By sorting the MBNMS database by year, tonnage range, and then tabulating the number of vessels lost each year we found information that revealed recurring patterns (**Table 5**). It is also important to note that many ships that fall within the designation of historic (over 50 years) were still afloat within more recent times and the date of their demise may be less than 50 years. The date of their demise does not reflect on their potential eligibility for historic status.

Throughout the period represented in the MBNMS database there are losses of vessel both large and small. We looked for patterns of loss. Certain factors we could compare such as time of year of loss and insurance claims, other patterns like management of business and investments we could not. We found that the loss of large vessels appears to correlate closely to time of year more than any other factor. It seems the week between Christmas and New Years is very dangerous for all vessels regardless of size. Other patterns became evident when we focused on smaller tonnage vessel losses. The highest recorded losses for small vessels cluster around the depression of 1929 and again in the recession following World War II.

Thus, when *size* is utilized as a category it can be an important tool to better understanding the vagaries of the written records. We were surprised to find that the category of size could be so informative, especially when paired with other pieces of information. It was easy to determine that the 6 ton, gas screw *Aneadedea* lost at Moss Landing is the smallest reported vessel lost in the sanctuary and that the 8,272 ton tanker *Montebello* lost off Point Piedras Blancas is the largest reported vessel lost near the sanctuary, but by comparing and sorting the size in different ways we were able to extrapolate much more information. We were able to find evidence of the small Monterey fishing vessels, that are invisible in the record keeping but so readily identified with Californian history. We chanced upon the affects of recession on the California fishing industry and how mariners dealt with the problem. In short, vessel size may turn out to be one of the most informative and versatile categories of information in the MBNMS database.

**Table 5:** Comparative Tonnage Ranges and Number of Losses Per Year

| Year Lost | High Tonnage | Low Tonnage | No. of Losses Reported |
|---|---|---|---|
| 1595 | 200[1] | | 1 |
| 1831[2] | | | 1 |
| 1837 | 298 | | 1 |
| 1841 | | | 1 |
| 1845 | 134 | | 1 |
| 1849 | 598 | 200 | 4 |
| 1851 | | | 4 |
| 1852 | 750 | 183 | 3 |
| 1853 | 1275 | 844 | 4 |
| 1854 | | | 1 |
| 1856 | 350 | | 1 |
| 1858 | 349 | | 1 |
| 1861 | 1215 | | 4 |
| 1862 | | | 3 |
| 1863 | | 97 | 5 |
| 1864 | | 34 | 1 |
| 1865 | 999 | 14 | 2 |
| 1866 | 680 | | 2 |
| 1867 | 291 | | 2 |
| 1868 | 868 | 64 | 5 |
| 1869 | 1246 | 70 | 4 |
| 1871 | 149 | | 2 |
| 1872 | 800 | | 2 |
| 1873 | 1140 | | 2 |
| 1874 | 988 | 40 | 8 |
| 1875 | 1129 | 48 | 2 |
| 1876 | 148 | | 3 |
| 1877 | | | 3 |
| 1878 | 1117 | 49 | 6 |
| 1879 | 114 | 12 | 7 |
| 1880 | 1457 | 84 | 4 |
| 1881 | 1425 | 66 | 3 |
| 1882 | | 41 | 1 |
| 1883 | 144 | 27 | 2 |
| 1884 | | | 1 |
| 1885 | 1119 | 45 | 2 |
| 1886 | | 21 | 4 |
| 1887 | 246 | 182 | 3 |
| 1888 | 246 | 70 | 5 |
| 1889 | | | 1 |
| 1890 | 194 | 173 | 2 |
| 1891 | 1866 | 98 | 2 |
| 1892 | | 15 | 1 |
| 1893 | | | 1 |
| 1894 | 495 | | 2 |
| 1895 | 217 | 84 | 2 |
| 1896 | 3616 | 889 | 2 |
| 1898 | 2000 | 112 | 2 |

| Year Lost | High Tonnage | Low Tonnage | No. of Losses Reported |
|---|---|---|---|
| 1899 | | | 1 |
| 1900 | | 26 | 3 |
| 1901 | 216 | | 1 |
| 1902 | 350 | 295 | 2 |
| 1903 | 2245 | 23 | 2 |
| 1904 | | 24 | 2 |
| 1905 | 1802 | 60 | 4 |
| 1906 | 173 | | 1 |
| 1907 | 831 | 9 | 5 |
| 1908 | | 59 | 1 |
| 1909 | 1534 | 8 | 6 |
| 1910 | 845 | 586 | 3 |
| 1911 | 1063 | 475 | 4 |
| 1912 | 1838 | 16 | 4 |
| 1913 | 253 | 12 | 7 |
| 1914 | 790 | 368 | 4 |
| 1915 | 484 | 40 | 3 |
| 1916 | 2354 | 11 | 5 |
| 1917 | 182 | 8 | 3 |
| 1918 | 692 | 9 | 4 |
| 1919 | 682 | 16 | 2 |
| 1920 | 201 | 34 | 4 |
| 1921 | 453 | 32 | 3 |
| 1922 | 3830 | 691 | 2 |
| 1923 | 3098 | 26 | 5 |
| 1924 | 102 | | 1 |
| 1925 | 97 | 13 | 7 |
| 1926 | 5153 | 14 | 2 |
| 1927 | 701 | 28 | 3 |
| 1928 | 35 | 18 | 6 |
| 1929 | 2150 | 11 | 10 |
| 1930 | 6157 | 10 | 9 |
| 1931 | 2606 | 12 | 8 |
| 1932 | 77 | 13 | 7 |
| 1933 | 1957 | 9 | 3 |
| 1934 | 922 | 71 | 4 |
| 1935 | 1211 | 12 | 8 |
| 1936 | 7500 | 39 | 3 |
| 1937 | 878 | 6 | 7 |
| 1938 | | 27 | 2 |
| 1939 | 19 | 7 | 7 |
| 1940 | | 7 | 3 |
| 1941 | 8272 | 7 | 10 |
| 1942 | 6157 | 12 | 16 |
| 1943 | 6500 | 10 | 10 |
| 1944 | 287 | 9 | 12 |
| 1945 | 58 | 11 | 11 |
| 1946 | 251 | 9 | 10 |
| 1947 | 50 | 11 | 7 |
| 1948 | 38 | 12 | 9 |
| 1949 | 46 | 9 | 7 |
| 1950 | 33 | 8 | 9 |

| Year Lost | High Tonnage | Low Tonnage | No. of Losses Reported |
|---|---|---|---|
| 1951 | 33 | 8 | 8 |
| 1952 | 15 | 9 | 10 |
| 1953 | 7869 | 10 | 6 |
| 1954 | 109 | 9 | 8 |
| 1955 | 11 | 10 | 2 |
| 1956 | 2477 | | 1 |
| 1957 | 13 | 8 | 2 |
| 1958 | 122 | 11 | 4 |
| 1959 | 14 | 11 | 3 |
| 1960 | 34 | 8 | 8 |
| 1961 | | 12 | 1 |
| 1966 | 169 | | 1 |
| 1972 | 76 | | 1 |

[1]When only one vessel was listed with tonnage and the tonnage is over 100 then the entry is placed in high tonnage. If below 100 the entry is placed in low tonnage.

[2]Years where losses are listed but no tonnage recorded.

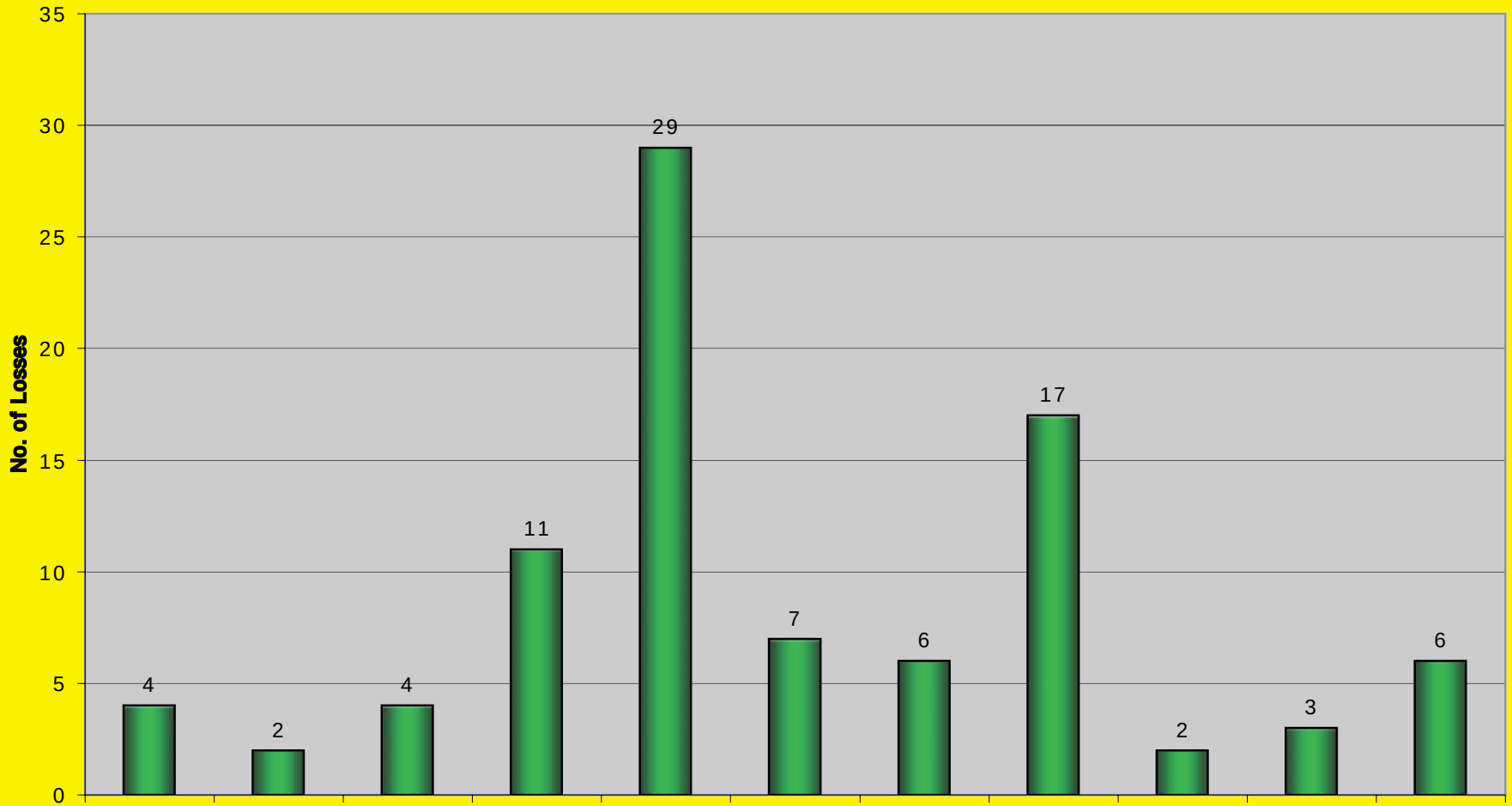
***What does the data reveal in terms of the pattern of vessels reported lost in the sanctuary?***

The 463 reported vessel losses located in the five counties along the Pacific Coast from the northern border of Marin County to the southern border of San Luis Obispo County represent approximately one quarter of California's vessel losses reviewed in this study. Historically significant sites such as the *Montebello* and the *Macon*, were documented at the time of their loss, and therefore have had their locations confirmed by the military and scientists. Others such as the *Drumburton* and the *Point Arena* have been located because they are beach wrecks. The whereabouts of still others are known because of their secondary use as in the case of the *William H. Smith* that was turned into a pier. However, the majority of reported losses have yet to be located and identified. Simple sorts of the data by the categories, landmark and county, do indicate the types of clustering of reported losses within the sanctuary.

Points of land where shoaling and rock outcrops are prevalent along California's rugged coastline not surprisingly represent the highest concentration of shipwrecks. Unlike the Cape of Good Hope, Ragged Point more than adequately describes the dangerous stretch of coast in Central California. Twenty landmarks or specific locations are home to two or more shipwrecks within the Monterey Bay National Marine Sanctuary (**Figure 12**). The rugged coast and dangerous rocks around Point Sur, Point Montara, Point Bonita and Pigeon Point claimed more vessels over the years than any other points within the sanctuary. Terms like 'struck,' 'stranded,' or 'wrecked are most often associated with vessels that met their demise on the rugged rocks along the coast associated with these points of land. More often than not, vessels running too close to shore in the fog hit submerged rocks. The vessel hulls were pierced by the collision with the rocks and the vessel was sometimes stranded or stuck on the rock until it sank and fell off into deeper water or broke up in the surf.

Monterey Bay and Half Moon Bay are less precise locations listed more than any other general areas as the site of vessel losses. The losses at these locations could have

Figure 12: Reported Vessel Losses Sorted by Specific Coastal Landmarks



resulted from several different reasons. The most common reported cause of loss in these locations was noted as bad weather. During storms vessels sometimes dragged or parted their anchors and were driven by wind and wave onto the shore. Sometimes vessels out in a storm ran into mechanical trouble or sprang a leak and then ran for shore, purposely driving the vessel aground to avoid loss of life. Terms like 'grounded,' 'beached,' or 'wrecked' are cited as the cause of loss in these cases.

The eleven locations listed in Figure 12 only account for 91 reported losses out of the total 463 recorded in the MBNMS database; less than half. Yet, it is these vessels that will require the lion's share of management and attention. The remains of these vessels are most likely to be found by recreational divers and beachcombers. Ascertaining which shipwrecks are being visited by divers and which locations have the greatest probability for visitation is important in the consideration of allocation of program and staff resources for management in the future. Thus location data from the MBNMS database when paired with the responses to the diving questionnaire regarding numerous impact questions about shipwrecks in the sanctuary will be extremely helpful as future management issues unfold (**Enclosure B:** Recreational Diver Questionnaire).

Unfortunately, not all vessel losses are identified with a specific landmark or location or even correctly associated with landmarks. The wreck report of the *City of New York* noted the ship went down off Point Bonita in Monterey. Point Bonita is located at the northern headland of the Golden Gate entering San Francisco Bay and is in Marin County. However, it should be noted that in the minds of mariners out on the water that none of these landmarks are very far apart. In truth, the life saving station at Point Bonita often responded to vessels in distress off Santa Cruz. An all too common notation in the reported losses of vessels is the vague terms 'near' or 'off.'

Many vessels sank out of sight of land. These are reported as 'foundering,' which refers to vessels that sink in deep water. Others collided with another vessel and then sank. Some caught fire and sank. Depending when the vessels sank and what the weather was like, some were able to record general latitude and longitude at the time of sinking. This is of some help but does not necessarily mean that the location recorded indicates where the vessel ended up. In shipwrecks there is no "X Marks the Spot." Foundering vessels continue to drift while sinking and continue to move with the currents on their way to the seafloor. In cases where modern searches for a specific ship that recorded its location at sinking have located the shipwreck, it is often up to a mile or more away from the recorded coordinates given in the written report at the time of loss.

Some vessels simply disappeared. The rediscovery of vessels lost at sea is difficult and without fully mounted expeditions, such as the Hunter Expedition to the *Montebello* or the Navy's search for the *Macon*, the discovery of these losses are more likely to come about through serendipity. In these instances, knowing the ships were lost in the sanctuary is important but the database is unlikely to provide the kind of information that can assist in the discovery of them.

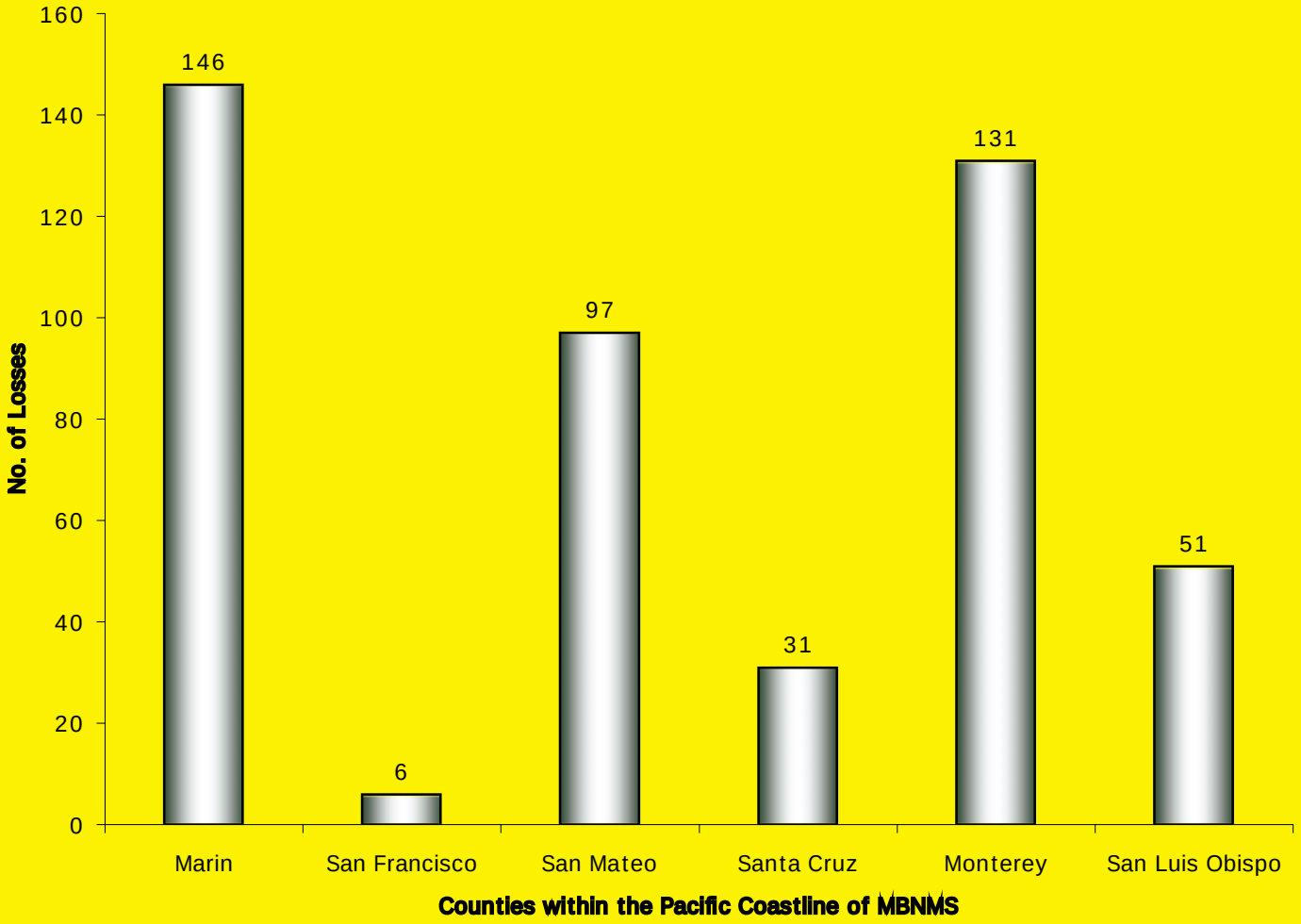
An important area where the database can help in a general manner for planning and management is the plotting of ship losses by county. Vessels losses across the five counties show that shipwrecks are not dispersed evenly. Some counties have greater concentrations of losses. This may be due in part to the maritime industries associated with the coastal communities as in Monterey, or simply the natural danger of the coast as in the case of the entrance to San Francisco Bay from the northern Marin side near Point Bonita. Whatever the reason, the distribution of wrecks clearly reveals that the resources are not evenly spread across the sanctuary (**Figure 13**). The majority of reported losses are located in the northernmost county of the sanctuary. Marin accounts for 32% (146) of the 463 losses. Monterey and San Mateo follow with 28% (131) and 21% (97) respectively. More than likely these numbers reflect the major population centers and the entrance to one of California's busiest ports. Where the population is smaller, as in Santa Cruz (31) and San Luis Obispo (51) counties, the reported losses are much smaller.

In summary, location is without doubt a powerful tool in understanding and managing the submerged cultural resources of the Monterey Bay National Marine Sanctuary, even when reviewed in the most general of terms. Knowing in which counties the majority of the submerged cultural resources reside is important for future planning and management. Knowing specific locations is even more helpful especially when we consider that majority of the shipwrecks are within the surge zone off the coast or in the surf zone. The factors of dive-ability, jurisdiction and community development underscore the need to understand where shipwrecks are located. Shallow water wrecks are imminently dive-able by recreational divers and more importantly shipwrecks within three miles of the shore fall under state jurisdiction. Some shipwrecks may also be in the path of on or near-shore development. Some shipwrecks are already being explored while others are still being sought. Some shipwrecks, have been destroyed by the natural environment, while others are simply masked by the environment.

None are marked by buoys or interpreted. Knowing the locations of the shipwrecks will help planning and management in the mitigation of impact to these historic sites. Targeting the systematic consideration of concentrations of submerged cultural resources is possible using the location information found within the MBNMS database.

Furthermore, future combinations of different kinds of information described within the MBNMS database could provide even more information. For instance, 87 of the total 170 entries of reported vessel losses for the 19$^{th}$ century are located in Marin, while only 25 are reported lost in Monterey for the same century. In the 19$^{th}$ century 45 vessels were reported lost in San Mateo. The positions of San Mateo and Monterey counties are reversed, in regard to 19$^{th}$ century losses verses their percentages of the overall losses by county reported in Figure 13. In this manner, infinite combinations and re-combinations of the data present researchers and staff with exciting possibilities of analysis of the submerged cultural resources of the sanctuary.

Figure 13 : Reported Vessel Losses Sorted by County



***What types of information are still missing in the MBNMS database?***
Where available, both the year of launch and the date of loss are supplied, as is detailed information about dimensions and propulsion. However, for the majority of entries only the barest amount of information is yet recorded. Where possible, vessel loss entries were updated to include general latitude and longitude coordinates, in addition to county, landmark and nearest community. To increase the power of the MBNMS database, information should continue to be sought to enhance the potential of the MBNMS database as a management tool. Small projects that are narrowly defined and focus on specific areas of information, like vessels sunk prior to 1849 would help round out the database file. More suggestions for discreet projects that will continue to enhance the MBNMS database and study of the submerged cultural resources of the sanctuary are discussed in the Recommendations section (**Section V**) of this report.

Without exaggeration it can be said that the Monterey Bay National Marine Sanctuary holds within its inventory of submerged cultural resources potentially one quarter of California's overall reported ship losses. This is a sizeable amount and is therefore worthy of further management and exploration. By using the data provided in the MBNMS database and continuing to upgrade the files, Monterey Bay National Marine Sanctuary has at its disposal a powerful tool for assessing the overall reservoir of submerged cultural resources and a powerful tool for indicating where program resources and staff time need to be expended. Moreover, the MBNMS database can be utilized as a powerful tool for directing further research and management of the cultural resources within the sanctuary. The MBNMS database combined with direct information from the recreational diving community, collateral research being amassed by marine biologists, fisheries, other marine studies, and marine industries, in conjunction with future partnerships will provide pivotal tools for the management tool kit of the Monterey Bay National Marine Sanctuary. The result will be the sustainable management of California's rich coastwise resources for the benefit and enjoyment of the present generation and many generations to come.

# Section IV: Prehistoric Submerged Cultural Resources

This section addresses the theoretical potential for the occurrence of prehistoric submerged subaerial archaeological sites of human activity within the Sanctuary. Submerged subaerial sites are terrestrial archaeological sites created by people living on the land. These sites were later drowned (if not partially or entirely destroyed) by a rising sea level transgressing across the continental shelf at the end of the last glacial maximum, beginning as early as 22,000 years before present (22,000 BP).

Current research on human migration into the Western Hemisphere is seriously reconsidering coastlines as attractive travel and settlement corridors, particularly to groups possessing maritime technology adapted to the coastal environment (Erlandson 1994, 2001, T. L. Jones 1992).

It is currently completely conjectural whether human beings were in North America at the height of the Wisconsin glacial maximum approximately 22,000 years ago. Sea level was then at its maximum corresponding low-stand of approximately 120m (400 ft) below present sea level (Shepard 1963). This exposed the continental shelves to colonization by plants and animals, most likely via drainages that formed on the exposed shelf and followed sea level to lower elevations. This ultimate low stand of sea level would also have allowed prehistoric human populations, if present, to range across the exposed shelf within the Sanctuary. As the world's glaciers retreated and released captured water, sea level transgressed up the continental shelves between 22,000 and 7,000 to 9,000 years before present (**Figure 14a**). For purposes of this discussion, we will take the rounded figure of approximately 8,000 years BP as when sea level arrived near its present altitude. Thus, the post Wisconsin transgression of the Sanctuary's continental shelf occurred over a 14,000-year period ending approximately 8,000 years ago.

The density of people inhabiting the now submerged continental shelf along the California coast at this early date is unknown, but two scenarios are feasible and potentially contemporary on a maritime-climate dominated coastline. First, groups of people essentially nomadic in lifestyle wandered the coastline living off the native biota. They may have been seasonally migratory within the coastal and interior regimes just as protohistoric Native Americans were doing when the Spanish settled the coast in the 18th century. Second, the size of these populations and degree to which they settled in permanent villages and contributed midden materials to the environment greatly affects the amount of material culture remaining to be found (D. A. Jones 1992). If these maritime adapted groups, with watercraft or without, remained in small bands and moved frequently, little may be left to study.

Discussion of the potential for archaeological sites is in four parts: First, could human populations have been present within the Sanctuary to exploit the exposed continental shelf in late Pleistocene time? Secondly, what were the details of topography of the exposed shelf and the transgressive processes involved in its inundation? Thirdly, would the impact of a rising sea level and its attendant "wave mill" transgression of the

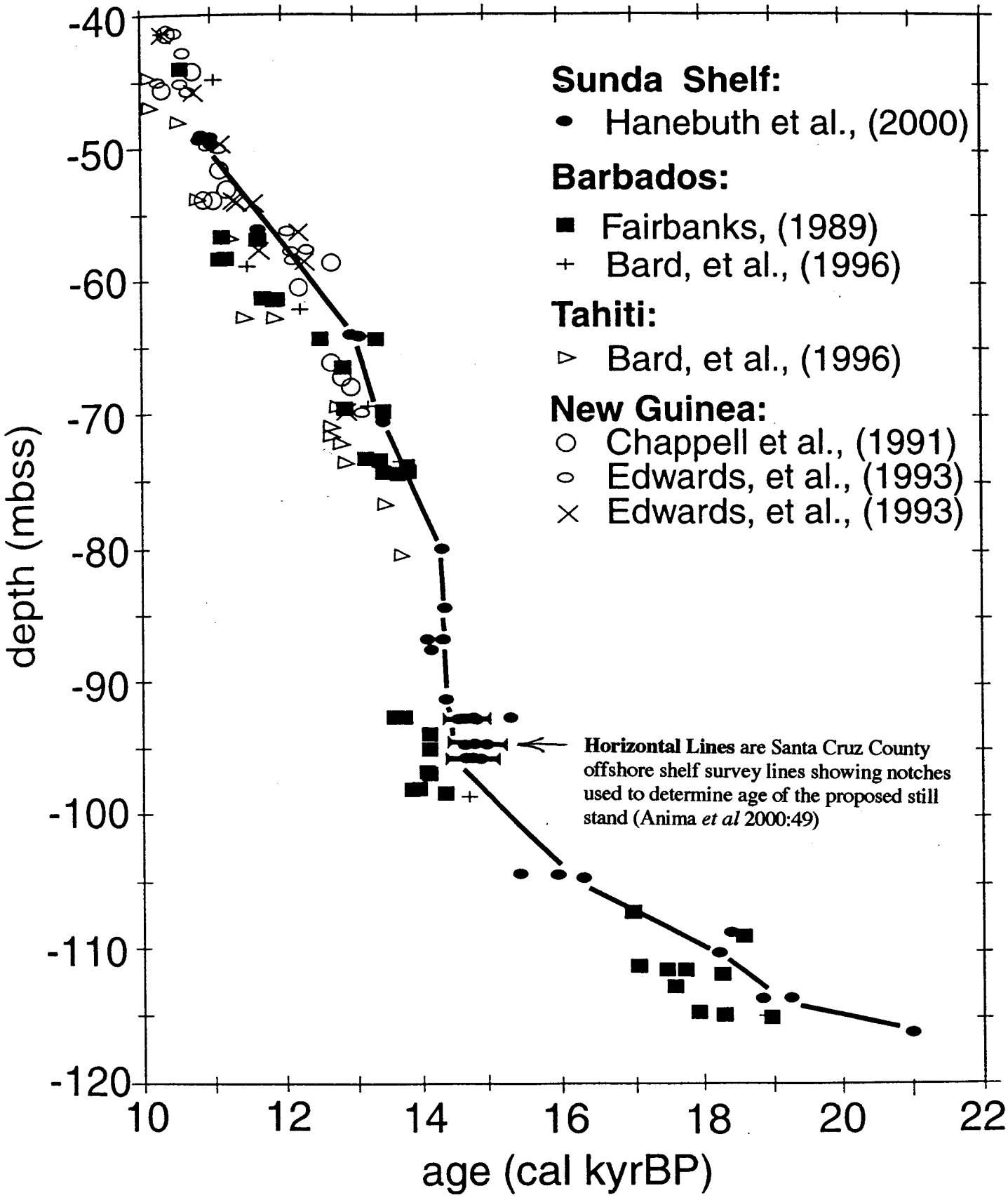



**Figure 14a: Sea Level Curve**
Compilation of sea level indicators from work of Anima, Ettreim and Stevenson showing fit with previous work in other areas (Hanebuth *et al* (2000) and Anima *et al* (2000:49) .

exposed shelf allow for the survival of indications of human occupation? Finally, given the vast expanse of the now drowned shelf, how would surviving indications of human presence be predicted and located?

### *Earliest Confirmed Indications of Human Presence in California*

Until recently, a piece of human cranium found near Tulare Lake in California's great Central Valley and believed to date to approximately 12,000 years ago, was to some the oldest confirmed human presence in California (Foster 2001). This date for human presence in California may have recently been pushed back as much as another thousand years by the radiocarbon dating of materials in association with Arlington Springs Woman, found on Santa Rosa Island, approximately 160 km south of the Sanctuary (Johnson 2001). Thus, it appears that prehistoric people were in California by at least 12,000 to 13,000 years ago. At lowered sea level, Santa Rosa Island joins other nearby Santa Barbara Channel Islands as part of a larger offshore land mass. Reaching this Island platform from the mainland required watercraft capable of traversing many miles of open sea. Although conjectural, logic suggests that such sea-going watercraft are necessary to transport prehistoric people to the Channel Islands at this early date. However, no evidence of such watercraft of this antiquity has yet been found.

If these dates remain solid, human populations were probably exploiting resources on the now submerged shelf out to a modern bathymetric depth of 60m (200 ft) below present sea level. In many locations, this is approximately half the width of the now submerged shelf. These depths are relative and uncorrected for local tectonic activity and thickness or extent of sediments overlying the transgressive erosion surface marking the Pleistocene/Holocene boundary (Eittreim *et al* 2002).

For the Monterey area itself, prehistoric archaeological sites currently above sea level rarely date to more than 6,000 years except away from the coast in interior valleys. T. L. Jones (1992) gives an excellent summary of central coast cultural progression from the archaeological record as currently understood.

### *Emerged Topography and Exposed Shelf Processes of Inundation*

Four major glaciations occurred during the Pleistocene Geological Epoch. The most recent is called the Wurm/Weichsel Glaciation in Eurasia and Wisconsin Glaciation in North America (Nilsson 1983). During glacial epochs, sea level is lower world wide because of the huge volume of water locked up in continental ice sheets. The greater the volume and extent of continental ice sheets, the lower sea level fell, and subsequently the greater the exposure of the continental shelf. The regression of the world's shorelines down slope on the continental shelves exposed vast tracts of land to settlement by air breathing plants and animals. As glaciation increased towards its maximum extent, down cutting of stream channels accelerated as streambed processes sought stabilization. Erosion along these deepened channels would have initially carried huge volumes of loose sediments back into the ocean, further scouring channels

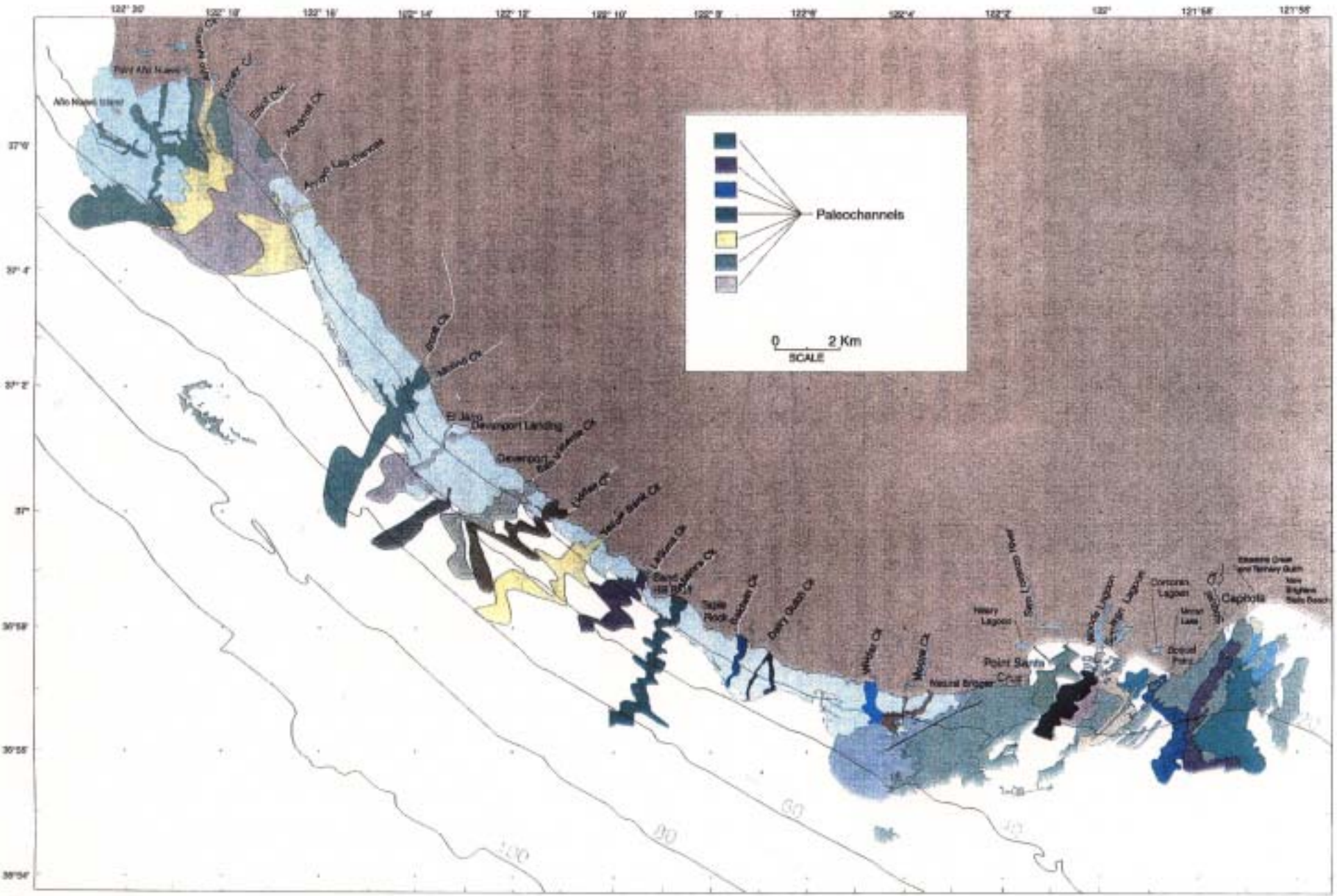



**Figure 14b: Paleo-Channels** Mapped out by color are the paleo-channels between Point Año Nuevo and Soquel Cove, Santa Cruz (Anima *et al* 2000:44)

on the shelf and slope. It is noted that buried paleo-channels can be mapped from the present shoreline out to 60m of depth (**Figure 14b**). These buried paleo-channels seem associated with channels seen cut into the continental slope as well. Except for the larger rivers, direct correlation of these buried near-shore and deeper slope channels are speculative (Anima *et al* 2002). It appears that forces of transgression may have eroded away any channels that formed on the middle and outer shelf.

When former underwater bathymetry becomes dry land topography and old geologic surfaces are exposed, fields of sediments and gravels overlying cobles and boulders emerge. Outcrops composed of resistant rock become high ground. Huge sand dune fields might form inland of large sources of shelf sediment left to the effects of wind. Marine sediments are eventually overlain with terrestrially formed soils. Streams entering the newly emerged shelf would first pool in low topography, then overflow to down-cut straight or meandering channels across the shelf to the sea. Filled stream channels are reopened and new channels are created. Stream banks acquired vegetation from upstream sources as wind and animals also spread new life. A process of biological succession ensues whereby the original colonizing plants and animals give way to more competitive species, and of course, all are climatically readapting to changing ecological conditions.

Geological understanding of the northern Monterey National Marine Sanctuary has recently been detailed by obtaining side scan sonar and multibeam data with seismic reflection profiler systems in combination with an extensive marine geological literature search (Eittreim and Noble 2002). The study focused on the Monterey inshore continental shelf between Point Ano Nuevo on the north and Point Sur on the south. Buried paleochannel occurrence is discussed for the northern Monterey shelf from Point Ano Nuevo to east of Soquel Point (Anima *et al* 2002). Nearly 30 major buried stream channels and valleys were identified along this 48 km stretch of offshore coastline (**Figure 14b**). Most could be connected with onshore streams evident today. It is widely believed that evidence of prehistoric human utilization of these paleo-channel or lagoonal environments will eventually be discovered.

### *Potential for Survival of Subaerial Sites of Human Activity*

The find of a single artifact of prehistoric human manufacture underwater conjures up a nearly infinite number of ways in which the object may have come to be found at the location in which it occurs. Its "provenience" (recorded context) is all-important if it can be proved to be *in situ*, or still in its original location of deposition. Recognized associations of artifacts form a feature and is infinitely valuable in making an assemblage suitable to study. Although the survival of drowned, prehistoric sites of human occupation are presumed to be rare; certain oceanographic and geological conditions may increase the chance of preservation. Marine scientists gather information on seafloor characteristics in order to make statements about its appearance, formation and potential importance to human economics or its value as habitat in the biosphere. Much of the scientific data collected on local portions of the continental shelf have been developed through the use of geophysical remote sensing

systems. Acoustic reflection (sound waves) is used to map seafloor bathymetry (depth), seafloor bottom features, outcrop and sediment boundaries, and buried strata depth and thickness. Among these instruments are the side-scan sonar, precision depth recorder and high-resolution subbottom profilers. From these data types, a series of seafloor views and maps have been developed of bathymetry, seafloor features, unconsolidated sediment isopaching (thickness contours), and shallow and deep structural geology. Analysis of these data sets and physical examination of the continental shelf may provide clues to remnant landforms that may contain the evidence of prehistoric human occupation of archaeological importance.

Recorded instances of artifact recovery from the seafloor have been determined to be the result of the erosion of this material from nearby onshore sites, or perhaps more rarely, kelp holdfast transport or canoe voyaging. Many of these discoveries are termed 'isolated finds' by researchers and are often made by members of the recreational SCUBA diving public through the selective recognition of large artifacts such as stone bowls or sometimes other objects (Hudson 1976). Discovery of submerged intact artifactual features within their original soils (*in situ*) would provide the critical evidence and essential proof for archaeological assessment of a drowned terrestrial site. Additionally, such a discovery would also be evaluated for important associated details to determine that the entire site did not slide underwater due to onshore slumping or another landslide process.

It is assumed that the cumulative rise of sea level over time undoubtedly pushed human occupation inland to the region of the present-day coast. However, the relative speed of this transgression is an important consideration in site survival. In recent years, some researchers have suggested that the process of post-glacial sea level rise might have occurred in shorter episodes, rather than slowly over longer time as often thought. Hanebuth *et al* (2000) has used datable materials on the Sunda shelf in Southeast Asia to get the most reliable dates to date. In what is termed "an accelerated sea level pulse" between 80 and 95 meters below modern sea level indicates a jump of 16 meters in just 300 years. Like many complicated aspects of global change, it is conceivably a combination of both slow and accelerated transgression interposed with periods of stability or even temporary minor regressions. A slow rise of sea level gives time for the "wave mill" of the advancing seashore to grind away all traces of human presence, while a relatively quick rise might bury sites before they are completely destroyed. Sites can also occur in protected areas where transgression may not have obliterated all indications. Sites around estuaries and lagoons that become environments of accretion rather than being eroded away are examples. Activities such as food processing, tool making, and other pastimes often leave abundant evidence of human presence (Kroeber 1925, Heizer 1978). Among these site types are rock and cave shelters, shellfish middens, roasting pits, stone tool quarries and perhaps cemeteries.

Of course, the larger the human population, the greater the accumulation of the material evidence of occupation. Some types of archaeological sites consist largely of accumulated refuse from human living. This material debris, often called "kitchen midden," or just "midden," builds as a layer of identifiable soil in the proximity of a village

or food processing location. Cultural midden is composed in large part of a greasy carbon coating of soil grains that distinguishes it from many other kinds of natural soil-building processes. Midden may remain undisturbed exactly where it originally accumulated, or it may have been "swept" regularly out of the living areas to the outer margins of the village. A cultural ring of midden soil within or surrounding the village would develop over time. There are corollaries found in modern communities. As a rule of thumb, an inch of midden represents a century of occupation. Of course, any particular accumulation of midden may vary from these common patterns depending on a specific array of factors requiring potentially detailed investigation.

### *Prediction and Location of Indications of Human Occupation*

The most direct approach to archaeological site location is to purposely strive to survey all seafloor surfaces, subbottom strata, and sediment packages for any indications of archaeological site presence. Advances in remote sensing technology, it is always hoped, will one day allow for the discovery of such sites with high integrity and minimal disturbance. This includes using geotechnical cores to examine terriginous strata for midden or other evidence of human presence. Proving such a site is not a slump block deposited offshore is also a principal concern.

In the past, the discovery of many artifacts have not come from the professional community but from activities associated with offshore recreational and commercial pursuits including sports SCUBA, commercial fishing and industrial diving activities. The Sanctuary therefore should institutionalize a method whereby non-archaeological scientists and the general public can be made aware of the importance of communicating such accidental finds for resource management evaluation, investigation and conservation.

Discovery of drowned sites of human occupation located on the seafloor will contribute immense information on the prehistoric peopling of North America, filling gaps in our present-day theories of maritime peoples. However, to date there are no confirmed discoveries of prehistoric sites of human occupation in the California submerged borderland. While several offshore sites are known (principally the Tennis Club site off La Jolla near San Diego) much research remains undone to prove that the site is not redeposited from onshore.

**Figures 15a** to **15e** illustrate the approximate pace of the post Wisconsin transgression across the continental shelf. Buried paleo-channels illustrated on **Figures 14b, 15b** and **15c** (Anima *et al* 2002) are an excellent environment to begin exploration of the potential for site discovery. This effort could be developed through interdisciplinary partnerships to share costs with other disciplines for more efficient and cost-effective acquisition of information. In every sense, the appearance of a submerged subaerial site of human activity on the continental shelf will "write its own ticket" in the funding climate of its discovery.

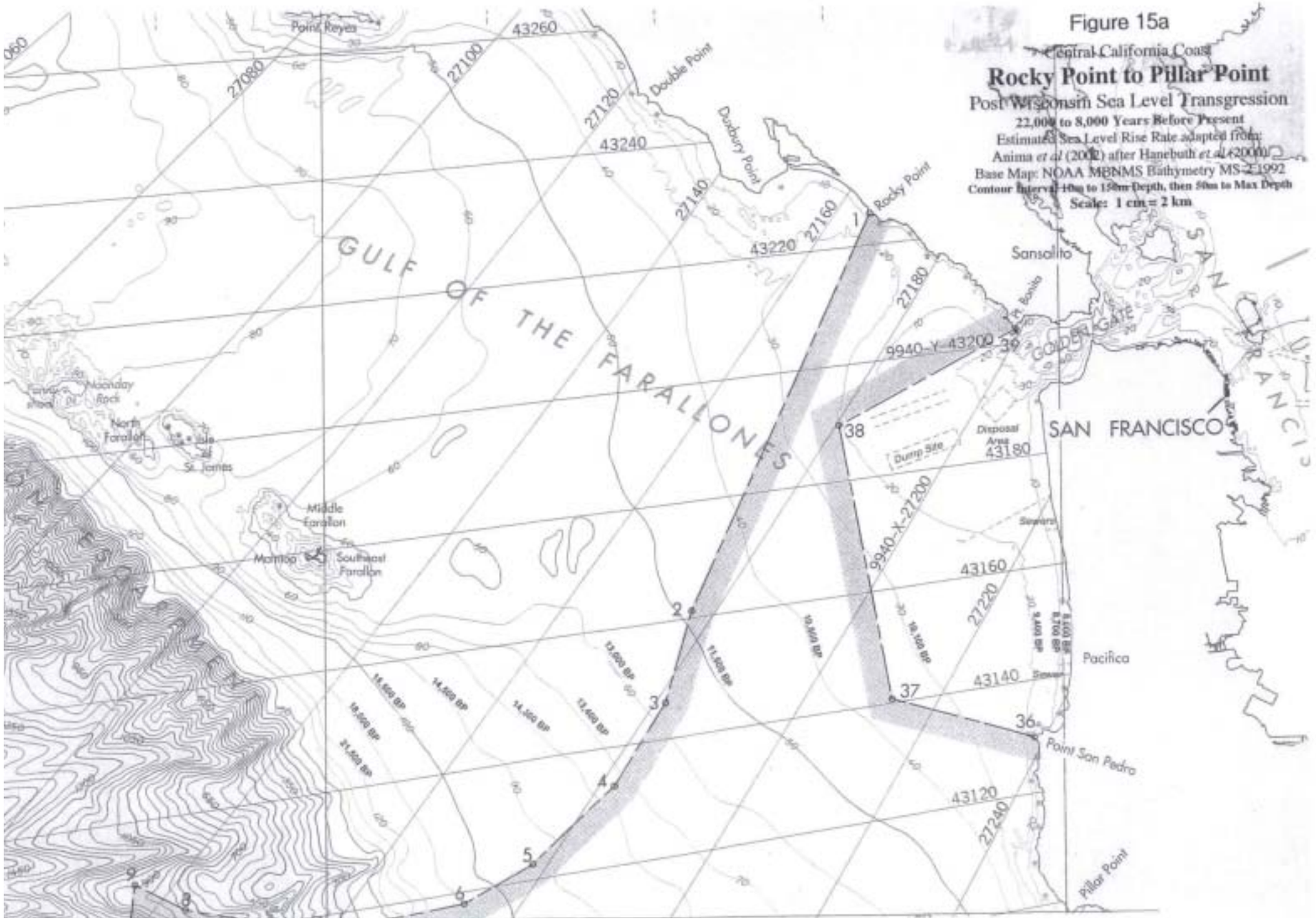


Figure 15a
Central California Coast
Rocky Point to Pillar Point
Post Wisconsin Sea Level Transgression
22,000 to 8,000 Years Before Present
Estimated Sea Level Rise Rate adapted from:
Anima et al (2002) after Hanebuth et al (2000)
Base Map: NOAA MBNMS Bathymetry MS-2 1992
Contour Interval: 10m to 150m Depth, then 50m to Max Depth
Scale: 1 cm = 2 km
GULF OF THE FARALLONES
SAN FRANCISCO
Point Reyes
Double Point
Dunbury Point
Rocky Point
Sausalito
Mt. Bonita
GOLDEN GATE
Disposal Area
Dump Site
Sewers
Pacifica
Point San Pedro
Pillar Point
Noonday Rock
North Farallon
Isle of St. James
Middle Farallon
Southeast Farallon
Maintop
9940-Y-43200
9940-X-27200
27080
27100
27120
27140
27160
27180
27220
27240
43260
43240
43220
43200
43180
43160
43140
43120
1
2
3
4
5
6
7
8
9
36
37
38
39
13,600 BP
14,600 BP
14,500 BP
13,400 BP
11,400 BP
10,400 BP
10,100 BP
9,400 BP
8,600 BP
8,700 BP

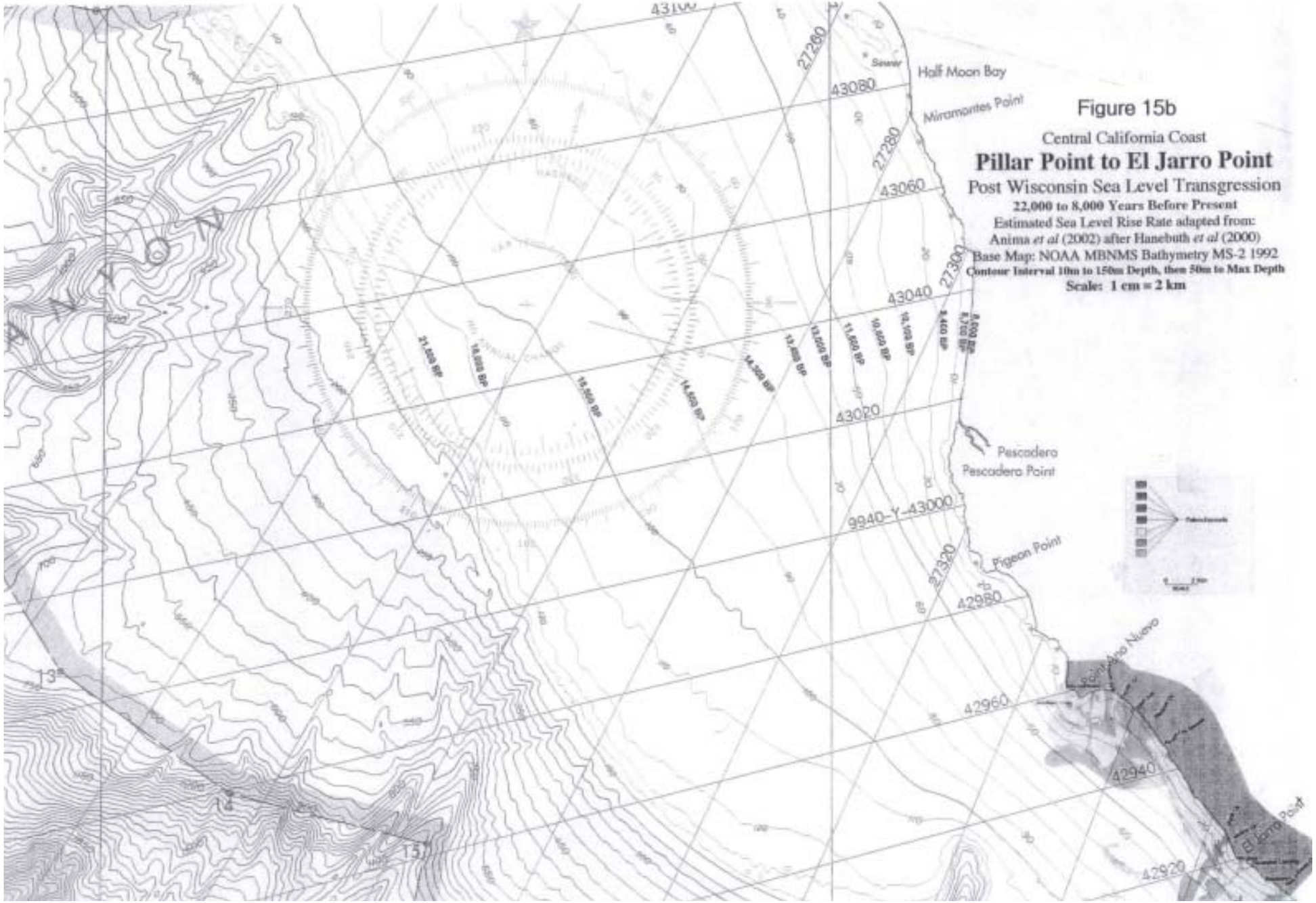
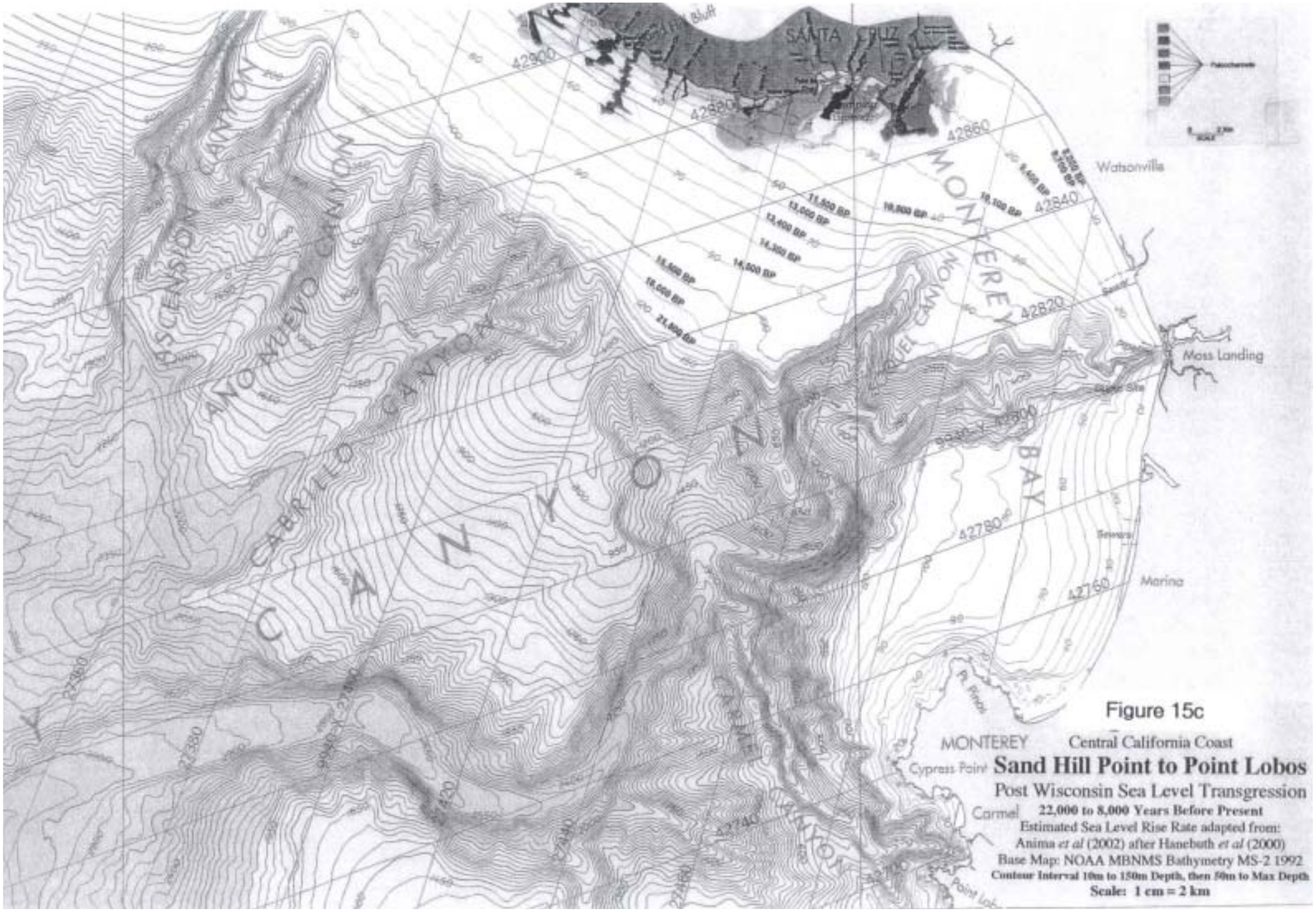


Figure 15b
Central California Coast
Pillar Point to El Jarro Point
Post Wisconsin Sea Level Transgression
22,000 to 8,000 Years Before Present
Estimated Sea Level Rise Rate adapted from:
Anima et al (2002) after Hanebuth et al (2000)
Base Map: NOAA MBNMS Bathymetry MS-2 1992
Contour Interval 10m to 150m Depth, then 50m to Max Depth
Scale: 1 cm = 2 km
Half Moon Bay
Miramontes Point
Pescadero
Pescadero Point
Pigeon Point
El Jarro Point
43080
43060
43040
43020
42980
42960
42940
42920
27260
27280
27300
27320
9940-Y-43000
13
14
15


SANTA CRUZ
Watsonville
Moss Landing
Marina
MONTEREY BAY
ASCENSION CANYON
ANO NUEVO CANYON
CABRILLO CANYON
MONTEREY CANYON
DUEL CANYON
42900
42880
42860
42840
42820
42800
42780
42760
42740
42720
42700
42680
42660
42640
42620
42600
42580
42560
42540
42520
42500
42480
42460
42440
42420
42400
42380
42360
42340
42320
42300
42280
42260
42240
42220
42200
42180
42160
42140
42120
42100
42080
42060
42040
42020
42000
41980
41960
41940
41920
41900
41880
41860
41840
41820
41800
41780
41760
41740
41720
41700
41680
41660
41640
41620
41600
41580
41560
41540
41520
41500
41480
41460
41440
41420
41400
41380
41360
41340
41320
41300
41280
41260
41240
41220
41200
41180
41160
41140
41120
41100
41080
41060
41040
41020
41000
40980
40960
40940
40920
40900
40880
40860
40840
40820
40800
40780
40760
40740
40720
40700
40680
40660
40640
40620
40600
40580
40560
40540
40520
40500
40480
40460
40440
40420
40400
40380
40360
40340
40320
40300
40280
40260
40240
40220
40200
40180
40160
40140
40120
40100
40080
40060
40040
40020
40000
39980
39960
39940
39920
39900
39880
39860
39840
39820
39800
39780
39760
39740
39720
39700
39680
39660
39640
39620
39600
39580
39560
39540
39520
39500
39480
39460
39440
39420
39400
39380
39360
39340
39320
39300
39280
39260
39240
39220
39200
39180
39160
39140
39120
39100
39080
39060
39040
39020
39000
38980
38960
38940
38920
38900
38880
38860
38840
38820
38800
38780
38760
38740
38720
38700
38680
38660
38640
38620
38600
38580
38560
38540
38520
38500
38480
38460
38440
38420
38400
38380
38360
38340
38320
38300
38280
38260
38240
38220
38200
38180
38160
38140
38120
38100
38080
38060
38040
38020
38000
37980
37960
37940
37920
37900
37880
37860
37840
37820
37800
37780
37760
37740
37720
37700
37680
37660
37640
37620
37600
37580
37560
37540
37520
37500
37480
37460
37440
37420
37400
37380
37360
37340
37320
37300
37280
37260
37240
37220
37200
37180
37160
37140
37120
37100
37080
37060
37040
37020
37000
36980
36960
36940
36920
36900
36880
36860
36840
36820
36800
36780
36760
36740
36720
36700
36680
36660
36640
36620
36600
36580
36560
36540
36520
36500
36480
36460
36440
36420
36400
36380
36360
36340
36320
36300
36280
36260
36240
36220
36200
36180
36160
36140
36120
36100
36080
36060
36040
36020
36000
35980
35960
35940
35920
35900
35880
35860
35840
35820
35800
35780
35760
35740
35720
35700
35680
35660
35640
35620
35600
35580
35560
35540
35520
35500
35480
35460
35440
35420
35400
35380
35360
35340
35320
35300
35280
35260
35240
35220
35200
35180
35160
35140
35120
35100
35080
35060
35040
35020
35000
34980
34960
34940
34920
34900
34880
34860
34840
34820
34800
34780
34760
34740
34720
34700
34680
34660
34640
34620
34600
34580
34560
34540
34520
34500
34480
34460
34440
34420
34400
34380
34360
34340
34320
34300
34280
34260
34240
34220
34200
34180
34160
34140
34120
34100
34080
34060
34040
34020
34000
33980
33960
33940
33920
33900
33880
33860
33840
33820
33800
33780
33760
33740
33720
33700
33680
33660
33640
33620
33600
33580
33560
33540
33520
33500
33480
33460
33440
33420
33400
33380
33360
33340
33320
33300
33280
33260
33240
33220
33200
33180
33160
33140
33120
33100
33080
33060
33040
33020
33000
32980
32960
32940
32920
32900
32880
32860
32840
32820
32800
32780
32760
32740
32720
32700
32680
32660
32640
32620
32600
32580
32560
32540
32520
32500
32480
32460
32440
32420
32400
32380
32360
32340
32320
32300
32280
32260
32240
32220
32200
32180
32160
32140
32120
32100
32080
32060
32040
32020
32000
31980
31960
31940
31920
31900
31880
31860
31840
31820
31800
31780
31760
31740
31720
31700
31680
31660
31640
31620
31600
31580
31560
31540
31520
31500
31480
31460
31440
31420
31400
31380
31360
31340
31320
31300
31280
31260
31240
31220
31200
31180
31160
31140
31120
31100
31080
31060
31040
31020
31000
30980
30960
30940
30920
30900
30880
30860
30840
30820
30800
30780
30760
30740
30720
30700
30680
30660
30640
30620
30600
30580
30560
30540
30520
30500
30480
30460
30440
30420
30400
30380
30360
30340
30320
30300
30280
30260
30240
30220
30200
30180
30160
30140
30120
30100
30080
30060
30040
30020
30000
29980
29960
29940
29920
29900
29880
29860
29840
29820
29800
29780
29760
29740
29720
29700
29680
29660
29640
29620
29600
29580
29560
29540
29520
29500
29480
29460
29440
29420
29400
29380
29360
29340
29320
29300
29280
29260
29240
29220
29200
29180
29160
29140
29120
29100
29080
29060
29040
29020
29000
28980
28960
28940
28920
28900
28880
28860
28840
28820
28800
28780
28760
28740
28720
28700
28680
28660
28640
28620
28600
28580
28560
28540
28520
28500
28480
28460
28440
28420
28400
28380
28360
28340
28320
28300
28280
28260
28240
28220
28200
28180
28160
28140
28120
28100
28080
28060
28040
28020
28000
27980
27960
27940
27920
27900
27880
27860
27840
27820
27800
27780
27760
27740
27720
27700
27680
27660
27640
27620
27600
27580
27560
27540
27520
27500
27480
27460
27440
27420
27400
27380
27360
27340
27320
27300
27280
27260
27240
27220
27200
27180
27160
27140
27120
27100
27080
27060
27040
27020
27000
26980
26960
26940
26920
26900
26880
26860
26840
26820
26800
26780
26760
26740
26720
26700
26680
26660
26640
26620
26600
26580
26560
26540
26520
26500
26480
26460
26440
26420
26400
26380
26360
26340
26320
26300
26280
26260
26240
26220
26200
26180
26160
26140
26120
26100
26080
26060
26040
26020
26000
25980
25960
25940
25920
25900
25880
25860
25840
25820
25800
25780
25760
25740
25720
25700
25680
25660
25640
25620
25600
25580
25560
25540
25520
25500
25480
25460
25440
25420
25400
25380
25360
25340
25320
25300
25280
25260
25240
25220
25200
25180
25160
25140
25120
25100
25080
25060
25040
25020
25000
24980
24960
24940
24920
24900
24880
24860
24840
24820
24800
24780
24760
24740
24720
24700
24680
24660
24640
24620
24600
24580
24560
24540
24520
24500
24480
24460
24440
24420
24400
24380
24360
24340
24320
24300
24280
24260
24240
24220
24200
24180
24160
24140
24120
24100
24080
24060
24040
24020
24000
23980
23960
23940
23920
23900
23880
23860
23840
23820
23800
23780
23760
23740
23720
23700
23680
23660
23640
23620
23600
23580
23560
23540
23520
23500
23480
23460
23440
23420
23400
23380
23360
23340
23320
23300
23280
23260
23240
23220
23200
23180
23160
23140
23120
23100
23080
23060
23040
23020
23000
22980
22960
22940
22920
22900
22880
22860
22840
22820
22800
22780
22760
22740
22720
22700
22680
22660
22640
22620
22600
22580
22560
22540
22520
22500
22480
22460
22440
22420
22400
22380
22360
22340
22320
22300
22280
22260
22240
22220
22200
22180
22160
22140
22120
22100
22080
22060
22040
22020
22000
21980
21960
21940
21920
21900
21880
21860
21840
21820
21800
21780
21760
21740
21720
21700
21680
21660
21640
21620
21600
21580
21560
21540
21520
21500
21480
21460
21440
21420
21400
21380
21360
21340
21320
21300
21280
21260
21240
21220
21200
21180
21160
21140
21120
21100
21080
21060
21040
21020
21000
20980
20960
20940
20920
20900
20880
20860
20840
20820
20800
20780
20760
20740
20720
20700
20680
20660
20640
20620
20600
20580
20560
20540
20520
20500
20480
20460
20440
20420
20400
20380
20360
20340
20320
20300
20280
20260
20240
20220
20200
20180
20160
20140
20120
20100
20080
20060
20040
20020
20000
19980
19960
19940
19920
19900
19880
19860
19840
19820
19800
19780
19760
19740
19720
19700
19680
19660
19640
19620
19600
19580
19560
19540
19520
19500
19480
19460
19440
19420
19400
19380
19360
19340
19320
19300
19280
19260
19240
19220
19200
19180
19160
19140
19120
19100
19080
19060
19040
19020
19000
18980
18960
18940
18920
18900
18880
18860
18840
18820
18800
18780
18760
18740
18720
18700
18680
18660
18640
18620
18600
18580
18560
18540
18520
18500
18480
18460
18440
18420
18400
18380
18360
18340
18320
18300
18280
18260
18240
18220
18200
18180
18160
18140
18120
18100
18080
18060
18040
18020
18000
17980
17960
17940
17920
17900
17880
17860
17840
17820
17800
17780
17760
17740
17720
17700
17680
17660
17640
17620
17600
17580
17560
17540
17520
17500
17480
17460
17440
17420
17400
17380
17360
17340
17320
17300
17280
17260
17240
17220
17200
17180
17160
17140
17120
17100
17080
17060
17040
17020
17000
16980
16960
16940
16920
16900
16880
16860
16840
16820
16800
16780
16760
16740
16720
16700
16680
16660
16640
16620
16600
16580
16560
16540
16520
16500
16480
16460
16440
16420
16400
16380
16360
16340
16320
16300
16280
16260
16240
16220
16200
16180
16160
16140
16120
16100
16080
16060
16040
16020
16000
15980
15960
15940
15920
15900
15880
15860
15840
15820
15800
15780
15760
15740
15720
15700
15680
15660
15640
15620
15600
15580
15560
15540
15520
15500
15480
15460
15440
15420
15400
15380
15360
15340
15320
15300
15280
15260
15240
15220
15200
15180
15160
15140
15120
15100
15080
15060
15040
15020
15000
14980
14960
14940
14920
14900
14880
14860
14840
14820
14800
14780
14760
14740
14720
14700
14680
14660
14640
14620
14600
14580
14560
14540
14520
14500
14480
14460
14440
14420
14400
14380
14360
14340
14320
14300
14280
14260
14240
14220
14200
14180
14160
14140
14120
14100
14080
14060
14040
14020
14000
13980
13960
13940
13920
13900
13880
13860
13840
13820
13800
13780
13760
13740
13720
13700
13680
13660
13640
13620
13600
13580
13560
13540
13520
13500
13480
13460
13440
13420
13400
13380
13360
13340
13320
13300
13280
13260
13240
13220
13200
13180
13160
13140
13120
13100
13080
13060
13040
13020
13000
12980
12960
12940
12920
12900
12880
12860
12840
12820
12800
12780
12760
12740
12720
12700
12680
12660
12640
12620
12600
12580
12560
12540
12520
12500
12480
12460
12440
12420
12400
12380
12360
12340
12320
12300
12280
12260
12240
12220
12200
12180
12160
12140
12120
12100
12080
12060
12040
12020
12000
11980
11960
11940
11920
11900
11880
11860
11840
11820
11800
11780
11760
11740
11720
11700
11680
11660
11640
11620
11600
11580
11560
11540
11520
11500
11480
11460
11440
11420
11400
11380
11360
11340
11320
11300
11280
11260
11240
11220
11200
11180
11160
11140
11120
11100
11080
11060
11040
11020
11000
10980
10960
10940
10920
10900
10880
10860
10840
10820
10800
10780
10760
10740
10720
10700
10680
10660
10640
10620
10600
10580
10560
10540
10520
10500
10480
10460
10440
10420
10400
10380
10360
10340
10320
10300
10280
10260
10240
10220
10200
10180
10160
10140
10120
10100
10080
10060
10040
10020
10000
9980
9960
9940
9920
9900
9880
9860
9840
9820
9800
9780
9760
9740
9720
9700
9680
9660
9640
9620
9600
9580
9560
9540
9520
9500
9480
9460
9440
9420
9400
9380
9360
9340
9320
9300
9280
9260
9240
9220
9200
9180
9160
9140
9120
9100
9080
9060
9040
9020
9000
8980
8960
8940
8920
8900
8880
8860
8840
8820
8800
8780
8760
8740
8720
8700
8680
8660
8640
8620
8600
8580
8560
8540
8520
8500
8480
8460
8440
8420
8400
8380
8360
8340
8320
8300
8280
8260
8240
8220
8200
8180
8160
8140
8120
8100
8080
8060
8040
8020
8000
7980
7960
7940
7920
7900
7880
7860
7840
7820
7800
7780
7760
7740
7720
7700
7680
7660
7640
7620
7600
7580
7560
7540
7520
7500
7480
7460
7440
7420
7400
7380
7360
7340
7320
7300
7280
7260
7240
7220
7200
7180
7160
7140
7120
7100
7080
7060
7040
7020
7000
6980
6960
6940
6920
6900
6880
6860
6840
6820
6800
6780
6760
6740
6720
6700
6680
6660
6640
6620
6600
6580
6560
6540
6520
6500
6480
6460
6440
6420
6400
6380
6360
6340
6320
6300
6280
6260
6240
6220
6200
6180
6160
6140
6120
6100
6080
6060
6040
6020
6000
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
5760
5740
5720
5700
5680
5660
5640
5620
5600
5580
5560
5540
5520
5500
5480
5460
5440
5420
5400
5380
5360
5340
5320
5300
5280
5260
5240
5220
5200
5180
5160
5140
5120
5100
5080
5060
5040
5020
5000
4980
4960
4940
4920
4900
4880
4860
4840
4820
4800
4780
4760
4740
4720
4700
4680
4660
4640
4620
4600
4580
4560
4540
4520
4500
4480
4460
4440
4420
4400
4380
4360
4340
4320
4300
4280
4260
4240
4220
4200
4180
4160
4140
4120
4100
4080
4060
4040
4020
4000
3980
3960
3940
3920
3900
3880
3860
3840
3820
3800
3780
3760
3740
3720
3700
3680
3660
3640
3620
3600
3580
3560
3540
3520
3500
3480
3460
3440
3420
3400
3380
3360
3340
3320
3300
3280
3260
3240
3220
3200
3180
3160
3140
3120
3100
3080
3060
3040
3020
3000
2980
2960
2940
2920
2900
2880
2860
2840
2820
2800
2780
2760
2740
2720
2700
2680
2660
2640
2620
2600
2580
2560
2540
2520
2500
2480
2460
2440
2420
2400
2380
2360
2340
2320
2300
2280
2260
2240
2220
2200
2180
2160
2140
2120
2100
2080
2060
2040
2020
2000
1980
1960
1940
1920
1900
1880
1860
1840
1820
1800
1780
1760
1740
1720
1700
1680
1660
1640
1620
1600
1580
1560
1540
1520
1500
1480
1460
1440
1420
1400
1380
1360
1340
1320
1300
1280
1260
1240
1220
1200
1180
1160
1140
1120
1100
1080
1060
1040
1020
1000
980
960
940
920
900
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
11,500 BP
13,000 BP
13,400 BP
14,300 BP
14,500 BP
15,500 BP
16,000 BP
21,000 BP
18,800 BP
19,100 BP
9,400 BP
9,700 BP
9,900 BP
Figure 15c
MONTEREY
Central California Coast
Sand Hill Point to Point Lobos
Post Wisconsin Sea Level Transgression
22,000 to 8,000 Years Before Present
Estimated Sea Level Rise Rate adapted from:
Anima et al (2002) after Hanebuth et al (2000)
Base Map: NOAA MBNMS Bathymetry MS-2 1992
Contour Interval 10m to 150m Depth, then 50m to Max Depth
Scale: 1 cm = 2 km

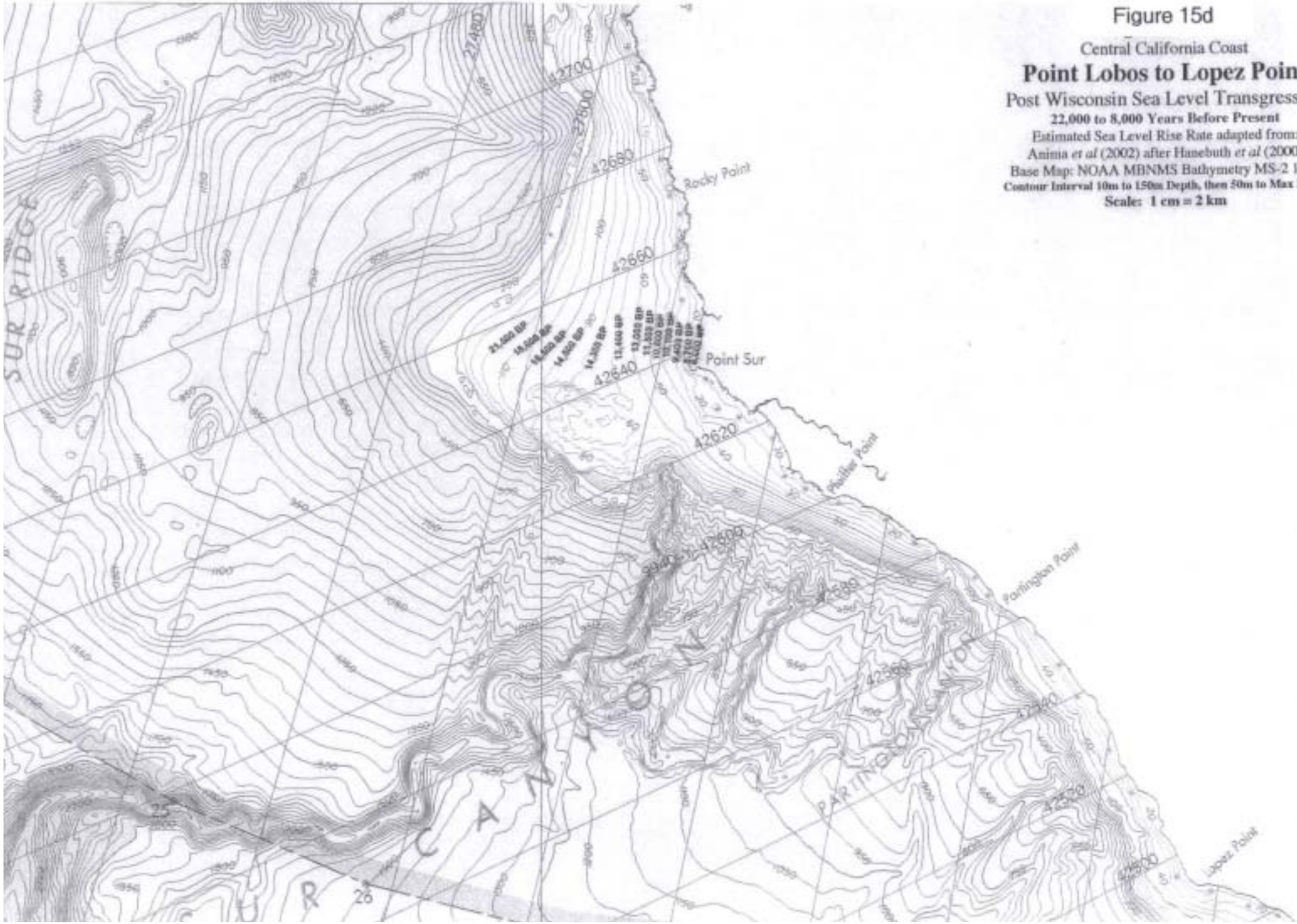



Figure 15d

Central California Coast

**Point Lobos to Lopez Point**

Post Wisconsin Sea Level Transgression

**22,000 to 8,000 Years Before Present**

Estimated Sea Level Rise Rate adapted from:

Anima *et al* (2002) after Hanebuth *et al* (2000)

Base Map: NOAA MBNMS Bathymetry MS-2 1992

**Contour Interval 10m to 150m Depth, then 50m to Max Depth**

**Scale: 1 cm = 2 km**

Figure 15e

Central California Coast

# Mill Creek to Cambria

Post Wisconsin Sea Level Transgression

**22,000 to 8,000 Years Before Present**

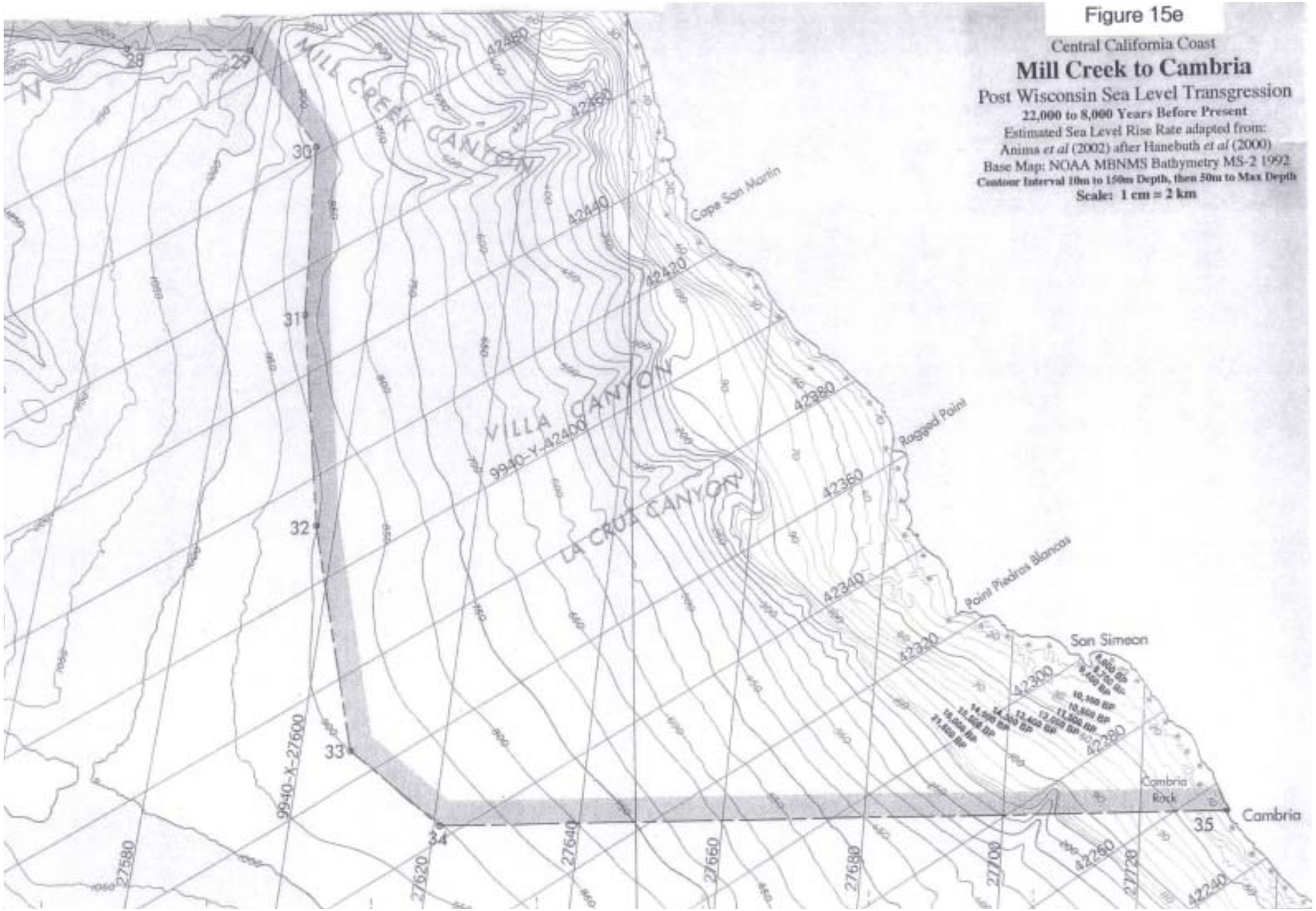
Estimated Sea Level Rise Rate adapted from:

Anima *et al* (2002) after Hanebuth *et al* (2000)

Base Map: NOAA MBNMS Bathymetry MS-2 1992

**Contour Interval 10m to 150m Depth, then 50m to Max Depth**

**Scale: 1 cm = 2 km**



# Section V: Recommendations; Management

The size of the Monterey Bay National Marine Sanctuary and its multi-jurisdictional components greatly influence the type and arrangements for appropriate management. Stretching across five counties, numerous State Parks and the jurisdiction of the State Lands Commission, future projects within the sanctuary require careful planning, inter-agency coordination and thoughtful implementation with an eye to the sustainable management of submerged cultural resources.

The first steps in the management of submerged cultural resources are to identify them, understand current usage and prepare for future impact. Although as a whole, the tasks seem quite daunting, when taken as discreet projects over time, the overall goals will be ultimately gained. Furthermore, by portioning out the overall goals into smaller phased projects, management is easier and the likelihood of success much greater.

The following suggestions lay out a number of small projects that would strengthen the cultural resources management foundation of Monterey Bay National Marine Sanctuary and point toward future work.

***Tracking on GIS***

Quick analysis is important for future research. If a researcher can quickly analyze whether submerged resources reside within the sanctuary's boundaries then valuable research time can be directed elsewhere. Tying the NOAA's ARCH database to a GIS format would greatly enhance this type of tracking and also give sanctuary staff greater control over the understanding of the submerged cultural resources and their positioning. However, DGPS coordinates of shipwreck sites should be protected by controlling public access to this sensitive location information.

***Diver Questionnaire***

It is important to understand who uses the resources, how the resources are used and where are the resources most impacted. Just knowing that the resources exist is only the beginning to truly managing the cultural resources and ensuring that they are sustainable. Thus the prepared Diver Questionnaire (**Enclosure B**) is a step toward understanding the "who, how and where" questions that aid management. This information can be collected and also stored in a database as well as attached to a GIS file. The longer the data is collected the more accurate the management of specific areas will become. Moreover, use patterns change over time and by collecting "use" data over time, the sanctuary can follow patterns and continue to tailor management to the changing needs of the resources and people who enjoy them and communities that benefit from.

***Outreach Educational Programs***

Reaching out to people of all ages in a variety of formats ensures that stewardship toward the submerged cultural resources will be sustained. The sanctuary has

traditionally focused on the natural resources in the educational programs put forth. A more holistic approach should involve the human dynamic also present in the sanctuary and how it relates to natural environment. At the disposal of the sanctuary are a large number of programs from TV to documentary, from published formats to websites, and from K-12 educational programming to adult stewardship seminars. Each one of these formats for outreach efforts has its benefits and is not exclusive of the other.

TV and documentaries can reach a wide audience revealing a few of the submerged cultural resources of the sanctuary that are rarely seen. Further discussion of two optimal choices for inclusion in a documentary, the *Macon* and the *Montebello*, are discussed in Recommendations of Showcase Outreach Examples (Section V). Expeditions to both of these sites could include direct uplink, so that people gathered on the surface can directly communicate and ask questions of researchers underwater.

The National Sanctuary System has a well, established reputation for its publications. The Monterey Bay National Marine Sanctuary has a website that does touch on the historic and prehistoric story of the area encompassed in the sanctuary but there is no special section devoted to submerged cultural resources, the history of the area is nested within "Other Topics." This particular segment of the sanctuary's website could be synthesized and expanded, as well as hot-linked to other correlating web addresses.

K-12 programming and adult stewardship seminars bring the public into closer contact with the resources and thus inculcate the greater population with the sense of importance and values that support creating a sustainable management program for the submerged cultural resources. Successful programs take time to develop but with web access can reach further a field than ever before. Also successful educational programming is more holistic in approach. Programs like those of the Newport Harbor Nautical Museum's that have combined history with correlating topics such as art, water safety and the natural environment have garnered the museum recognition and acclaim.

Funding for programming is available through foundations that target education. Particularly helpful are the Dayton Hudson Company owners of department store chain, TARGET, the Milkin Foundation located in Southern California and the LilaWallace Foundation. Each of these foundations has a web site where information regarding funding goals and funding cycles is available. The California Community Foundation would also be an excellent source from which to seek funding.

### *A Holistic Approach*

Historically, the protection of natural resources of the underwater world has driven the creation of marine sanctuaries. This is evident by the term "marine" which refers to the natural environment and rarely suggests inclusion of the human dynamic in the equation. However, it is quite impossible in this day and age not to consider the human dynamic, since so many of the natural resources are threatened by humankind. A small project that focuses on how the two areas of natural and human dynamics interact would substantially aid future management of the whole array of resources within the sanctuary. Monterey Bay National Marine Sanctuary can easily lead the way by simply

bringing these varying interests together with the goal of seeing how they can work together toward creating sustainable resources within the sanctuary. In addition, the holistic approach could help to build a strong a foundation for successful coordinated efforts in the future. Instead of looking at projects and research data after its collection to see if there are any submerged cultural resources detected, the consideration of such discoveries could be built into the initial research design. It may be as simple as developing a list of submerged cultural resources that Monterey Bay National Marine Sanctuary seeks information about. This could be disseminated to all agencies and institutions working within the sanctuary. The feedback would then be added to the ongoing foundation of information the sanctuary uses to make management decisions.

# Section V: Recommendations; Research

Although we consulted the bulk of known databases in amassing the information for this project there is still more that can be accomplished with historical research. This research is not immediately pressing but will enhance the overall general understanding of submerged cultural resources within the Monterey Bay National Marine Sanctuary. Discreet smaller projects can be undertaken over time. The goal of these projects would be to add to the extant database and the holistic understanding of the resources within the sanctuary. Furthermore, research can and will progress as new technologies continue to unfold. At this time there are at least three areas of research that can easily be phased in over time and will undoubtedly enhance the overall understanding of the submerged cultural resources of the sanctuary. Listed below are small projects that come readily to mind when assessing the total needs of future research for the sanctuary. In every case the garnered information from each project will make the task of planning for the sustainable management of the total resources base, a task that becomes more manageable.

***Historical Research***

The field of history has an inordinate amount of value to the study of submerged cultural resources within the sanctuary, especially where the human dynamic is involved.

1. **Ship Registry and Enrollment Search**: Research all ship registrations pertaining to the shipwrecks within the sanctuary. The entire compilation of ship registries and enrollments for California vessels between 1850 and 1900 exists at the Library of Congress and in microfilm form at a number of institutions such as the Los Angeles Maritime Museum and the Porter Shaw Library at Fort Mason in San Francisco. Digital copies of the registries can be attached to the entries in the FileMaker Pro program. This specific project could be broken down alphabetically or chronologically and spaced over several years.
2. **Historic Newspaper Review**: Search newspapers for corresponding articles regarding loss and cargo. Throughout the 19th century newspapers had a section called, “Shipping Intelligence.” Listed in the shipping intelligence section of the newspaper are the daily arrivals and departures of vessels. Once again microfilm copies of pertinent newspapers exist at a number of institutions. Digital copies of the reports could also be attached to the files and this specific project could stand-alone and be phased in over a number of years. Most of the California college libraries have microfilm copies of historic California newspapers.
3. **Full Dossier Research**: In depth historical research can be undertaken for specific wrecks that fall within the areas of intensive impact by either fishing or recreational interests. This type of discreet project would be developed on a case-by-case basis and should be undertaken prior to any archaeological investigation. As we noted in Section I on Maritime and Submerged Cultural Resources, each vessel potentially has registry papers, line drawings, entry and exit records for every port it visited, cargo manifests, captain’s logs, passenger journals, photographs, charts, and mementos. To begin a full set of documents

for the *Macon* and *Montebello* would compliment any outreach program undertaken by the sanctuary. The Hunter Expedition to the *Montebello* collected a great deal of information on the vessel and should be included as a first step. The US Navy also put together information on the *Macon* before mounting their expedition to find the dirigible. Assistance could be sought from the National Parks Service Maritime Initiative in Washington, DC or the Naval History Center also in Washington, DC. In general, an easy way to prioritize the order of vessels for full dossier research is to start with the oldest vessels reported lost and move forward toward the more recent losses.

4. **An Illustrated Typology of Ships for the Pacific**: A comprehensive typology of vessel types set against a timeline would be helpful for researchers just beginning to explore the potential of losses along the Pacific coast of North America. Moreover, a well-devised compendium of vessel types in conjunction with the ship loss database would make identification of archaeological remains easier.
5. **On-shore Maritime Community Research**: A systematic historical overview of the on-shore maritime communities will assist in the understanding of why shipwrecks exist within the sanctuary beyond the obvious natural perils of the coastline. Moreover, ethnographic research of contemporary community values will enhance a holistic approach to understanding the impact and exploitation of the sanctuaries total resources reservoir. Once again, this could be divided by county and be undertaken over a period of time in a phased approach.

### *Archaeological Research*

The very fact that our maritime heritage is riddled with gaping holes in the documentation makes Archaeology the perfect partner of History. As the MBNMS strives to collect data that will assist in the understanding and management of the sanctuary, there are several discreet archaeological projects that would significantly aid these tasks.

1. **Remote Sensing Survey**: Remote sensing surveys around the areas of highest concentration of potential submerged resources will greatly add to the store of knowledge and certainly assist any future decision making in regards to the total impact of any and all use. These projects can easily be partnered with the efforts of natural scientists, who have a distinct interest and area of study of sanctuary resources and their management.

   Continue to collect and analyze geophysical remote sensing (side scan sonar, multibeam, subbottom profiler) data for the remaining portions of the Sanctuary. As stated in "Eittreim *et al (*2002:5), "The large area of the northern Sanctuary shelf from Point Año Nuevo northward to San Francisco has yet to be mapped with 100% acoustic coverage and, due to its large areal extent and exposure to the weather, will require a significant effort to accomplish. The southern Sanctuary shelf south of Point Sur, on the other hand is very narrow and could be surveyed at relatively low cost." Review previous USGS and other remote sensing data for bottom features potentially representing cultural resources.

Investigate unidentified bottom features of potential archaeological value in order to properly conserve and protect those non-renewable resources

2. **Collaborative Surveys with other Sciences**: As an offshoot of the project type mentioned above, a review of the recent data collected by biologists from Moss Landing around the Point Lobos area may reflect some of the submerged cultural resources that were not the focus of the marine biology study but captured in the remote sensing data nonetheless.
3. **Beach Surveys**: Systematic surveys of the beaches within the sanctuary for the vessels that were stranded or beached and whose remnants are buried within the beach strata. This type of effort is best employed following winter storm events when offshore movement of sand and shoreline erosion often expose previously buried cultural materials.
4. **Full Archaeological Investigation**: On a case-by-case study, vessels of historic significance that are deemed eligible for inclusion in the National Register of Historic Places and capture the imagination of the public could be fully investigated, creating a number of educational scenarios and public outreach products. However, entering into a full interdisciplinary investigation of a submerged or buried archaeological site is simultaneously exciting and frightening. Each complete vessel investigation is a decade commitment by the core team of researchers and an on-going commitment to conservation, preservation and institutional support. For these reasons, the majority of successful projects have occurred through partnerships between public institutions, private industry, philanthropic funding and the community that is home to the archaeological site.

# Section V: Recommendations; Partnerships

The era of agencies standing alone against the daunting task of submerged cultural resources management is drawing to a close. Over the past few decades it has become painfully apparent that the tasks are too great and the management resources too small for any one agency or group to succeed. It is obvious today that partnerships can succeed where a single agency might falter. Furthermore, in today's shrinking global economy, partnerships spur people and agencies through collaboration to identify a wider array of research areas and develop necessary financial support. Partnerships also garner more accolades.

The Monterey Bay National Marine Sanctuary is in the enviable position of being surrounded by agencies, organizations and institutions that would readily partner to achieve the success of managing Pacific coastal resources. Although this is not a new idea, there are new approaches that would better ensure success. At the state level of government there are two state agencies, the Department of Parks and Recreation and California State Lands Commission, mandated to protect, enhance and manage submerged cultural resources. Other governmental bodies like the California Coastal Commission and the California Historic Preservation Office also play significant roles in the protection of submerged cultural resources. In addition, there are a number of agencies that are mandated to protect the non-human resources and there are a number of organizations and industries and interest groups who crossover between impacting the natural environment and being part of the maritime culture. By first identifying all the audiences and their strengths, the sanctuary would then be in a position to bring them together to address the issues without preconceived conclusions, thus avoiding the teleological pitfalls that have marked previous attempts at consensus and partnerships.

Partnerships with California State Parks and the State Lands Commission would increase the potential for successful management of submerged cultural resources. As a first step, sharing information would provide a good beginning. Bringing the agencies together to discuss ways that the burden of management can be logically divided and where research has already taken place would only strengthen the management of all three agencies.

Collaborations with academic institutions regarding submerged cultural resources would greatly assist in the collection of data. Institutions of higher learning from community college programs to university programs are looking for ways to give their students hands-on experience in the management of the submerged cultural resources, and the sanctuary is in need of the simple labor to accumulate the data. It is a natural fit. Currently there are three collegiate programs in California addressing maritime studies. They are the programs at St. Mary's College in San Francisco, Long Beach City College and University of San Diego.

Development of educational programming can be accomplished through a number of coordinated efforts. The California Archaeological Site Stewardship Program has gained popularity and is very successful. In regards to curriculum development for maritime issues, the PAST Foundation has made remarkable strides across the US, partnering with local educational agencies and teachers to tailor curriculum to fit individual local needs within each state's published guidelines for educational scope and sequencing.

By collaborating MBNMS can extend the sanctuary's outreach, secure stewardship, streamline management issues that are shared by other agencies, and expand the management of the sanctuary without shouldering the tasks alone. If approached in a positive manner without apriori assumptions, the result of partnerships will increase the power base of each organization, will augment the success of all projects and will attain the ultimate goal of sustainable management. It is true this is not a simple task, but if the approach is set forth in a positive manner and culture or the human dimension is laid on the table on an equal footing with the natural environment, then the daunting tasks before us all can potentially be better understood and more easily achieved.

***Potential Agency Contacts***

California State Lands Commission, Shipwreck Database
Sacramento, CA
Pam Griggs
916-574-1854

California State Parks, Submerged Cultural Resources
Sacramento, CA
John Foster, Senior Archaeologist
916-653-4529

Long Beach City College, Maritime Archaeology Certificate Program
Long Beach, CA
Dr. Laurel Breece
562-938-4836

PAST Foundation
Columbus, Ohio
Dr. Annalies Corbin
614-326-2642

***Potential Agency Contacts continued***

St. Mary's College
San Francisco, CA
James Allen

University of San Diego, Maritime Archaeology Program
San Diego, CA
Dr. Jerome Hall
619-260-4008

# Section V: Recommendations; Showcase Outreach Examples

***Documentary***
In consideration of the potential of a documentary of underwater sites within the Monterey Bay National Marine Sanctuary, two known sites hold the greatest potential for catching the attention of the viewing audience. Both sites are historical and have elements of a great story.

***The Dirigible Macon, The Age of Airships***
First is the *Macon*, which has already been showcased in *National Geographic* (January 1992;Vol.181, No.1, pp.114-127). Sunk in 1935, the loss of the *Macon* sounded the death knell for dirigible use by the military. Missing for over 55 years, the mystery of the *Macon* caught the imagination of many. Not until technology exposed the deep seafloor of the oceans, did the *Macon's* whereabouts become known. Today the skeleton of the dirigible and the biplane Sparrowhawks bear mute testimony to the ingenuity and resourcefulness of early flight.

Exploring the archaeological site with remotely operated vehicles in a respectful and informative manner will enlighten viewers as to the nature of preservation underwater, the richness of the maritime resources within the sanctuary and the importance of protecting such national treasures.

***The Montebello, World War II touches California's Coast***
The second site plays to the fascination and preoccupation that many people have regarding war. The Japanese in World War II torpedoed the *Montebello* off the coast of California. Within minutes of the attack in December of 1941, the Union Oil tanker went down carrying with it a full load of heavy, crude oil. In 1996, the Hunter Expedition, a successful collaboration between NOAA's National Undersea Research Program, the Central Coast Maritime Museum, a nonprofit community based organization and Delta Oceanographics, a privately owned research-and-design company, sought out the resting place of the *Montebello*. Located and explored by research submarine, the *Montebello* is now documented on video, sitting upright on the bottom at over 800 feet with all her crude oil still aboard just outside the southern boundary of the sanctuary. At 800 ft the oil is almost in a solid state due to the pressure and temperature of the water. Her sinking reminds us of the vulnerability on the open ocean, but her continued presence on the bottom brings up environmental questions that could impact much broader issues. If a large tank of crude oil sat deteriorating on the coast visible to the human eye, would it be ignored? Certainly, the hull of the *Montebello* is deteriorating in the saltwater environment. What will happen when the hull lets go? How will the release of 8,000 tons of crude oil impact the environment? Can we respect the historical value of the site and protect the natural environment? These questions do not explore the issues of will the ship's hull fail for it will, or will the crude oil spill out over the ocean floor when the hull fails, for it will. These questions explore the issues of how to balance the preservation of history and the fragile ocean environment. By exploring

these issues in a holistic way Monterey Bay National Marine Sanctuary can give viewers insight into the complexity of managing submerged cultural resources.

Both sites explore the varying issues and fascination of submerged cultural resources. Both represent sites to which the average person will never have access. Both sites can lead to the connection of maritime community that include those of the Navy and Merchant Marine. Both can lead to connections of shipwrecks that are equally deserving of study and exist within the accessible environment of the sanctuary, yet outside the jurisdiction of the state.

# Section VI:
# Appendix A: Common Vessel Loss Databases & Lists

There are a number of readily available lists and databases that exist. Each has its strength. None are totally complete. The MBNMS database now contains data from all of the databases and lists that are published here.

**Physical Databases:**

California State Lands Commission Shipwreck Database
Sacramento, CA and the State Lands Commission web site

San Francisco Port Records; Entries and Exits
Porter Shaw Library, San Francisco, CA

United States Vessel Registries and Enrollments
National Archives, Washington, DC

United States Coast Guard Reported Vessel Losses
National Archives, San Bruno, CA

**Published Lists:**

Gibb's List, *Shipwrecks of the Pacific Coast*

Berman's List, *Encyclopedia of American Shipwrecks*

Lonsdale's List, *A Guide to Sunken Ships in American Waters*

Pierson's List, *Shipwrecks Oregon to the Mexican Border*

US Coast Guard, *US Merchant Reported Vessel Losses*

# Section VI:
# Appendix B: Vessel Rigging Descriptions

**Bark** — Barks were introduced in the 1830s. Barks are large deep-water ships with three to five masts. All the masts carry square sails except for the aftermost mast which carries fore-and-aft sails.

**Barkentine** — Barkentines developed from barks. The barkentine carries square sails on the foremast only. The other two to four masts carry fore-and-aft sails.

**Brig** — Brigs were introduced in the late 18th century and popular throughout the first quarter of the 19th century. Brigs have two masts. Only square sails are set on the foremast, while the lower sail on the mainmast is fore-and-aft.

**Ketch** — Ketches are smaller two masted vessels with the shorter mizzenmast set behind the mainmast. Both masts carry fore-and –aft sails.

**Não** — The Não was a Spanish exploration vessel that had a lateen rigged sail allowing it to sail closer to the wind. The Não was preferred by explorers for close-in, coastal investigation.

**Paddlewheeler** — Paddlewheelers are vessels propelled by large paddles that are either located on the sides of the boat or at the stern. Early paddlewheelers used on the trans-oceanic crossings also carried masts to conserve on fuel and take advantage of wind power. Some trans-oceanic paddlewheelers dismantled the paddles while at sea.

**Pilot** — Pilot boats were usually ketch rigged and helped guide larger vessels into harbors.

**Schooner** — Introduced in the early 1800s, a schooner can have any number of masts. Fore-and-aft sails are set on all masts. The schooner, *Thomas W. Lawson* had 7 masts.

**Scow** — Scows were common throughout the Age of Sail. A scow has a blunt bow and stern with a single mast and fore-and-aft sail. Most common is the gaff rig, where the sail

has a boom at the foot of the sail and a gaff spar at the head or top of the sail

**Ship** Large, deep-water vessels with three masts and square sails on all masts.

**Sloop** Sloops gained popularity in the 19th century. The rig was originally developed in the Caribbean and sometimes is called a Bermuda rig. Sloops have a single mast with a fore-and-aft sail.

**Yacht** Yachts refer to pleasure craft that have one of more masts with fore-and-aft sails.

## Unrigged

**Barge** Barges have blunt bows and sterns with straight sides. The barges are generally towed, but some barges are motorized. Sometimes older sailing vessels were de-masted and turned into towed barges.

**Beidarka/kayak** Beidarkas and Kayaks are skin-covered boat that are paddled. Eskimos developed the craft for fishing and hunting.

**Lighter** Lighters were used to ferry goods to shore from larger vessels. In some instances the terms lighters and barges are used interchangeably.

**Paddlewheeler** Paddlewheelers are vessels propelled by large paddles that are either located on the sides of the boat or at the stern. Although paddlewheelers were used on the Ocean, this type of vessel was best suited to riverine travel.

# Section VI:
# Appendix C: NOAAs Archaeology Database Format

The database developed by NOAA for reported ship losses located in or near the thirteen marine sanctuaries is divided into 8 categories:

1. Database Record Information
2. Source Information
3. Site Information
4. Coordinates
5. Vessel Information
6. Archaeological Findings
7. Management

Within the 8 categories are 76 fields where information can be entered. Analysis of the data can be sorted for any one or any combination hierarchy of the 76 fields. Enclosed is an example of an individual file for the dirigible *Macon,* the only known shipwreck located within the sanctuary.

# NOAA's ARCH; DATABASE FORM

## Database Record Information

**Recorder** L. Vann

## Source Information

**Source Reference** SLC Database, US Navy, Reinstedt

**Source Type**

**Source Notes** National Geographic; 181;no.1, pp114-127

## Site Information

**Vessel** Macon

**Popular Name**

**NMS** Monterey

**NOAA Site No.**

**Other Site No.**

**Site Type** Shipwreck

**Century** 20

**Nearest Community** Monterey

**State** California

**County** Monterey

**Water Body** Pacific

**Landmark** Point Sur

**Site Situation** Underwater

**Water Depth** 1450ft

**Site Condition**

**Site Notes**

## Coordinates

**Coordinates** Yes

**DGPS** Yes

**Lat. Degree**

**Lat. Min.**

**Lat. Sec**

**Lon. Degree**

**Lon. Min**

**Lon. Sec**

**Coordinate Notes**

## Vessel Information

**Vessel Type** dirigible-aircraft carrier

**Owner** US Navy

**Builder** Goodyear-Zeppelin

**Nationality** US Navy

**Place Built** Akron, Ohio

**Date Built** 1933

(Day / Month / Year)

**Date of Loss** 12 02 1935

(Day / Month / Year)

**Original Use** aircraft carrier

**Use at Loss** aircraft carrier

**Loss Cause** equipment failure

# NOAA's ARCH; DATABASE FORM

## Vessel Information

| | | | | | |
|---|---|---|---|---|---|
| **Rigging** | dirigible | | | **No. of Masts** | |
| **LOA** | 785 | **WOA** | 133 | **Draft** | **Depth of Hold** |
| **Tonnage** | 12 | **Hull Material** | composite | | |
| **Engine Type** | 8 560 hp Maybach engines | | | **Propulsion** | propellers /helium |
| **Cargo** | Sparrowhawk Bi-planes | | | | |
| **Armament** | | | | | |
| **Vessel Notes** | Captain at Loss: Herbert V. Wiley | | | | |

## Archaeological Findings

| | | | | | |
|---|---|---|---|---|---|
| **Site Plan** | Yes | **Video/Images** | Yes | **Field Notes** | |
| **Structural Remains** | Hull Fragments | | | | |
| **Artifacts** | Yes | **Anchors** | | | |

**Habitat Description**

**Diving Conditions**

**Site Threats** **Site Overburden**

## Management

| | | | | | |
|---|---|---|---|---|---|
| **Management Agency** | US Navy | | | **Restricted Data** | |
| **National Register** | | **National Landmark** | | **State Landmark** | |
| **Permits** | | **Permit No.** | | | |

**Assoc. Publications**

**Location of Assoc. Files**

**Management Recommendations**

# Section VI:
# Appendix D: Reported Vessel Losses within MBNMS Database (sorted by vessel alphabetically)

In this particular sort, eleven of the possible 76 categories were selected. The sort lists all the vessels within the MBNMS database by:

| | |
|---|---|
| **Vessel** | Vessel Name |
| **Rigging** | Rigging type |
| **Cent**. | Century associated with the building date |
| **Date Built** | Year the vessel was launched |
| **DL Year** | Date of Loss Year |
| **Loss Cause** | How the vessel was lost |
| **LOA** | Length Overall |
| **Tonnage** | Net tonnage listed on registry |
| **Propulsion** | Propulsion type for vessel |
| **Coordinates** | Are the general latitude and longitude coordinates reported for the loss site of the vessel |
| **County** | The county where the loss occurred |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Date Built Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| 40Fathoms No. 4 | oil screw | 20 | | 1949 | foundered | | 46 | Oil Screw | Yes | Monterey |
| A. Crosby | schooner | 19 | | 1869 | foundered | | 70 | Sail | Yes | Santa Cruz |
| A No. 1 | barge | 20 | | 1930 | foundered | | 12 | Towed | | Monterey |
| Aberdeen | schooner | 19 | | 1916 | foundered | | 499 | Sail & Steam | | Santa Cruz |
| Abraham Lincoln | schooner | 19 | | 1881 | dragged anchors | 71 | ? | Sail | No | Sonoma |
| Abraham Lincoln | schooner | 19 | | 1931 | explosion | 77 | 71 | Motor | Yes | San Mateo |
| Acalin | Purse Seiner | | | 1934 | stranded | 73 | 87 | | Yes | Monterey |
| Active | schooner | 19 | | 1876 | grounded | 92 | 148 | Sail | Yes | Santa Cruz |
| Acuelo | Ship | 19 | | 1872 | stranded | | 800 | | Yes | San Mateo |
| Ada May | schooner | 19 | | 1880 | stranded | 89.5 | 84.48 | Sail | Yes | San Mateo |
| Admiral | gas screw | 20 | | 1928 | foundered | | 33 | gas screw | | Santa Cruz |
| Ajax | oil screw | 20 | | 1974 | foundered | | 50 | Oil Screw | | San Mateo |
| Alaskan | oil screw | 20 | | 1959 | foundered | | 13 | Oil Screw | | San Luis C |
| Albert | bark | 19 | | 1919 | stranded | | 682 | Sail | Yes | Marin |
| Albert | | 19 | | 1874 | | | | | Yes | Marin |
| Alert | schooner | 19 | | 1868 | stranded | | | Sail | Yes | San Mateo |
| Alexander Duncan | Steamship | 19 | | 1881 | foundered | | | | | Monterey |
| Alice Buck | Ship | 19 | | 1881 | stranded | | 1425 | Sail | Yes | San Mateo |
| Allessandro | schooner | 19 | | 1874 | capsized | | | | Yes | Marin |
| Aloha | steam schooner | 19 | | 1901 | burned | 127 | 216 | Sail & Steam | Yes | Marin |
| Aloha | oil screw | 20 | | 1955 | stranded | | 10 | Oil Screw | | San Mateo |
| Altura | oil screw | 20 | | 1968 | foundered | | 14 | Oil Screw | | San Mateo |
| American Boy | schooner | 19 | | 1890 | stranded | 105.6 | 173.89 | Sail | No | Marin |
| American Clipper | | 20 | | 1948 | unknown | | | | Yes | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Date Built Cent. | DL Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|
| Aneadedea | gas screw | 20 | 1967 | stranded | | 6 | Gas Screw | | Monterey |
| Anglo-American | | 19 | 1861 | wrecked | | | Sail | Yes | Marin |
| Anna Marie | oil screw | 20 | 1974 | foundered | | 28 | Oil Screw | | Monterey |
| Anne (Annie) | schooner | 19 | 1871 | stranded | | | Sail | Yes | Marin |
| Annie | | | 1920 | | | | | Yes | Marin |
| Annie E. Smale | schooner | 20 | 1910 | stranded | 200 | 845 | Sail | Yes | Marin |
| Annie H. Johnson | schooner | 19 | 1879 | stranded | 63.5 | 38.81 | Sail | Yes | Santa Cruz |
| Apache II | oil screw | 20 | 1952 | stranded | | 13 | Oil Screw | | San Franc |
| Arakan | steamship | | 1920 | wrecked | | | Steam Screw | Yes | Marin |
| Argonaut | schooner | 19 | 1890 | stranded | 105 | 194 | Sail | Yes | San Mateo |
| Atlantic | | 19 | 1886 | | | | | | Monterey |
| Aurora | schooner | 20 | 1935 | stranded | | 1211 | Sail | Yes | Monterey |
| Avanti | barge | 20 | 1939 | foundered | | 19 | Towed | | Santa Cruz |
| Ayacucho | brig | 19 | 1841 | | | | Sail | Yes | Marin |
| Babinda | gas screw | 20 | 1923 | burned | 269 | 3098 | Screw | Yes | Monterey |
| Barbara Marie | oil screw | 20 | 1952 | foundered | | 10 | Oil Screw | | San Luis C |
| Beeswing | schooner | 19 | 1863 | foundered | | | Sail | Yes | San Franc |
| Bessie Everding | schooner | 19 | 1888 | stranded | 73.5 | 70.02 | Sail | No | San Franc |
| Betty Ann | oil screw | 20 | 1948 | foundered | | 33 | Oil Screw | | Monterey |
| Beverly M | gas screw | 20 | 1950 | burned | | 11 | gas screw | | Monterey |
| Bishop | steam screw | 19 | 1877 | stranded | | | Steam Screw | Yes | Marin |
| Blue Bell | gas screw | 20 | 1951 | foundered | | 10 | Gas Screw | | San Mateo |
| Bob | launch | 19 | 1893 | capsized | | | | Yes | Marin |
| Bonita | schooner | 19 | 1920 | stranded | | 14 | | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| Bonita | | 19 | | 1896 | | | | | | Monterey |
| Bonita | | 20 | | 1920 | | | | | | Monterey |
| Bonita | | 20 | | 1907 | | | | | | Monterey |
| Bonnie Margaret | gas screw | 20 | | 1948 | foundered | | 17 | Gas Screw | | Monterey |
| Branco Clipper | gas screw | 20 | | 1941 | foundered | | 20 | gas screw | | Santa Cruz |
| Bridget II | oil screw | 20 | | 1958 | foundered | | 16 | Oil Screw | | San Luis C |
| Bud | oil screw | 20 | | 1972 | foundered | | 11 | Oil Screw | | San Luis C |
| Burnbrite | gas screw | 20 | | 1960 | stranded | | 8 | Gas Screw | | Monterey |
| C-7742 | trawler | | | 1929 | | | | | Yes | Marin |
| California | gas screw | 20 | | 1931 | stranded | | 12 | gas screw | | Monterey |
| Californian | Tanker | 20 | | 1932 | foundered | | 74 | Oil Screw | Yes | San Mateo |
| Cappy Rick's | oil screw | 20 | | 1977 | foundered | | 12 | Oil Screw | | Monterey |
| Caroline | stern wheel | 19 | | 1917 | burned | | 182 | | Yes | Marin |
| Carolyn II | gas screw | 20 | | 1952 | foundered | | 10 | Gas Screw | | Monterey |
| Carrier Pigeon | Ship | 19 | | 1853 | grounded | | 844 | Sail | Yes | San Mateo |
| Casco | schooner | 20 | | | | | 533 | Steam Screw | Yes | San Luis C |
| Cassandra | oil screw | 20 | | 1952 | stranded | | 10 | Oil Screw | | San Luis C |
| Catania | tanker | 19 | | 1915 | | | | | | Monterey |
| Caterina | barge | 20 | | 1932 | stranded | | 15 | Towed | | Monterey |
| Cathy Ann | gas screw | 20 | | 1964 | stranded | | 10 | Gas Screw | | Monterey |
| Celia | schooner | 20 | | 1906 | stranded | | 173 | Sail & Steam | Yes | Monterey |
| CG 256 | cutter | | | 1933 | grounded | 75 | | | Yes | Monterey |
| Challenge | schooner | 19 | | 1877 | wrecked | | | Sail | Yes | San Luis C |
| Charline | oil screw | 20 | | 1966 | stranded | | 45 | Oil Screw | | Marin |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| Chinampa | oil screw | 20 | | 1951 | foundered | | 18 | Oil Screw | | Marin |
| City of Glendale | schooner | 20 | | 1921 | arson | | | | Yes | San Mateo |
| City of New York | | 19 | | | | | | | | Monterey |
| Clara | oil screw | 20 | | 1966 | stranded | | 34 | Oil Screw | | San Mateo |
| Claus Spreckles | brig | 19 | | 1888 | grounded | 122.5 | 246.62 | Sail | Yes | Marin |
| Coaster | gas screw | 20 | | 1925 | burned | | 14 | gas screw | | San Mateo |
| Colonel Baker | schooner | 19 | | 1913 | stranded | 75 | 83 | Sail | Yes | Marin |
| Columbia | oil screw | 20 | | 1949 | colliosn | | 42 | Oil Screw | | Marin |
| Columbia (City of | steamer | 19 | | 1896 | grounded | | 3616 | Steam Screw | Yes | San Mateo |
| Commodore Rogers | Ship | 19 | | 1837 | sank in storm | | 298 | Sail | Yes | Monterey |
| Constance Romeo | oil screw | 20 | | 1954 | foundered | | 40 | Oil Screw | | San Mateo |
| Conte di Savoia | oil screw | 20 | | 1974 | stranded | | 7 | Oil Screw | | Monterey |
| Coya | bark | 19 | | 1886 | grounded | | | Sail | Yes | San Mateo |
| Crescent City | schooner | 20 | | 1927 | stranded | | 701 | Sail & Steam | Yes | San Mateo |
| Cub | gas screw | 20 | | 1943 | stranded | | 10 | gas screw | | Monterey |
| D.M. Renton | oil screw | 20 | | 1965 | foundered | | 68 | Oil Screw | | San Luis C |
| Daisy Rowe | | 19 | | 1900 | | | | | | Marin |
| Danny Lee | oil screw | 20 | | 1964 | foundered | | 14 | Oil Screw | | Santa Cru |
| Dawn | gas screw | 20 | | 1947 | foundered | | 13 | Gas Screw | | San Luis C |
| Delle Marie | oil screw | 20 | | 1959 | burned | | 24 | Oil Screw | | San Mateo |
| Dianna II | fishing | 20 | | 1954 | foundered | | 10 | | | Monterey |
| Donnie Boy | oil screw | 20 | | 1951 | burned | | 24 | Oil Screw | | San Luis C |
| Dored | | 20 | | | | | | | | Marin |
| Dorothy C | oil screw | 20 | | 1962 | foundered | | 12 | Oil Screw | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Dorphy | gas screw | 20 | | 1953 | burned | | 15 | Gas Screw | | San Luis C |
| Dott | gas screw | 20 | | 1919 | foundered | | 8 | Gas Screw | | Monterey |
| Drumburton | schooner | 19 | | 1904 | foundered | 266'7" | 1891 | towed | No | San Mateo |
| Duxberry | | 19 | | 1849 | grounded | | | Sail | Yes | Marin |
| E. Antoni | | | | 1938 | wrecked | | | | Yes | Marin |
| E.S. Lucido | oil screw | 20 | | 1946 | foundered | | 16 | Oil Screw | | San Mateo |
| Echo | sloop | 19 | | 1879 | foundered | | | Sail | Yes | San Mateo |
| Efina Kuyne | galliot | 19 | | 1862 | foundered | | | Sail | Yes | San Mateo |
| El Dorado | Sidewheel | 19 | | 1851 | | | | Paddlewheel/s | Yes | Marin |
| Electra | schooner | 19 | | 1894 | parted cables | | | Sail | Yes | San Luis C |
| Elizabeth | Ship | 19 | | 1891 | stranded | 232 | 1866 | Sail | Yes | Marin |
| Ella | gas screw | 20 | | 1966 | stranded | | 8 | Gas Screw | | Marin |
| Elsie Iverson | | 19 | | 1888 | stranded | 94 | 122 | Sail | Yes | Marin |
| Elwood No. 1 | gas screw | 20 | | 1931 | stranded | | 13 | gas screw | | San Luis C |
| Elysia | oil screw | 20 | | 1971 | stranded | | 13 | Oil Screw | | San Mateo |
| Emma M. | oil screw | 20 | | 1951 | foundered | | 33 | Oil Screw | | Monterey |
| Empress | modern ship | 20 | | 1966 | foundered | | 169 | Oil Screw | | Monterey |
| Empress | gas screw | 20 | | 1942 | stranded | | 13 | gas screw | | Marin |
| Eneas | oil screw | 20 | | 1955 | foundered | | 84 | Oil Screw | | Monterey |
| Erin's Star | bark | 19 | | 1880 | stranded | 203 | 1457 | Sail | Yes | Marin |
| Esperanza | schooner | 19 | | 1892 | grounded | 46.2 | 15.11 | Sail | Yes | Marin |
| Eureka | barkentine/schoone | 19 | | 1902 | grounded | 134'3" | 295 | Sail | Yes | San Franc |
| Eureka | steam screw | 20 | | 1915 | stranded | | 484 | Steam Screw | No | Marin |
| European | | 19 | | 1861 | | | | Sail | Yes | Marin |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Evening Star | schooner | 19 | | 1880 | wrecked | n | | | Yes | Marin |
| Express | oil screw | 20 | | 1942 | foundered | | 53 | Oil Screw | Yes | Santa Cruz |
| Express | oil screw | 20 | | 1942 | foundered | | 53 | Oil Screw | | Santa Cruz |
| F-1 | submarine | 20 | | 1912 | stranded | | 330 | | | Monterey |
| Fallmouth | schooner | 19 | | 1874 | abandoned | | | Sail | Yes | Monterey |
| Fama | | 19 | | | | | | | | Monterey |
| Fiesta | oil screw | 20 | | 1970 | foundered | | 21 | Oil Screw | | Monterey |
| Five Brothers | | 19 | | 1900 | wrecked | | | | Yes | Marin |
| Flavel | schooner | 20 | | 1923 | stranded | | 967 | Sail & Steam | Yes | Monterey |
| Florida | gas screw | 20 | | 1930 | burned | | 36 | gas screw | | Monterey |
| Fourth of July | schooner | 19 | | 1878 | grounded | | 49.95 | Sail | Yes | Marin |
| Frances | schooner | 19 | | 1879 | stranded | 42 | 16 | Sail | Yes | Marin |
| Francois Coppee | bark | 20 | | | grounded | 277 | 1728 | Sail | Yes | Marin |
| Frank Lawrence | gas screw | 19 | | 1946 | foundered | | 58 | screw | Yes | Monterey |
| Free Trade | schooner | 19 | | 1878 | stranded | | | Sail | Yes | Marin |
| G.C. Lindauer | steam screw | 20 | | 1921 | wrecked | | 453 | Steam Screw | Yes | Monterey |
| Galilee | schooner | 19 | | 1935 | | 132.5 | 354 | Sail | Yes | Marin |
| Gambolier | oil screw | 20 | | 1949 | stranded | | 15 | Oil Screw | | San Luis C |
| Gardner 7 | oil screw | 20 | | 1967 | burned | | 13 | Oil Screw | | San Mateo |
| Geneva No. 2 | barge | 20 | | 1930 | stranded | | 23 | Towed | | Monterey |
| Geoff | gas screw | 20 | | 1950 | stranded | | 8 | Gas Screw | | Marin |
| George R. Bailey | gas screw | 20 | | 1909 | stranded | | 26 | Gas Screw | | Monterey |
| Gifford | bark | 19 | | 1903 | grounded | 282 | 2245 | Sail | Yes | San Mateo |
| Gipsy | steamer | 19 | | 1905 | grounded | | 293 | Screw | Yes | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| Giuseppe | barge | 20 | | 1930 | stranded | | 17 | Towed | | Monterey |
| Golden Gate | schooner | 19 | | 1873 | parted cable | | | Sail | Yes | San Luis C |
| Granger | schooner | 19 | | 1908 | | | 59 | Sail | Yes | San Mateo |
| Greenland | oil screw | 20 | | 1934 | | | 71 | Oil Screw | No | Monterey |
| H.C. Almay | schooner | 19 | | 1879 | dragged anchor | 36 | 12.71 | Sail | Yes | Marin |
| H. Caroline | | 19 | | 1874 | wrecked | | | | Yes | Marin |
| H. L. Rutgers | bark | 19 | | 1868 | grounded | 167 | 405 | Sail | Yes | Marin |
| H.M. | oil screw | 20 | | 1960 | stranded | | 25 | Oil Screw | Yes | San Luis C |
| H.M. Adams | oil screw | 20 | | 1945 | stranded | | 58 | Oil Screw | Yes | San Luis C |
| Haddingtonshire | bark | 19 | | 1885 | grounded | 215 | 1119 | Sail | Yes | Marin |
| Hanalei | schooner | 20 | | 1914 | stranded | 174.5 | 666 | | Yes | Marin |
| Handy | oil screw | 20 | | 1960 | foundered | | 34 | Oil Screw | | San Luis C |
| Hannah M. Bourne | | | | 1868 | wrecked | | | | Yes | Marin |
| Harlech Castle | bark | 19 | | 1869 | grounded | | | Sail | Yes | San Luis C |
| Harlech Castle | bark | 19 | | 1905 | grounded | | 1802 | Sail | Yes | San Luis C |
| Harmony | | | | 1940 | wrecked | | | | Yes | Marin |
| Hartwood | schooner | 20 | | 1929 | grounded | 199 | 946 | | Yes | Marin |
| Hayes | | 19 | | 1869 | wrecked | | | | Yes | Marin |
| Helena | bark | 19 | | 1849 | grounded | | 598 | Sail | Yes | Marin |
| Hellespont | Ship | 19 | | 1868 | grounded | | 868 | Sail | Yes | San Mateo |
| Henrietta | steam screw | 19 | | 1927 | burned | | 53 | Steam Screw | Yes | Marin |
| Henrietta | schooner | 19 | | 1868 | stranded | | 64 | | Yes | Marin |
| Henriette | schooner | 19 | | 1879 | grounded | | | Sail | Yes | Marin |
| Hi Brow | oil screw | 20 | | 1978 | foundered | | 14 | Oil Screw | | Marin |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hildegard | oil screw | 20 | | | 1960 | stranded | | 13 | Oil Screw | | Marin |
| Howard Olson | schooner | 20 | | | 1956 | colliosn | 253 | 2477 | Sail | Yes | Monterey |
| Ida A | schooner | | | | 1905 | stranded | | 60 | | Yes | Marin |
| Ida May | gas screw | 20 | | | 1930 | stranded | | 62 | screw | Yes | Monterey |
| Idaho | Oil screw | 20 | | | 1929 | foundered | | 38 | Oil Screw | | Monterey |
| Ideal | launch | | | | 1928 | wrecked | | | | Yes | Marin |
| Illinois | gas screw | 20 | | | 1949 | foundered | | 9 | Gas Screw | | Monterey |
| Infallable | oil screw | 20 | | | 1944 | foundered | | 118 | Oil Screw | Yes | Santa Cruz |
| Iolanda | steamer | 20 | | | 1923 | stranded | | 53 | Steam Screw | Yes | San Mateo |
| Ipokai | yacht | 20 | | | 1935 | stranded | | 22 | Motor Sail | | Monterey |
| Isabelita Hyne | bark | 19 | | | 1856 | sank in storm | | 350 | Sail | Yes | San Mateo |
| Ituna | steamship | 19 | | | 1920 | foundered | | 201 | Steam Screw | Yes | Marin |
| Iva F | gas screw | 20 | | | 1951 | stranded | | 8 | Gas Screw | | San Mateo |
| J.B. Stetson | schooner | 20 | | | 1934 | stranded | | 922 | Sail & Steam | Yes | Monterey |
| J.C. Condon | | 19 | | | 1886 | colliosn | | | Sail | Yes | Marin |
| J.C. Cousins | pilot boat | 19 | | | 1875 | stranded | 66 | 48.83 | Sail | | San Mateo |
| J.E. Haskins | schooner | 19 | | | 1874 | capsized | 54'6" | ? | Sail | Yes | Marin |
| J. E. Reese | schooner | 19 | | | 1874 | capsized | | | Sail | Yes | Marin |
| J Eppinger | schooner | 19 | | | 1898 | colliosn | | 112 | Sail | Yes | Marin |
| J. Sarkie | bark | 19 | | | 1851 | | | | Sail | Yes | San Mateo |
| J.W. Seaver | bark | 19 | | | 1887 | grounded | 106.5 | 230 | Sail | Yes | San Mateo |
| Jack Jr. | oil screw | 20 | | | 1960 | stranded | | 30 | Oil Screw | | San Luis C |
| Jacob Luckenbach | Steamship | 20 | | | 1953 | colliosn | | 7869 | Steam Screw | | San Mateo |
| Jade Sea | oil screw | 20 | | | 1967 | foundered | | 13 | Oil Screw | | San Luis C |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| James Rolph | schooner | 19 | | 1910 | grounded | 169'1" | 586 | Sail | Yes | San Mateo |
| Jean | oil screw | 20 | | 1972 | foundered | | 16 | Oil Screw | | Santa Cruz |
| Jenern | gas screw | 20 | | 1967 | foundered | | 9 | Gas Screw | | Santa Cruz |
| Jennie Osborn | Ship | 19 | | 1878 | stranded | | 1056 | Sail | Yes | Marin |
| Jo Jean | gas screw | 20 | | 1959 | sank in storm | | 11 | Gas Screw | | Santa Cruz |
| Jo Rita Bennett | gas screw | 20 | | 1946 | stranded | | 16 | Gas Screw | | Monterey |
| Joe Jr. | oil screw | 20 | | 1954 | unknown | | 30 | Oil Screw | | San Mateo |
| John E. Spreckels | barkentine | 19 | | 1913 | colliosn | 124.6 | 253 | Sail | No | Marin |
| Johnson No. 1 | gas screw | 20 | | 1948 | burned | | 21 | Gas Screw | | Monterey |
| Johsua Grindle | schooner | 19 | | 1887 | water-logged | 105 | 182.85 | Sail | Yes | San Luis C |
| Joker | oil screw | 20 | | 1960 | foundered | | 10 | Oil Screw | | Monterey |
| Juanita | | 20 | | 1947 | | | | | Yes | Monterey |
| Jugo Slavia | oil screw | 20 | | 1940 | foundered | | | Oil Screw | Yes | San Mateo |
| Julia Brown | schooner | 19 | | 1879 | parted anchor | 62.5 | 45.14 | Sail | Yes | Santa Cruz |
| Julius Pringle | schooner | 19 | | 1863 | | 83 | ? | | Yes | Monterey |
| K.H. Co. No.2 | Barge | 20 | | 1938 | stranded | | 27 | Towed | | Monterey |
| Kaiser | oil screw | 20 | | 1978 | foundered | | 49 | Oil Screw | | Marin |
| Kama | gas screw | 20 | | 1971 | foundered | | 9 | Gas Screw | | San Mateo |
| Katherine Donovan | steamer | 20 | | 1941 | stranded | | 993 | Steam Screw | | San Franc |
| Kiyo II | oil screw | 20 | | 1945 | foundered | | 16 | Oil Screw | | San Luis C |
| Kolie | gas screw | 20 | | 1957 | stranded | | 8 | Gas Screw | | Monterey |
| Kona | barge | 20 | | | parted tow | 336 | 5825 | Towed | Yes | Marin |
| Kornat | oil screw | 20 | | 1971 | burned | | 14 | Oil Screw | | San Luis C |
| La Crescentia | | | | 1935 | wrecked | | | | Yes | San Luis C |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| La Feliz | freighter | 20 | | 1924 | grounded | 72 | 102 | Steam Screw | Yes | Santa Cruz |
| Labouchere | Stemship | 19 | | 1866 | | 202 | 680 | Paddlewheel/s | Yes | Marin |
| Lady Luck | oil screw | 20 | | 1950 | foundered | | 14 | Oil Screw | | San Luis C |
| Lecene R II | oil screw | 20 | | 1963 | stranded | | 25 | Oil Screw | | Monterey |
| Leelenaw | | 19 | | 1899 | unknown | | | | Yes | San Mateo |
| Lena | schooner | 19 | | 1866 | grounded | | | Sail | Yes | San Luis C |
| Leona | oil screw | 20 | | 1955 | stranded | | 11 | Oil Screw | | Monterey |
| Liguria | oil screw | 20 | | 1976 | foundered | | 11 | Oil Screw | | San Luis C |
| Lilianne | oil screw | 20 | | 1963 | foundered | | 14 | Oil Screw | | San Mateo |
| Lillebonne | schooner | 19 | | 1912 | foundered | | 218 | | | Marin |
| Lizzie C. Jurss | schooner | 19 | | 1885 | burned | 63 | 45.83 | Sail | No | San Mateo |
| Lizzie Derby | schooner | 19 | | 1891 | stranded | 81 | 98 | Sail | Yes | Marin |
| Los Angeles | steamship | 19 | | 1894 | grounded | 170 | 495 | Steam Screw | Yes | Monterey |
| Louis | schooner | 19 | | 1907 | stranded | 193.8 | 831 | | No | Marin |
| Louisa | schooner | 19 | | 1864 | foundered | 45 | ? | Sail | No | Marin |
| Louisa De Merritt | sloop/schooner | 19 | | 1886 | stranded | 41'3" | ? | Sail | No | Marin |
| Louise | gas screw | 20 | | 1952 | foundered | | 9 | Gas Screw | | Marin |
| Lucas | Ship | 19 | | 1858 | wrecked | 112'9" | ? | Sail | No | Marin |
| Lucille | oil screw | 20 | | 1959 | unknown | | 14 | Oil Screw | | San Mateo |
| Luck Day | oil screw | 20 | | 1963 | foundered | | 9 | Oil Screw | | San Luis C |
| Lyda B | gas screw | 20 | | 1958 | foundered | | 11 | Gas Screw | | Marin |
| Lyman Stewart | steamer | 20 | | 1922 | colliosn | 408.8 | 3830 | Steam Screw | No | Monterey |
| M. Mangels | schooner | 19 | | 1882 | | 62.5 | 41.47 | Sail | | San Franc |
| Ma-Nee | oil screw | 20 | | 1961 | colliosn | | 12 | Oil Screw | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Mabel | oil screw | 20 | | 1929 | foundered | | 42 | Oil Screw | | San Mateo |
| Macon | dirigible | 20 | | 1935 | equipment failure | 785 | 12 | propellers | Yes | Monterey |
| Madeline | sloop | 20 | | 1925 | burned | | | Sail | Yes | Marin |
| Maggie Johnston | schooner | 19 | | 1863 | | | | Sail | Yes | San Mateo |
| Majestic | schooner | 20 | | 1909 | grounded | 187 | 870 | Sail & Steam | Yes | Monterey |
| Maple Leaf | gas screw | 20 | | 1947 | burned | | 24 | Gas Screw | | San Luis C |
| Mardine | oil screw | 20 | | 1980 | foundered | | 16 | Oil Screw | | San Mateo |
| Margaret | oil screw | 20 | | 1928 | foundered | | 35 | Oil Screw | | Marin |
| Margaret | oil screw | 20 | | 1954 | foundered | | 12 | Oil Screw | | Santa Cruz |
| Marian | gas screw | 20 | | 1962 | burned | | 14 | Gas Screw | | Monterey |
| Marian | gas screw | 20 | | 1970 | stranded | | 23 | Gas Screw | | San Luis C |
| Marin | schooner | 19 | | 1861 | | | | Sail | Yes | Marin |
| Mary | schooner | 19 | | 1853 | | | | Sail | Yes | Marin |
| Mary | barge | 20 | | 1937 | foundered | | 18 | Towed | | San Mateo |
| Mary D. Pomeroy | schooner | 19 | | 1879 | capsized | | 114 | Sail | Yes | Marin |
| Mary Lois | gas screw | 20 | | 1948 | foundered | | 12 | Gas Screw | | Monterey |
| Mary Martin | schooner | 19 | | 1863 | stranded | | | Sail | Yes | San Mateo |
| Mary Stuart | brig | 19 | | 1851 | stranded | | | | Yes | San Mateo |
| Maryland | steamship | | | 1913 | burned | | 51 | Steam Screw | Yes | Marin |
| Maxie V | oil screw | 20 | | 1978 | | | 14 | Oil Screw | Yes | Marin |
| May B | oil screw | 20 | | 1972 | stranded | | 26 | Oil Screw | | Monterey |
| Megara Augusta | oil screw | 20 | | | | | 13 | Oil Screw | | Monterey |
| Mello Bay | oil screw | 20 | | 1965 | stranded | | 21 | Oil Screw | | San Luis C |
| Merry Jim | oil screw | 20 | | 1971 | stranded | | 16 | Oil Screw | | San Franc |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Mia Maria | gas screw | 20 | | 1972 | burned | | 11 | Gas Screw | | Marin |
| Mine | gas screw | 20 | | 1937 | stranded | | 12 | gas screw | | Monterey |
| Mirn | oil screw | 20 | | 1952 | stranded | | 15 | Oil Screw | | Monterey |
| Miss Enez | oil screw | 20 | | 1979 | foundered | | 22 | Oil Screw | | Santa Cruz |
| Misty Blue | oil screw | 20 | | 1979 | foundered | | 12 | Oil Screw | | Monterey |
| Monarch | oil screw | 20 | | 1972 | foundered | | 22 | Oil Screw | | San Mateo |
| Montebello | tanker | 20 | | 1941 | sunk by Japanese | 440 | 8272 | | Yes | San Luis C |
| Monterey | schooner | 19 | | 1862 | | | | Sail | Yes | Marin |
| Morning Mist | oil screw | 20 | | 1964 | foundered | | 18 | Oil Screw | | San Franc |
| Mose | | 19 | | | wrecked | | | | Yes | Marin |
| Munleon | freighter | 20 | | 1931 | foundered | 251 | 2606 | Steam Screw | Yes | Marin |
| Myrtle D | gas screw | 20 | | 1925 | burned | | 16 | gas screw | | San Mateo |
| Mystery | schooner | 19 | | 1907 | capsized | | 31 | | No | San Mateo |
| Mystic | oil screw | 20 | | 1960 | unknown | | 17 | Oil Screw | | San Luis C |
| N & K No. 1 | gas screw | 20 | | 1931 | stranded | | 17 | gas screw | | Monterey |
| Nahumkeag | bark | 19 | | 1867 | stranded | 110 | 291 | Sail | Yes | Marin |
| Napa City | schooner | 19 | | | capsized | | 46 | Sail | Yes | Marin |
| Natala (Natalia) | schooner | 19 | | 1831 | sank in storm | | | Sail | | Monterey |
| Nerenta K | oil screw | 20 | | 1941 | foundered | | 60 | Oil Screw | Yes | Santa Cruz |
| Nerenta K | oil screw | 20 | | 1941 | foundered | | 60 | Oil Screw | | Santa Cruz |
| Nettie Low | schooner | 19 | | 1900 | capsized | 55 | 26 | Motor Sail | Yes | Marin |
| New Crivello | oil screw | 20 | | 1936 | foundered | | 116 | Oil Screw | Yes | San Mateo |
| New England | bark | | | | | | | | | Marin |
| New Hope | oil screw | 20 | | 1953 | stranded | | 107 | | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| New Roma | oil screw | 20 | | 1970 | foundered | | 102 | Oil Screw | | Monterey |
| New Sunset | oil screw | 20 | | 1964 | foundered | | 64 | Oil Screw | | San Luis C |
| New York | Ship | 19 | | 1898 | beachd | | 2000 | Sail | Yes | San Mateo |
| No Name | oil screw | 20 | | 1980 | foundered | | 11 | Oil Screw | | Monterey |
| No Name | barge | 20 | | 1909 | stranded | | 200 | Towed | | San Franc |
| No Name | barge | 19 | | 1914 | stranded | | - - - | Towed | | Monterey |
| No Name | barge | 20 | | 1916 | foundered | | 100 | Unknown | | Marin |
| No Name | barge | 20 | | 1915 | sank in storm | | 40 | Towed | | Marin |
| Norma Jean | gas screw | 20 | | 1958 | colliosn | | 18 | Gas Screw | | San Mateo |
| North Star | oil screw | 20 | | 1953 | foundered | | 10 | Oil Screw | | Monterey |
| Novato | scow | 19 | | 1884 | burned | | | Sail | Yes | Marin |
| Novick (Norvick) | corvette | 19 | | 1863 | stranded | | | | Yes | Marin |
| Oceania | | | | | | | | | Yes | San Mateo |
| Ohio No. 2 | gas screw | 20 | | 1948 | foundered | | 17 | Gas Screw | | Monterey |
| Ohioan | steamship | 20 | | 1926 | stranded | | 5153 | Steam Screw | | Monterey |
| Old Tom | gas screw | 20 | | 1941 | burned | | 13 | gas screw | | Monterey |
| Orazio | barge | 20 | | 1931 | foundered | | 15 | Towed | | Monterey |
| Oregon | oil screw | 20 | | 1934 | stranded | | 52 | Oil Screw | Yes | Monterey |
| Orion | oil screw | 20 | | 1942 | stranded | | 56 | Oil Screw | Yes | Monterey |
| Oseola | scow schooner | 19 | | 1878 | stranded | | | Sail | Yes | Marin |
| Osprey | oil screw | 20 | | 1978 | foundered | | 8 | Oil Screw | | San Mateo |
| Ostego | schooner | 19 | | 1872 | stranded | | | Sail | Yes | San Luis C |
| Otago | bark | 19 | | 1888 | stranded | | 870 | Sail | Yes | Marin |
| Owl | motor boat | 19 | | 1935 | burned | | 47 | Gas Screw | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| Oxford | | 19 | | 1852 | grounded | | 750 | Sail | Yes | Marin |
| P.D. Patrol | gas screw | 20 | | 1937 | foundered | | 15 | gas screw | | Santa Cruz |
| P15 | oil screw | 20 | | 1962 | | | 13 | Oil Screw | Yes | San Luis C |
| Page | schooner | 19 | | 1889 | grounded | | | Sail | Yes | Marin |
| Palo Alto | tanker | 20 | | 1936 | abandoned | 435 | 7500 | | Yes | Santa Cruz |
| Panama | gas screw | 20 | | 1930 | foundered | | 10 | gas screw | | Monterey |
| Panama | | 20 | | 1930 | rescue and salvage | 46 | | | | Monterey |
| Panglima | Oil Screw | 20 | | 1942 | burned | | 22 | Oil Screw | | San Mateo |
| Panjax | gas screw | 20 | | 1939 | stranded | | 14 | gas screw | | Monterey |
| Patrician | Ship | 19 | | 1873 | foundered | 195 | 1140 | Sail | Yes | Marin |
| Pelican | oil screw | 20 | | 1962 | foundered | | 126 | Oil Screw | | San Mateo |
| Penny A | oil screw | 20 | | 1953 | colliosn | | 10 | Oil Screw | | Monterey |
| Peso | oil screw | 20 | | 1968 | stranded | | 16 | Oil Screw | | Santa Cruz |
| Petersburg | brig | 19 | | 1852 | grounded | 81.6 | 183 | | Yes | Marin |
| Pilgrim | gas screw | 20 | | 1925 | foundered | | 15 | gas screw | | San Mateo |
| Point Arena | steam schooner | 19 | | 1913 | stranded | 115 | 245 | Sail & Steam | Yes | San Mateo |
| Polaris | schooner | 20 | | 1914 | stranded | 195 | 790 | Sail | Yes | Marin |
| Pomo | schooner | 20 | | 1914 | burst seams | 130 | 368 | Steam Screw | Yes | Marin |
| Poor Boy | oil screw | 20 | | 1972 | burned | | 16 | Oil Screw | | San Mateo |
| Portola | Oil Screw | 20 | | 1932 | burned | | 13 | Oil Screw | | Monterey |
| Posidon | gas screw | 20 | | 1942 | stranded | | 12 | gas screw | | Monterey |
| Prince Alfred | steamship | 19 | | 1874 | grounded | 160.5 | 815 | | Yes | Marin |
| Progress | steamer | 20 | | 1942 | stranded | 405 | 6157 | Oil Screw | Yes | Monterey |
| Quinault | | | | 1911 | wrecked | | | | Yes | Marin |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| R.D. Inman | schooner | 20 | | 1909 | stranded | 186.5 | 768 | Sail & Steam | Yes | Marin |
| Rachel | schooner | 19 | | 1895 | | | 84 | Sail | Yes | Marin |
| Rambler | gas screw | 20 | | 1945 | stranded | | 12 | Gas Screw | | San Mateo |
| Raymond | gas screw | 20 | | 1917 | wrecked | | 11 | gas screw | | Monterey |
| Redwing | gas screw | 20 | | 1974 | burned | | 10 | Gas Screw | | San Mateo |
| Remus | oil screw | 20 | | 1960 | foundered | | 11 | Oil Screw | | Monterey |
| Reporter | schooner | 19 | | 1902 | wrecked | 141.4 | 350 | Sail | | San Franc |
| Rhine Maru | freighter | 20 | | 1930 | grounded | 405 | 6157 | | Yes | Monterey |
| Richfield | tanker | 20 | | 1930 | grounded | 250 | 2366 | Steam Screw | Yes | Marin |
| Riverside | steamship | | | 1912 | capsized | | 1838 | Steam Screw | Yes | Marin |
| Roanoke | steamship | 19 | | 1916 | foundered | 276 | 2354 | Steam Screw | Yes | San Luis C |
| Rob Roy | gas screw | 20 | | 1954 | unknown | | 9 | gas screw | | San Mateo |
| Rochelle | brig | 19 | | 1849 | | | | | Yes | Monterey |
| Roderick Dhu | bark | 19 | | 1909 | stranded | 257.1 | 1534 | Towed | Yes | Monterey |
| Rosa | barge | 20 | | 1931 | stranded | | 14 | Towed | | Monterey |
| Rosana | oil screw | 20 | | 1953 | foundered | | 105 | Oil Screw | Yes | San Mateo |
| Rose | barge | 20 | | 1932 | stranded | | 17 | Towed | | Monterey |
| Rowena | gas screw | 20 | | 1941 | burned | | 14 | gas screw | | Monterey |
| Ruth | gas screw | 20 | | 1925 | foundered | | 13 | gas screw | | San Luis C |
| Rydall Hall | Ship | 19 | | 1876 | foundered | | | | Yes | San Mateo |
| Saint Paul | barkentine | 19 | | 1896 | grounded | 198 | 889 | Sail & Steam | Yes | Monterey |
| Saint Theresa | oil screw | 20 | | 1948 | foundered | | 23 | Oil Screw | | Monterey |
| Sal Angelo | oil screw | 20 | | 1951 | burned | | 21 | Oil Screw | | Marin |
| Salinas | steam screw | 19 | | 1871 | stranded | | 149 | Steam Screw | Yes | San Mateo |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Samoa | steamship | 19 | | 1913 | stranded | | | Steam Screw | Yes | Marin |
| Samson | schooner | 19 | | 1895 | wrecked | | 217 | Sail | | Marin |
| Samuel Lewis | Steamship | 19 | | 1853 | grounded | 216.9 | 1104 | Steam Screw | Yes | Marin |
| San Augustin | Ship | 16 | | 1595 | sank in storm | 80 | 200 | Sail | Yes | Marin |
| San Domenico | Purse Seiner | 20 | | 1935 | stranded | 86 | 109 | | Yes | Marin |
| San Gabriel | steamship | | | 1907 | wrecked | | | | Yes | Marin |
| San Juan | steamship | 19 | | 1929 | collision | 283 | 2150 | Steam Screw | Yes | San Mateo |
| San Juana | gas screw | 20 | | 1929 | burned | | 34 | gas screw | | Monterey |
| San Ramon | steamship | 19 | | | stranded | | | Steam Screw | Yes | San Mateo |
| San Vincente | steam screw | 19 | | 1887 | | 107 | 246 | Steam Screw | Yes | San Mateo |
| San Xavier | gas screw | 20 | | 1946 | foundered | | 9 | Gas Screw | | San Luis C |
| Santa Barbara | | 20 | | 1905 | stranded | | 695 | | Yes | Santa Cruz |
| Santa Cruz | steam screw | | | 1904 | wrecked | | | Steam Screw | Yes | San Luis C |
| Santa Lucia | oil screw | 20 | | 1954 | burned | | 109 | Oil Screw | Yes | San Luis C |
| Santa Rita | oil screw | 20 | | 1971 | foundered | | 7 | Oil Screw | | San Mateo |
| Santa Rosalia | oil screw | 20 | | 1976 | stranded | | 23 | Oil Screw | | Monterey |
| Sarah W. | schooner | 19 | | 1867 | sabotage | | | Sail | Yes | San Mateo |
| Sausalito | | 19 | | | wrecked | 205 | 692 | | Yes | Marin |
| Scio Page | schooner | 19 | | 1888 | | | | Sail | Yes | Marin |
| Sea Bird | gas screw | 20 | | 1913 | stranded | | 12 | screw | No | Monterey |
| Sea Cloud | oil screw | 20 | | 1980 | foundered | | 287 | Oil Screw | | San Mateo |
| Sea Fox | gas screw | 20 | | 1954 | stranded | | 13 | gas screw | | San Mateo |
| Sea Grinch | oil screw | 20 | | 1967 | foundered | | 25 | Oil Screw | | San Luis C |
| Sea Hag | oil screw | 20 | | 1957 | foundered | | 13 | Oil Screw | | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Sea King | oil screw | 20 | | 1955 | | | 10 | Oil Screw | | Marin |
| Sea King | oil screw | 20 | | 1980 | foundered | | 287 | Oil Screw | | San Mateo |
| Sea Maid | oil screw | 20 | | 1973 | foundered | | 12 | Oil Screw | | Monterey |
| Sea Master | oil screw | 20 | | 1954 | stranded | | 14 | Oil Screw | | Monterey |
| Sea Nymph | Ship | 19 | | 1861 | stranded | | 1215 | Sail | Yes | Marin |
| Sea Prince | oil screw | 20 | | 1980 | foundered | | 287 | Oil Screw | | San Mateo |
| Sea Rogin | oil screw | 20 | | 1980 | foundered | | 287 | Oil Screw | | San Mateo |
| Sea Trader | | 19 | | 1878 | wrecked | | | | Yes | Marin |
| Sea Witch | oil screw | 20 | | 1975 | foundered | | 11 | Oil Screw | | Marin |
| Sea Wolf | oil screw | 20 | | 1932 | foundered | | 61 | Oil Screw | Yes | Santa Cruz |
| Seaco | oil screw | 20 | | 1928 | foundered | | 26 | Oil Screw | | San Mateo |
| Sebastian L | oil screw | 20 | | 1954 | foundered | | 30 | Oil Screw | | Monterey |
| Sehome | Oil Screw | 19 | | 1918 | colliosn | | 692 | Oil Screw | Yes | Marin |
| Selja | steamship | | | 1910 | colliosn | | | | Yes | Marin |
| Selma | schooner | 19 | | 1877 | stranded | | | | Yes | Marin |
| Selma J. | oil screw | 20 | | 1973 | foundered | | 14 | Oil Screw | | Monterey |
| Service | water taxi | 20 | | 1934 | burned | | | | Yes | Marin |
| Shamrock VI | gaff rigged, topsail | 20 | | 1972 | | 125 | 76 | | No | San Franc |
| Shangrila | oil screw | 20 | | 1974 | stranded | | 18 | Oil Screw | | Monterey |
| Shasta | steam schooner | 20 | | 1937 | Derelict | 192 | 878 | | Yes | Marin |
| Shna Yak | schooner | 20 | | 1916 | | 188.7 | 452 | Steam Screw | | Monterey |
| Sierra Nevada | Sidewheel | 19 | | 1869 | grounded | | 1246 | Paddlewheel/s | Yes | San Luis C |
| Signal | schooner | 19 | | 1911 | equipment failure | | 475 | Steam Screw | | Monterey |
| Silver Cloud | schooner | 19 | | 1876 | | | | Sail | Yes | Monterey |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built DL | Year | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| Silver Fox | oil screw | 20 | | 1950 | foundered | | 10 | Oil Screw | | Marin |
| Sir John Franklin | Ship | 19 | | 1865 | grounded | | 999 | | Yes | San Mateo |
| Sonoma | schooner | 19 | | 1911 | | | 1063 | Sail | Yes | Marin |
| Southland | oil screw | 20 | | 1944 | foundered | | 62 | Oil Screw | Yes | San Mateo |
| Spencer | Oil Screw | 20 | | 1947 | stranded | | 11 | Oil Screw | | Santa Cruz |
| Spy | gas screw | 20 | | 1948 | burned | | 13 | Gas Screw | | Santa Cruz |
| St. Mary | oil screw | 20 | | 1966 | | | 49 | Oil Screw | | Monterey |
| Stanford | oil screw | 20 | | 1943 | | | 59 | Oil Screw | Yes | Santa Cruz |
| Stanford | oil screw | 20 | | 1958 | burned | | 122 | Oil Screw | | San Luis C |
| Star of the West | brig | 19 | | 1845 | grounded | | 134 | Sail | Yes | Monterey |
| Steelhead | oil screw | 20 | | 1960 | sank in storm | | 14 | Oil Screw | | San Mateo |
| Steelhead | oil screw | 20 | | 1963 | stranded | | 13 | Oil Screw | | Marin |
| Stella Maris | oil screw | 20 | | 1975 | burned | | 20 | Oil Screw | | Santa Cruz |
| Sunlight | oil screw | 20 | | 1937 | colliosn | | 57 | Oil Screw | Yes | San Mateo |
| Swan | Oil Screw | 20 | | 1950 | burned | | 15 | Oil Screw | | Marin |
| Tagus | Ship | 19 | | 1851 | fog | | | | Yes | Marin |
| Tamalpais | schooner | 20 | | 1931 | stranded | | 574 | Sail & Steam | | Monterey |
| Tano | gas screw | 20 | | 1921 | | | 32 | Gas Screw | | San Mateo |
| Tennessee | Sidewheel | 19 | | 1853 | stranded | 211 | 1275 | Paddlewheel/s | Yes | Marin |
| Texas Rocket | oil screw | 20 | | 1960 | foundered | | 12 | Oil Screw | | Marin |
| Thad | gas screw | 20 | | 1919 | stranded | | 9 | Gas Screw | | Monterey |
| Thomas H. Benton | brig | 19 | | 1849 | stranded | | 200 | Sail | Yes | Marin |
| Thomas L. Wand | schooner | 20 | | 1922 | grounded | 174 | 691 | Sail & Steam | | Monterey |
| Three Sisters | oil screw | 20 | | 1929 | wrecked | | 28.28 | Oil Screw | Yes | Marin |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| Timesend | gas screw | 20 | | 1970 | | | 7 | Gas Screw | | Marin |
| Tisa | oil screw | 20 | | 1967 | stranded | | 15 | Oil Screw | | Marin |
| Tongawanda | schooner | 19 | | 1862 | capsized | | | Sail | Yes | Marin |
| Traveler | schooner | 19 | | 1852 | burned | | | Sail | Yes | Santa Cruz |
| Triton | schooner | | | 1911 | | | | Motor Sail | Yes | San Mateo |
| Tuna | gas screw | 20 | | 1962 | foundered | | 13 | Gas Screw | | San Luis C |
| Two Brothers | oil screw | 20 | | 1960 | foundered | | 18 | Oil Screw | | Monterey |
| Valentine Alviso | schooner | 19 | | 1883 | stranded | 43 | 27 | | Yes | Marin |
| Ventura | steamer | 19 | | 1875 | grounded | 216 | 1129 | Steam Screw | Yes | Monterey |
| Victory | gas screw | 20 | | 1949 | foundered | | 9 | Gas Screw | | San Luis C |
| Viking | Oil Screw | 20 | | 1942 | | | 16 | Oil Screw | | Santa Cruz |
| Virginia | oil screw | 20 | | 1932 | burned | | | Oil Screw | Yes | San Mateo |
| Virginia I | oil screw | 20 | | 1948 | foundered | | 38 | Oil Screw | | Monterey |
| Vyra | gas screw | 20 | | 1965 | foundered | | 18 | Gas Screw | | San Mateo |
| W. C. F. Co. No. 2 | gas screw | 20 | | 1936 | burned | | 39 | gas screw | | San Mateo |
| W.H. Gawley | barkentine | 19 | | 1880 | stranded | 147 | 483.15 | Sail | Yes | San Mateo |
| W.T. Wheaton | | 19 | | 1854 | | | | | Yes | Monterey |
| Wahoo | oil screw | 20 | | 1964 | colliosn | | 18 | | Yes | San Luis C |
| Warren H. | oil screw | 20 | | 1949 | foundered | | 33 | Oil Screw | | San Luis C |
| Warrior Queen | Ship | 19 | | 1874 | wrecked | | 988 | Sail | Yes | Marin |
| Western No. 2 | barge | 20 | | 1939 | stranded | | 18 | Towed | | Monterey |
| Western Shore | Ship | 19 | | 1878 | grounded | 183.5 | ? | Sail | Yes | Marin |
| Western Spirit | gas screw | | | 1932 | stranded | | 77 | | Yes | San Mateo |
| Whale | barge | 20 | | 1925 | stranded | | 97 | Towed | Yes | San Luis C |

# Appendix D: Known Vessel Losses within MBNMS Database

(Sorted by Vessel Alphabetically)

20/10/2003

| Vessel | Rigging | Cent. | Date Built | | Loss Cause | LOA | Tonnage | Propulsion | Coordinates | County |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DL | Year | | | | | | |
| William Ackmann | schooner | 19 | | 1883 | wrecked | 104 | 144 | Sail & Steam | Yes | Marin |
| William f. | schooner | 19 | | 1907 | grounded | 160 | 473 | Sail | Yes | Marin |
| William H. Smith | Ship | 19 | | 1933 | grounded | 232.4 | 1957 | Sail | | Monterey |
| Xilda | gas screw | 20 | | 1950 | foundered | | 13 | Gas Screw | | Marin |
| YFD #20 | barge | 20 | | 1943 | parted tow | 622 | 6500 | Towed | Yes | Marin |
| YP 128 | patrol boat | 20 | | 1952 | wrecked | | | | Yes | Monterey |
| YP 636 | patrol boat | 20 | | 1946 | grounded | | | | Yes | San Mateo |

# Section VII: Bibliography


Anima, R.J., S.L. Eittreim, B.D. Edwards, and A.J. Stevenson
"Nearshore Morphology and Late Quarternary Geologic Framework of the Northern Monterey Bay National Marine Sanctuary in Seafloor Geology and Natural Environment of the Monterey Bay National Marine Sanctuary," *International Journal of Marine Geology, Geochemistry and Geophysics* Stephen L. Eittreim and Marlene Noble, Editors, Special Issue, Vol. 181, pp. 35-54, 2002.

Barry, James and J. Foster
*California Department of Parks and Recreation Underwater Parks and Reserves Plan* (draft). California Department of Parks and Recreation, Sacramento, CA, 2001.

Bateson, Charles
*Gold Fleet for California*. Michigan State University, Lansing, MI, 1963.

Berman,Bruce D.
*Encyclopedia of American Shipwrecks*. The Mariners Press,Boston, MA,1972.

Best, Gerald M.
*Ships and Narrow Gauge Rails*. Howell North, Berkeley, CA, 1964.

Blodgett, Peter
*Land of Golden Dreams*. Huntington Library, CA, 1999.

Bronson, William
*Still Flying and Nailed to the Mast*. Doubleday, New York, 1963.

Cabo San Lucas Chamber of Commerce. http://ww.cabosanlucas.org 2001

California Coastal Commission
*Central Coast District Maps, Monterey*. California Coastal Commission, Sacramento, CA, 1849-pres.

California Department of Parks and Recreation. http://www.caparks.gov.ca 2001

California Department of Parks and Recreation
*The Seventh Generation*. Sacramento, CA, 2001.

Carnett, Carol L.
"A Survey of State Statutes Protecting Archaeological Resources," *Archeological Assistance Study*. National Historic Trust, Washington, DC, 1995.

Chapelle, Howard
*The History of American Sailing Ships.* W.W. Norton Co., NY, 1982 (reprint from 1930).

Cunningham, Richard W.
*California Indian Watercraft*, EZ Nature Books, San Luis Obispo, CA, 1989.

Cutter, Donald (ed)
*The California Coast; Documents from the Sutro Collection*. University of Oklahoma, Norman, OK, 1969.
Davis, Charles
*American Sailing Ships; Their Plans and History*. Dover, NY, 1984 (reprint from 1929).

Davis, Charles
*Rigs of the Nine Principal Types of American Sailing Vessels.* Peabody Museum, Salem, MA, 1989.

Emery, K.O. and R.L. Edwards,
"Archaeological Potential on the Atlantic Coastal Shelf," *American Antiquity* 31:733-737, 1966.

Erlandson, John M.
*Early Hunter-Gatherers of the California Coast*, Plenum Press, New York, 1994.

Erlandson, John M.
*Maritime Voyaging in the Prehistoric North Pacific*, (taped lecture), Santa Barbara Museum of Natural History, Santa Barbara, CA, December 3, 2001

Espey Houston & Associates
"California, Oregon, and Washington Archaeological Resource Study," *MMS-OCS Study Volume V: Small Scale Maps*. Minerals Management, Washington, DC, 1990.

Espey Houston & Associates
"California, Oregon, and Washington Archaeological Resource Study," *MMS-OCS Study Volume IV: History*. Minerals Management, Washington, DC, 1990.

Eittreim, Stephen L. and Marlene Noble, Editors
"Seafloor Geology and Natural Environment of the Monterey Bay National Marine Sanctuary." *International Journal of Marine Geology, Geochemistry and Geophysics*, Special Issue, Vol. 181, 2002.

Galvin, John (ed.)
*The First Spanish Entry into San Francisco Bay, 1775.* John Howell Publisher, San Francisco, 1971, p. 25.

Gearhart, Robert L., Clell L. Bond and Steven D. Hoyt (Editors)
*California, Oregon and Washington Archaeological Resource Study*
Six Volumes, U.S. Department of the Interior, Minerals Management Service, Pacific OCS Region, Camarillo. 1990.

Gibbs, Jr., James A.
*Disaster Log of Ships*. Superior Publishing, Seattle, WA, 1971.

Gibbs, Jr., James A.
*Pacific Square Riggers*. Superior Publishing Co., Seattle, WA, 1969.

Gibb, Jr., James A.
*Shipwrecks of the Pacific Coast*. Binford & Mort, Portland, OR, 1957.

Gibbs, Jr., James A.
*Shipwrecks of the Pacific Coast.* Binford & Mort, Portland, OR, 1981.

Gibbs, Jr., James A.
*West Coast Lighthouses*. Superior Publishing Co., Seattle, WA, 1974.

Gibbs, Jr., James A.
*Windjammers of the Pacific Rim*. Schiffer Publishing, Ltd, West Chester, PA, 1987.

Greene, H.G.
*Geology of the Monterey Bay Region*, U.S. Geological Survey Open-File Report No. 77-718, Washington, DC, 1977.

Greene, H.G., N.M. Maher, and C.K. Paull
"Physiography of the Monterey Bay National Marine Sanctuary and Implications about Continental Margin Development in Seafloor Geology and Natural Environment of the Monterey Bay National Marine Sanctuary," International *Journal of Marine Geology, Geochemistry and Geophysics*, Stephen L. Eittreim and Marlene Noble, Editors. Special Issue, Vol. 181, pp. 55-82, 2002.

Hanebuth, T., K. Stattegger, and P.M. Grootes
"Rapid Flooding of the Sunda Shelf: A Late-Glacial Sea-Level record."
*Science* 288, 1033-1035, 2000.

Heizer, Robert F.
*Handbook of North American Indians, California,* Volume 8, Smithsonian Institution, Washington DC, 1978.

Hudson, Travis
*Marine Archaeology Along the Southern California Coast*, San Diego Museum Paper No. 9, San Diego, CA, 1976.

Johnson, John
Personal communication, Santa Barbara Museum of Natural History, Santa Barbara, CA, 2001.

Jones, Deborah A.
"The Forager-Collector Model and Monterey Bay Prehistory,"
*Essays on the Prehistory of Maritime California, Terry L. Jones, Editor*
Center for Archaeological Research at Davis, No. 10, pp. 105-113, 1992.

Jones, Terry L. (Editor)
*Essays on the Prehistory of Maritime California*, Publication No. 10, Center for Archaeological Research, University of California at Davis, CA, 1992.

Keatts, Henry and Brian Skerry
*Complete Wreck Diving*. Watersport Publishing, San Diego, CA, 1995.

Kentley, Eric
*Boat*. Eyewitness Books, NY, 1992.

Kroeber, A.L.
*Handbook of California Indians*, Bulletin 78 of the Bureau of American Ethnology, Smithsonian Institution, 1925 (Dover reprint 1976).

Landström, Björn
*The Ship*. Doubleday & Co., NY, 1961.

Le Boeuf, Burney J. and Stephanie Kaza (eds.)
*The Natural History of Anõ Nuevo*. The Boxwood Press, Pacific Grove, CA, 1985.

Leach, Marianne
*Newspaper Holdings of the California State Library*. California State Library Foundation, Sacramento, CA,1999.

Lonsdale, Adrian L. and H.R. Kaplan
*A Guide to Sunken Ships in American Waters*. Compass Publications, Arlington, VA, 1964.

Lydon, Sandy
*The Japanese in the Monterey Bay Region*. Capitola Book Co., Capitola, CA, 1997.

Matthews, Frederick
*American Merchant Ships 1850-1900*. Dover Publications, 1987 (reprint from 1930).

McArdle, Deborah
*California Marine Protected Areas*. California Sea Grant Program, La Jolla, 1997.

McDougall, Walter
*Let the Sea Make a Noise*. Basic Books, NY, 1993.

McNairn, Jack and Jerry MacMullen
Ships of the Redwood Coast. Stanford University Press, CA, 1970.

Monterey Bay National Marine Sanctuary website. http://bonita.mbnms.noaa.gov

Moore, L.J. and G.B. Griggs
"Long Term Cliff Retreat and Erosion Hot Spots along the Central Shores of the Monterey Bay National Marine Sanctuary in Seafloor Geology and Natural Environment of the Monterey Bay National Marine Sanctuary," *International Journal of Marine Geology, Geochemistry and Geophysics* Stephen L. Eittreim and Marlene Noble, Editors, Special Issue, Vol. 181, pp. 265-283, 2002.

Morrison, Samuel Elliott
*The European Discovery of America; The Southern Voyages*. Oxford University Press, England, 1974.

Nabergall, James
"Doheny Beach, Orange County, California Historical," *WPA Landmark Series #61*, Department of Parks and Recreation, Sacramento, CA, 1982.

National Archives
*San Francisco Vessel Registries & Losses*, Record Group 69, USCG. San Bruno, CA, 1935.

National Geographic Society
"The Dirigible Macon," *National Geographic*, Vol. 18, No. 1. National Geographic Society, Washington, DC, 1992

National Oceanic and Atmospheric Administration (NOAA)
*Distance Between United States Ports*. NOAA, Washington, DC, 1978.

Newell, Gordon and Joe Williamson
*Pacific Lumber Ships*. Bonanza Books, NY, 1950.

Newell, Gordon and Joe Williamson
*Pacific Steamboats*. Bonanza Books, NY, 1958.

Nilsson, Tage
*The Pleistocene: Geology and Life in the Quaternary Ice Age*. Ferdinand Enke Verlag, Stuttgart, Germany, 1983.

PADI
*Annual Diving Statistics*. PADI (Professional Association of Diving Instructors),Tustin, CA 2001.

Paddison, Joshua (ed.)
*A World Transformed*. Heyday Books, Berkeley, CA, 1999.

Pelkofer, Marilyn A. (ed.)
*California Shipwrecks, Historical Profiles*. The Institute for Western Maritime Archaeology, Sacramento, CA, 1993.

Pierson, Larry
*Shipwrecks; Oregon to the Mexican Border*. Minerals Management, Washington, DC, 1987.

Port Authority of Los Angeles
Personal communication, 2001.

Reinstedt, Randall A.
*Shipwrecks & Sea Monsters of California's Central Coast*. Ghost Town Publications, Monterey, CA, 1975.

Scarry, Huck
*Things that Sail*. Derrydale Books, NY, 1986.

Shepard, F.P.
Submarine Geology
(2nd Edition) 557 p. Harper and Row, New York, 1963.

State Lands Commission
*California Shipwreck Database*. State Lands Commission, Sacramento, CA, 2001

Sullenberger, Martha
*Dogholes and Donkey Engines.* California Department of Parks and Recreation, Sacramento, CA, 1992.

Temple, Sydney
*Carmel By-the Sea*. Angel Press, Monterey, CA, 1987.

Time-Life
*Clipper Ships*. Time-Life Series, NY, 1982.

Topozone.com. http://www.topozone.com

United States Coast Guard
US Merchant Vessel Losses. United States Coast Guard, Washington, DC, 1900-1976.

United States Coast Guard Historian's Office
US Coast Guard Reference List. United States Coast Guard, Washington, DC, 1900-1976.

Van Dereedt, John K.
*The Interrelationship of Maritime Records in the Civil Archives Division, 1789-1900*, (manuscript). National Archives, Washington, DC, 1985.

Vann, Loetta
Personal communication. 2002.

Wallace, William
"Post Pleistocene Archaeology, 9000 to 2000 BC," *Handbook of North American Indians: California*, Heize, (ed) Vol. 8, Smithsonian Institute, Washington, DC, 1978.

Williams, Neville
*The Sea Dogs*. Macmillan Publishing Co., NY, 1975.

Woodward, Lillian
Moss Landing. Woodward Publishing, Carmel, CA, 1983

# Enclosure A: MBNMS Database CD

Enclosed is a CD with three folders. Within the folder titled “Report” is the various sections, charts and appendices of this study’s report. The MBNMS Submerged Cultural Resource Study: 2001 report is written in Microsoft Word: 2000. The graphs for the report are composed in Microsoft Excel (Microsoft Office 2000).

Within the folder titled “Databases A, B,and C” are three files dividing out the overall MBNMS database as described in the section on Historic Submerged Cultural Resources.

The final folder holds a single file named MBNMS Database. All of the MBNMS database files of this report are in keeping with the format set forth in NOAA’s ARCH. The program version is FileMaker Pro 5.5®.

All of the computer files are MacIntosh formatted.

# Enclosure B: Divers Questionnaire

One of the goals of the MBNMS Submerged Cultural Resources Study: 2001 was to begin the process of understanding *who* are the audiences of the submerged cultural resources within the sanctuary and how are the audiences using and impacting the resources. Although it is not within the scope of this study to identify all audiences and their potential impact, it is possible to focus on one of the most active audience groups and begin the process of better understanding them. One of the most active audience groups is recreational SCUBA divers.

There are 7 million certified scuba divers in the United States. California is listed as one of the top two dive destinations in the United States and shipwrecks, after underwater photography, is the most popular reason for diving (PADI Dive Statistics, 2001). Therefore, recreational divers are an important group to understand.

To achieve this goal we constructed a questionnaire for divers. Students at Long Beach City College in the Maritime Archaeology Certificate Program looked at diving questionnaires used by the California State Parks system, PADI and other diving destinations. A questionnaire was constructed from these examples. Drafts of the questionnaire were sent out to specialists in park management and recreational diving. The final draft presented in this report is ready to be placed on the web site of the Long Beach City College and submitted to the free newspaper, *California Diver*. Through an article in the California Diver, recreational scuba divers will be encouraged to answer the questionnaire either by sending in comments or answering the questionnaire on the web.

Students in the Long Beach City College Maritime Archaeology Certificate Program will collect responses from the questionnaire and enter the data into an ongoing database. The Monterey Bay National Marine Sanctuary will be able to hotlink the sanctuary's website to the questionnaire, as well as receive tabulated results from the college.

# Diving Questionnaire

We would like to ensure that diving in California is enjoyable and stays that way for future divers. In an attempt to better serve the public we ask you to take a few minutes and answer this questionnaire. The results of the survey will be used to craft future improvements and maintenance at the California State Parks and the National Marine Sanctuaries that have a diving component.

**Do you dive in the National Marine Sanctuaries located in California? (Circle as many as you like)**

Monterey Bay National Marine Sanctuary
Channel Islands National Marine Sanctuary
Gulf of the Farallons National Marine Sancturary
Cordell Bank National Marine Sanctuary

**Do you you dive in the Underwater State Parks? (Circle as many as you like)**

Cardiff/San Elijo
Crystal Cove
Doheny
Emerald Bay, Lake Tahoe
Fort Ross
Julia Pfeiffer Burns
MacKerricher
Manchester
Point Lobos
Refugio
Russian Gulch
Salt Point
Sonoma Coast
Van Damme

**What kind of diving?**

Free dive
Scuba
Both

**How many times per year?**

**1-4**
5-10
More than 10

**Are you an instructor and use the park?** YES NO

**What time of year do you most often dive? (Circle as many as you like)**

Fall
Winter
Spring
Summer
All seasons

## Diving Questionnaire, continued

**What is your level of diving?**

Basic
Open Water II
Advanced
Instructor

**What attracts you to a location underwater?**

Reefs
Sea Life
Wrecks
Hunting

**What attracts you to a location on shore?**

Showers
Ability to store gear
Ease of Access
Parking
Availability of air & refills

**Would you like access to night diving?** YES NO

**Do you think hunting should be:**

Allowed openly
Restricted to specific areas
Not allowed

**What would you like improved at your favorite site? (Circle as many as you like)**

Mooring buoys
Self-guided underwater tours
On-shore interpretive panels
Underwater laminated maps for touring & identification

**For Scuba Instructors: What level of classes do you teach at your favorite site?**

Basic
Open Water II
Advanced
Special Interest Courses (example: Photography, Night Diving, Navigation)

*Thanks for taking the time to help make California a great diving destination.*

# Enclosure C: Database of 2000/2001 Recreational Dive Companies in California

A database of the Recreational Dive Companies located in California is enclosed. The purpose of this database is to assist sanctuary staff in discerning where the scuba diver audience of the Monterey Bay National Marine Sanctuary comes from. To dive any location requires the support of a dive shop and the ability to obtain compressed air. According to the California Tourism Office, divers will travel up to one hour to most dive locations and further for long weekends. However, sites that have dive shops conveniently located are more likely to attract long weekend divers than those sites that do not have readily accessible air support.

The information contained in this database would be even more helpful if imported into a GIS program.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 53, | Blue Water Divers, | 1150 Ballena Blvd, | Alameda, | CA, | 94501-3685, | 510-769-6203 | |
| 66, | Cal Diving, | 1750-6th, | Albany, | CA, | 94706, | 510-524-3248 | |
| 37, | Autrey's Underwater Sports, | 1328 Sunset Dr , | Antioch, | CA, | 94509-2853, | 510-778-1600 | |
| 112, | Dolphin Dive Ctr., | 21 W Duarte Rd , | Arcadia , | CA , | 91007-6919, | 626-447-5536, | http://home.earthlink.net/~dolphindive/ |
| 281, | Tradewinds Dive & Travel, | 1355 Grand Ave , | Arroyo Grande | CA , | 93420-2421, | 805-489-3483 | |
| 213, | Scuba Adventures, | 1039 Grand Avenue , | Arroyo Grande , | CA , | 93420, | 805-473-1111 | |
| 134, | High Sierra Divers Inc., | 217 Palm Ave , | Auburn , | CA , | 95603-3905, | 530-823-6757, | atminch@gunet.com |
| 35, | Auburn Ski Hut N Sports, | 585 High St, | Auburn , | CA, | 95603-4205, | 916-885-2232 | |
| 114, | Doug Bombard Enterprises, | 1 Banning House Rd , | Avalon , | CA , | 90704, | 310-510-1745 | |
| 33, | Argo Diving Service, | 314 Metrople Ave., | Avalon , | CA, | 90704, | 310-510-2337, | scubalab1@aol.com |
| 74, | Catalina Divers Supply, | PO Box # 126 7 Pleasure Pier , | Avalon , | CA , | 90704, | 800-353-0330, | http://www.diveinfo.com/cds, |
| 75, | Catalina Scuba Luv, | 126 Catalina Ave, | Avalon, | CA , | 90704, | 310-510-2350, | prneptune@aol.com |
| 225, | Scuba Schools International, | Po Box 2289 , | Avalon, | CA , | 90704-2289, | 310-510-2208 | |
| 38, | Avalon Aquatic's, | 615 Crescent Ave. , | Avalon, , | CA, | 90704, | 310-510-1225 | |
| 73, | Captain Frog Scuba, | 1609 S H St , | Bakersfield , | CA , | 93304-4931, | 661-833-3781, | sjrex@aol.com |
| 239, | Sky Dive Lake Tahoe, | 82405 Highway 70, | Beckwourth , | CA , | 96129, | 530-832-1474 | |
| 275, | Studio Divers Supply, | 10211 Rosecrans Blvd. , | Bellflower | CA, | 90706-2601, | 562-804-0304 | |
| 65, | Cal Dive & Travel, | 1750 6th St, | Berkeley , | CA, | 94710-1868, | 510-524-3248, | |
| 203, | Reef Seekers Dive Co, | 8612 Wilshire Blvd , | Beverly Hills , | CA , | 90211-3006, | 310-652-4990, | reefseekrs@aol.com |
| 48, | Beverly Hills Dive Club, | 150 S Rodeo Dr # 140, | Beverly Hills, | CA, | 90212-2411, | 310-274-0873 | |
| 61, | Bodega Bay Pro Dive, | 1275 Hwy. 1 , | Bodega Bay , | CA, | 94923, | 707-875-3054 | |
| 252, | Sport Chalet, | 2500 East Imperial Hwy #150 , | Brea , | CA , | 92621, | 714-255-0132 | |
| 129, | Great Escape Charters, | 10031 Beatrice Cir , | Buena Park , | CA , | 90620-4315, | 714-828-9157 | |
| 261, | Sport Chalet, | 201 East Magnolia Blvd., Ste 145, | Burbank , | CA , | 91501, | 818-558-3500 | |
| 18, | Aqua Adventures Unlimited, | 2120 W Magnolia Blvd , | Burbank , | CA, | 91506-1732, | 818-848-2163 | |
| 44, | Be Dive Ready, | 2219 W Olive #182, | Burbank, | CA, | 91506, | 818-846-9877 | |
| 227, | Scuba Schools of Burlingame, | 390 Lang Road , | Burlingame , | CA , | 94010, | 650-579-1954, | easydiver@earthlink.net |
| 32, | Aqua-Ventures Inc., | 2172-2180 Pickwick Dr. , | Camarillo , | CA, | 93010, | 805-484-1594 | |
| 69, | Cameron Park Dive Center, | 3330 Cameron Park Dr., | Cameron Park , | CA , | 95682-8861, | 916-676-3483 | |
| 119, | Extreme Adventures Inc., | 2931 S. Winchester Blvd. , | CAMPBELL , | CA , | 95008, | 408-871-3111, | http://www.extreme-adventures.com |
| 57, | Blue-Water Pursuits, | , | Campbell, | CA, | 95008, | 408-377-7587 | |
| 36, | Australian Swim School, | 22235 Sherman Way , | Canoga Park, | CA, | 91303-1048, | 818-883-9100 | |
| 138, | Hydro Dynamics Scuba, | 68545 Ramon Rd #C-102 , | Cathedral City , | CA , | 92334, | 619-328-9639 | |
| 25, | Aquarius Dive Shop Alley Scuba, | 455 E 20th St , | Chico | CA | 95928-4414, | 530-891-5041 | |
| 78, | Chico Dive Center, | 959 East Ave. #A , | Chico , | CA , | 95926, | 916-343-2431 | |
| 273, | Stingray Scuba, | 1929 Esplanade Ave. , | Chico , | CA, | 95926-2357, | 530-343-7540 | |
| 194, | Paradise Dive Ctr., | 130 W. East Ave. Suite B , | Chico , | CA, | 95926-7200, | 530-343-2350 | |
| 79, | Chico Dive Center, | 2061 WHITMAN #E2 , | CHICO , | CA , | 95928, | 530-343-2461, | womler@cyberforce.com |
| 268, | Sport Chalet, | 13041 Peyton Drive , | Chino Hills , | CA , | 91709, | 909-627-8996 | |
| 219, | Scuba Nautics, | 7142 Auburn Blvd. , | Citrus Heights, | CA , | 95610, | 916-722-6776 | |
| 131, | Guided Discoveries, | PO Box 1360 , | Claremont , | CA , | 91711, | 909-625-6194 | |
| 92, | Dive N Board, | 1776 Arnold Industrial Wy # O, | Concord , | CA , | 94520-5308, | 925-689-6969 | |
| 142, | Kelp Forest Guided Tours, | 1804 Alicante Ct , | Concord , | CA , | 94521-2449, | 925-672-2061 | |
| 64, | Bottom Time Scuba, | 1925 Harbor Blvd. Suite, | Costa Mesa , | CA, | 92627, | 949-645-3483 | |
| 287, | Underwater Adventures, | , | Cotati , | CA | 94931, | 707-795-6510 | |
| 186, | Pacific Quest Dive Center, | 160 Marine Way , | Cresent City , | CA , | 95531, | 707-464-8753, | asantillan@msn.com |
| 228, | Scuba Toys | 6021 Orange Ave, | Cypress , | CA , | 90630-3328, | 714-527-0430, | SCUBA-TOYS.COM |
| 184, | Pacific Discount Dive Sales, | 24551 Del Prado Box 3561 , | Dana Point , | CA , | 92629, | 714-831-7222 | |
| 94, | Dive N' Surf, | 34318 Pacific Coast Highway , | Dana Point , | CA , | 92629, | 949-443-2303 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 85, | Dana Point, | 34283 Pacific Coast Hwy , | Dana Point , | CA , | 92629-2823, | 949-443-3858 | |
| 46, | Beach Cities Scuba Ctr., | 34283 Pacific Coast Hwy, | Dana Point, | CA, | 92629-2823, | 949-855-2323, | hosame@aol.com |
| 178, | Octopus's Garden, | 946 Olive Dr. #2, | Davis , | CA , | 95616, | 916-758-3850 | |
| 87, | Del Mar Ocean Sports, | 1227 Camino Del Mar, | Del Mar , | CA , | 92014, | 619-792-1903 | |
| 130, | Guccione's Scuba Habitat, | 3220 Brea Canyon Rd. , | Diamond Bar , | CA , | 91765, | 909-594-7927 | |
| 217, | Scuba Habitat, | 3220 Brea Canyon Road , | Diamond Bar , | CA , | 91765, | 909-594-7927, | scubahabitat@yahoo.com |
| 101, | Divers Corner, | 12043 Paramount Blvd, | Downey , | CA , | 90242, | 310- 869-7702 | |
| 139, | Institute Of Diving Technology, | 8646 Davona Dr , | Dublin , | CA , | 94568-1128, | 925-551-8478 | |
| 71, | Captain Aqua's Full Svc Dive, | 6715 Dublin Blvd # A , | Dublin , | CA , | 94568-3030, | 925-829-3843, | http://www.captainaqua.com/ |
| 246, | Sport Chalet, | 405 Parkway Plaza , | El Cajon , | CA , | 92020, | 619-590-1260 | |
| 279, | The Dive Shack, | 787 Arnele Avenue , | El Cajon , | CA , | 92020, | 619-447-7400, | kingtut1@home.com |
| 143, | Kialoa III, | 2250 East Imperial , | El Segundo, | CA , | 90245, | 213-772-1193 | |
| 115, | Elk Grove Divin Ctr., | 9257 Elok Grove Blvd. , | Elk Grove , | CA, | 95624-2101, | 916-686-1122 | |
| 96, | Dive Pro San Diego, | , | Encinitas , | CA , | 92024, | 760-632-7060 | |
| 166, | North County Scuba Ctr., | 122 Encinitas Blvd , | Encinitas , | CA , | 92024-3642, | 760-753-0036, | http://www.ncscubacenter.com/ |
| 29, | Aquatic Discount Scuba, | 1303 1st St , | Escalon , | CA, | 95320-1768, | 209-838-3481, | mdodge@itechnet.net |
| 205, | Rick's Diving Locker, | 945 W Valley Pkwy # L , | Escondido , | CA , | 92025-2539, | 760-746-8980, | http://www.ricksdivinglocker.com |
| 200, | Pro Sport Ctr., | 508 Myrtle Ave. , | Eureka , | CA, | 95501-0698, | 707-443-6328 | |
| 102, | Diver's Cove, | 325 A East Bidwell St. , | Folsom , | CA , | 95630, | 916-984-6185, | diverscove@jps.net |
| 278, | The Dive Center, | 642 East Bidwell , | Folsom , | CA , | 95630, | 916-984-3483 | |
| 276, | Sub-Surface Progression, | 18600 Hwy. 1 , | Fort Bragg , | CA , | 95437, | 707-964-3793 | |
| 165, | North Coast Divers Supply, | 19275 South Harbor Dr. , | Fort Bragg, | CA , | 95437, | 707-961-1143 | |
| 49, | Big Blue Dive, | 710 Main St. , | Fortuna , | CA, | 95540-1924, | 707-725-1318 | |
| 215, | Scuba Connection, | 43262 Christy St, | Fremont , | CA , | 94538-3172, | 510-226-1331 | |
| 72, | Captain Aqua's Full Svc Dive, | 40849 Fremont Blvd , | Fremont , | CA , | 94538-4306, | 510-490-5597, | http://www.captainaqua.com/ |
| 177, | Ocen Quest Dive Ctr. Inc., | 45301 Industrial Pl. #2, | Fremont , | CA, | 94538-6471, | 510-561-6000 | |
| 151, | Manta Ray Dive Ctr Fresno, | 6236 N Blackstone, | Fresno , | CA , | 93710, | 209-437-1355, | rescue392@aol.com |
| 22, | Aqua Sports Divers Dive Shop, | 1616 E Shields Ave , | Fresno, | CA, | 93704-5141, | 559-224-0744, | diveinfo@aquasports.com |
| 55, | Blue Water Ocean Sports, | 499 W Bedford Ave. #102, | Fresno, | CA, | 93711-5808, | 559-432-2583, | diver@fresnoscuba.com |
| 59, | Bob's Dive Shop Of Fresno, | 4374 N Blackstone Ave, | Fresno, | CA, | 93726-1971, | 559-225-3483 | |
| 238, | Sea Ventures Dive School, | 337 S State College Blvd , | Fullerton | CA , | 92831-4902, | 714-871-2218, | divevulchr@aol.com |
| 20, | Aqua Lab Industries, | 12618 Hooverr St. , | Garden Grove , | CA, | 92841, | 714-897-2822 | |
| 125, | Gilroy Scuba, | 7828 Monterey St. , | Gilroy, , | CA , | 95020, | 408-842-1770, | http://www.makeitclean.com/gilroyscuba/ |
| 126, | Glendale Y M C A, | 735 E Lexington Dr. , | Glendale , | CA , | 91206-3752, | 818-242-4155 | |
| 251, | Sport Chalet, | 940 S. Grand Ave. , | Glendora , | CA , | 91740, | 818-335-3344 | |
| 208, | Santa Barbara Aquatics Inc., | 5822 Hollister Ave , | Goleta , | CA , | 93117-3624, | 805-967-4456 | |
| 31, | Aquatics/Dive Locker, | 5780 Hollister Ave. , | Goletta , | CA, | 93117-3418, | 805-967-4456 | |
| 54, | Blue Water Hunter, | 5708 #B Hollister Ave., | Goletta, | CA, | 93117-3421, | 800-452-6696 | |
| 68, | California Watersports, | 5822 Hollister Ave. , | Goletta, | CA, | 93117-3624, | 805-964-0180 | |
| 290, | Underwater World, | 17614 Chatsworth St. , | Granada Hills , | CA | 91344, | 818-831-3483 | |
| 11, | Aloha Dive & Travel, | 17614 Chatsworth St , | Granada Hills , | CA, | 91344-5601, | 818-363-7163 | |
| 52, | Blue Planet Divers, | 1425 E. Main St., | Grass Valley, | CA, | 95945-5209, | 530-727-8295 | |
| 8, | Adventures in Diving, | 1644 W. 240th St. , | Harbor City , | CA, | 90710, | 310-320-2782 | |
| 47, | Beach Cities Scuba Ctr., | 19036 Brookhurst St , | Huntington Beach , | CA , | 92646-2552, | 714-378-2611 | |
| 247, | Sport Chalet, | 16242 Beach Blvd. , | Huntington Beach , | CA , | 92647, | 714-848-0988 | |
| 283, | Two Deep, | 16903 Beach Blvd. , | Huntington Beach , | CA , | 92647, | 714-375-5471, | twodeep@gte.net |
| 171, | Ocean Gear, | 7522 Slater Ave # 107 , | Huntington Beach , | CA , | 92647-7737, | 714-375-0595 | |
| 282, | Two Deep, | 5842 McFadden , | Huntington Beach , | CA , | 92649, | 714-379-3830 | |
| 116, | Elmesie Scuba, | 402 13TH STREET #C , | Huntington Beach, | CA , | 92648, | 714-960-7470, | elmesie@prodigy.net |
| 127, | Go Scuba Diving Adventures, | 17775 Main St, | Irvine , | CA , | 92614-6708, | 949-955-3483 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 250, | Sport Chalet, | 2983 Michelson Drive , | Irvine , | CA , | 92715, | 949-476-9555, | jguido@sportchalet.com |
| 248, | Sport Chalet, | 920 Foothill Blvd. , | La Canada , | CA , | 91011, | 818-790-9800 | |
| 167, | North Orange County Rop, | 401 S Palm St , | La Habra , | CA , | 90631-5735, | 562-694-5040 | |
| 168, | O.E. Express, | 2158 Avenida de la Playa , | La Jolla , | CA , | 92037, | 858-454-6195, | diveoex@excite.com |
| 118, | Explorer Dive & Travel, | 7524 La Jolla Blvd , | La Jolla , | CA , | 92037-4720, | 858-551-8324 | |
| 210, | Sarcas Ski & Sport, | 2451 Foothill Blvd # B , | La Verne , | CA , | 91750-3073, | 714-596-4946 | |
| 145, | Laguna Sea Sports, | 925 N. Coast Hwy , | Laguna Beach , | CA , | 92651, | 949-494-6965, | http://www.scuba-superstore.com/ |
| 263, | Sport Chalet, | 27080 Alicia Parkway , | Laguna Niguel , | CA , | 92656, | 949-362-0342 | |
| 180, | Orange County Scuba, | 24882 MUIRLANDS BLVD., | LAKE FOREST , | CA , | 92630, | 949-830-7233, | info@ocscuba.com |
| 45, | Beach Cities Scuba | 24882 Muirlands Blvd. , | Lake Forest , | CA , | 92630, | 949-855-2323, | hosame@aol.com |
| 237, | Sea Stallion Scuba Outfitters, | 21098 Bake Pkwy # 108 , | Lake Forest , | CA , | 92630-2163, | 949-450-0404 | |
| 242, | South Coast Scuba, | 24882 Muirlands Blvd , | Lake Forest , | CA , | 92630-4812, | 949-830-7233 | |
| 109, | Diverwest, | 21906 Shenandoah Dr , | Lake Forest , | CA , | 92630-5743, | 949-855-4711 | |
| 2, | A V Scuba, | 1440 W Avenue I, | Lancaster , | CA , | 93534-2129, | 661-949-2555, | aquatic@adirectory.com |
| 16, | Antelope Valley Scuba, | 1440 West Avenue I , | Lancaster, | CA, | 93534, | 661-949-2555, | avscuba@gnet.com |
| 7, | Adventures In Diving, | 4646 Manhattan Beach Blvd , | Lawndale , | CA, | 90260-2581, | 310-370-3830 | |
| 10, | Allsports, | 16706 Hawthorne Blvd , | Lawndale , | CA, | 90260-3243, | 310-793-1530 | |
| 155, | Max's Dive Shop Inc., | 1901 Pacific Coast Hwy , | Lomita , | CA , | 90717, | 310-326-6663 | |
| 12, | American Diving, | 1901 Pacific Coast Hwy , | Lomita , | CA, | 90717-2602, | 310-326-6663. | www.amerdive@earthlink.net |
| 176, | Ocean Sports of Lompoc, | 304 Laurel Ave. , | Lompoc , | CA, | 93436-5941 | 805-736-3272 | |
| 190, | Pacific Sporting Goods, | 11 39th Pl , | Long Beach , | CA , | 90803-2806, | 562-434-1604 | |
| 266, | Sport Chalet, | 7440 Carson Blvd , | Long Beach , | CA , | 90808, | 562-429-9560 | |
| 164, | New England Divers Inc., | 2936 Clark Ave , | Long Beach , | CA , | 90815-1040, | 562-421-8939 | |
| 296, | Water World Dive Center, | 319 N WESTERN AVE, | LOS ANGELES | CA | 90004, | 323-962-3636, | h2oworldla@aol.com |
| 80, | City Scuba Inc, | 10641 W Pico Blvd , | Los Angeles , | CA , | 90064-2222, | 310-234-2727 | |
| 104, | Divers Discount.com #3, | 3575 Cahuenga Blvd W. #104 , | LOS ANGELES , | CA , | 90068, | 323-850-5050, | http://www.diversdiscount.com/ |
| 89, | Depth Perceptions, | 540 Mar Vista Dr. , | Los Osos , | CA, | 93402-3726, | 805-772-3128 | |
| 150, | Malibu Divers, | 21231 Pacific Coast Hwy , | Malibu, | CA , | 90265-5290, | 310-456-2396, | budivers@aol.com |
| 67, | California Divers, | 555 Lode St, | Manteca , | CA, | 95336-3474, | 209-239-8188 | |
| 154, | Marina Del Rey Scuba, | 13470 Washington Blvd. , | Marina Del Rey , | CA, | 90292, | 310-578-0966 | |
| 3, | Action Watersports, | 4144 Lincoln Blvd., | Marina Del Rey , | CA, | 90292-5616, | 800-394-4754 | |
| 255, | Sport Chalet, | 13455 Maxella Avenue , | Marina Del Rey, | CA , | 90292, | 310-821-9400 | |
| 175, | Ocean Sports Adventure, | 26012 Pala Drive , | Mission Viejo , | CA , | 92691, | 949-699-6145, | ranaye@oceansportsadventures.com |
| 258, | Sport Chalet, | 27551 Puerta Real , | Mission Viejo, | CA , | 92691, | 949-582-3363 | |
| 30, | Aquatic Dreams, | 1212 Kansas Ave, | Modesto , | CA, | 95351-1528, | 209-577-3483, | bobs@aquaticdreams.com |
| 103, | Divers Discount.com #2, | 9197-H CENTRAL AVE , | MONTCLAIR , | CA , | 91763, | 909-621-5000, | http://www.diversdiscount.com/ |
| 226, | Scuba Schools of America, | 4420 Holt Blvd. , | Montclair , | CA, | 91763-4115 | 909-621-4171 | |
| 158, | Monterey Express, | Beachwater Cove 1 Cannery Rd., | Monterey , | CA, | 93940, | 888-422-2999, | capttim@montereyexpress.com |
| 157, | Monterey Bay Dive Ctr., | 225 Cannery Row # 225 , | Monterey , | CA , | 93940-1434, | 831-656-0454, | service@mbdc.to |
| 152, | Manta Ray Dive Ctr., | 245 Foam St , | Monterey , | CA , | 93940-1470, | 831-375-6268, | mantaray@mantaraydive.com |
| 182, | Outdoor Recreational Equip., | Bldg 228 Lewis Hall Presidio, | MONTEREY , | CA , | 93944, | 831-242-6132, | siegristt@pom-emh1.army.mil |
| 26, | Aquarius Dive Shop, | 2040 Del Monte Ave., | Monterey, | CA, | 93940, | 831-375-1933, | http://www.montereybay.com/dive/ |
| 42, | Bamboo Reef Enterprises, | 614 Lighthouse Ave, | Monterey, | CA, | 93940-1008, | 831-372-1685 | |
| 27, | Aquarius Dive Shop, | 32 Cannery Row Unit 4 , | Monterey, | CA, | 93940-1447, | 408-375-6605 | |
| 196, | Peninsula Diving Ctr., | 1015 W El Camino Real , | Mountain View , | CA , | 94040-2515, | 650-965-2241 | |
| 1, | A Bruce's Scuba School, | 1075 Space Park Way #228, | Mountainview , | CA , | 94043-1411, | 650-967-2822, | http://www.scubadiveronline.com |
| 204, | Reel Divers, | 1370 Trancas St , | Napa , | CA , | 94558-2912, | 707-254-0307 | |
| 148, | Mako Marine Outfitters, | 3041 California Blvd # A , | Napa , | CA , | 94558-3304, | 707-251-5600 | |
| 149, | Mako Marine Outfitters, | 1930 Clay St , | Napa , | CA , | 94559-2359, | 707-253-1318 | |
| 160, | Napa Dive & Sport, | 162 S Coombs St , | Napa , | CA , | 94559-4531, | 707-257-2822, | napadive@juno.com |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 83, | Colorado Riv. Valley Dive Sch., | 2001 De Soto , | Needles , | CA, | 92363-3024 | 760-326-3232 | |
| 288, | Underwater Fantasies, | PO Box # 2392 , | Nevada City , | CA , | 95959-1947, | 530-292-4213 | |
| 28, | Aquatic Center, | 4537 W Coast Hwy , | Newport Beach , | CA, | 92663-2617, | 949-650-5440 | |
| 197, | Pinnacles Dive Ctr., | 875 Grant Ave, | Novato , | CA , | 94945-3239, | 415-897-9962 | |
| 181, | Original Steele's Discount, | 5987 TELEGRAPH AVE , | OAKLAND , | CA , | 94609, | 510-655-4344 | |
| 202, | Pyramid Divers Inc., | 282 Harbor Dr S , | Oceanside , | CA , | 92054-1037, | 760-433-6842, | diversts@cs.com |
| 289, | Underwater Schools of America, | 225 Brooks St. , | Oceanside , | CA, | 92054-3404, | 760-722-7826 | |
| 191, | Pacific Wilderness Inc., | 1132 E. Katella Ave. Suite A7 , | Orange , | CA , | 9286, | 714-997-5506, | fred@pacificwilderness.com |
| 140, | International Training Center, | 1706 N TUSTIN , | ORANGE , | CA , | 92865, | 800-701-9373, | scubawww@aol.com |
| 231, | Scuba World, | 1706 N Tustin St , | Orange, | CA , | 92865-4603, | 714-998-6382 | |
| 256, | Sport Chalet, | 1885 Ventura Blvd , | Oxnard , | CA , | 93030, | 805-485-5222 | |
| 188, | Pacific Scuba Ctr., | 3600 Harbor Blvd # 215 , | Oxnard , | CA , | 93035-4172, | 805-984-2566, | captnemo@worldnet.att.net |
| 14, | Anchor Shack Skin Diving Ctr, | 5775 Pacheco Blvd , | Pacheco , | CA, | 94553-5129, | 925-825-4960, | decokevin@aol.com |
| 15, | Anderson's Scuba Diving, | 541 Oceana Blvd., | Pacifica , | CA, | 94044-1902, | 650-355-3050, | http://www.andersonscuba.com/ |
| 144, | La Crescenta Driving & Traffic, | 10764 Glenoaks Blvd , | Pacoima , | CA , | 91331-1614, | 818-785-0818 | |
| 124, | Get Wet Scuba, | 635 OLEANDER RD., | PALM SPRINGS , | CA , | 92264, | 760-322-7160 | |
| 269, | Sport Chalet, | 39180 10th Street West , | Palmdale , | CA | 93551, | 661-266-3232 | |
| 243, | Specialized Diving Services, | 520 W. Palmdale Blvd.Suite. D, | Palmdale , | CA, | 93551-4230, | 661-947-3737 | |
| 195, | Paradise Dive Ctr., | 6268 Skyway , | Paradise , | CA , | 95969-4535, | 530-872-7707 | |
| 108, | Divers West Pasadena, | 2333 E Foothill Blvd , | Pasadena , | CA , | 91107-3660, | 626-796-4287 | |
| 39, | B Neath The Waves Diving, | 500 Railroad Ave , | Pittsburg , | CA, | 94565-2305, | 925-432-6413 | |
| 4, | Advanced Diving Technologies, | 625 California Ave. , | Pittsburg , | CA, | 94565-4000 | 925-754-8180 | |
| 58, | B'Neath The Waves Diving, | 500 Railroad Ave. , | Pittsburg, | CA, | 94565-2305, | 925-432-6413 | |
| 5, | Adventure Diving Pro Scuba, | PO Box # 765, | Placerville , | CA, | 95667-0765, | 530-626-6785 | |
| 161, | Nautilus Aquatics, | 3264 Buskirk Ave , | Pleasant Hill | CA , | 94523-4315, | 925-932-3483 | |
| 60, | Bob's Scuba Diving Serivce, | 3372 Harpers Ferry Ct , | Pleasanton, | CA, | 94588-5212, | 925-846-2535 | |
| 260, | Sport Chalet, | 3695 Midway Drive , | Point Loma , | CA , | 92110, | 619-224-6777, | jguido@sportchalet.com |
| 265, | Sport Chalet, | 19817 Rinaldi Street , | Porter Ranch , | CA , | 91326, | 818-831-9520 | |
| 272, | Stingray Scuba Ctr., | 2268 Sunrise Blvd , | Rancho Cordova , | CA , | 95670, | 916-852-1747, | rcaccamo@telis.org |
| 137, | Hudson Family Dive Ctr., | 11335B Folsom Blvd , | Rancho Cordova , | CA , | 95742, | 916-808-2344, | hfdc@directcon.net |
| 249, | Sport Chalet, | 12449 Foothill Blvd. , | Rancho Cucamonga, | CA, | 91739, | 909-987-4321 | |
| 193, | PADI, | 30151 Tomas , | Rancho Santa Marg , | CA , | 92688-2125, | 949-858-7234 | |
| 106, | Divers Discount.com, | 30161 Ave. De Las Banderas #C, | Rancho Santa Marg., | CA , | 92688-2014, | , | http://www.diversdiscount.com/ |
| 105, | Divers Discount.com, | 30308 Esperanza , | Rancho Santa Marg., | CA, | 92688-2118, | 949-459-9400 | |
| 301, | Zax Aquawear & Repair, | 11595 Pershing Rd , | Red Bluff , | CA | 96080-7732, | 530-529-3483 | |
| 300, | World Of Water Scuba, | 2156 Hilltop Dr , | Redding | CA | 96002-0512, | 530-222-6822, | WOWSCUBA.COM |
| 70, | Camps Diving Adventure Ctr., | 3048 South Market St. , | Redding , | CA , | 96001, | 530-241-4530, | letusgol@aol.com |
| 135, | Howell's Dive Shop, | 1426 Eureka Way , | Redding , | CA , | 96001-0699, | 530-241-1571 | |
| 81, | Colby Scuba Diving, | 1556 Hartnell Ave , | Redding , | CA , | 96002-2277, | 530-222-8278 | |
| 117, | Empire Scuba Family Dive Ctr., | 611 W Redlands Blvd # A , | Redlands , | CA , | 92373-4664, | 909-798-3483. | http://www.empirescuba.com/ |
| 95, | Dive N' Surf, | 504 West Broadway , | Redondo Beach , | CA , | 90277, | 310-372-8423, | buckoneer@aol.com |
| 233, | Sea D Sea, | 1911 S Catalina Ave , | Redondo Beach , | CA , | 90277-5515, | 310-373-6355, | email@seadsea.com |
| 241, | Sonoma Coast Bamboo Reef, | 5702 Commerce Blvd. , | Rhonert Park , | CA, | 94928-1627, | 707-586-0272 | |
| 216, | Scuba Express, | 12154 SEVERN WAY , | RIVERSIDE , | CA , | 92503, | 909-735-4225 | |
| 236, | Sea Sports Of Riverside, | 6343 Magnolia Ave , | Riverside , | CA , | 92506-2402, | 909-683-6244 | seasportr@aol.com |
| 299, | Wiley's Scuba Locker, | 1043 W La Cadena Dr , | Riverside, | CA | 92501-1413, | 909-682-3483, | SCUBALOCKER.COM |
| 224, | Scuba School of America, | 8099 Indiana Ave. , | Riverside, | CA, | 92504-4099, | 909-6892422 | |
| 146, | Lancaster's Sports, | 5810 Argyle Way , | Riverside, | CA , | 92506-3511, | 909-784-4929 | |
| 163, | Nautilus Diving & Sports Ctr., | 6839 Five Star Blvd # B , | Rocklin , | CA , | 95677-2685, | 916-624-3483, | nautilusdc@aol.com |
| 43, | Bamboo Reef, | 5702 Commerce Blvd , | Rohnert Park , | CA, | 94928-1627, | 707-586-0272 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 206, | Rohnert Park Dive & Travel, | 5665 Redwood Dr # B , | Rohnert Park , | CA , | 94928-7910, | 707-584-2323, | rpdced@sonic.net |
| 128, | Granite Bay Dive Ctr., | 3998 Douglas Blvd. Suite H , | Roseville | CA , | 95661, | 916-791-3483, | dale@sacscuba.com |
| 172, | Ocean Master, | 2930 Blandford Dr , | Rowland Heights , | CA , | 91748-4821, | 626-582-8000 | |
| 147, | Liburdi's Scuba Ctr., | 15315 Culver Dr # 140 I, | rvine , | CA , | 92604-7131, | 949-857-6722, | http://www.liburdisscuba.com/ |
| 159, | Mother Lode Dive Shop, | 2020 "H" St. , | Sacramento , | CA, | 95814-3110, | 916-446-4041 | |
| 34, | Atlantis Dive Ctr., | 2020 H St , | Sacramento , | CA, | 95814-3110, | 916-446-4041 | |
| 113, | Dolphin Scuba Diving Ctr., | 1530 El Camino Ave , | Sacramento , | CA , | 95815-2741, | 916-929-8188 | |
| 229, | Scuba World Sacramento, | 5114 Madison Ave , | Sacramento , | CA , | 95841-3002, | 916-332-8294, | andy@scubaworldsacto.com |
| 230, | Scuba World, | 5122 Madison #108 , | Sacramento , | CA, | 95841-3002, | 916-332-8294 | |
| 211, | Scuba Adventures Unlimited, | 24548 Redlands Blvd , | San Bernadino , | CA , | 92354-4017, | 909-796-1235 | |
| 156, | Mitchell Scuba College, | 271 Madison Ave, | San Bruno , | CA , | 94066-4016, | 650-873-7321, | http://www.mitchellscuba.com |
| 294, | Wallin's Dive Ctr., | 1119 Industrial Rd. , | San Carlos , | CA, | 94070-4125, | 650-591-5641 | |
| 132, | Handicapped Scuba Assn, | 1104 1/3092768 El Prado , | San Clemente , | CA , | 92672-4637, | 949-498-6128 | |
| 97, | Dive Pro San Diego, | 10353 San Diego Mission Rd. , | San Diego , | CA , | 92108-2152, | 619-284-0226 | |
| 222, | Scuba San Diego, | 1775 E. Mission Bay Dr., | San Diego , | CA, | 92109, | 619-260-1880 | |
| 111, | Diving Locker, | 1020 Grand Ave , | San Diego , | CA , | 92109-4197, | 858-272-1120 | |
| 223, | Scuba San Diego-Get Wet, | 4122 Napier St, | San Diego , | CA , | 92110-3441, | 858-693-3483 | |
| 295, | Water Education Training, | 4122 Napier St. , | San Diego , | CA, | 92110-3441, | 619-275-DIVE | |
| 207, | San Diego Divers Supply Inc., | 4004 Sports Arena Blvd , | San Diego , | CA , | 92110-5191, | 619-224-3439 | |
| 170, | Ocean Enterprises, | 7710 Balboa Ave # 101 , | San Diego , | CA , | 92111-2251, | 858-565-6054 | |
| 23, | Aqua Tech Dive Ctr., | 1800 Logan Ave , | San Diego , | CA, | 92113-2112, | 619-237-1800, | seabrass@divecenter.com |
| 221, | Scuba San Diego Inc., | 4564 Mississippi St , | San Diego , | CA , | 92116-2853, | 619-260-1880, | SCUBASANDIEGO.COM |
| 253, | Sport Chalet, | 4525 La Jolla Village Dr,Ste D-19, | San Diego , | CA , | 92122, | 858-453-5656 | |
| 264, | Sport Chalet, | 1640 Camino del Rio N., Ste 110, | San Diego, | CA , | 92108-1506, | 619-718-7070 | |
| 51, | Blue Escape Dive Ctr., | 1617 Quivira Rd # B, | San Diego, | CA, | 92109-7801, | 619-223-3483, | dive@blueescape.com |
| 107, | Diver's Outlet, | 329 W Bonita Ave , | San Dimas , | CA , | 91773-2574, | 909-394-2180 | |
| 41, | Bamboo Reef Enterprises Inc, | 584 4th St, | San Francisco, | CA , | 94107-1620, | 415-362-6694 | |
| 174, | Ocean Safari Scuba & Travel, | 125 E Las Tunas Dr. , | San Gabriel , | CA , | 91776-1449, | 626-287-6283, | http://www.oceansafariscuba.com |
| 185, | Pacific Offshore Divers, | 1188 Branham Ln , | San Jose , | CA , | 95118-3701, | 408-265-3483, | podi@pacbell.net |
| 271, | Stan's Skin Diving Shop, | 554 S Bascom Ave , | San Jose , | CA | 95128-2213, | 408-998-0767, | http://www.stansdiving.com/ |
| 17, | Any Water Sports | 1344 Saratoga Ave , | San Jose , | CA, | 95129-4336, | 408-244-4433, | http://www.anywater.com |
| 240, | Slo Ocean Currents, | 3121 S Higuera St # B , | San Luis Obispo , | CA , | 93401-6900, | 805-544-7227, | SLOOCEANCURRENTS@AOL.COM |
| 123, | Gard John, | 435 Voelker Dr , | San Mateo, | CA , | 94403-4210, | 650-572-1080 | |
| 192, | Pacific Wilderness, | 1719 S Pacific Ave, | San Pedro , | CA , | 90731-4728, | 310-833-2422, | scubabear@msn.com |
| 153, | Marin Skin Diving, | 3765 Redwood Hwy , | San Rafael , | CA , | 94903-3999, | 415-479-4332, | info@marinskindiving.com |
| 162, | Nautilus Aquatics, | 3140 Crow Canyon Rd , | San Ramon , | CA , | 94583-1302, | 925-275-9005 | |
| 286, | Undersea Adventures, | 2550 San Ramon Valley Blvd # G, | San Ramon , | CA , | 94583-1636, | 925-838-2348 | |
| 122, | Flying Dutchmen Hyperbarics, | 1800 E 1st St , | Santa Ana , | CA , | 92705-4002, | 714-558-3788 | |
| 179, | Openwater Habitat Marine Sch., | 1800 East First Street, | Santa Ana , | CA , | 92705-4002, | 714-558-1055, | gasmixer@soca.com |
| 63, | Bottom Time Scuba, | 3621 W. MacArthur Blvd. #111, | Santa Ana, | CA, | 92704-6843, | 714-556-6347 | |
| 199, | Private Scuba, | 3103 W. CENTRAL AVE., | SANTA ANNA , | CA , | 92704, | 714-434-1274, | http://www.privatescuba.com/ |
| 235, | Sea Landing Dive Ctr., | 301 W Cabrillo Blvd, | Santa Barbara , | CA | 93101, | 805-963-3564 | |
| 86, | Deca Diving, | 333 EAST HALEY STREET , | Santa Barbara , | CA , | 93101, | 805-564-1923, | decadive@aol.com |
| 110, | Diving Equip. Co. of America, | 333 E. Haley St., | Santa Barbara , | CA, | 93101-1712, | 805-564-1923 | |
| 13, | Anacapa Dive Ctr, | 22 Anacapa St , | Santa Barbara , | CA, | 93101-1802, | 805-963-8917, | http://www.anacapadivecenter.com |
| 209, | Santa Barbara Watersports, | 117 B Harbor Way, | Santa Barbara , | CA, | 93109-2356, | 805-962-6550 | |
| 100, | Diver Dan's Wet Pleasure, | 2245 El Camino Real , | Santa Clara , | CA , | 95050-4058, | 408-984-5819, | DIVERDANSWETPLEASURE.COM |
| 244, | Splash Aquatics, | 2215 El Camino Real , | Santa Clara , | CA , | 95050-4058, | 408-261-3483, | SPLASH-AQUATICS.COM |
| 6, | Adventure Sports Unlimited, | 303 Potrero Court, #15 , | Santa Cruz , | CA, | 95060, | 831-458-3648, | adventuresports@asudoit. |
| 88, | Dennis Lynn Gillis/ Scuba One, | 3340 COFFEE LANE , | SANTA CRUZ , | CA , | 95062, | 831-476-7611, | nitrox1@earthlink.net |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 90, | Dive Central, | 1515 Capitola Rd Suite D , | SANTA CRUZ , | CA , | 95062, | 831-465-1185, | jcapwell@divecentral.com |
| 21, | Aqua Safaris Scuba Ctr., | 6896 Soquel Ave # A , | Santa Cruz , | CA, | 95062-2072, | 831-479-4386, | http://www.aquasafaris.com |
| 173, | Ocean Odyssey Dive Ctr., | 860 17th Ave , | Santa Cruz , | CA , | 95062-4171, | 831-475-3483 | |
| 212, | Scuba Adventures, | 1975 S Broadway # B , | Santa Maria , | CA , | 93454-7888, | 805- 614-9884 | |
| 98, | Dive Shop Of Santa Maria, | 1975 S Broadway # B , | Santa Maria , | CA , | 93454-7888, | 805-922-0076 | |
| 99, | Dive West Sports, | 115 W. Main St., | Santa Maria , | CA, | 93458-5024, | 805-925-5878 | |
| 218, | Scuba Haus, | 2501 Wilshire Blvd , | Santa Monica , | CA , | 90403-4615, | 310-828-2916, | rockfishs@aol.com |
| 50, | Blue Cheer Dive & Surf, | 1112 Wilshire Blvd, | Santa Monica, | CA, | 90401-2012, | 310-319-1370 | |
| 198, | Pinnacles Dive Ctr., | 2112 Armory Dr , | Santa Rosa , | CA , | 95401-3610, | 707-542-3100 | |
| 62, | Bold Blue Adventure Diving, | 9367 MISSIONS GORGE RD., | SANTEE, | CA, | 92071-4169, | 619-258-7752, | http://www.boldblue.com |
| 133, | Harbor Dive & Kayak Ctr., | 200 Harbor Dr , | Sausalito , | CA , | 94965-1427, | 415-331-0904, | hdc@harbordive.com |
| 136, | Hudson Family Dive Ctr., | 4110 Datsun Ct. #C , | Shingle Springs , | CA , | 95682-7202, | 530-676-9501, | hfdc@directcon.net |
| 232, | Scuba, | 35 Aspen Ct El , | Sobrante , | CA, | 94803-1600, | 510-223-6554, | http://www.scubaca.com |
| 277, | Sun Sports, | 1018 Herbert #4 , | South Lake Tahoe | CA | 96150, | 530-541-6000, | sunsport@cwia.com |
| 274, | Stockton Aquatic Ctr., | 1127 W Fremont St, | Stockton , | CA , | 95203-2621, | 209-467-3483 | |
| 220, | Scuba Plus, | 3255 W Hammer Ln # 2 , | Stockton , | CA , | 95209-2753, | 209-957-2822 | |
| 234, | Sea Horse Scuba Ctr., | 515 Marina Center , | Suisun , | CA, | 94585, | 707-426-3483 | |
| 56, | Bluewater Divers, | 820 West El Camino Real, | Sunnyvale, | CA, | 94087, | 408-733-4369, | bwdiver@ix.netcom.com |
| 40, | Back Yard Scuba, | 28780 Old Town Front St # A2, | Temecula , | CA, | 92590-2848, | 909-506-9631, | byscuba@earthlink.com |
| 267, | Sport Chalet, | 40432 Winchester Road , | Temecula , | CA , | 92591, | 909-296-0019 | |
| 121, | Far West Marinr Ctr., | 2941 Willow Ln. , | Thousand Oaks, | CA, | 91361-4916, | 805-495-3600 | |
| 9, | All Sports Aquatics., | 2400 Carson Suite # 115 , | Torrance , | CA, | 90501-3174 | | |
| 262, | Sport Chalet, | 21305 Hawthorne Blvd, Suite 205, | Torrance , | CA , | 90503, | 310-316-6634 | |
| 93, | Dive N' Surf, | 62D Del Amo Fashion Square , | Torrance , | CA, | 90503-5711, | 310-370-6371 | |
| 285, | U 2 Can Dive, | 29879 S Chrisman Rd , | Tracy , | CA , | 95304-8140, | 209-835-7164 | |
| 280, | Tracy Skin Diving School, | 18 E 9th St , | Tracy, | CA , | 95376-4028, | 209-836-1154 | |
| 120, | Fantasea Connection Scuba Ctr., | 1675 N. Gem St. | Tulare , | CA, | 93274-1550, | 559-685-1471 | |
| 292, | Valley Scuba Ctr., | 2025 E. Tulare Ave. , | Tulare , | CA, | 93274-3219, | 559-687-8266 | |
| 298, | West End Dive Center, | 1 Banning House Road , | Two Harbors | CA , | 90704-5044, | , | 2harbors@catalinas.net |
| 284, | Two Harbors Dive & Rec. Ctr., | 1 Banning House Rd. , | Two Harbors , | CA , | 90704, | 310-510-2800, | dive@scico.com |
| 76, | Catalina West End Dive Ctr., | Isthmus Cove Pier , | Two Harbors, | CA , | 90704, | 310-510-0303 | |
| 291, | USS Water Sports, | 1107 S STATE ST , | UKIAH , | CA | 95482, | 707-462-5396, | bowers@pacific.net |
| 270, | Sports Cove, | 1410 E Monte Vista Ave , | Vacaville , | CA , | 95688-3016, | 707-448-9454, | SPORTSCOVE.COM |
| 187, | Pacific Reef Scuba Snorkeling, | 615 Merchant St # B, | Vacaville , | CA , | 95688-6924, | 707-448-3483, | http://www.pacificreef.com |
| 259, | Sport Chalet, | 25560 The Old Road , | Valencia , | CA , | 91381, | 805-253-3883 | |
| 297, | West Coast Divers Supply, | 16931 SHERMAN WAY , | VAN NUYS | CA | 91406, | 818-708-8136, | divewcds@aol.com |
| 24, | Aqua-Pro Cybersea, | 6257 Van Nuys Blvd # 101 , | Van Nuys , | CA, | 91401-2735, | 818-782-1587 | |
| 245, | Splash Dive Co., | 2490 Lincoln Blvd , | Venice , | CA , | 90291-5041, | 310-306-6733, | SPLASHDIVE.COM |
| 169, | Ocean Adventures Dive Co., | 1915 Lincoln Blvd , | Venice, | CA , | 90291, | 310-578-9391 | |
| 293, | Ventura Dive & Sport, | 1559 Spinnaker Dr # 108 , | Ventura | CA , | 93001-5302, | 805-650-6500, | vendive@jps.net |
| 141, | Keep Bubblin, | 2646 Palma Dr # 470 , | Ventura , | CA , | 93003-8007, | 805-339-9659 | |
| 77, | Channel Islands Scuba, | 4255 E Main St # 4 , | Ventura , | CA , | 93003-8245, | 805-644-3483, | ciscuba@silcom.com |
| 201, | Progressive Diving Institute, | 147 ALPINE AVE , | VENTURA , | CA , | 93004-1244, | 805-662-8681, | nitrox@prodigy.net |
| 189, | Pacific Scuba, | 315 herman Ave. , | Watsonville , | CA, | 95076-2942, | 408-761-3254 | |
| 183, | Pacific Coast Specialty Diving, | 23277 Valerio St , | West Hills , | CA , | 91304-5354, | 818-340-8927 | |
| 257, | Sport Chalet, | 6701 Fallbrook Avenue , | West Hills , | CA , | 91307, | 818-710-0999 | |
| 84, | Coral Reef, | 14161 Beach Blvd. , | Westminster , | CA , | 92683, | 714-894-3483, | tony@coralreefusa.com |
| 214, | Scuba Central, | 5871 Westminster Blvd # F-G , | Westminster , | CA , | 92683-3580, | 714-901-6206 | |
| 82, | College Of Oceaneering, | 272 S Fries Ave , | Wilmington , | CA , | 90744-6399, | 310-834-2501 | |
| 91, | Dive In Scuba, | 22725 Ventura Blvd , | Woodland Hills , | CA , | 91364-1334, | 818-225-1616, | herbzin@aol.com |
| 19, | Aqua Divers, | 650 N Palora Ave , | Yuba City , | CA, | 95991-3625, | 530-671-3483, | aquadivers@otn.net |