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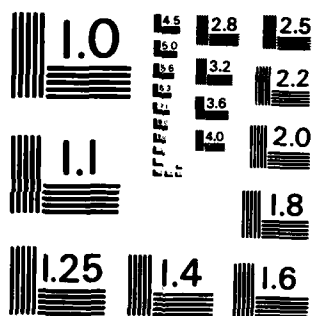
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A CULTURAL RESOURCE RECONNAISSANCE STUDY
OF PROPOSED DREDGING AND CONSTRUCTION AREAS
AT MISSION BAY HARBOR, CALIFORNIA

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ABSTRACT

The following report describes a cultural resource underwater reconnaissance of certain areas within and near the Mission Bay Harbor entrance channel, San Diego, California. This investigation, undertaken at the request of the U. S. Army Corps of Engineers, is in support of their proposed dredging and construction projects for this locality.

The investigation was conducted in three phases: 1) literature, 2) magnetometer remote sensing survey, and 3) diver inspection survey.

The magnetometer survey detected three objects of probable cultural origin within the survey area. One of these (Anomaly A) proved to be a modern construction resembling a flotation pontoon and has no cultural resource value. The two remaining anomalies are buried within the sediment blanket and remain of unknown cultural value.



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FIGURE ONE PROJECT LOCATION



A CULTURAL RESOURCE RECONNAISSANCE STUDY
OF PROPOSED DREDGING AND CONSTRUCTION AREAS
AT MISSION BAY HARBOR, CALIFORNIA

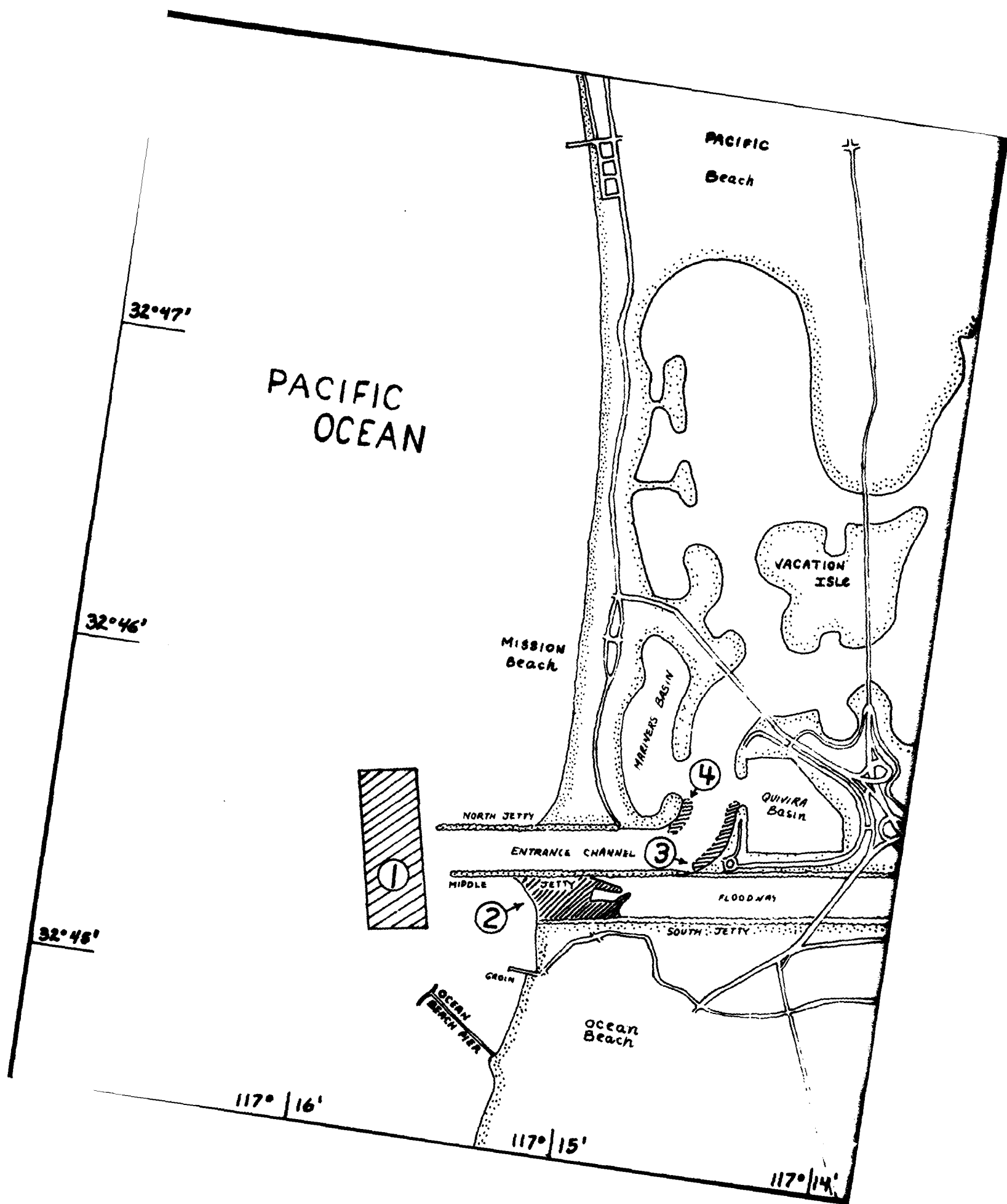
1.0 INTRODUCTION

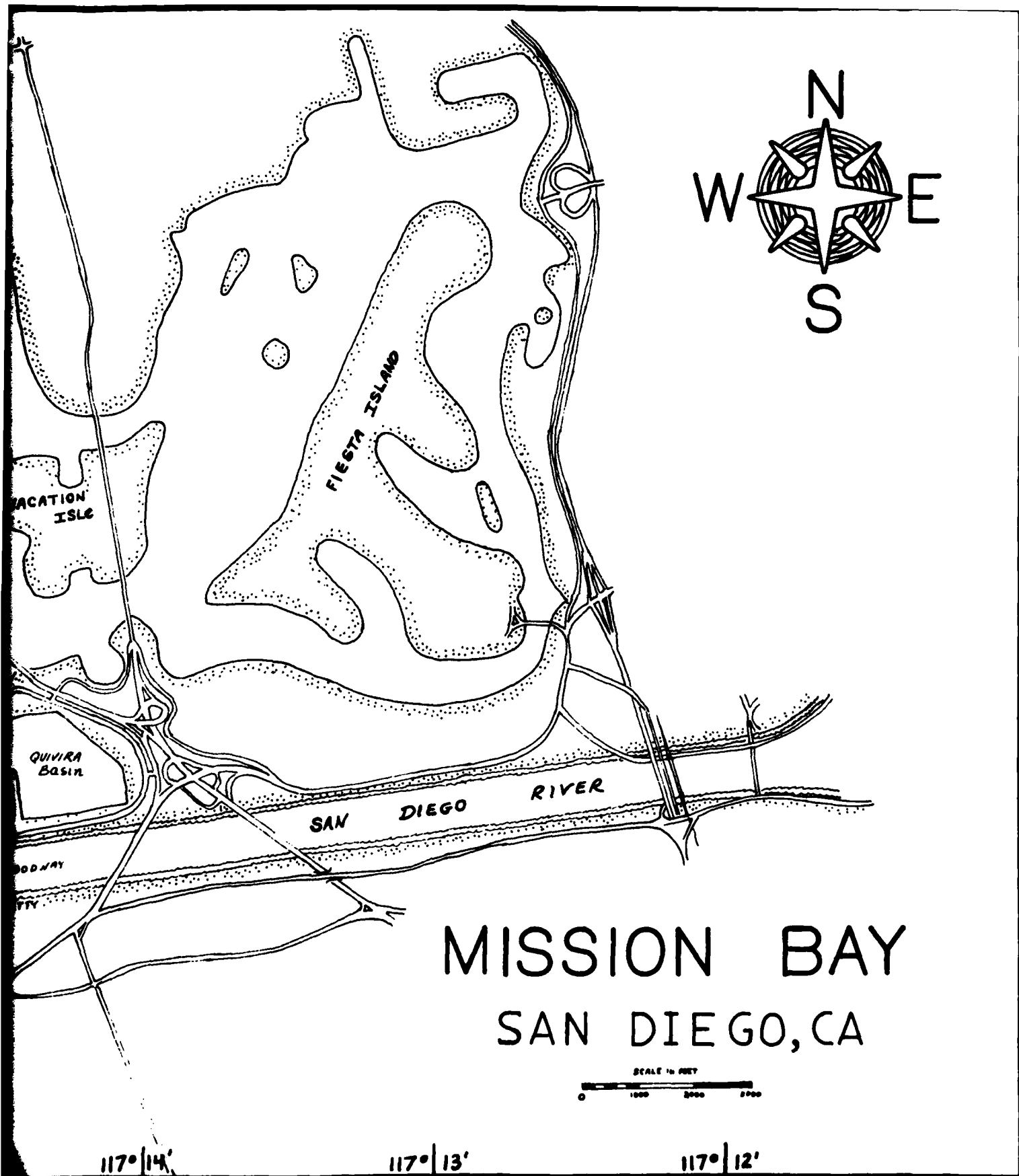
During the period July 29 through December 1, 1979, a cultural resource underwater reconnaissance was conducted in four locations within and near the Mission Bay Harbor entrance channel, San Diego, California (Figure 1). This investigation, authorized under Public Law 91-190, National Environmental Policy Act; Public Law 93-291, Archaeological and Historical Preservation Act; and Executive Order 11593, Protection and Enhancement of Cultural Environment, was comprised of a literature search, including interviews with knowledgeable persons, and a two-part marine field survey.

The purpose of this study was to determine the impact, if any, upon known or discovered cultural resources which were determined to be within the proposed U. S. Army Corps of Engineers dredging and breakwater construction project areas at this location (Figure 2).

1.1 PROJECT LOCATION AND SETTING

Mission Bay is located north of San Diego Bay between the Point Loma Peninsula and the coastal hills comprising La Jolla and Torrey Pines. It is presently bounded on the south by the San Diego River floodway, the east by Interstate 5, the north by the city of Pacific Beach, and on the





west by Mission Beach and the Pacific Ocean. Latitude is 32° 45' 30" North, longitude 117° 15' 45" West.

The four areas of investigation (refer to Figure 2) include the proposed breakwater location (1), an area centered approximately 244 meters (800 feet) west of the Mission Bay Harbor entrance channel terminus and comprising 25 hectares (62 acres); the San Diego River floodway mouth sandbar (2) with an area of 16.7 hectares (41 acres), and the baffle areas within the main entrance channel outside Quivira Basin (3) and Mariners Basin (4).

1.2 FIELD CREW

The Magnetometer remote sensing survey of the proposed breakwater location (1) was conducted on July 29, 1979, aboard the M/V Caroline by the following personnel of Pelagos Corporation, La Jolla, California: William Speidel, navigator/geophysicist; Terry Curley, electronics support; Jack Donovan, vessel operator/deck support; Phan Ke Ninh, Miniranger shore station support.

Additional personnel in attendance for the remote sensing survey were: Jack Hunter, contractor/data annotater; Patricia Martz, U. S. Army Corps of Engineers, observer; and Robert Kealhofer, shore station transit operator.

The Diving survey team consisted of Jack Hunter, marine archaeologist; Russel Belmer, Environmental Section, U. S.

Army Corps of Engineers. Additional diving support for the final field day came from Roy Pettus, diving archaeologist. All diving operations were conducted from the M/V Jennifer, David Harcq, owner/operator.

1.3 TIME EXPENDED

A total of 15 days were expended for the literature search. All major archive collections in the San Diego area were scrutinized for information assisting the reconstruction of the history and development of Mission Bay.

A total of 10 field days were expended for the magnetometer survey (1 day), diving investigation (8 days), and shore study (1 day). Analysis of geologic data and report preparation took an additional 7 days.

2.0 PHYSIOGRAPHY

It is best to start a description of a potential archaeological environment with a firm understanding of the geological and geomorphological processes which have conspired to shape the present day setting of the project areas.

2.1 CLIMATE

The present climate of San Diego County is classified as steppe, with a Köppen designation of BSk. Precipitation, moderate at ten inches per year average, occurs chiefly between the months of October and April. Nearly 75 per cent results from winter cyclonic storms out of the Pacific Ocean.

Temperatures below freezing and above 100° Fahrenheit are exceedingly rare, and seldom deviate more than 13° from an annual mean of 63°F. Spring and summer months characteristically have evening and early morning cloudcover and the winter and fall months have periods of considerable fog. The fogs usually dissipate by noon, but can roll in again from offshore with the late afternoon ocean breeze.

2.2 GENERAL GEOLOGY

The underlying basement rocks of the San Diego coastal area are a complex series of metamorphics and granitics formed in the Jurassic and Cretaceous periods. The surface areas of these formations were then extensively eroded and an overlying deposit of sedimentary strata consisting of boulder and conglomerates followed by siltstones and sandstones of late Cretaceous age were then formed. Exposures of Eocene age rock outcrop in the hills of La Jolla and Point Loma. While primarily of marine origin, it is possible that the conglomerates may be the result of nearby continental erosion. A substantial amount of these conglomerates consist of reworked deposits which may be younger than Eocene in age. Oligocene and Miocene sediments are not found in the San Diego coastal area as far as is known.

A series of flat lying sandstones called the San Diego Formation and representing the late Pliocene period occur in the southern part of Mission Valley and extend, widely exposed,

to the Mexican border. Igneous activity within the Pliocene Period is visible as recurrent bentonite deposits (principally volcanic ash) interbedded with marine sands. A shallow sea covered much of San Diego during this time.

Overlying the San Diego Formation and capping most of the terrace areas south of Mission Valley is a layer of conglomerates named the Sweitzer Formation. It is concluded by most sources that this formation represents the deposition of coarse materials by wave and/or stream erosion in the shallow sea of the early Pleistocene.

Later Pleistocene marine deposits, composed chiefly of sands, gravels, and crushed shell, occur principally upon the lower terraces, including the Coronado peninsula bordering San Diego Bay to the south of the project area.

Mission Bay itself is essentially an environment of loosely layed and reworked sedimentary deposits of late Pleistocene and Holocene age which have been constantly scoured by tidal currents and river deltaic forces.

2.3 SEDIMENTATION HISTORY

Within the context of constructing a sedimentation history of the project area, it is necessary to examine the record history of efforts to influence or control the water transport (i.e., sediment transport) system comprising the San Diego River/Mission Bay estuary system during the recent historic past.

As pointed out in the study on estuarine sedimentation by Marine Advisors, Inc. (now Intersea Research Corporation) 1969, a closer understanding of the area is achieved by qualification of the terms estuary and lagoon. Emery, et al (1957) notes that an estuary is a body of water separated from the ocean by land masses that were originally shaped by nonmarine processes. Conversely, a lagoon is an environment similar to the estuary, but is generally considered to be separated from the ocean by land masses of marine origin. Mission Bay is separated from the ocean by both forms of land. The highlands of Point Loma and Crown Point terrace partially separated the bay from the open ocean. In later stages of coastal geomorphological process, the bay mouth barrier sand bar now comprising the western boundry (Mission Beach) formed by placing the estuary into a lagoonal situation. As the San Diego River snaked back and forth across its delta (which combines Mission Bay with San Diego Bay), it alternately switched the Mission Bay scenario from one of the estuarine to lagoonal, depending into which it flowed. This caused the major dynamic forces acting on the sediment system to alternate their intensity of impact within the project areas.

The San Diego River and Mission Bay sediment system has evolved through four stages:

1. River emptying directly into the sea.
2. River and separate esturine environments.

3. River and Mission Bay system, together.
4. River isolated by constructed floodworks.

Since the supposition that the San Diego coast is emergent from Pleistocene time is confirmed by extant coastal terraces dating from that period, it can be assumed that during the higher associated sea levels with that time, the San Diego River emptied directly into the sea.

As sea level lowered (or relatively speaking, the land emerged), the Mission Valley and Bay area filled with sediments which were formally carried off by coastal processes. This created the estuarine environment (tidal flats) which predominate the backbay area. As wave and current forces eroded and deposited sediments along the formative shore creating the bars, spits, and other sand forms of a high energy environment, the sediment depth evolved to its present thickness.

2.4 TIDES AND TIDAL CURRENT

The tidal station in Quivira Basin records a mean tide range of 3.8 feet with the range between mean lower low water and mean higher high water being 5.4 feet. Mean tide level is 2.8 feet. The tidal current in the entrance channel has a daily maximum of 1 to 2 knots and a yearly maximum of about 3 knots.

3.0 GENERAL PREHISTORY OF SAN DIEGO COUNTY

San Diego County has been frequently divided into three culture sequences. They are the San Dieguito, the La Jolla-Pauma, and the Kumeyaay/Diegueño.

3.1 SAN DIEGUITO

The San Dieguito culture complex comprises the Paleo-Indian Tradition of prehistoric San Diego. While generally represented as having three phases or industries and occurring approximately 12,000 to 7,500 years ago, some authors are postulating a San Dieguito Phase, one complex going back to as early as 21,000 years ago (Childers, 1974, restated by Eckhardt, 1978).

Occupying the mountains, deserts, and mesas of San Diego County, these people are typified as nomadic big-game hunters. Their material culture survives largely as scattered bladed, large projectile points, choppers and scrapers.

The San Dieguito II Culture industry occurs in western San Diego County as well as inland area. Artifacts of this phase are represented by more finely worked blades, smaller projectile points, and a variety of choppers and scrapers. Warren (1961) and Moriarty (1969) suggest that these people, while big game hunters as were their predecessors, also augmented their diet by gathering and foraging.

A San Dieguito III or terminal phase is considered to be characterized by a wider variety of tool types and the introduction of pressure-flaking. Occurring during this phase are planes, choppers, plano-convex scrapers, crescentic stones, elongated bifacial knives, and leaf-shaped projectile points (Rogers 1939).

3.2 LA JOLLAN-PAUMA

Around 7,500 to 7,000 years B.P. a different cultural assemblage appears along the coast and inland valleys of San Diego County. These people, the La Jollans, are thought to be a new group specializing in exploitation of the coastal littoral zone resource base (Harding 1951; Moriarty 1959, 1969; Wallace 1960).

The material culture of the La Jollans is characterized principally by the technological innovation of milling equipment consisting of manos, matates, mortars and pestles. Other traits include fire hearths, shell middens, flexed inhumation, and a change in the mineralogical content of tool materials.

Mariarty has ordered these traits in the following summation, based upon coastal site radiometrics (Moriarty 1966):

LA JOLLA I: (7,500 - 5,500 B.P.)

1. Appearance of milling implements.
2. Mineralogical change in lithic assemblage from felsitic materials of the transitional phase, to local rhyodactites, meta-quartzites, and diabases for Phase I.
3. Crude percussion flaked lithic assemblage based upon a cobblestone, chopper, and scraper typology.
4. Increase in variety of tool types and flaking technology.
5. Burials are complete inhumations, flexed, integrated, with no attempt at directional orientation, and occasional mortuary offerings such as shell beads.
6. Artifact assemblage indicates stable food gathering economy.

LA JOLLA II: (5,500 - 4,000 B.P.)

1. Contacts with northern coastal and Channel Island cultures.
2. Drilled and polished stone artifacts, increase in bifacial artifact types.
3. Reappearance of projectile points of which there are four specific types:
 - a. lanceolate
 - b. small triangular points
 - c. equilateral triangle with convex base.
 - d. a large blade type.
4. Burial practices now include flexed burials with a generalized orientation, segregation into true cemeteries, and occurrence of mortuary offerings.

LA JOLLA III: (4,000 - 3,000 B.P.)

1. Geographic change in site locale to lower elevations, along edges of coastal lagoons, or possibly further inland.
2. Beginning of process of amalgamation between the La Jolla and Yuman cultures which extended to about 2,000 B.P.).

The Pauma complex is "an interior upland manifestation of a milling-stone horizon, probably related in some way with the coastal La Jollan milling-stone culture complex" (True, Meighan, Crew, 1974). As the La Jollan culture is principally defined as coastal, the degree of similarity and association with the inland Pauma is still in discussion and awaiting further research (Pettus, 1979).

A Yuman intrusion, possibly followed by a Shoshonean intrusion, is known to have occurred between 3,000 and 2,000 B.P. (Moriarty, 1966). This migration has had the effect of confusing

the archaeological record with respect to which cultural traits during this period are developmental and which are the product of diffusion.

The Shoshonean wedge into coastal San Diego seems to have occurred approximately 1,000 to 1,500 years ago. This intrusion produced cultural variations called the San Luis Rey I and II complex (Meighan 1954).

3.3 KUMEYAAY/NORTHERN DIEGUEÑO-LUISEÑO

The last phase of San Diego prehistory is represented by the territorial clans found inhabiting the area at the time of Spanish exploration and occupation.

Ipai, the term used by recent anthropological literature in discussing the groups in residence around the project area coastline, will not be used in favor of the larger body of archaeological knowledge which has been published under the names heading this section.

Diegueño is the Spanish name for the Indians of Yuman linguistic stock (two dialects) who were associated with the mission, San Diego de Alcalá, from its establishment in 1769. It is thought that the Yuman people introduced pottery to the San Diego region around 1800 B.P. (Moriarty 1966).

How Mission Bay figured into the local and regional resource base is not entirely known. It can be presumed to have offered at least as much potential as other estuaries of

the southern California coast. Cuero (1968) describes one aspect as follows:

"There were a lot of vegetables in Mission Bay. More mud and weeds were in the bay then, like marshland. Between Old Town and Point Loma was a lot of black mud where it is dry now. We would gather the greens and roots and boil and dry them. Seeds and things like that were stored for grinding later. The food gathered from the mud and around the edge of the mud was real good because it was salty. It tasted good and it kept real good."

3.4 ABORIGINAL MARITIME ADAPTATION

The use of balsas, fashioned from easily procured tules (*Scirpus* sp.) for protected waters fishing and transportation is well known for San Diego environs (Kroeber 1922). The balsa, or rush raft, was usually moved by polling, although it is possible the paddle was employed when water depth required it.

The plank and dugout style of canoe, known in waters adjacent to the San Diego estuary system, does not seem to have become suitable for general use within the project region. This is probably attributable to the shallow nature of southern California estuaries, and unnecessary labor required of the other two forms by a coastal people who did not need to venture far from shore.

It is possible, however, that on occasion a plank canoe from the north may have put into Mission Bay, or passed by the shore. Also, should accident befall a northern coastal boat while at sea, the prevalent south moving current may well have transported said vessel into project waters.

3.5 NATIVE AMERICAN OBSERVATION

Contact was made with the Native American community to monitor or comment on any aboriginal material discovered within the project area. Since no prehistoric material was located through the efforts of this survey, further Native American involvement with this phase of the investigation was unnecessary.

3.6 KNOWN ARCHAEOLOGICAL SITES

Nine aboriginal occupation sites are recorded as being within a one mile circumference of the proposed project area. None are known for within the project area itself. All nine sites are located upon the La Jolla 7.5 minute topographic quadrangle. Following is a brief description of each site as recorded on the appropriate site records on file at the particular institutional survey office.

SDi-42

Camp site traces. Site recorded by N. C. Nelson.

"Situated about one and a half miles west of Old Town or North San Diego on the low hills near the point where the San Diego River first touches the high hills after crossing the delta separating False Bay and San Diego Bay. Only a little refuse is present and the site probably marks only a temporary camp."

SDi-43

Camp site traces. Recorded by N. C. Nelson.

" Situated on the south side of False Bay near the head of the second tongue of the high land running into the marsh. This place is of little significance."

SDi-44

Refuse heap. Recorded by N. C. Nelson.

"Situated on the south side of False Bay, a little west of the town of Ocean Beach. The refuse lies on an easy slope not far from the marsh edge and covers an area approximately 75 feet in diameter. A good deal of sand is mixed in with the shell, etc., and the depth of the material is uncertain though not very great."

SDi-45

Refuse heap. Recorded by N. C. Nelson.

"Situated within the town limits of Ocean Beach between the harbor channel and the first street south and not far from the small cove extending southward from the channel. The refuse of the characteristic shellmound material covers an area measuring about 50 x 75 feet and may be two feet in thickness."

SDi-46

Refuse heap. Recorded by N. C. Nelson.

"Situated within the town limits of Ocean Beach between the harbor channel and the first street south. The accumulation lies in a private garden and is of small dimensions, measuring not over 30 feet in diameter and one or two feet in depth."

SDi-47

Refuse heap. Recorded by N. C. Nelson.

"Situated within the town limits of Ocean Beach near the harbor channel and not far from the bath house. Two streets meeting in the form of a 'Y' cut through the refuse which covers an area measuring approximately 200 feet in diameter. The depth may amount to one or two feet in places."

W-160

La Jolla II site. Recorder unknown.

"Through modern alterations and the main section left being covered by a residence and plantings nothing could be done but to examine an exposure in the slough terrace talus. Depth, nature, and number of cultures present are unknown. La Jolla II midden matter was exposed. Point Loma Boulevard cuts off a 100' strip, leaving a small area on the heights and a larger section under houses on the Mission Bay slough margin.

W-166

La Jolla II & III site. Recorder unknown.

"In the cliff on the bay side tidal scour has uncovered small midden lenses at a depth of 7'. These may be of La Jolla I age but it could take a considerable amount of excavation to determine. The first definite evidence of man here begins with La Jolla II. After this period La Jolla III fishers occasionally visited the point as is attested to by a very few sherds. Located on Crown Point. Area is one mile north and south by one-half mile east and west. Scattered and discontinuous."

W-1150

Pacific - Mission Beach, Recorded by F. Shippek, 11/2/76.

"Entire beach area was used by Kumeyaay who came down from the mountains to get seafood and trade with coastal people. Probably camping above high tide line and above beach.... Mission Beach formally had cover of manzanita."

4.0 HISTORY OF MISSION BAY

The name "Mission Bay" was appended to the region in 1888 with the publication of a poem in Golden Era Magazine. A name

no doubt, with more dignity and romance than the old name:
False Bay (Held 1975).

4.1 EARLY DESCRIPTIONS

The Cabrillo-Ferrelo expedition of 1542-1543 is the first expedition to this part of the California coast. While some mention is made of the Bay of San Diego to the south, nothing is known of Cabrillo's observations regarding Mission Bay. This situation is due to the original log of his exploration not surviving from the era of its writing. What does survive is a recounting and summation of the journey credited to Juan Paez. However, details of the journey are woefully absent from this otherwise important account (Moriarty and Keistman 1968).

The next voyage of exploration to this coast, and the first to actually explore Mission Bay, was that of Sebastian Vizcaino in 1602-1603. On November 20, 1602, an ensign of the expedition was ordered to

" . . . examine a bay which was to windward some four leagues . . . he did so, and the next day . . . reported to the General that he had entered said bay, that it was a good port, although it had at its entrance a bar of little more than two fathoms depth, and that there was a very large grove at an estuary which extended into the land, and many Indians; and that he had not gone ashore" (Bolton 1908).

The Derrotero of the expedition records the name given to the estuary as "Ensenada de Baxa Entrada" which means "Harbor of the Lower Entrance."

"Puerto Anegado" (overflowed port) is the name of Mission Bay in use during 1776 when Pedro Font was staying at the newly established (1767) Mission San Diego de Alcala. The following excerpt from his account (Bolton 1933:206) shows the effect physical discomfort can have on the observations of even the most well intended observer:

"Wednesday, January 17, 1776.

Although I felt somewhat relieved of the flux, I myself was very much afflicted by some very painful little sores which came out of my mouth and tongue, scarcely permitting me to talk or eat except with great difficulty. It is the disease which in California they call fuego marcial.

Thursday, January 18, [1776].

The day continued very damp and dismal from the fog, and I expelled much humor from my sore mouth and tongue without relief, and talked with great difficulty. In the afternoon came a report that in Puerto Anegado a whale had become beached, and later on that there were two; however, they were not whales, but two large fish about three varas long. It is to be noted that on those coasts it regularly happens each year that some whale is beached. When this occurs the Indians notify each other immediately and assemble like flies to eat it, and there they remain on the coast until they finish it. And since it usually is so fat and they so vile, on eating it they oil and smear themselves with the fat, which is foul, and then they are so malodorous that with the bad scent which they exude they are a veritable pest."

When George Vancouver visited San Diego in 1793, he referred to Mission Bay as "Puerto Falso" (False Port) and "the Lagoon" (Wilbur 1954:182). The name Puerto Falso or Bahia Flaza (False Bay) became by far the most common designation with regard

to maritime activities throughout Spanish and American period seafaring. Numerous sailing directions for these historical early years warn the shipmaster to be cautious and not mistake False Bay for the port of San Diego to the south.

4.2 MISSION BAY AS NAVIGABLE WATERS

In the very strictest sense of the term, Mission Bay was a navigable waterway throughout recorded history. However, in actual practice, only the smallest sail or paddle powered boats could avail themselves of the estuary's shallow interior. Soundings made by various surveyors through the last 400 years have shown the former natural entrance channel and the offshore bars to be too undependable with respect to attempted penetration by larger draft vessels.

Beginning with Vizcaino's survey of less than two fathoms over the entrance bar, and continuing through Patoja's map of 1782, which showed the entrance to Puerto Falso as shoaling, the recommendation of all who recorded its entrance was avoidance. Lt. Emory, the U. S. Surveyor of early California remarked: "Where meeting the waters rolling in from seaward, a bar was formed by the deposit of sand, making the entrance of False Bay impractical."

James Alden, on his hydrographic survey chart of 1859 shows Mission Bay to be with bar and "heavy breakers," regardless of its seemingly navigable interior. The precision of his soundings outside Mission Bay is impressive as he labels two small

locations there as having a hard bottom. The field survey portion of this study indeed revealed two reefs in the same approximate positions.

One exception to the foregoing evidence of impractical penetration of False Bay is the statement attributed to Lt. George Derby by George Davidson (1887) that False Bay was once sufficiently deep as to admit vessels of considerable size, but by 1810 it was filled with shoals and sandbars and hardly deep enough at low tide for a sailboat (Pourade 1960).

Numerous sources credit the name "Puerto Falso" to Cabrillo's 1542 voyage. The story, briefly retold here, is that a watering party was sent out to fill the ship's casks. Somehow, apparently, the groups' amblings became confused, and they returned to find their ship missing. Thinking she had sailed without them, they surmounted their collective despair, and set off south for Mexico. After just several miles, they made San Diego Bay again, and to their great delight, realized their error. There in the real bay of San Diego reposed their vessel, awaiting their return and unaware of the trickery of False Bay.

While a romantic story and no doubt suitable for continued telling, the author of this report could not find authoritative reference which could clarify its source or truth.

The name "North Bay" occurs infrequently when referring to Mission Bay, but this title, although regionally logical,

causes confusion with the northern portion of San Diego Bay and, presumably was never very popular.

The official adoption of the name "Mission Bay" occurred under the auspices of the United States Board of Geographic Names on October 6, 1935 (MacMullen 1956). However, many sources continued using the old name of False Bay until much later. The highly respected and exceedingly accurate British Admiralty's Sailing Directions continued the old name through their 1950 edition.

4.3 HISTORICAL DEVELOPMENT

The mudflats of Mission Bay were popular as a resource for waterfowl from prehistoric times (Cuero 1968). By the 1880's and probably sooner, the San Diego citizenry operated temporary hunting camps around the estuary with a permanent camp and first cottage being erected by W. Morgan, W. Francis, and M. Chick at a place known as Duckville near the back of the bay in 1885 (Held 1975).

A second structure was erected by Charles May in 1887. By 1900 there were a dozen shacks making up Duckville and by 1915 nearly 30. The flood of 1916 carried most of them into the sea.

In early 1915 the bay shore railroad company built a 1500 foot bridge across the entrance to Mission Bay from Ocean Beach to what was to become Mission Beach for the purpose of selling

lots. This wooden structure was 50 feet wide and supported trolley tracks as well as two automobile traffic lanes and pedestrian sidewalks.

Ruth Varney Held, from whom much of this information on turn-of-the-century history is taken, describes the process of adding recent cultural material to the present project area:

"Perhaps the bridge's greatest hour was when the January 1916 flood washed out almost everything in Mission Valley, including the Morena bridge by Old Town, and the railroad track. Nobody could go north except through Ocean Beach and across the Mission Bay bridge.

Debris from the flood jammed up against the pilings so thickly that expert log-rollers had to be imported to keep a small space open in the center of the channel. I remember looking down on all that kindling-wood from fences, trees, houses and furniture, and seeing a dead pig or cow, still floating, and a rocking chair, crazily tilted.

For months, treasures from this clogged-up mess floated onto the nearby beach, and beachcombers made some fascinating finds."

The bridge, demolished in 1951, was located approximately across the entrance channel as the main channel turns toward Mariner and Quivira basins moving up harbor from the sea. No evidence of its presence now exists within the project areas.

4.4 MISSION BAY PARK

The California Division of Parks acquired miscellaneous lands within the Mission Bay estuary from purchase and contributions between 1929 and 1945. Planning of the park was begun

by the City of San Diego in 1930, with major configuration to park design being completed in 1962 (Patterson 1965).

4.5 EXISTING PROJECT AREA JETTIES

The project area contains three jetties formed of ultra-basic rock material blasted out of the sides of Mission Bay Gorge and hauled 12 miles to their present position. Approximately 650,000 tons, weighing from 8 to 12 tons each were used in construction with an additional 10,000 tons of rock, weighing from 12 to 15 tons each, placed at the outer ends of the jetties as armor stones (Davis 1953).

The middle jetty, about 3800 feet long, was completed in 1949. The south jetty, about 1500 feet long, was completed in January, 1950. The north jetty, 3300 feet long, was completed in September, 1950. The south jetty was extended in September, 1970. These structures have a top width of 16 feet, side slope of one on one and a half and rise to 14 feet above mean low water.

4.6 DREDGING HISTORY

The dredging and filling of the interior portions of Mission Bay (outside the present project area) was begun in 1946 and completed in 1963.

Within the present project area, dredging of the entrance channel commenced in June of 1950 with a 300 foot wide pilot channel dredged to minus 8 feet MLLW. The Korean War interrupted

this effort until 1954. In July, 1955, the navigational channel was completed to a depth of minus 25 feet MLLW.

The dredging of the remaining channel within the current study area, to a depth of minus 20 feet MLLW, was completed in December, 1957. The spoil from this operation was pumped to the eastern perimeter of the bay along Highway 101. Detection and inspection of this fill area for cultural resource indications was negative.

In June, 1960, the outer 1,000 feet of the navigational channel entrance was redredged to minus 25 feet MLLW. In May of 1973 additional maintenance dredging was conducted within the entrance channel.

4.7 HISTORIC VESSEL LOSSES

Numerous published compendiums of shipwreck losses, as well as the author's own files, were consulted for indications of known or suspected vessel losses, modern or historic, within and near the project area.

Several vessel losses of over 50 tons gross weight are recorded for the Point Loma and La Jolla Peninsulas to the south and north of the project area, with one sinking occurring within Mission Bay itself. None are recorded as within the project area under study, nor sufficiently close to warrant detailed consideration here. It is important, however, to understand that except for the late historic period, shipwreck

knowledge along the California coast is decidedly incomplete, with the discovery and research potential of older, unknown wreckings being the most scientifically valuable. The following list of known losses is presented under the criteria that each may have contributed some amount of artifactual material to the environment, and are not discussed with respect to individual culture resource value nor salvage history, which must be considered probable in view of their relationship to local maritime support facilities.

<u>Name</u>	<u>Vessel Type</u>	<u>Loss Date</u>	<u>Loss Location</u>
ALICE McDONALD	Lumber Schooner	12/31/09	Pt. Loma Light
ALICIEL	Gas screw	12/13/16	Near Pt. Loma
BELLE ISLE	Oil screw ferry	6/12/34	Off San Diego
DIANA	----	8/7/48	No. of Pt. Loma
DOT	Converted Navy craft	12/2/51	Mission Bay channel
LAZY DAYS	Barge	5/9/53	Off Sunset Cliffs
SHOSHONI	Oil screw	3/18/65	Mission Bay
Unknown Junk	----	----	at Pt. Loma

Generally, the maritime weather of the San Diego region is considered consistently favorable for waterborn commerce when compared to other areas of the Pacific coast. Except for the months of fog common to the entire north Pacific region, a seafarer was relieved to come into San Diego waters. This condition rarified accidents due to storms and foul weather, with

most sinkings occurring for other reasons.

A number of smaller vessels are known to have sunk, capsized, or broken up in the vicinity of the entrance channel at Mission Bay. These accidents are normally the result of unsafe boats or inexperienced operators, although the early natural configuration of the entrance channel and later semi-developed channel generated unusual and dangerous conditions which could take even the expectant experienced boater by surprise.

Newspaper articles have periodically appeared lamenting the unsafe conditions for boaters and swimmers within the entrance channel (San Diego Union 1937, 1950, 1951, 1952, 1965, 1973). Any or all of these events may have had the capacity to litter the offshore seabottom with human cultural material. In the diving inspections which were conducted throughout the project area, numerous debris was encountered attesting to constant loss or expulsion of modern artifactual material.

5.0 SURVEY METHODOLOGY

Each of the four locations comprising the project area were examined for archaeological potential based upon the perceived impacts of natural processes and historic human development.

The dredging history of the main channel outside Quivira and Mariners Basins, compounded by recent sediment accumulation, minimizes the potential for visible cultural material. Therefore

these two locations were surveyed by divers for indications of undisturbed surfaces or protruding artifacts. None were found.

The mouth of the San Diego River, as presently fixed by Army Corps of Engineer's floodworks, roughly defines the late historic location of the river outfall. This area is now obscured under a natural sandbar, which commonly forms at locations of this configuration. This accumulation of sand is of recent origin and should not have historic or prehistoric material associated with it. Visual inspection confirmed this assumption.

The proposed breakwater location offshore of the Mission Bay entrance channel was deduced as having the best chance of containing cultural resources due to its comparatively low disturbance by modern human development. This is not to say that this area is wholly unimpacted, but that natural oceanic forces have probably played the major role in its present configuration.

When viewed as part of the larger coastal processes which dictate nearshore bottom topography, it can be seen that the breakwater project area is composed of sands in seasonal dynamic flux, impacted to an unknown extent by proximity to a tidal basin (Mission Bay), bay barrier bar (Mission Beach) and active, although intermittent fluvial outfall (San Diego River).

The various sand migration and transport schemes which can be postulated for this environment are of course tentative and theoretical until checked, but basically it can be assumed by the archaeologist at sea, as well as on land, that this area has seen periods of sediment erosion and deposition, probably alternately, and that archaeological material has been either buried or uncovered within the sediment blanket and may or may not be exposed at the time of survey. This necessary realization begins a process of seeking to understand those considerations which are peculiar to the search for cultural heritage underwater.

5.1 REMOTE SENSING

Subjecting a suspected archaeological area to the closest possible scrutiny, within the constraints of time and budget, is the goal of the survey archaeologist. In the water-covered environment, particularly a survey area of some size, a cost effective expedient is the implementation of remote sensing instrumentation. These devices in consort with accurate navigational positioning, can determine the presence of certain cultural indicators, some of which may not be accessible to a visually or tactile oriented survey diver.

What's more, these remote sensing systems, when interrelated, can provide the investigator with a unique "aerial view" not otherwise possible in a water covered environment. Physiographic

features such as outcropping, sand patches (current direction and force can be inferred from reflected sandwave patterns), and even cultural artifacts of the right type, can be accurately plotted and investigated efficiently. The data generated by these devices can be further utilized during later engineering and construction phases. A variety of remote sensing systems are available, and their application to marine archaeological survey is just beginning.

5.2 REMOTE SENSING SURVEY

A remote sensing survey was conducted on July 29, 1979, offshore of Mission Bay at the proposed breakwater location and consisted of a Geometrics Model 801/3 full field marine proton magnetometer. This instrument consists of a sensor head, transmission tow cable, and electronics console. The sensor depth in the water column is controlled by the amount of cable issued from the survey vessel.

Optimum distance off bottom sediments is considered to be six feet. However, due to kelp, probable outcropping, and the potential for modern debris associated with a harbor entrance, a somewhat higher altitude (depth) was maintained.

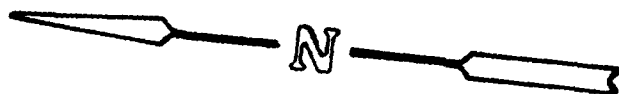
The magnetometer detects disturbances in the earth's local magnetic field caused by concentrations of ferromagnetic material (i.e., iron, steel, etc.). A variation of gradient, called an anomaly, is recorded upon a strip chart as permanent record.

Chart speed for this survey was two inches per minute. Vessel speed approximately three knots. The sensor was polarized every three seconds along the survey transects. Line spacing was sixty feet with instrument sensitivity plus or minus one gamma.

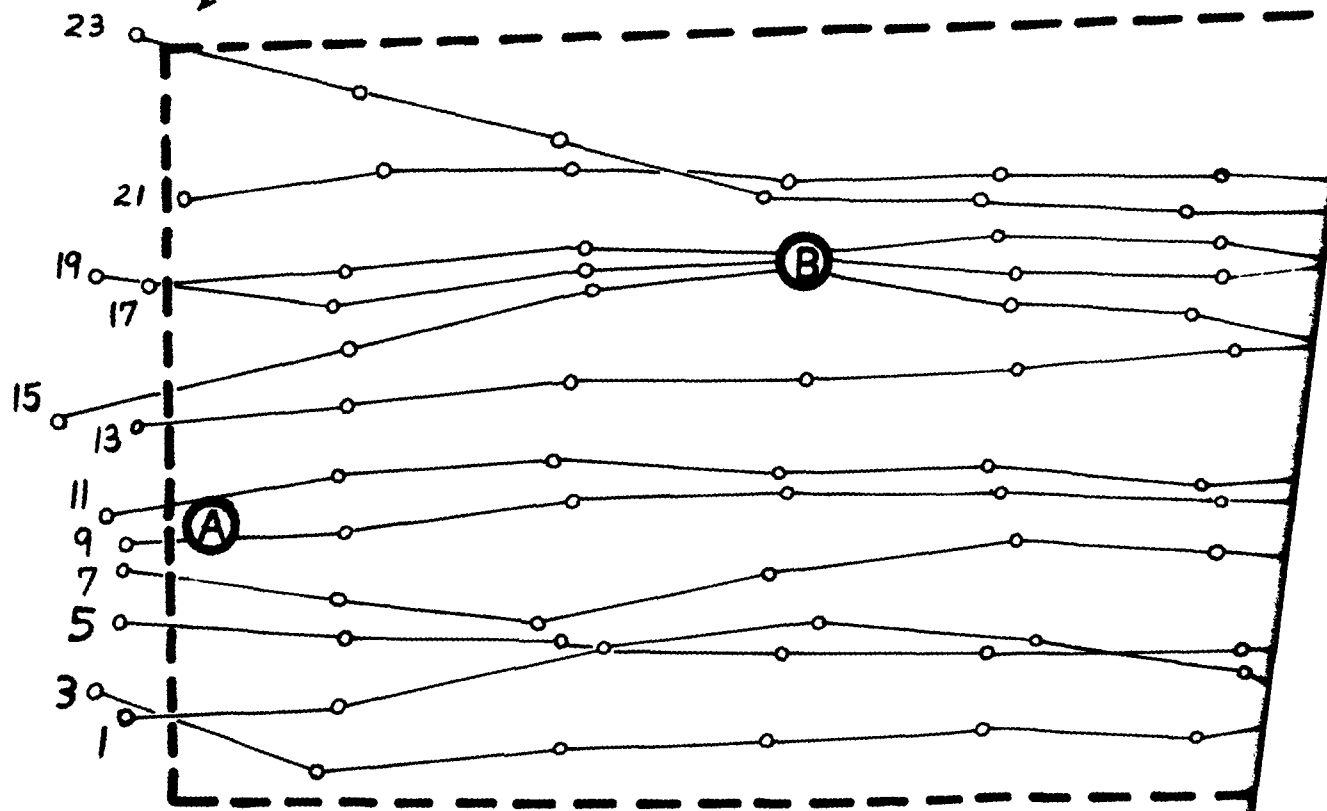
The magnetometer's sensitivity to an iron object is a function of mass versus distance. Survey parameters were selected to detect any ferrous object of sufficient size within range of the sensor. Although natural geologic features containing significant amounts of iron are also detected, waveform analysis can distinguish those anomalies normally considered of cultural origin.

Ferromagnetic objects of cultural resource value may derive from the iron known to be aboard historic period vessels, or from other materials such as fire baked bricks, hearth rock, imported stonework, and ship ballast. All effect ambient magnetics.

Navigational positioning throughout the magnetometer survey was obtained using a Motorola Mark III Miniranger system employing a primary transponder net consisting of two transponders, each deployed upon a U. S. G. S. benchmark ashore. Accuracy of this system at survey range was plus or minus three feet. Navigational fixes (shot points) were taken at 250 foot intervals along all survey tracts. In addition to this system, a transit position was established on the north entrance jetty



N 217,610
E 1,689,330



PROPOSED BREAKWATER (A)

N 217,495
E 1,688,440

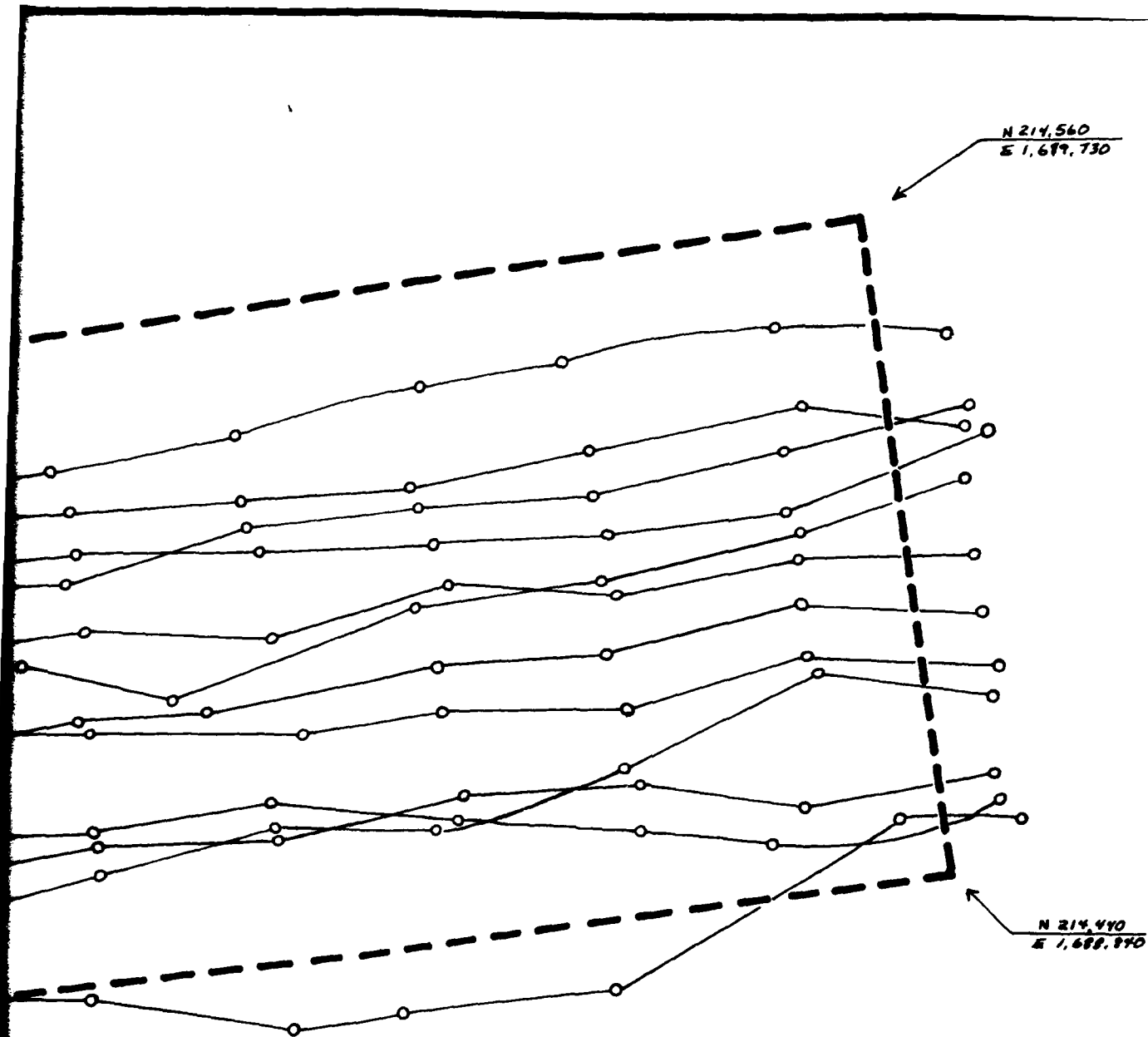


FIGURE THREE MAGNETOMETER SURVEY

Ⓐ Ⓑ Ⓒ FERROMAGNETIC SOURCES

---○--- NAVIGATIONAL FIX POINTS

1" = 200'

overlooking the survey area to facilitate relocation and tie in the survey area to local charts.

5.3 SURVEY RESULTS

Overall, the magnetometer performed well and the resulting records were acceptable with regard to archaeological analysis. The data revealed three magnetic anomalies within the primary survey area (Figure 3).

Anomaly "A", 1250 feet northwest of the north entrance jetty in approximately 40 feet of water, measured 25 gammas above ambient background gradient. Upon diver inspection this source proved to be an angle-iron and corrugated pipe fabrication approximately twelve feet long, by six feet wide, by eighteen inches high as it rested in bottom sediment. Undoubtedly of modern construction, this object in its present deteriorated condition is suggestive of a pontoon float. Its mass is estimated at approximately 600 lbs. The relatively low gamma value for an object of this size with respect to sensor distance at this survey line separation is considered to be a function of its structural components being assembled so as to partially cancel each member's individual magnetic alignment. Rust, which is nonmagnetic, may also contribute to the low value. Unfortunately, poor water visibility due to suspended particles precluded obtaining a decent photograph. This submerged feature has no cultural resource value.

Anomaly "B", having a gamma value of -15, is located approximately 725 feet west of the north jetty in 25 feet of water. Section 6.1 of this report describes the search for this object. It was observed on magnetometer survey lines 15, 17, and 19, and is the only anomaly of the three that appears as a peak in the negative polarity. This condition normally indicates detection of the northerly disruption trough within the local magnetic field. As the survey lines diverge apart in this location, the positive sense (polarity) may be undetected and slightly west of this feature.

Anomaly "C" is 20 gammas in size and is seen on survey lines five and seven at shot point eight. Its location is approximately 1450 feet southwest of the transit position on the north jetty. Water depth is 35 feet. A description of the diver search also appears in Section 6.1.

5.4 DISCUSSION OF RESULTS

It should be noted that the ambient magnetic gradient, while consistent in the northern half of the survey area, falls off sharply moving from the center south. This may correspond to basement lithic horizons (rock beds) dipping south under the area, or it may, and probably does, point to a sediment filled erosive feature associated with the nearby San Diego River Channel to which it aligns. The thickness of unconsolidated sediments over this feature is unknown, as is

its effect upon the proposed overlying breakwater structure.

Every marine survey encounters field problems which appear without warning and sometimes continue without end. Some situations occurred during this particular survey which are illustrative of this statement and they will be discussed here in the hope of terminating their existence with respect to future field efforts.

First of all, each remote sensing instrument which can provide additional information about the project area is well worth the slightly additional cost, providing its output is productive. The decision to continue a planned field day without a particular instrument can prove to be troublesome later.

The original survey of this area was designed to employ a side scan sonar system to define bottom characteristics such as outcrops, sand patterns, and protruding artifacts, if any. The day before field mobilization, it was determined that the side scan sonar was inoperative and required factory repair. A search was made to locate a replacement, but all systems were in use elsewhere. Since the remaining survey instruments were committed to other projects following these days of reservation, it was decided to go without sonar. Mistake! The survey area, described by all locals interviewed as a featureless sand plain, was found during diver search to have outcrops, depressions, rises, and at least one visible object (Anomaly "A"). Later diver investigation would have proceeded far

smoother if these bottom features were sonagraphically recorded.

The original methodology was a second time changed by a stand down interval of one week between the remote sensing survey and diver inspection survey. The original plan was to mark any discovered anomalies with buoys so that they could be inspected by the dive party the following day. Since it was felt that a week was too long a time to expect the buoys to remain on site, it was decided to relocate the anomalies using the angle and range information from the shore transit station. This later proved difficult due to a variety of factors such as glare, distance, swells, and variations between cartographic materials.

The high traffic volume of watercraft around a marina entrance lent an unexpected, although minor problem affecting data quality. Anticipating the possibility of high boating traffic with regard to safety and survey line interruption, a new variable interloped. It seems that water turbulence caused by vessels powering through the survey area can leave a disrupted zone for some minutes after their departure. The magnetometer sensor head was sufficiently disturbed in its orientation while being towed through these zones of "shadow turbulence," that it registered vibration on the recording chart. While not detrimental to the primary survey transects, this condition increased unexpectedly when the afternoon sun

brought out additional marina traffic and subsequently canceled plans to reinforce the primary survey magnetometry data with an interrelated secondary survey.

It can be seen that the east inshore edge of the survey area (Figure 3) shows no survey transects. These missing lines were run, but the magnetic influence area of the iron-rich jetty rock was such as to make their interpretation of marginal value.

In retrospect it is felt that the remote sensing survey was extremely beneficial to proper investigative inquiry. The limitations imposed upon this equipment are being continuously challenged by innovative application. This survey, now within the Corps of Engineers' experience, will allow for a continuous tightening of survey control standards in future efforts.

6.0 DIVER INSPECTION SURVEY

Diving activities within the proposed breakwater area (Location 1, Figure 3) were conducted in two phases:

6.1 TOWED DIVER LINEAR TRANSECTS

A series of nine diver survey transects were implemented north and south along the length of the offshore survey area. Visibility varied from 5 to 25 feet horizontally over all field work as well as through each diving day. Average visibility was approximately 15 feet. The two towed divers maintained a separation from each other of about 15 feet. This allowed

an average inspection corridor 45 feet wide with a 15 foot overlap of center. Approximately 50 per cent of the study area was inspected in this manner.

Initially, the divers were towed on underwater sleds by the support vessel. However, it was decided on the second day that in this depth of water (35 to 45 feet) it was more convenient to discard the sleds and simply utilize tow ropes. The support vessel would maintain course and position references with the short transit station, and at "walking speed" (1 - 2 knots) tow the dive team, each grasping individual 150 foot tow lines, down and back across the study area.

Each diver was able to independently alter his depth and relative position to the other survey diver by using his free arm as a combination elevator/aileron control surface. The arching of the back and offsetting of the legs serves as a rudder. This method proved highly workable and allowed the divers to concentrate on bottom inspection, rather than diverting attention to the sled. This additionally increased safety, as the primary concern of a quick-response tow sled is the danger of embolizing the diver with overly fast altitude adjustments. Should strong currents or diver fatigue problems have appeared, the sleds would have been reemployed.

Each diver, throughout all field work, was equipped with a personally deployable buoy for marking any finds made. It is necessary to carefully choose a buoy for this purpose, as

some commercially available models are inadequate for open water use, the under-weighted anchor being a principal complaint.

6.2 TOWED DIVER TRANSVERSES

In addition to the previously described linear transects of the survey area length, a short traverse by dive tow was utilized across the 900 foot width of the survey area. Seven transects were made in this fashion, the purpose to concentrate attention on the areas indicating the source of the ferromagnetic disturbances. Another 15 per cent of the survey area was inspected in this mode. While sufficiently workable for its intended purpose, it was found that the turn-around aspect in this short an area caused the divers to come to rest while waiting for the support vessel to make its 180 degree turn. For this reason it was determined that the study area width was too short for this procedure, and the searchline method more suitable.

6.3 LINE AND ANCHOR CIRCLE SEARCHES

The second phase of diving operations consisted of performing a particularly intensive inspection of those localities which indicated a ferromagnetic disturbance, but which yielded no sighting during transect operations. This was accomplished by anchoring the support vessel over the location and instigating diver circle searches of the locality.

The procedure is simple and effective for locating objects not entirely buried and in low visibility water.

With one end of a predetermined length of line (75 feet was found best) secured to an effective anchoring weight, a circle is described by one diver swimming the free end, while the other diver monitors the drag of the intermediate length. If the line snags on a protrusion, both divers will soon become aware of it. A 150 foot diameter circle can thus be inspected.

6.4 DIVER PHYSIOGRAPHIC OBSERVATIONS

Visibility, as previously mentioned varied throughout all diving phases. During transect tows of the study area, water clarity ranged from over 20 feet to less than five feet. This patchy appearance is thought caused by shallow depressions which were evident throughout the survey area. While having a negative relief of only a foot or so over perhaps a 100 foot area, depressions would pool heavy particulate-laden water and create a patchy visibility effect within the survey area. While not of such significance as to hamper diving operations, they did cause a slight loss of the orientation to an area which a survey diver normally develops when working a project location.

All diving was spaced with appropriate surface intervals so as to eliminate the need for decompression stops and other equipment required when working on the decompression tables.

6.5 DIVING SURVEY RESULTS

During the first two days of diving several areas of outcropping were discovered. Both appear linear and strike toward

each other. They probably connect under the sediment blanket,

One area occurs in the southern portion of the proposed breakwater area, the other exists just outside and to the west of the northern sector. They each consist of the same type of sandstone material and may be part of the same formation. The southern outcrop is more heavily overgrown with algae and grasses. This is probably due to its shallower water depth (30 feet). These outcrops were devoid of any archaeological material, although some modern fishing and boating debris was noted.

Although a jet probe system was on board for the majority of diving days, it was used only to uncover one end of Anomaly "A" (the float) and to dig several test trenches in the area of Anomaly "B". Its usefulness is considered applicable when the source under investigation has been carefully pinpointed by the magnetometer or sensitive metal detector.

Five per cent of the offshore survey area was investigated by the circle search diving method. This brings the total percentage of project area surveyed by observation divers to 70 per cent, which compares favorably with sample size estimates of similiar terrestrial areas.

7.0 CONCLUSIONS

The project area exhibits the potential for discovering artifactual material of a historic or prehistoric nature. However, no material was found to be within the area of proposed impact itself.

Except for magnetometry Anomaly "A", an angle-iron assemblage of modern construction and probably a float or section of floating dock, the two remaining ferromagnetic sources are unidentified. Their depth of burial in sediment is unknown, although waveform analysis suggests they are shallow, probably less than five feet. No other cultural indications are apparent within any of the four survey areas.

Additionally, the maintenance dredging contemplated for the Mission Bay navigational channel entrance is not expected to have impact upon cultural resources due to the original dredging having already reached the indicated depths.

8.0 RECOMMENDATIONS

Magnetometry wave form analysis indicated the two unidentified ferromagnetic sources to be of cultural origin; their cultural resource value is unknown. While the area has seen a large amount of modern development, it is also located near the oldest spanish city in Alta California. The very name "False Bay" itself suggests, in a maritime sense, the possibility of historic accident depositing maritime materials in this locality.

The magnetic anomalies herein reported may have potential research value. They are located approximately 250 feet either side of the proposed breakwater baseline (Figure 3).

Due to the nature of the proposed project and the distance of each unknown anomaly to the baseline, no further action regarding determination of the identities of these objects is

recommended at this time. However, should the breakwater construction be moved so as to impact these unknown objects, an additional test phase should be implemented for the purpose of uncovering the identity of these sources and determining their cultural significance.

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