

Monterey Bay
National Marine Sanctuary
Submerged Cultural Resources Study:
2001

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UAC
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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

The largest marine protected area in California, the Monterey Bay National Marine Sanctuary is a 1,000 square mile area of the Pacific Ocean off the coast of California. It is home to a rich diversity of marine life, including whales, seals, and a variety of fish and invertebrates. The sanctuary is also a major center for marine research and education.

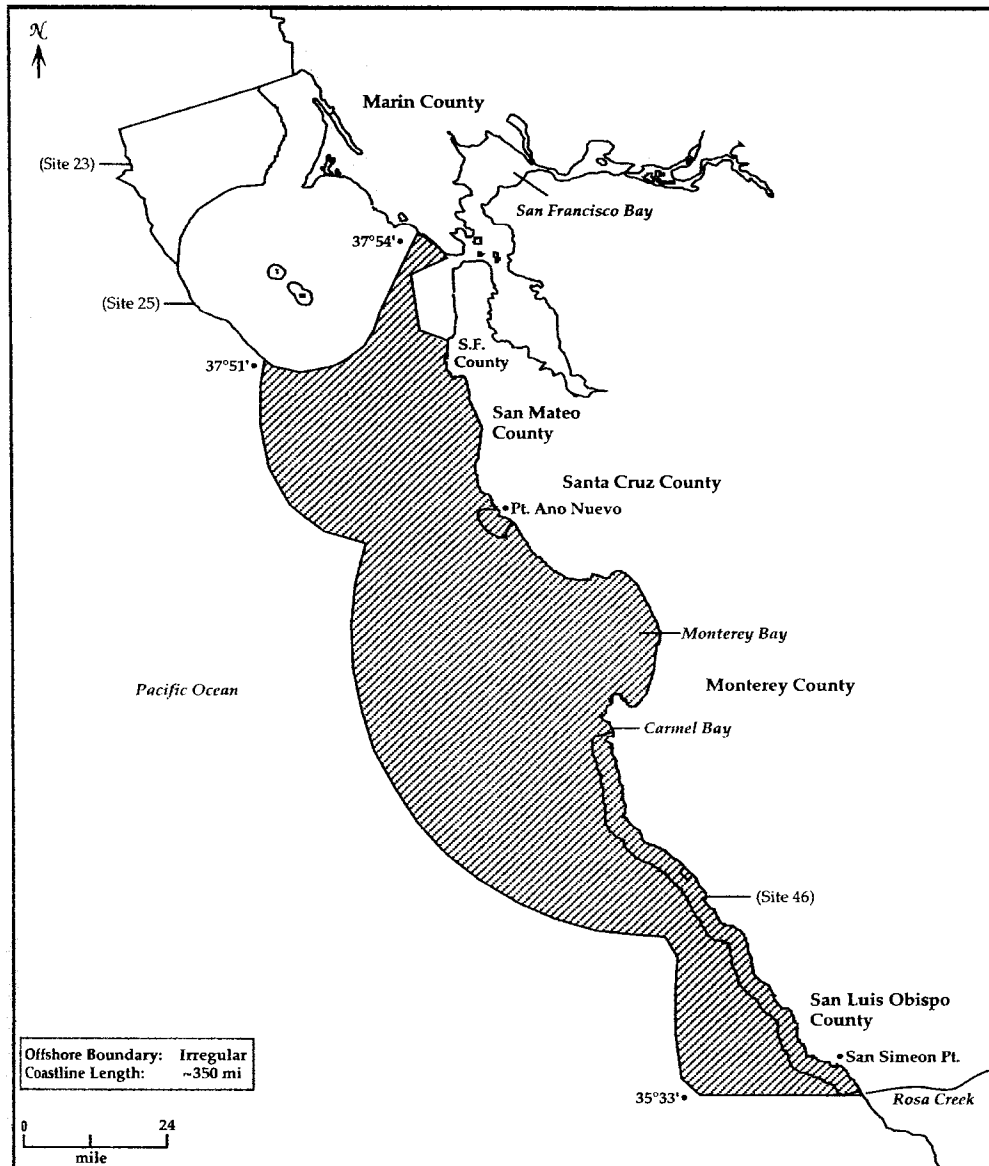


Legend

- County Name
- Approximated County Line
- Major Shipping Lanes

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 19th 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 gauge 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 emigrants populated the Pacific coastal areas first and that the region was so bountiful that many stayed. Those emigrants 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).

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



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

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.

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



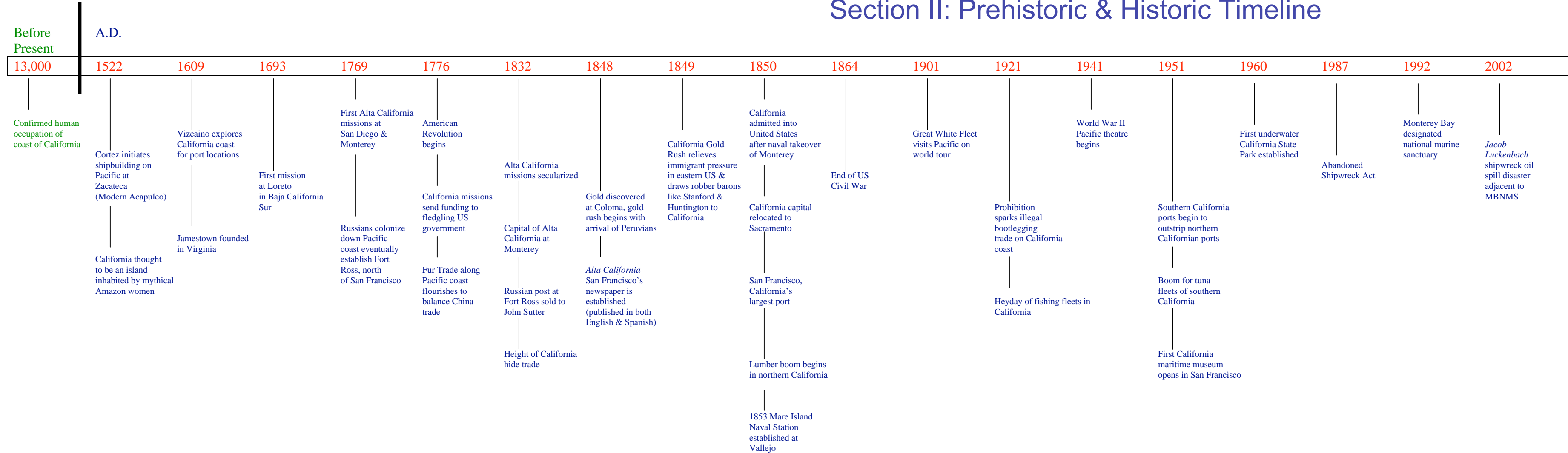
Figure 6: First coal then diesel and oil powered modern ships (courtesy of Porter Shaw Library).

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, Sullenberger 1992). 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

¹The loss of the *Virginia*, *Star of the West*, *Californian*, *Natalie*, *Bonita* and *Rhine Maru* were reported more than once in the 2000 MBNMS database.

²Known shipwrecks require DGPS locations that are repeatable. Only the dirigible *Macon* is known to rest inside the MBNMS waters.

³Known shipwrecks near the boundaries of MBNMS include the *Luckenbach* and the *Montebello*.

⁴Drift 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

Figure 7: Ship Rig



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.

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*

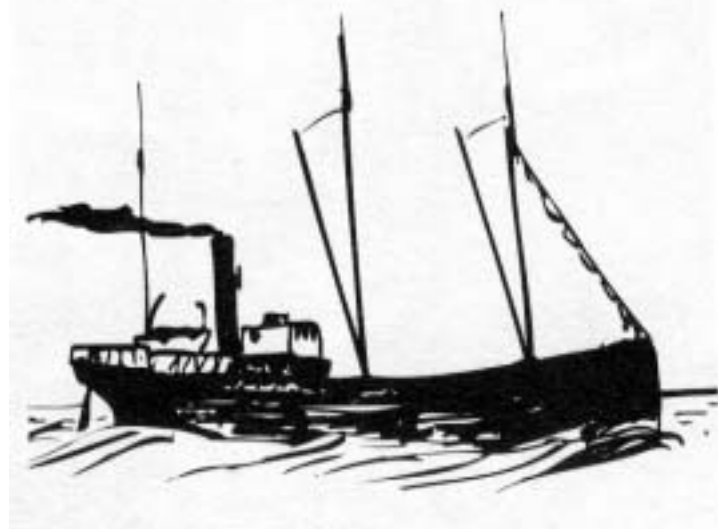


Figure 8: Schooner Rig

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 20th 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

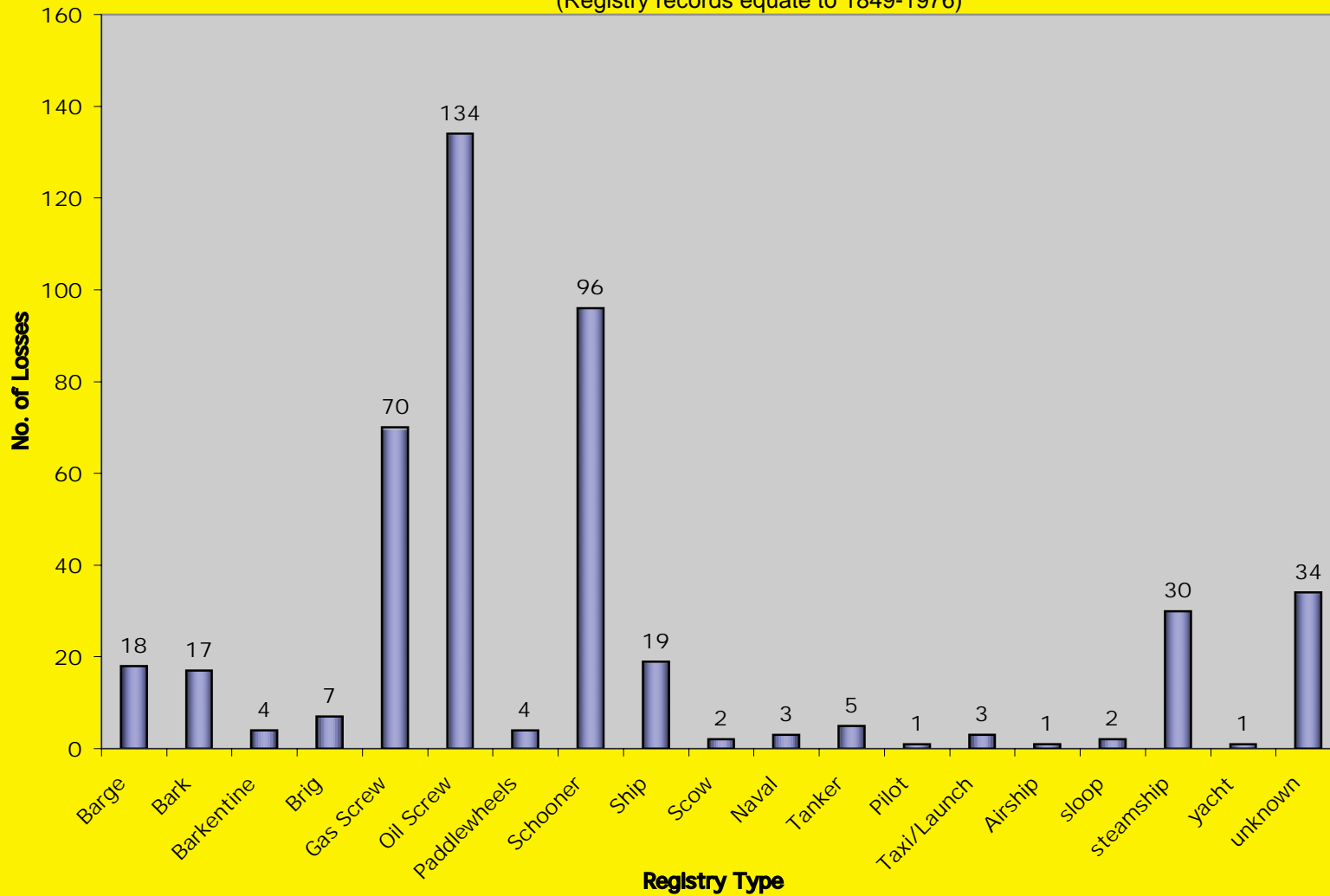
Table 3: Vessel Types Recorded in MBNMS Database of Vessel Losses and Sorted by Registry Types

Type	Propulsion		Century in Use			Functional Use			
	Rigged	Unrigged	18 th	19 th	20 th	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		•			•	•			

¹Certain 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 outstripped 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**).

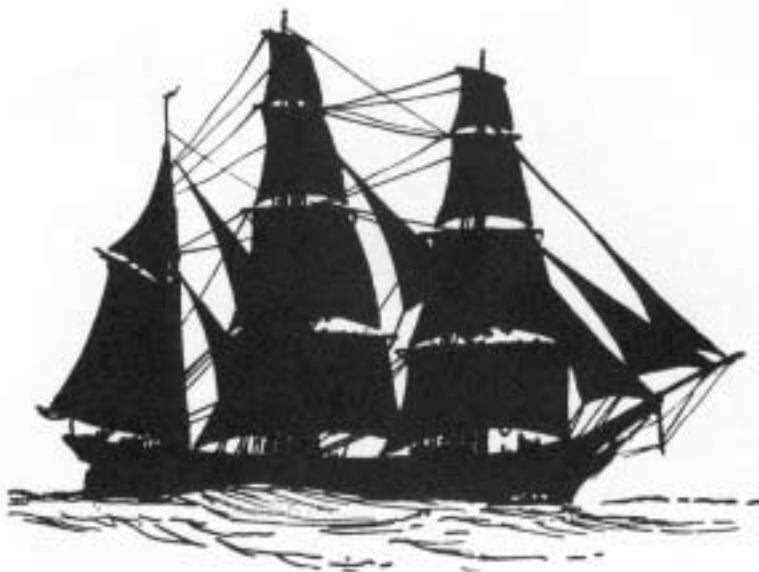


Figure 11: Bark Rig

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.

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 downturns. 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.			

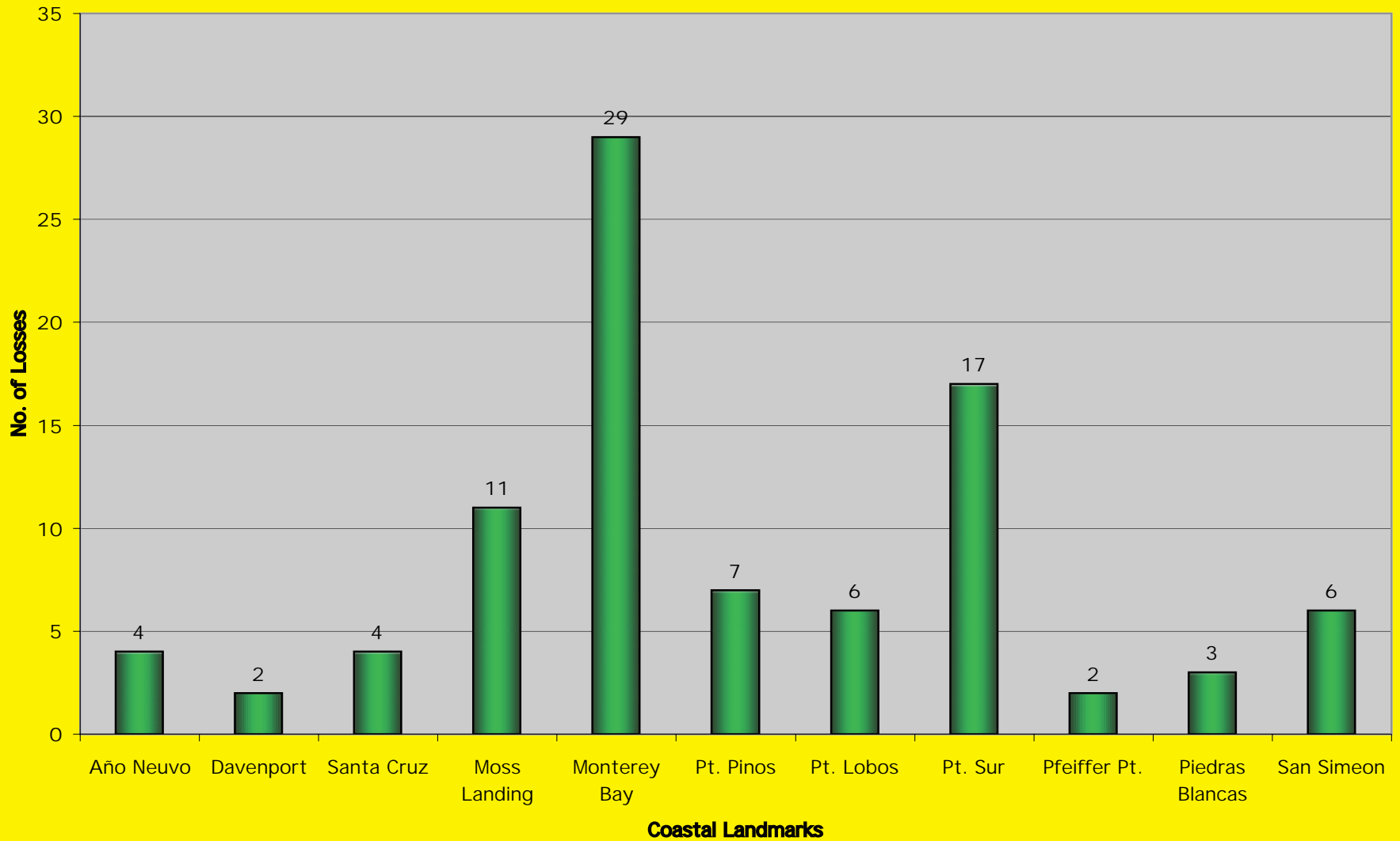
What does the data reveal in terms of the pattern of vessels reported lost in the sanctuary?

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.

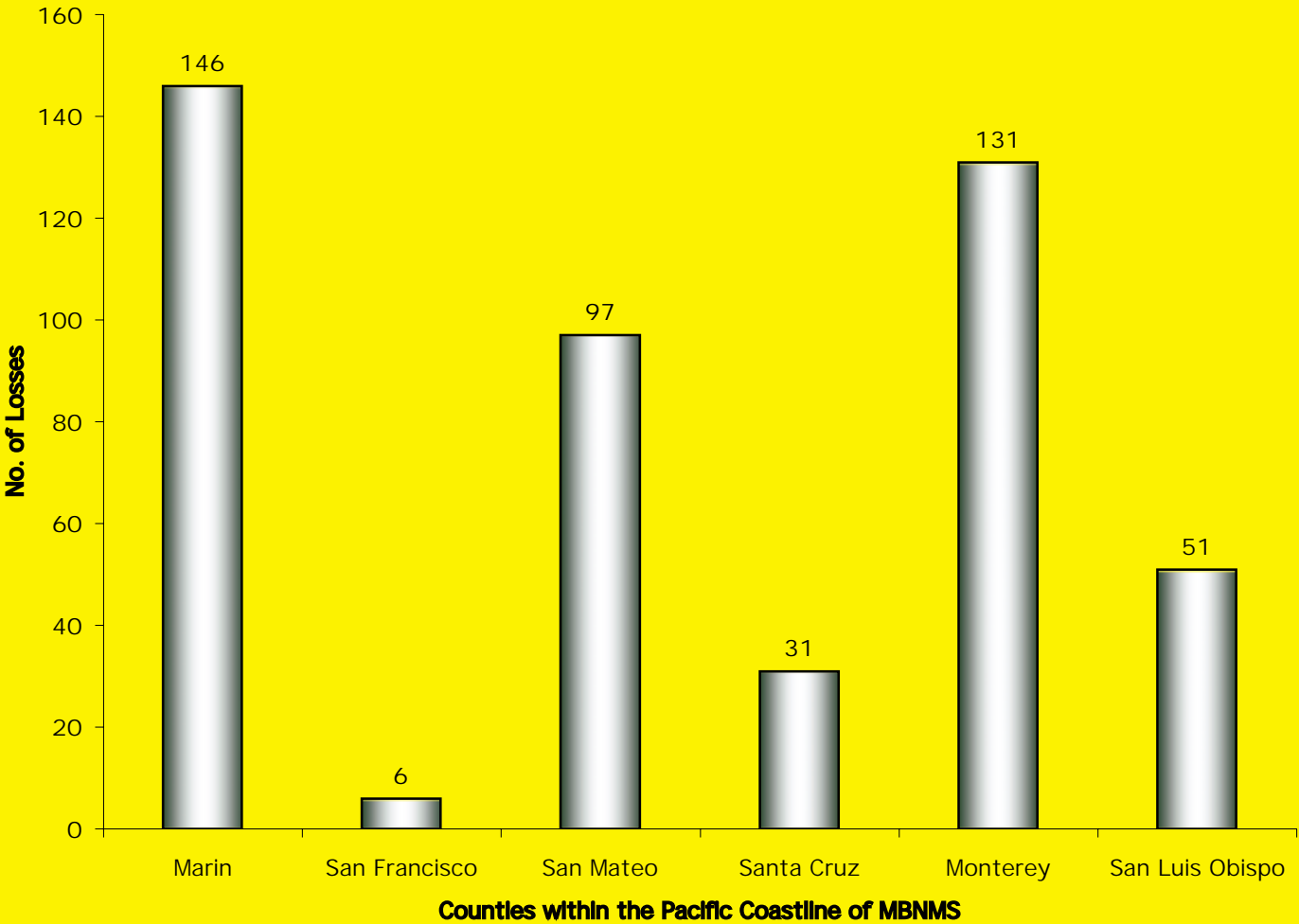
An important area where the database can help in a general manner for planning and management is the plotting of ship losses by county. Vessels losses across the five counties show that shipwrecks are not dispersed evenly. Some counties have greater concentrations of losses. This may be due in part to 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 19th century are located in Marin, while only 25 are reported lost in Monterey for the same century. In the 19th century 45 vessels were reported lost in San Mateo. The positions of San Mateo and Monterey counties are reversed, in regard to 19th 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

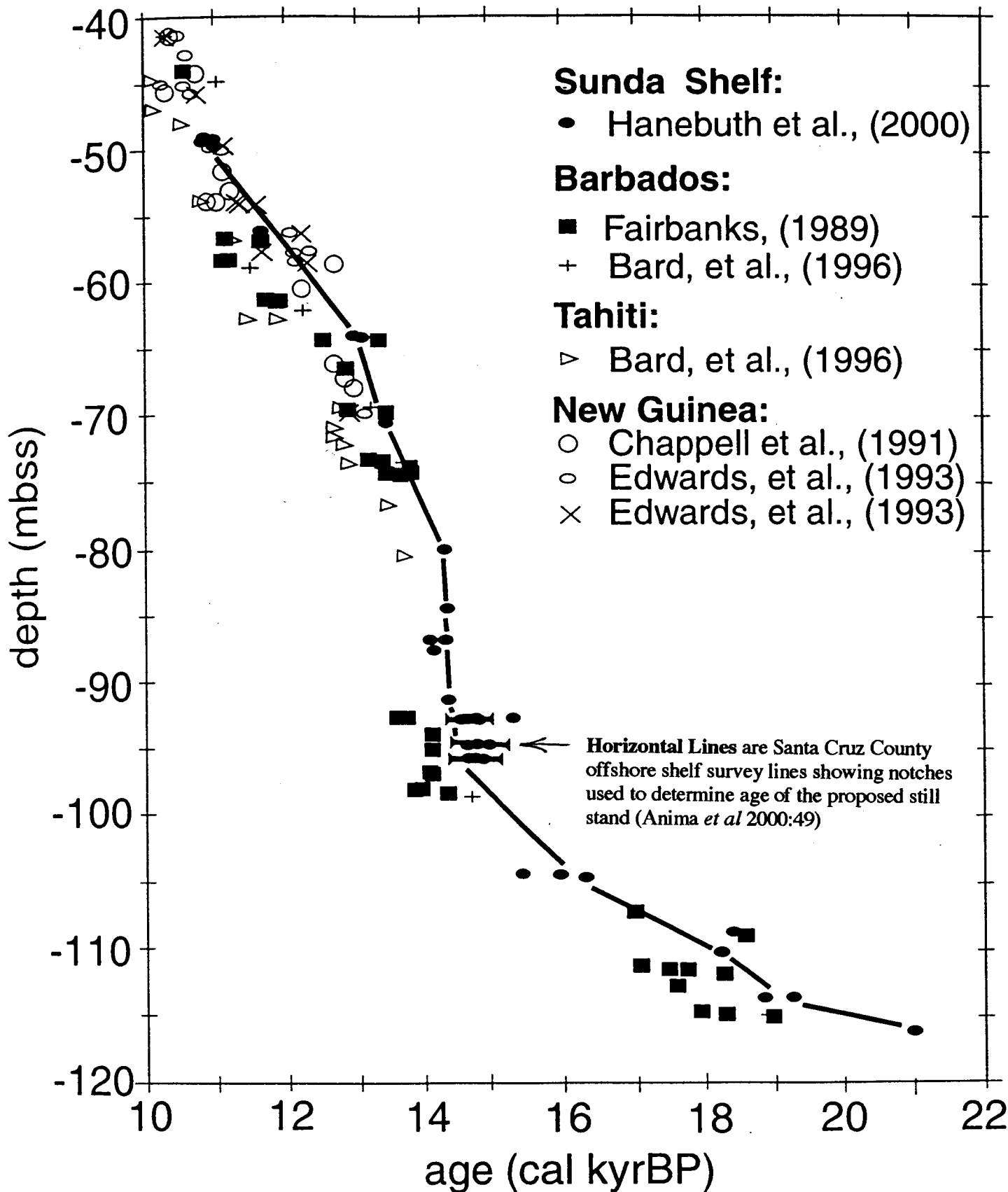


Figure 14a: Sea Level Curve
 Compilation of sea level indicators from work of Anima, Ettreim and Stevenson showing fit with previous work in other areas (Hanebuth et al (2000) and Anima et al (2000:49) .

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 (Eittrheim *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

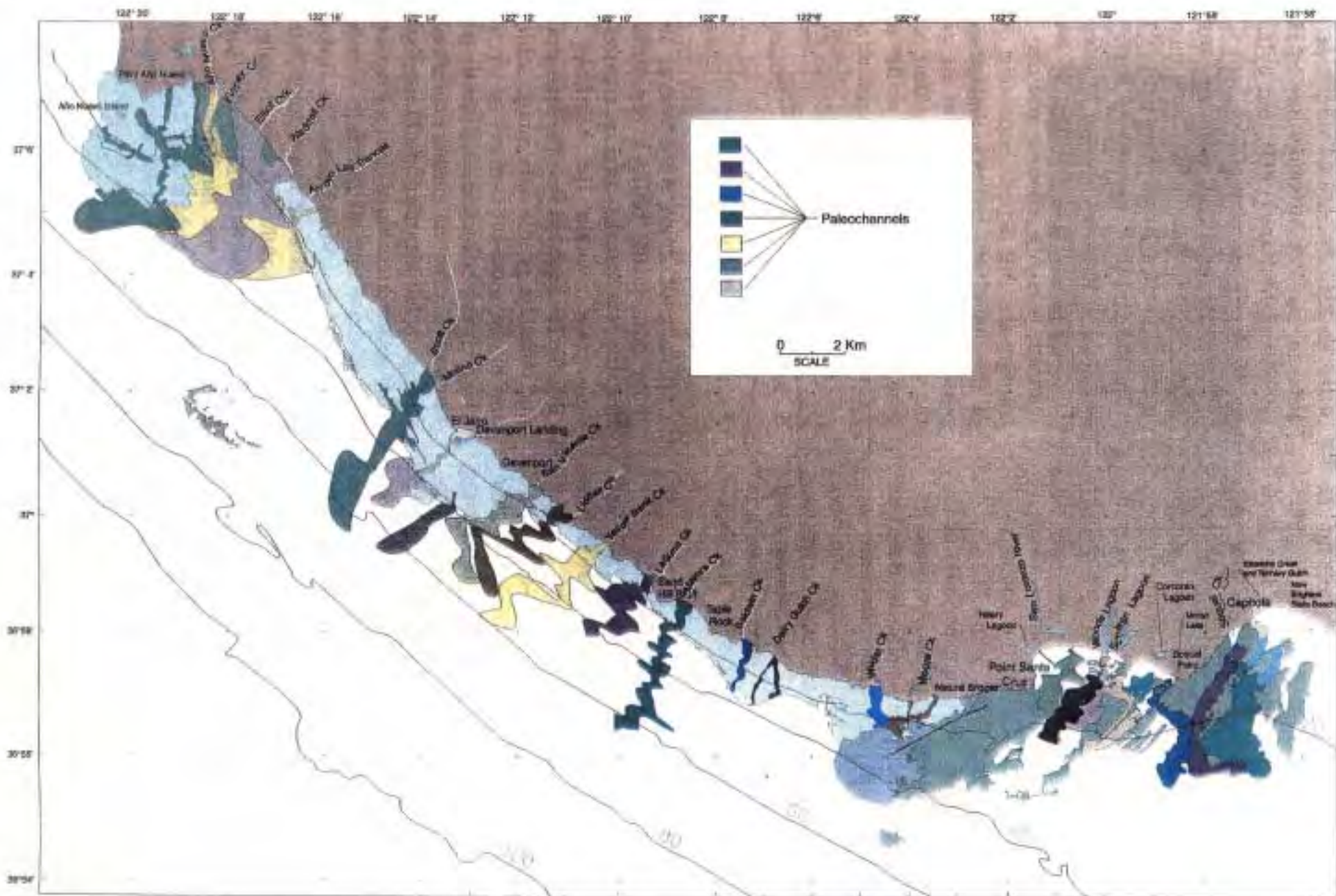


Figure 14b: Paleo-Channels Mapped out by color are the paleo-channels between Point Año Nuevo and Soquel Cove, Santa Cruz (Anima *et al* 2000:44)

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 cobbles 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 terrigenous 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.



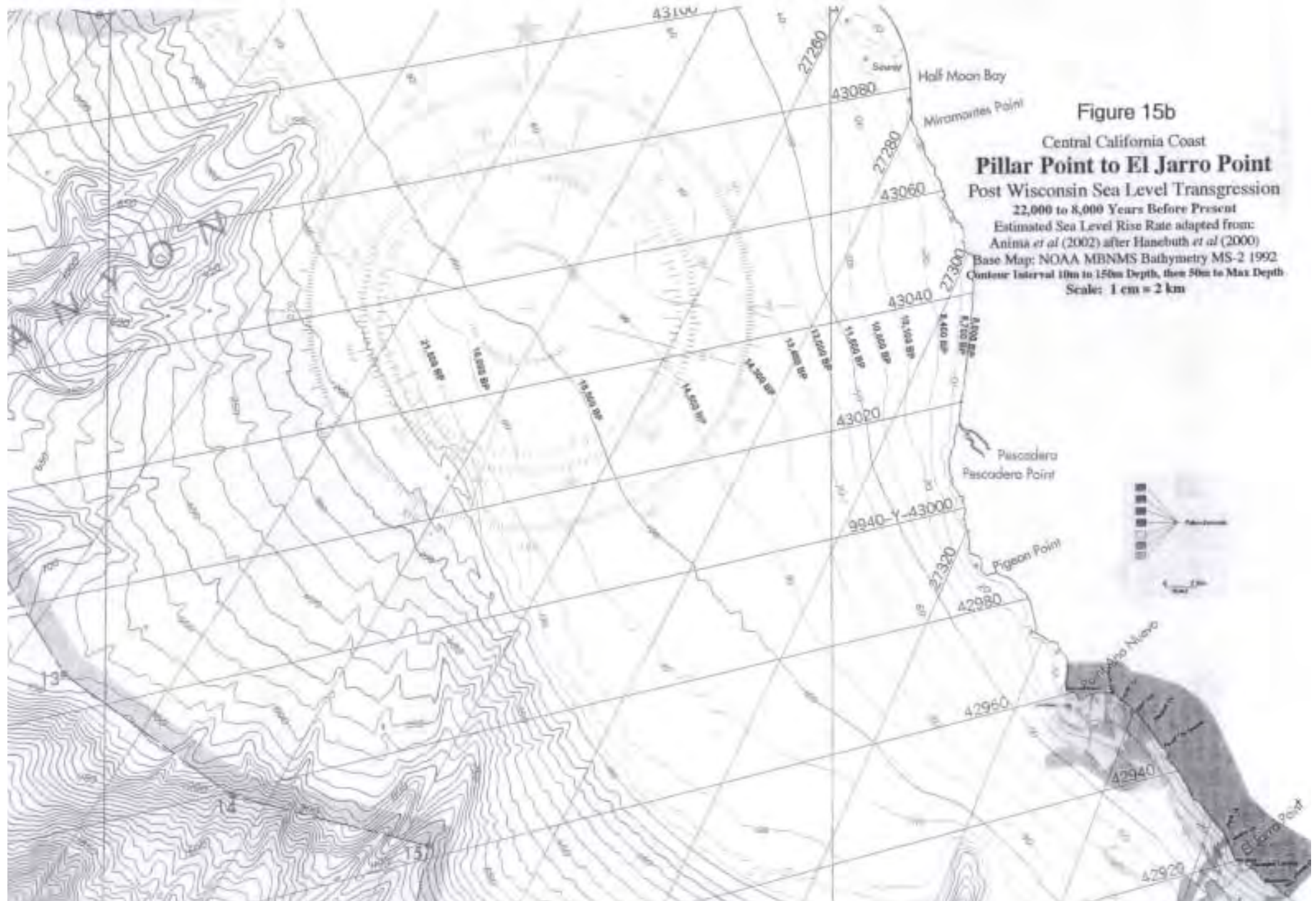




Figure 15d

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:
Aminia *et al* (2002) after Hasebuth *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

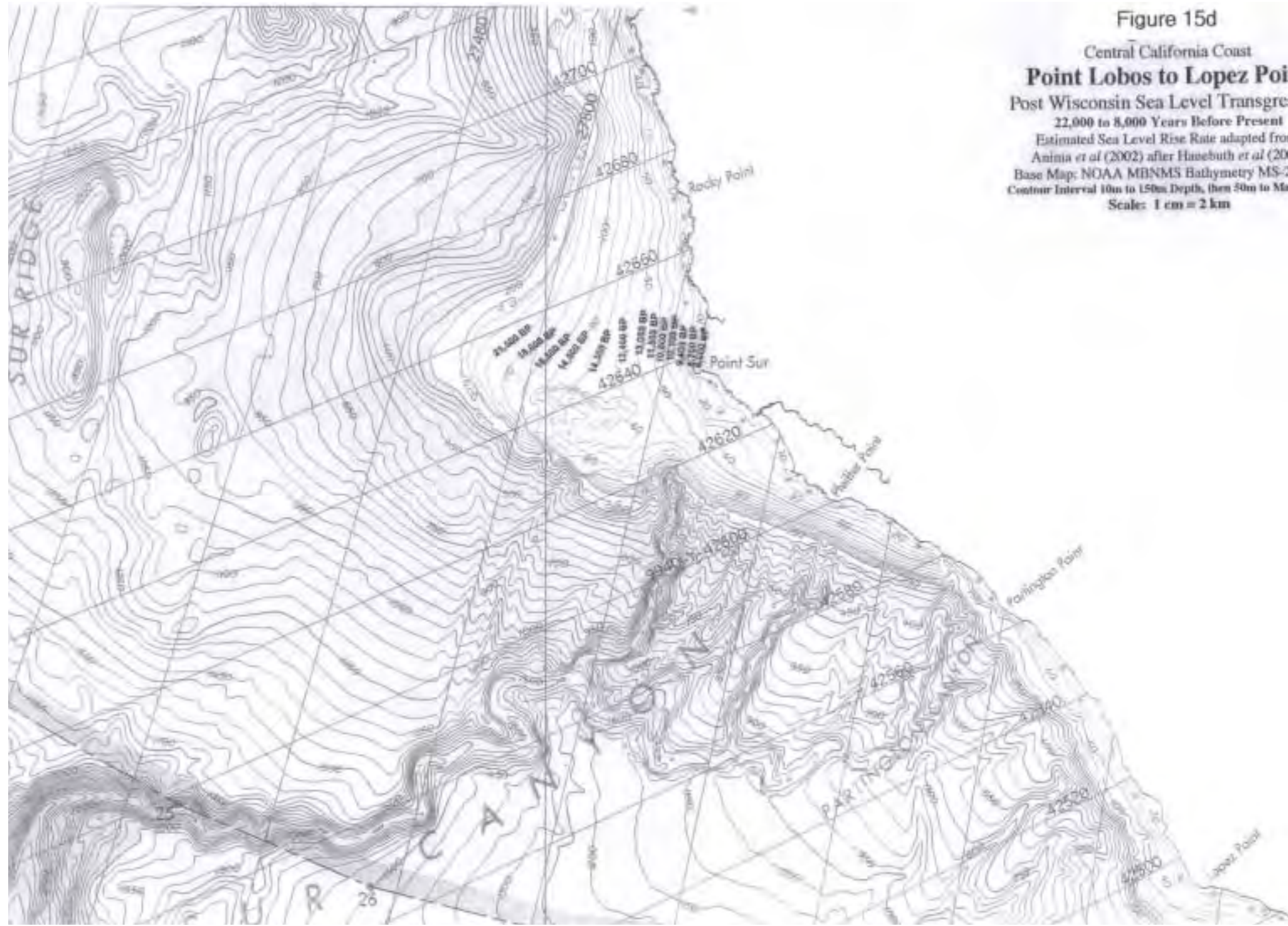


Figure 15e

Central California Coast

Mill Creek to Cambria

Post Wisconsin Sea Level Transgression

22,000 to 8,000 Years Before Present

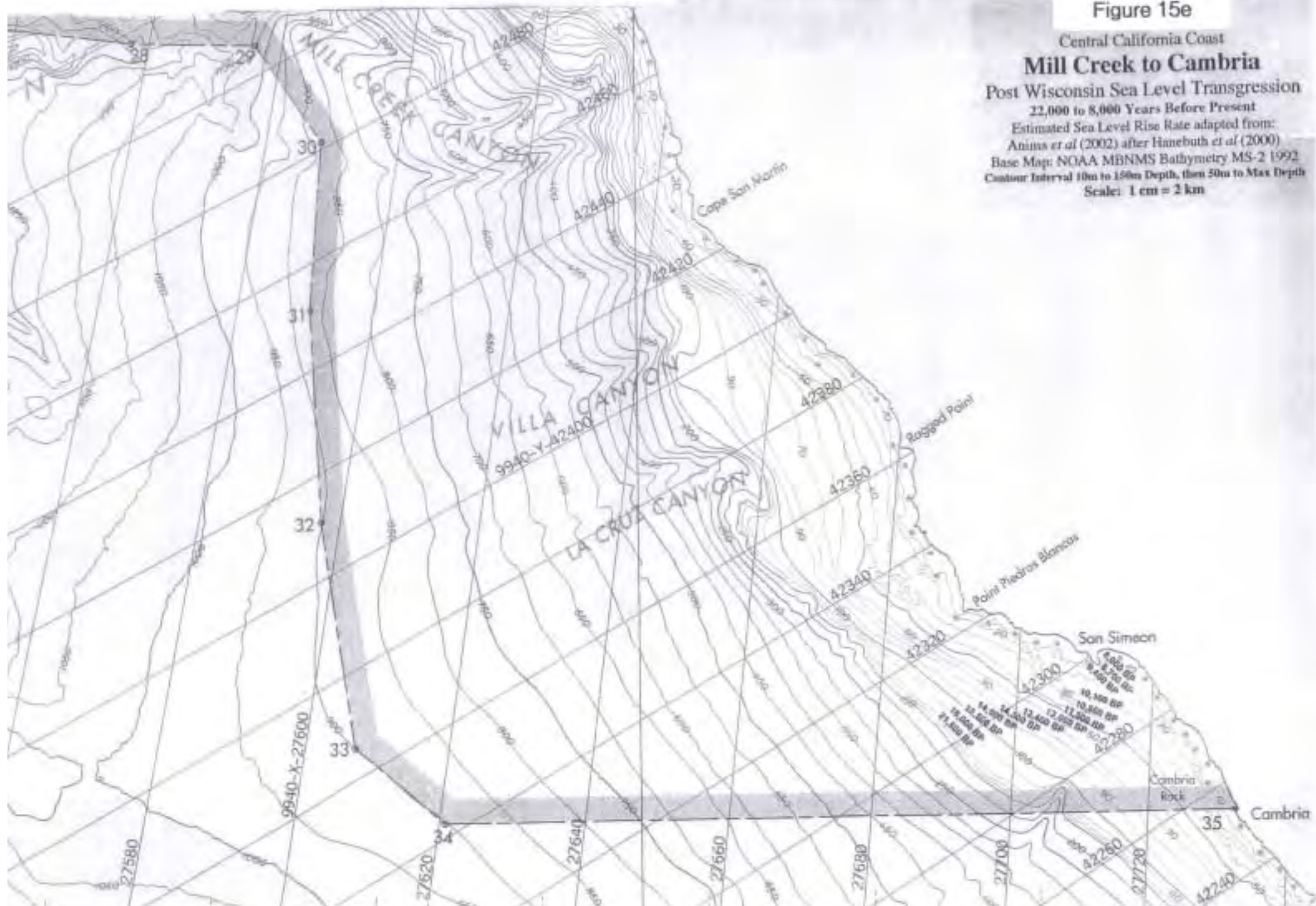
Estimated Sea Level Rise Rate adapted from:

Annis *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 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 18 th century and popular throughout the first quarter of the 19 th 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, <i>Thomas W. Lawson</i> 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 or 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
Day Month Year 1933

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	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	County	
40Fathoms No. 4	oil screw	20		1949	foundered		46	Oil Screw	Yes	Monterey
A. Crosby	schooner	19		1869	foundered		70	Sail	Yes	Santa Cru:
A No. 1	barge	20		1930	foundered		12	Towed		Monterey
Aberdeen	schooner	19		1916	foundered		499	Sail & Steam		Santa Cru:
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 Cru:
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 Cru:
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	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	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 Cru.
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 Cru.
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		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year					County	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 Cru.
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		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year					County	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	collisn		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		Coordinates		County
			DL	Year				Propulsion			
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		Coordinates	
			DL	Year				Propulsion	County	
Evening Star	schooner	19		1880	wrecked	n			Yes	Marin
Express	oil screw	20		1942	foundered		53	Oil Screw	Yes	Santa Cru:
Express	oil screw	20		1942	foundered		53	Oil Screw		Santa Cru:
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates		County
			DL	Year				Propulsion			
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 Cru:	
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	

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year					County	County
James Rolph	schooner	19		1910	grounded	169'1"	586	Sail	Yes	San Mateo
Jean	oil screw	20		1972	foundered		16	Oil Screw		Santa Cru:
Jenern	gas screw	20		1967	foundered		9	Gas Screw		Santa Cru:
Jennie Osborn	Ship	19		1878	stranded		1056	Sail	Yes	Marin
Jo Jean	gas screw	20		1959	sank in storm		11	Gas Screw		Santa Cru:
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	collisn	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 Cru:
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates		County
			DL	Year				Propulsion			
La Feliz	freighter	20		1924	grounded	72	102	Steam Screw	Yes	Santa Cru.	
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	

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year					County	County
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 Cru:
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	County	
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 Cru.
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 Cru.
Nerenta K	oil screw	20		1941	foundered		60	Oil Screw		Santa Cru.
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year						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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	County	
Oxford		19		1852	grounded		750	Sail	Yes	Marin
P.D. Patrol	gas screw	20		1937	foundered		15	gas screw		Santa Cru:
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 Cru:
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	collisn		10	Oil Screw		Monterey
Peso	oil screw	20		1968	stranded		16	Oil Screw		Santa Cru:
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year			Propulsion	County		
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	County	
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 Cru:
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

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Vessel	Rigging	Cent.	Date Built		Loss Cause	LOA	Tonnage	Propulsion	Coordinates	
			DL	Year					County	County
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	collisn		692	Oil Screw	Yes	Marin
Selja	steamship			1910	collisn				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		Loss Cause	LOA	Tonnage		Coordinates	
			DL	Year				Propulsion	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 Cru:
Spy	gas screw	20		1948	burned		13	Gas Screw		Santa Cru:
St. Mary	oil screw	20		1966			49	Oil Screw		Monterey
Stanford	oil screw	20		1943			59	Oil Screw	Yes	Santa Cru:
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 Cru:
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		Coordinates	
			DL	Year				Propulsion	County	
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 Cru:
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 Cru:
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	
			DL	Year						County
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

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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 Sanctuary
Cordell Bank National Marine Sanctuary

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

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

Scuba Shops of California

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/~dolphinsdive/
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 ,	Auburn ,	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 ,	Crescent 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	

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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.captinaqua.com/
246,	Sport Chalet,	405 Parkway Plaza ,	El Cajon ,	CA ,	92020,	619-590-1260	
279,	The Dive Shack,	787 Arnelo 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@itech.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.captinaqua.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 Hoover 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	

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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.amerdiver@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,	h2oworlda@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

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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 Service,	3372 Harpers Ferry Ct ,	Pleasanton,	CA,	94588-5212,	925-846-2535	
260,	Sport Chalet,	3695 Midway Drive ,	Point Loma ,	CA ,	92110,	619-224-6777,	iguido@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	

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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.liburdiscluba.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,	podii@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

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90,	Dive Central,	1515 Capitola Rd Suite D ,	SANTA CRUZ ,	CA ,	95062,	831-465-1185,	jcawell@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,	rockfish@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 ,	Sobranite ,	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,	divewc@s@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

