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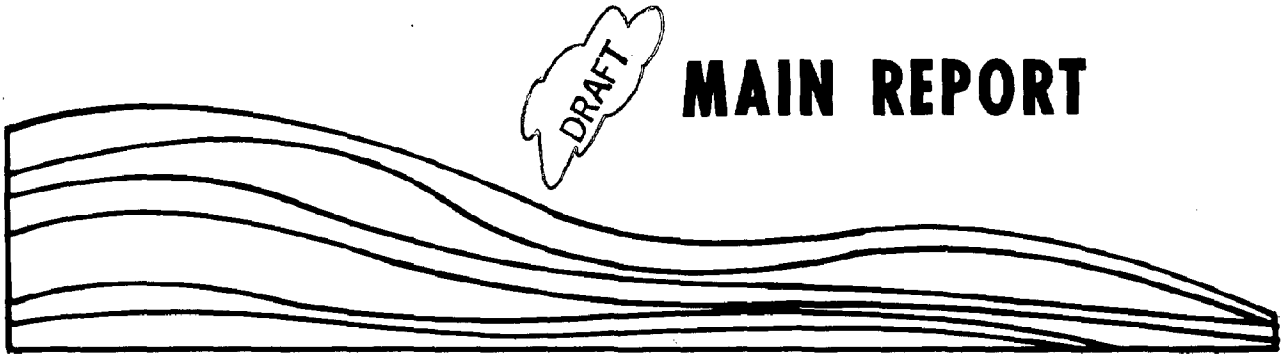
SURVEY REPORT FOR BEACH EROSION CONTROL



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DECEMBER 1978

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VENTURA COUNTY, CALIFORNIA

SURVEY REPORT FOR BEACH EROSION CONTROL

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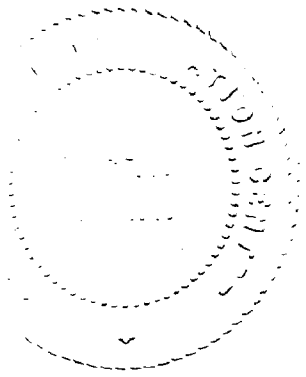

Prepared by

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Los Angeles District, California

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December 1978

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VENTURA COUNTY, CALIFORNIA

SURVEY REPORT FOR BEACH EROSION CONTROL

SYLLABUS

The District Engineer finds that there are insufficient benefits to justify Federal participation in any shore protection projects in Ventura County at this time.

It is concluded that there is no demand for additional beach area in the foreseeable future because overall, there is adequate beach area and a slowing populaton growth in the tributary area.

Analyses of the economic, photographic, and coastal data have determined that, at the present, except for the private areas of Oxnard Shores and County Line Beach, beach erosion control projects are economically infeasible. No authorization now exists for Federal participation in private areas, therefore participation in the financing of beach erosion control projects by the Federal government in Ventura County is precluded.

VENTURA COUNTY, CALIFORNIA

SURVEY REPORT FOR BEACH EROSION CONTROL

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No.	Title
1.	Ventura County coastline
2.	Shoreline ownership

APPENDIXES

No.	Title
1.	Significant environmental features and concerns
2.	Tributary area analysis
3.	Coastal data
4.	Wave and longshore transport climate
5.	Pertinent correspondence

VENTURA COUNTY, CALIFORNIA

SURVEY REPORT FOR BEACH EROSION CONTROL

THE STUDY AND REPORT

The Ventura County shoreline is along the coast of southern California between Los Angeles County and Santa Barbara County. (See pl. 1.) The shoreline has long been the scene of beach erosion, varying from minor to critical; therefore, concern over the potential damage to public and private property prompted the Board of Supervisors, County of Ventura, to pass a Resolution on February 9, 1971, to request the United States Congress to provide funds for a beach erosion control study of the Ventura County coastline. In response to this request, Congress provided authority and funds to initiate this study through the U.S. Army Corps of Engineers.

AUTHORITY AND PURPOSE

This report presents the results of the beach erosion control study made of the shoreline of Ventura County, California. This investigation was carried out in accordance with the following resolution sponsored by the late Congressman Charles Teague and adopted October 19, 1967, by the Committee on Public Works, United States House of Representatives:

Resolved by the Committee on Public Works of the House of Representatives, United States, that, in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army is hereby requested to direct the Chief of Engineers, to make a survey of the shores of Ventura County, California, and such adjacent areas as may be necessary in the interest of beach erosion control and related purposes.

The purpose of this study is to: (a) evaluate the various aspects of the beach erosion problems along the Ventura County coastline; and (b) determine the extent of Federal interest in the problem areas.

SCOPE OF STUDY

The study area encompasses 41.2 miles of Ventura County shoreline, extending from Rincon Point at the Santa Barbara County line downcoast to Sequit Point near the Los Angeles County line. (See pl. 1.)

STUDY PARTICIPANTS AND COORDINATION

LOCAL SPONSOR

The Department of Public Works, Ventura County, provided technical data and valuable assistance to the Los Angeles District, U.S. Army Corps of Engineers, during the entire study period.

GOVERNMENTAL AGENCIES

Close liaison was maintained with all governmental agencies having property ownership or jurisdiction over the shoreline. These agencies consisted of the U.S. Naval Construction Battalion Center at Port Hueneme, the Point Mugu Naval Air Station, the State of California Department of Transportation, the State of California Parks and Recreation Department, the State of California 31st Agricultural District Association, the Ventura County Parks Department, the Ventura County Harbor Department, the Ventura Port District, the City of San Buenaventura Parks and Recreation Department, the City of Oxnard Planning Department, and the City of Port Hueneme Public Works Department. In addition to these agencies, close coordination was had with and valuable information was obtained from the State of California Department of Navigation and Ocean Development, the State Lands Commission, and the U.S. Fish and Wildlife Service.

CITIZENS' COORDINATING COMMITTEE

Public involvement was maintained from the start of the study by the formation of a citizens' coordinating committee shortly after the initial public meeting. Meeting bimonthly, the Ventura County Citizens' Advisory Committee, composed of private citizens and public employees, provided valuable input to the study by obtaining comments from the public regarding their problems and concerns.

PUBLIC MEETINGS

An initial public meeting was held on June 22, 1972, to provide all interested individuals and organizations the opportunity to express their ideas and comments on the beach erosion problems and also to express their desires and needs. For a more detailed discussion of the concerns of the public, refer to a subsequent section titled "Problems and Needs."

PRIOR REPORTS

Prior reports of the U.S. Army Corps of Engineers in the general study area are shown in the following table. In addition to these reports, several technical studies concerning the sand bypassing at Port Hueneme, and the submarine topography and sedimentation of Mugu Canyon have been prepared for the U.S. Army Coastal Research Center at Fort Belvoir, Virginia. A report has been prepared by the Ventura County Public Works Department entitled "Report of Beach Erosion and Damages to the Ventura County Shoreline," June 1972. File copies of the above reports are available for inspection in the office of the Los Angeles District, U.S. Army Corps of Engineers.

PRIOR REPORTS
VENTURA COUNTY, CALIFORNIA

Title	Date	Document
Ventura Harbor, California	Feb. 25, 1916	H. Doc. 792 64th Cong. 1st sess.
Appendix I, Coast of California, Carpinteria to Point Mugu, Beach Erosion Control Study	Oct. 24, 1952	H. Doc. 29 83d Cong. 1st sess.
Port Hueneme, California	Apr. 2, 1954	H. Doc. 362 83d Cong. 2d sess.
Design Memorandum No. 1, General Design for Harbor and Shore Protection Works near Port Hueneme, California	May 1957	Unpublished.
Beach Erosion Control Report on on Cooperative Study of Coast of Southern California, Point Conception to Mexican Boundary, Appendix VII, Interim Report	Apr. 5, 1960	Do.
Coast of Southern California Special Interim Report on the Ventura Area, Cooperative Beach Erosion Control Study	June 25, 1962	H. Doc. 458 87th Cong. 2d sess.
Design Memorandums for Beach Erosion Control, Ventura-Pierpont Bay Area, California		
Phase 1 Construction	Feb. 1962	Unpublished.
Phase 2 Construction	June 1964	Do.
Phase 3 Construction	Feb. 1966	Do.
Beach Erosion Control Report on Cooperative Study of Coast of Southern California, Point Conception to Mexican Boundary, Appendix VII, 2nd Interim Report	Aug. 24, 1962	Do.
Beach Erosion Control Report on Cooperative Study of Coast of Southern California, Cape San Martin to Mexican Boundary, Appendix VII, Final Report	June 1967	Do.

PRIOR REPORTS - Continued
VENTURA COUNTY, CALIFORNIA

Title	Date	Document
Port Hueneme Harbor, California	July 16, 1968	H. Doc. 362 90th Cong. 2d sess.
Ventura Marina, California	July 16, 1968	H. Doc. 356 90th Cong. 2d sess.
Beach Erosion Control Report Cooperative Research and Data Collection Program of Coast of Southern California, Cape San Martin to Mexican Boundary, Three Year Report 1964-1965-1966	Mar. 1969	Unpublished.
Beach Erosion Control Report, Cooperative Research and Data Collection Program of Coast of Southern California, Cape San Martin to Mexican Boundary, Three Year Report 1967-1968-1969	Dec. 1970	Unpublished.
Design Memorandum No. 1, General Design, Port Hueneme Harbor, California	Feb. 1974	Unpublished.

DESCRIPTION OF THE STUDY AREA

The backshore area of Ventura County is developed over much of its length, especially in the vicinity of Ventura, Oxnard, and Port Hueneme. A great deal of the county's shoreline is publicly owned and available for recreation. Exceptions include the private communities of Seacliff Beach Colony, Faria Beach Colony, Solimar Beach Colony, and Oxnard Shores, and the Federal property at Point Mugu Naval Air Station. Harbors along this coastline include Ventura Marina, Channel Islands Harbor, and Port Hueneme. Plate 2, "Shoreline Ownership," indicates public and private shoreline frontage ownership (29 miles publicly owned and 12 miles privately owned) shoreline frontage ownership in accordance with information provided by the Ventura County Public Works Agency.

GEOGRAPHIC SETTING

Ventura County is bordered on the north, east, and west by Kern, Los Angeles, and Santa Barbara counties. To the south, the Pacific Ocean provides a 41.2-mile coastline. In total, the county covers 1,843 square miles. The county presents considerable geographical variety; physical features vary from coastal beaches and fertile plains to the rugged inland mountains.

TOPOGRAPHY

The foothills and the coastal plains that comprise the Ventura coastline and the drainage areas that supply sediment to the beaches are in the Transverse Range physiographic province. This province consists of foothills and mountain ranges that trend east-west and is composed of a basement complex of crystalline rocks overlain by marine and continental sediments, volcanic rocks, and younger and older alluvium. Beach sand and gravel cover parts of the coastline; and sand, silt, and mud cover much of the shelf offshore, except for a few areas where rocks are present. Relief along the coastline varies from the gently sloping Oxnard plain to the steep, almost sheer 200- to 400-foot cliffs found along a 14-mile section of coastline from Rincon Point to Ventura. The maximum elevations along the coastline are 1,965 feet at Clark's Peak in the Santa Monica Mountains and 2,161 feet at Rincon Mountain, 9 miles northwest of Ventura.

REGIONAL GEOLOGY

The drainage areas which furnish sediments to the beaches consist of the Ventura River Basin, Santa Clara River Basin, and Calleguas-Simi Creek Basin. Bedrock in these drainage areas consists of a basement complex of crystalline rock overlain by marine and continental sediments and some volcanics. Sedimentaries in the area are of Quaternary and Tertiary age and some Cretaceous. The Quaternary terrace deposits have a considerable extent in Ojai Valley, the foothills south of Ventura, the Saugus

and Santa Paula Creek regions, the headwaters of Piru Creek and the Santa Clara River between the Pacific Ocean and the county line. Tertiary sedimentaries are found along all three drainage basins. They consist of sandstone, siltstone, clay shale and mudstone and are the major sand producing strata in the area. The Ventura River and its tributaries flow across a thick section of these sedimentaries, which are exposed in belts in a general east-west trend across the basin. Cretaceous sediments occur in isolated deposits along the upper reach of Calleguas Creek. Volcanics are found mostly in the mountain area south of Calleguas and Conejo Creek.

GEOLOGY OF THE COASTLINE

The coastline from Rincon Point at the Santa Barbara County line downcoast to the Ventura River, a distance of about 13 miles is characterized by steep bluffs composed of Tertiary marine sediments overlain by Pleistocene marine and nonmarine terrace deposits of sand and gravel. The marine sediments are the Miocene Monterey formation, described as shales, claystones, and diatomaceous shales; and the Pliocene Pico formation, described as siltstones, shales, and conglomerates. The sedimentary rocks have been uplifted into a series of northwest trending domelike anticlines and basinlike synclines. These structures have been further modified by northwest trending faults. Evidence of former shorelines, now uplifted, are seen as marine terraces, especially at Punta Gorda where there are 200- to 400-foot-high cliffs.

Downcoast from the Ventura River, the shoreline extends about 1 mile east to the San Buenaventura State Beach pier, then turns in a southeast direction for about 3 miles to the mouth of the Santa Clara River. The sediments exposed in this part of the coastline, known as Pierpont Bay, are older fan deposits, described as sands and gravels; and deltaic deposits, described as silts, sands, and clays. These Recent sediments are underlain by a sequence of Tertiary marine and nonmarine sediments; lower Pleistocene marine sediments; and upper Pleistocene alluvial flood plain deposits of clay, silt, sand, and gravels to an undetermined depth. The Oakridge fault, an east-west trending fault that parallels the Santa Clara River for about 30 miles, intercepts the coastline at Ventura Marina, which is south of Pierpont Bay.

Downcoast from the Santa Clara River to Calleguas Creek, about 15 miles, the shoreline forms the seaward limit of the Oxnard Plain, which is a broad flood plain that is formed by meandering streams and backfilled lagoons. During Recent geologic time, both Calleguas Creek and the Santa Clara River deposited alluvial material to this plain. Windblown sands, back bay deposits, and other shallow marine sediments were also deposited along the shoreline. Tertiary marine and nonmarine sediments and Pleistocene marine sediments underlie the Recent sediments to an undetermined depth. Mugu Canyon forms the southeast boundary of the Oxnard Plain and the seaward end of Calleguas Creek. Mugu Lagoon, at the mouth of the canyon, is a Recent geological feature formed by a subsiding coast and a rising sea level.

Downcoast from Calleguas Creek, the shoreline trends southeast about 2 miles to Point Mugu, a projecting headland of the Santa Monica Mountains, then continues southeast about 8 miles to the Los Angeles County line. The Santa Monica Mountains are on an east-west trending, domelike, anticlinal structure, composed of marine and nonmarine sediments and volcanic rocks. The sediments are the Vaqueros sandstone and conglomerate, both of the Miocene age. The volcanic rocks are the Conejo volcanics, composed of basalts, andesites, and breccias, also of the Miocene age.

The Santa Monica-Malibu fault lies a few miles offshore to the south and trends east-west. The Sycamore Canyon fault trends northeast-southwest and intercepts the shoreline about 1 mile upcoast from Point Mugu. The Calleguas Creek fault trends almost north-south along Calleguas Creek and intercepts the shoreline at Mugu Lagoon.

GROUND WATER

Ground water is only found in the Oxnard Plain along that part of the coastline from Ventura to Mugu Lagoon. The remaining coastline has narrow beaches that are usually bordered by cliffs of impervious bedrock. Ground water obtained either from near the narrow beaches or from the impervious bedrock would generally be highly mineralized and of poor quality.

EARTHQUAKES

Earthquakes with magnitudes ranging from 6.0 to 7.7 have occurred during the past 50 years in the Santa Barbara Channel 20 to 30 miles west of the study area and in the White Wolf fault zone 50 miles to the north. About 40 miles east of the study area, a destructive earthquake occurred with a magnitude of 6.4 at its epicenter, which was about 14 miles north of San Fernando. Other earthquakes of lesser magnitudes have occurred along the coastline, particularly offshore from Point Mugu at the southern edge of Ventura County.

LITTORAL MATERIAL

Most of the beach material in the area under consideration is derived from sediment carried to the shore by rainfall runoff from the numerous short streams draining the south slope of the Santa Ynez Mountains between Carpinteria and Ventura, from the Ventura and Santa Clara Rivers, and from littoral drift from the beaches downcoast from Santa Barbara. Geologic investigations and stream sedimentation studies indicate that the beach material consists mostly of sand.

The amount of material transported by the streams is determined by the intensity of rainfall, the stream gradient, the extent of granulation of surface rocks, and the absorptive capacity of the soil at the beginning of each rainfall episode. Deltas at the mouths of coastal streams in the

southern California area are an indication of the beach replenishing effect of runoff during floods. The material contributed by the various streams is distributed along the shore by wave action. Stream deltas are cut back by wave forces, and the material is distributed generally in a downcoast direction to adjacent beaches. Although there are no natural barriers to downcoast drift in this area, accretion on the upcoast sides of the artificial barriers at Santa Barbara and at Port Hueneme indicates a predominant downcoast movement of littoral material along this shore.

The composition of the beach material in the Ventura area has been previously determined by the Corps of Engineers, Appendix I, Coast of California, Carpinteria to Point Mugu, in its report entitled "Beach Erosion Control Study." As determined by sieve analysis, the grain size of the beach material indicates that it is sand. The median diameter of the beach sand between Carpinteria and the Santa Clara River ranges from .199 to .380 millimeter, and the average for the area is .248 millimeter. The average median diameter of the beach sand between the Ventura and Santa Clara Rivers is .275 millimeter. A study of the sieve analysis indicates that the mean grain size of the beach sand increases slightly with the distance downcoast from Carpinteria to the Ventura River; that the grain size increases more at the delta area of the Ventura River; and that the grain size increases sharply in the delta area of the Santa Clara River. The general conclusion is that the rivers add sand of larger median size than that of sand moving downcoast from Santa Barbara and that the general trend is an increase in grain size downcoast.

SOURCES OF CONSTRUCTION MATERIAL

The closest source of durable quarry stone is southeast of Camarillo, near Conejo Mountain, which is about 20 miles southeast of Ventura. This stone is durable but light in weight, having an apparent specific gravity of about 2.45. The closest source of heavier stone is Soledad Quarry, which is about 55 miles northwest of Ventura.

ENVIRONMENTAL SETTING

The Ventura County coastline from Rincon Point downcoast to Sequit Point is about 41 miles long and is composed of about 20 miles of sandy beach, about 11 miles of cobble or rocky shoreline, and about 10 miles of seawalls or rocky revetments. The Mugu Lagoon entrance, the Ventura and Santa Clara River mouths, Rincon Island (a manmade structure), and three manmade harbors -- Ventura Marina, Channel Islands, and Port Hueneme -- are prominent features. The following paragraphs summarize the environmental setting along the coastline. A more detailed discussion of the environmental setting is contained in appendix 1.

LITTORAL CONDITIONS

Although within a warm-temperate marine region, this west- and southwest-facing open coast is exposed to severe wave action. High wave energy forces

are especially prevalent in the winter, creating considerable shoreline instability. The shoreline falls within the Santa Barbara littoral cell (Inman and Frautschy, 1966). This cycle of littoral transportation and sedimentation derives its sand from the Ventura and Santa Clara Rivers. Transportation occurs as the result of wave action and longshore currents. The most frequent surface currents are from the southwest, and a downcoast movement is typical.

SAND DUNES

Because sand dunes provide a unique coastal vegetation and wildlife habitat, they are considered a significant natural resource. These areas of surplus sand occur near Port Hueneme, at the southeast end of Point Mugu State Beach Park, and at several other areas along the coast, including the "Hobo Jungle" south of Emma Wood State Beach.

OCEAN WATER QUALITY

The chemical properties of the seawater appear characteristic of similar, well mixed nearshore environments along the southern California coast.

BIOLOGICAL ENVIRONMENT

The study area contains long stretches of sandy beach that are interspersed with hard substrate (rock and cobblestone) and with many tide pool areas. Several locally unique habitats, such as marshlands, estuaries, lagoons, and sand dunes, are present. These features, in addition to the nearshore environments, provide habitats for a variety of significant biological resources, such as shore birds, invertebrate species, fish, marine mammals, and kelp. Several rare, threatened, and endangered faunal species are present, including important avifauna, such as the California least tern, the California brown pelican, and the southern bald eagle. A list of the rare, threatened, and endangered species in the Ventura County coastal area is presented in appendix 1.

RECREATIONAL ENVIRONMENT

The Ventura County coastline provides open coast beaches suitable for swimming and for other beach activities, such as fishing, hiking, camping, sightseeing, education, wildlife observation, and some of the best surfing along the southern California coast. Regional opportunities are discussed in greater detail in appendixes 1 and 2.

ARCHEOLOGICAL AND HISTORICAL ENVIRONMENT

Aboriginal occupation within the Ventura County coastal area may extend as far back as 7000 B.C. The Chumash peoples who occupied the area at the time of European contact developed a complex culture that is considered unique among most hunting and gathering societies. The area was densely populated. At least 10 major village sites are mentioned in the literature.

Seven aboriginal sites were located during the current study. Four of these sites appear to be eligible for inclusion in the National Register of Historic Places and for preservation. These sites are located at Emma Wood State Beach, at Point Mugu Naval Air Station, and at County Line Beach.

Nearshore areas at Rincon Point and at Surfer's Point have produced submerged aboriginal artifacts. Shipwrecks, which are considered to be of significant cultural importance, are present within the vicinities of San Buenaventura State Beach, McGrath State Beach, and the Port Hueneme area. There is evidence to suggest that other areas within the nearshore waters of the Ventura coastline contain cultural remains that represent a considerable timespan. These cultural remains may include aboriginal sites inundated as a result of a rise in the sea level, sunken canoes and artifacts from coastal sites, and shipwrecks from 16th century European explorers to present-day mariners (Hudson, 1976; Moriarty, 1961; Bureau of Land Management, 1978).

Historic sites representing European settlement were not observed within the study area.

DEVELOPMENT AND ECONOMY

Juan Rodriguez Cabrillo, a Portuguese navigator, landed on the shore of what is now Ventura County in 1542 where he was greeted by the friendly Chumash Indians inhabiting the area. In 1782, Father Junipero Serra dedicated Mission San Buenaventura, named in honor of a sainted Franciscan monk who lived in the 13th century. In 1872, the county was created from part of Santa Barbara County and the name was abbreviated to Ventura. Through the mid-19th century, the area's economy was agriculturally oriented. By the 1860's, however, oil was discovered in the county; and by 1900, the county had become an important area of petroleum production. This century has seen considerable diversification of the county's economy. At present, the largest employment sectors in the county are (in order): government, wholesale and retail trade, services, and manufacturing.

RECREATION AND TOURISM

Recreational facilities in Ventura County attract many visitors, as well as residents. State beaches and parks on the ocean front, harbors, and marinas make water sports a favorite form of recreation in the county. At inland lakes and parks, camping, picnicking, and freshwater sports are

enjoyed; while riding and hiking may be pursued in the Los Padres National Forest. At the Mt. Pinos Recreation Area, near the county's northern border, winter sports facilities are available. See recreational demand study for projections.

POPULATION

The latest estimates for population centers of Ventura County (as of January 1, 1977) show the largest city to be Oxnard, which has a population of 90,880. Other major centers and their estimated populations include: Simi Valley (72,209), Ventura (67,076), Thousand Oaks (62,016), Camarillo (26,463), Santa Paula (18,693), and Port Hueneme (19,491). The estimated population for Ventura County in January 1977 is 459,351. For projections see table in Appendix 2, entitled "Historical and projected population of tributary area of beach and camper usage, 1950-2020."

EMPLOYMENT

Total civilian employment in Ventura County dropped from 192,000 in June 1978 to 187,200 in July. This was the second consecutive month of declining employment in the county. Compared with June 1977 employment has increased by 6,700 or 3.7 percent.

Over the year, nonagricultural wage and salary employment grew by 2.3 percent. Gains were registered in mining, transportation and public utilities, wholesale trade, retail trade, federal government and services. Manufacturing and finance, insurance and real estate held steady over the year and declines occurred in construction and state and local government.

Wage and Salary Employment by Industry, July 1977 and July 1978

Ventura County, California

	July 1978	July 1977
All industries - total	144,200	142,400
Agriculture, forestry, fisheries	17,400	18,400
Nonagricultural industries	126,800	124,000
Mining	2,300	2,200
Construction	5,700	5,900
Manufacturing	19,400	19,400
Durable goods	13,300	13,300
Stone, clay, glass	300	300
Machinery	5,800	5,900
Trans. equip.	3,400	3,400
Other durables	3,800	3,700
Nondurable goods	6,100	6.100
Food and kindred	1,500	1,600
Printing and publishing	1,100	1,100
Other nondurable goods	3,500	3,400
Transportation and public utilities	5,300	5,200
Wholesale trade	6,200	5,800
Retail trade	26,400	23,900
Finance, insurance, real estate	5,100	5,100
Services	22,400	21,900
Government	34,000	34,600
Federal	10,000	9,800
State and local	24,000	24,800

NOTE: Employment reported by place of work excluding workers involved in labor disputes. Current month preliminary; past months revised.
SOURCE: Employment Development Department, State of California

CONSTRUCTION AND DEPARTMENT STORE SALES

Comparing July, 1978, with the year-earlier month, the component indexes measuring building permit valuations and department store sales reported increases, while a small year-to-year decline was posted by the real estate sales index.

It should be noted, however, that the region's building permit valuations index was unusually active in June. The 22.4 percent month-to-month surge of the index in 1978 compared with a 3.6 percent increase in June of 1977 and a 3.8 percent advance in June, 1976. A significant portion of the June, 1978, growth in building activity was related to a rush by developers to obtain building permits before July 1, when new statewide energy conservation standards were to take effect for all new construction.

AGRICULTURE

Agriculture continues to play an important economic role in Ventura County's economy, it ranked eleventh in the state in total gross value of agricultural products for 1977. In 1977, the total valuation of agricultural products marketed reached $307,837,000. This figure was 14 percent above the 1976 total valuation figure, with lemons, valencia oranges, and strawberries the leading products in this category. The vegetables category ranked second in terms of 1977 total marketed value. The principal vegetable

products were lettuce, tomatoes and celery. This category was followed by the livestock, poultry, and dairy category; the leading products in this group were eggs and other poultry products.

PER CAPITA INCOME

The per capita personal income for the years 1970-77 for Ventura County are as follows: $3,988 (1970), $4,099 (1971), $4,378 (1972), $4,716 (1973), $5,114 (1974), $5,507 (1975), $5,995 (1976), and $6,502 (1977). About 65 percent of the total personal income is received in the form of wages and salaries. "Real disposal personal income per capita" has risen by about 13 percent in the past 10 years.

EXISTING U.S. ARMY CORPS OF ENGINEERS PROJECTS

There are six existing U.S. Army Corps of Engineers projects - four coastal and two flood control - and they are described briefly in the following paragraphs.

VENTURA RIVER LEVEE

This flood control project, authorized by the 1944 Flood Control Act (H. Doc. 323, 77th Cong., 1st sess.), was completed in December 1948. The levee, which is along the left bank of the lower Ventura River, protects the City of Ventura from floods on the Ventura River.

SAN BUENAVENTURA STATE (VENTURA-PIERPONT AREA)

This beach erosion control project was authorized by the 1954 River and Harbor Act (H. Doc. 29, 83d Cong., 1st sess.) and was modified by the 1962 River and Harbor Act (H. Doc. 458, 87th Cong., 2d sess.). Three stages of the five-stage construction were completed by March 1967 and consisted of seven groins and about 882,000 cubic yards of beach fill. In February 1974, the last two stages were reclassified to the "deferred" status, pending demonstra-

tion of need. Periodically, sand is deposited between the groins during the maintenance dredging of Ventura Marina. The last deposition of sand was made in December 1975.

The construction of 700 feet of revetment, repair of a 30-inch storm sewer and a 6-inch waterline, and replacement of about 5,000 cubic yards of beach fill were completed as emergency work in January 1973. One groin was removed and was later restored as emergency work in February 1973. Since the completion of the emergency work in 1973, the existing groin field has been functioning satisfactorily. During the recent storms of 1977-78, no unusual or large amounts of erosion were reported.

VENTURA MARINA

This recreational harbor, built and financed by the local interests, was completed in 1963. The 1968 River and Harbor Act (H. Doc. 356, 90th Cong., 2d sess.) authorized the maintenance of the existing general navigation features and the modification of the existing harbor by constructing an offshore breakwater 1,500 feet long, by dredging about 800,000 cubic yards of material to form a sand trap in the lee of the breakwater, and by constructing recreational facilities on the jetty crests. The dredging of the sand trap was completed in December 1971; the construction of the breakwater was completed in February 1972; and the construction of the recreational facilities was completed in February 1973. The last maintenance dredging of the entrance channel and of the sand trap was completed in July 1977. About 800,000

cubic yards of material from the sand trap are usually deposited biennially on McGrath State Beach, which is downcoast from the mouth of the Santa Clara River.

Operation and maintenance funds have been authorized to study the feasibility of installing an effective fixed sand bypass system for Ventura Marina to be applied to small craft harbors where shoaling is a constantly recurring problem and a hazard to small craft. During the past fiscal year, five hydrographic surveys were completed in the entrance channel and sand trap areas. This data has been analyzed by Waterways Experimental Station at Vicksburg, Mississippi, and a preliminary draft report has been prepared. In addition, a review report to study possible improvements of the entrance channel has been proposed.

SANTA CLARA RIVER LEVEE IMPROVEMENT

This flood control project, authorized by the 1948 Flood Control Act (H. Doc. 443, 80th Cong., 1st sess.), was completed in April 1961. The improvement, a unit in an overall plan that also includes the Santa Paula Creek channel and debris basins (including Mud Creek) flood control project (not yet constructed), extends along the left side of the Santa Clara River from the west end of South Mountain to the bridge on U.S. Highway 101. The levee protects property on the Oxnard Plain, including the City of Oxnard, Port Hueneme, and valuable agricultural areas from most floods on the Santa Clara River.

CHANNEL ISLANDS HARBOR (PORT HUENEME HARBOR)

The 1954 River and Harbor Act (H. Doc. 362, 83d Cong., 2d sess.) authorized the construction of this small-craft harbor and of shore protection works. The authorized project was modified by the Chief of Engineers, U.S. Army Corps of Engineers, in 1957. The construction of the jetties and of the offshore breakwater was completed by October 1960. The dredging of the harbor and of the sand trap was completed in August 1961. In constructing the harbor, about 6,238,000 cubic yards of dredged material were deposited on the downcoast shoreline to protect the beach between Port Hueneme and Mugu Lagoon. The sand trap in the shelter of the 2,300-foot-long offshore breakwater is dredged biennially of about 2,500,000 cubic yards of material. A small amount of sand was deposited on Silver Strand Beach Park and the remainder was deposited on Port Hueneme Beach from the last dredging, which was completed in June 1978.

PORT HUENEME

This harbor is a manmade improvement that was constructed by the Oxnard Harbor District in 1940. The U.S. Navy acquired this harbor by condemnation in 1942. The 1968 River and Harbor Act (H. Doc. 362, 90th Cong., 2d sess.) authorized the modernization and expansion of the existing harbor and the maintenance of the modified harbor. The lengthening, deepening, and widening of part of channel A, included in the Federal project, were completed by the local intersts in May 1972 under the agreement that was made pursuant to section 215 of the 1968 Flood Control Act. The deepening of the central basin and of

part of channel A was completed in September 1975. In July 1974, the lengthening of the remainder of channel A was "deferred," pending demonstration of need.

OTHER PROJECTS

Several governmental agencies have constructed shore protection measures along the Ventura County coastline. The State of California Department of Transportation (Caltrans) has constructed rock revetment adjacent to the State highway in the Rincon and the Point Mugu areas, seaward from the homes at Seacliff Beach Colony, and seaward from the camping sites at Hobson Park. The newly constructed revetment at Hobson Park performed satisfactorily in the recent storms of the winter of 1977-1978, with only small stones being displaced in the parking areas. Caltrans has also recently repaired the old highway's revetment from Hobson Park downcoast to Emma Wood State Beach, which was damaged by the winter of 1977-1978. The State of California Parks and Recreation Department has constructed a rock revetment to protect the entrance road leading into Emma Wood State Beach. Immediately downcoast from the south jetty at Port Hueneme, the U.S. Navy has constructed a massive rock seawall to protect its property from flooding. Also, at the Point Mugu Naval Air Station, a groin field and rock revetments have been constructed by the U.S. Navy to protect the military and recreational facilities.

PROBLEM AND NEEDS

STATEMENT OF THE PROBLEM

The County of Ventura has expressed its desire to support the U.S. Army Corps of Engineers study of the causes and effects of the beach erosion that has plagued the Ventura County coastline over the years. At the initial public meeting, held on June 22, 1972, the public expressed its desires and interests. Of major concern was the damage from wave action that had occurred to the private beaches of Oxnard Shores and Seacliff Beach Colony. Concern was also expressed for the potential danger to other private sectors, Mussel Shoals and Faria Beach Colony and for the long-term outlook for the stability of the Ventura County coastline. It was stated that if land were washed away the County would lose the much needed tax money. The damage that has occurred is directly attributable to wave-induced erosion of the shoreline and the lack of protective beach or shoreline protective structures. One of the main causes of shoreline erosion is lack of sufficient rainfall on the south slope of the Santa Ynez Mountains between the cities of Carpinteria and Oxnard. The rainfall that does occur along the short streams of the south slope drains out to the coast through Calleguas Creek and the Santa Clara and Ventura Rivers. When the runoff is sufficiently large, these stream contribute to the littoral stream which replenishes the beaches. However, the rainfall over past decades has generally been insufficient to produce large enough runoffs to maintain the beaches. The shortage of beach sand is also attributed by many persons to the damming of

the rivers, to urbanization and to the removal by commercial sources of the sand and gravel from the riverbeds.

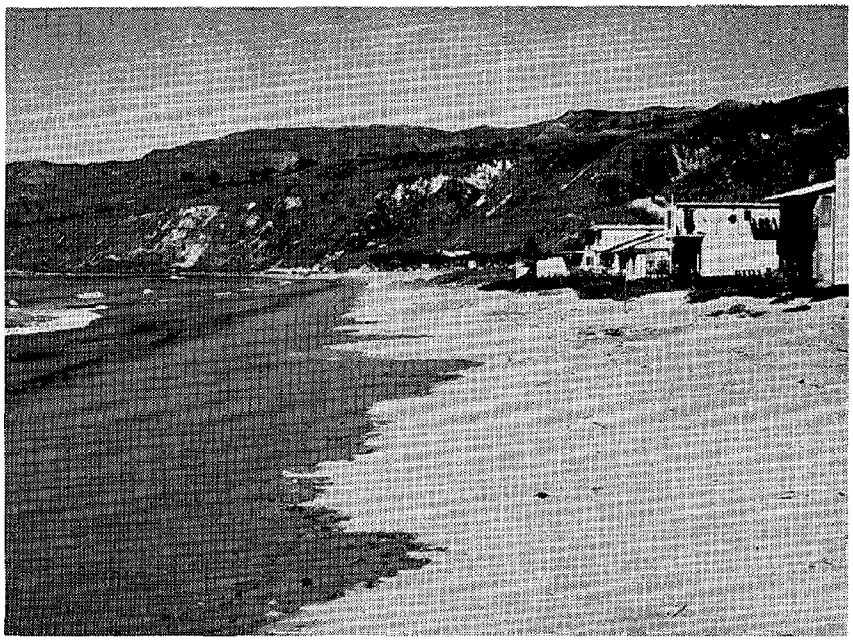
In order to provide a more detailed description of needs and problems, the Ventura County coastline was divided into three major subregions, namely; north coast, central coast, and south coast.

NORTH COAST SUBREGION

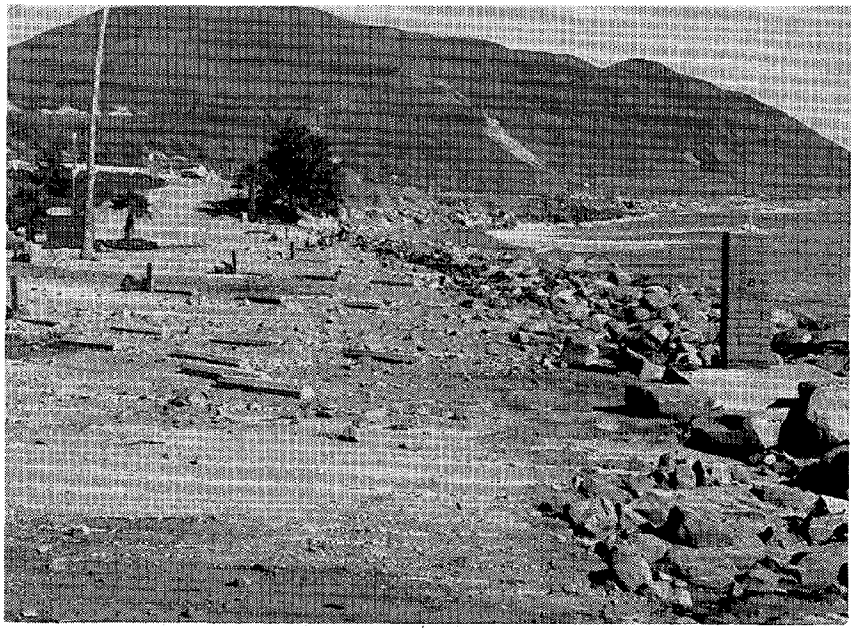
The north coast subregion starts at Rincon Point (near the Santa Barbara County-Ventura County line) and extends southeasterly to the Ventura River. The Ventura River estuary provides a wildlife habitat for a large number of species. The sand dunes at the mouth of the river are a significant resource. Important species found in these areas are described in Appendix 1. The mouth of the Ventura River is particularly sensitive with regard to silting and erosion. Silting of rocky substrate areas and significant changes in the rates of sediment transport would be environmentally damaging.

In this subregion, public beaches with camping activities consist of two small parks - Hobson and Faria Parks, and a larger one - Emma Wood State Beach. There is an extreme shortage of beach camper facilities in this area.

The beach at Mussel Shoals has the usual seasonal fluctuation of onshore accretion of sand in the summer and offshore erosion in the winter. The 1977-1978 winter storms caused an unusually high degree of erosion and threatened



Upcoast view of Mussel Shoals, Dec. 2, 1976



Downcoast view of Hobson Park, Mar. 15, 1978

Downcoast view of Faria Park, Mar. 15, 1978

Downcoast view of Emma Wood State Beach, Mar. 15, 1978

five homes. Rock revetment was placed to protect these homes at a cost to each homeowner of about $4,000.

The residents of Seacliff Beach Colony, a private residential area of about 40 homes, believed that the realignment of Highway 101 and the associated shoreline filling operation created their erosion problems. Negotiations between the homeowners and Caltrans resulted in the State constructing a massive rock revetment to protect the homes. Following major erosion in June 1974, Caltrans extended the seawall to include the adjacent parcel of private property and Hobson Park. The lack of beach sand can be observed in the above photographs.

CENTRAL COAST SUBREGION

The central coast subregion, discussed in the following paragraphs, begins with the 31st Agricultural District Association property, and proceeds downcoast to and includes Point Mugu Naval Air Station. There are several significant wildlife habitats within the McGrath State Beach upcoast to the Ventura Marina area. The estuarine area at the mouth of the Santa Clara River is particularly important, providing habitat for several species of fish and for such endangered avifauna as the light-footed clapper rail, the California least tern, the California brown pelican, and Belding's savannah sparrow. Construction could worsen erosion, affecting the grunion which spawn at McGrath State Beach, and cause silting in this area.

Although a considerable amount of beach area does exist between the Ventura Marina and Ormond Beach, access from the freeways is poor. In the central area, many public beaches are not easily reached by the motoring public. In the Oxnard area, access to several beaches is especially difficult, and some are undeveloped. This situation puts extreme pressure on the more accessible beaches and causes crowded conditions through the beach season. Although there is no shortage of beach acreage for the entire Ventura County coastline, the availability of family-type sandy beaches in close proximity to urban areas and transportation arteries is limited.

This subregion also offers some of the best surfing waters along the southern California coast. There is a tremendous need to preserve the existing surfing sites due to rapidly increasing popularity of surfing. Ideas have also been expressed in official areas as to the need for a comprehensive surfing study that would result in the creation of more surfing areas. Surfing, due to its importance as a recreational activity, warrants a separate tributary area map (see APP. 2. p. 3).

Oxnard Shores has been repeatedly attacked by waves, and some homes have been destroyed or severely damaged. Private citizens have attempted various shore protection devices to protect their homes, with varying degrees of success. Local interests have placed rock revetment on the upcoast part of Oxnard Shores that is adjacent to Mandalay Road to protect against the high wave action. Homes landward from the road have suffered inconveniences from wave action overtopping the berm and carrying sand and debris into the streets

and yards. Three factors contributed to this problem: (a) at the time of the construction of these homes, the shoreline was probably at its most seaward position as a result of the 1938 floods; (b) protective dunes were removed; and (c) the houses were built on concrete slabs or on standard footings instead of on piles. The area was subsequently annexed by the City of Oxnard. The city now requires new construction to have higher floor elevations and to be built on piles. Since this time, damage to these homes have been minimal.

Port Hueneme Beach has had a continual history of erosion, which is undoubtedly affected by Hueneme Canyon, a submarine canyon immediately upcoast. The U.S. Navy property, adjacent to the downcoast jetty of the harbor, has been revetted for protection from wave attack. The shoreline is generally stabilized by the biennial dredging operation of the Channel Islands Harbor sand trap; however, there are major fluctuations of the shoreline because of the seasonal erosion and the winter storms.

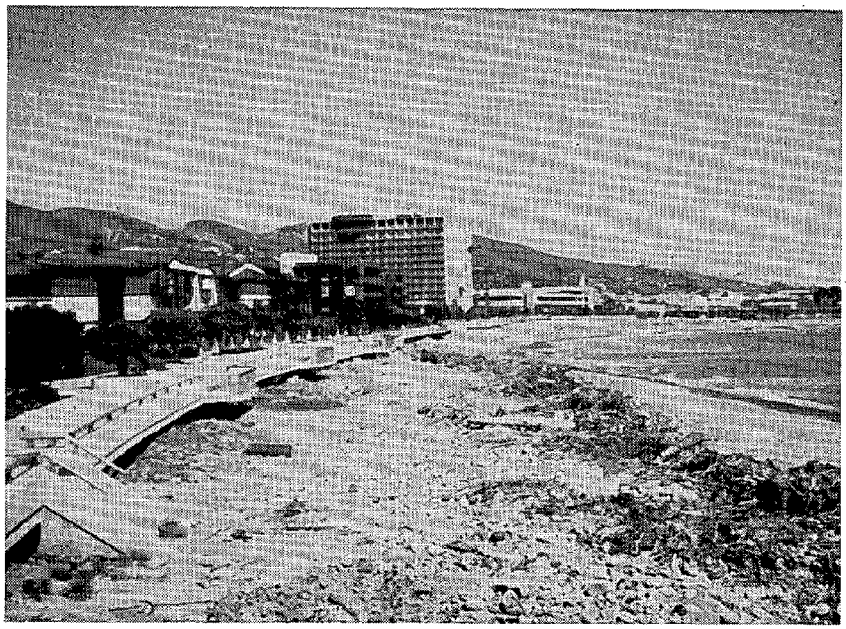
Ormond Beach, an undeveloped beach of 85 acres, owned by the City of Oxnard, has experienced an average erosion rate of about 3.5 feet per year along a 10,400 ft strip including the Edison property over the past 45 years. The City of Oxnard plans to leave this area in its natural state. There are no major improvements constructed or any projects planned.

The following photographs generally show the debris and denuded condition of the beaches in the central coast subregion immediately after the winter of 1977-1978 storms.

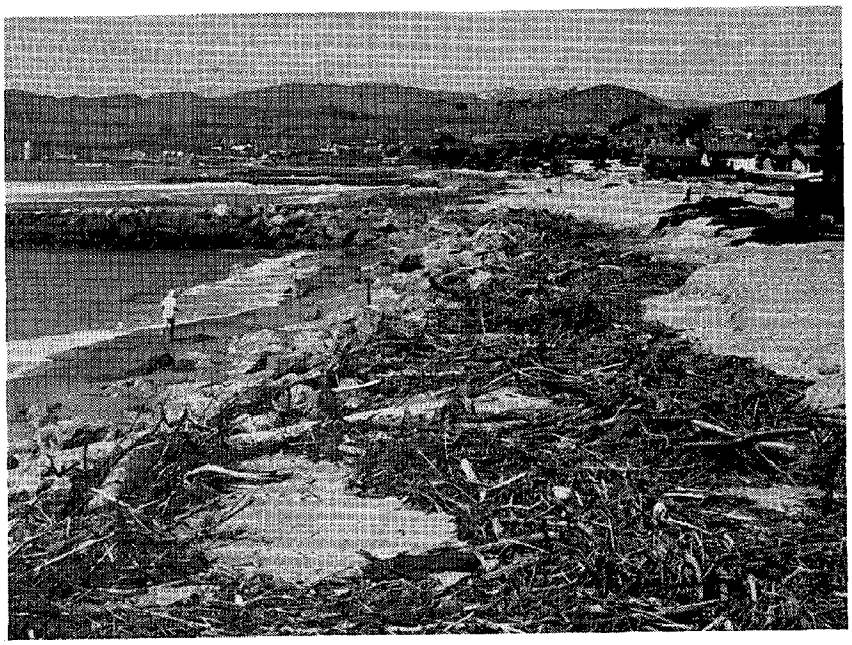
Upcoast view of 31st Agricultural District Association, Mar. 15, 1978

Upcoast view of Surfer's Point Park, Mar. 15, 1978

Upcoast view of Surfer's Point from San Buenaventura State Beach, Mar. 15, 1978

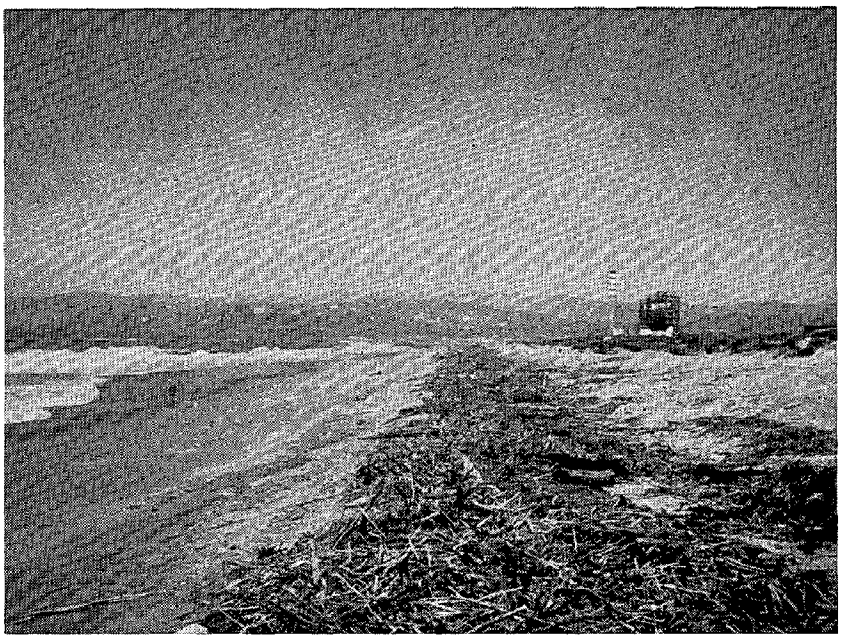


Downcoast view of San Buenaventura State Beach from Surfer's Point, Mar. 15, 1978

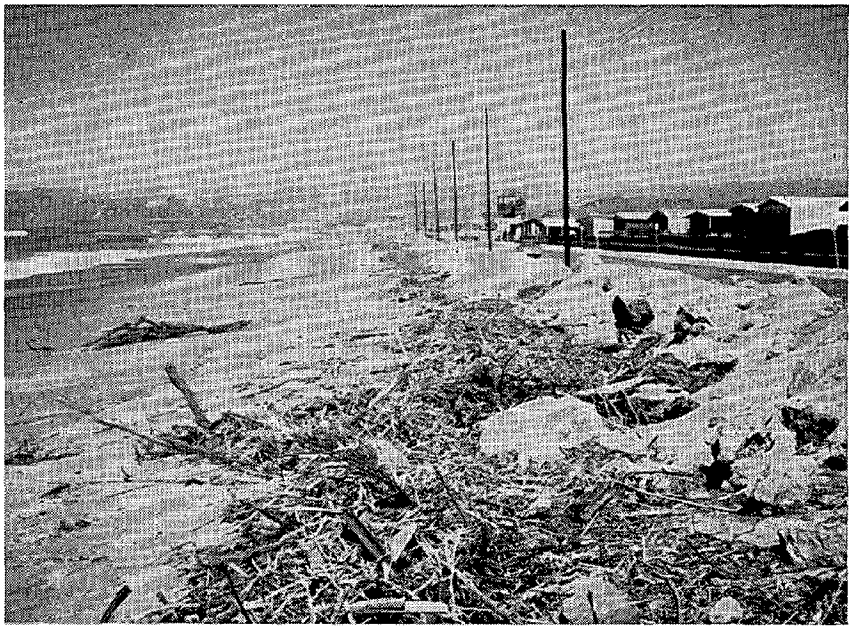


Upcoast view of groin field at San Buenaventura State Beach, Mar. 15, 1978

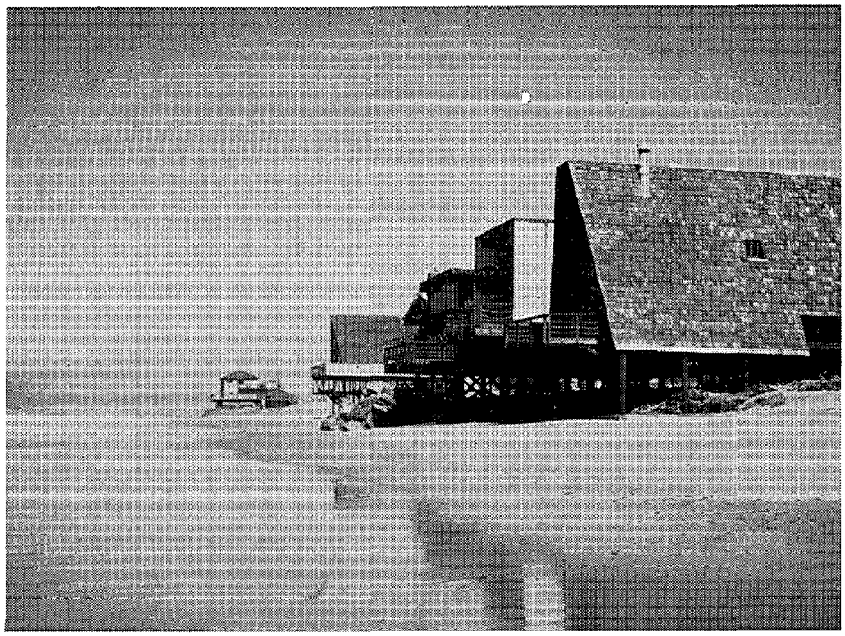
Downcoast view of groin no. 1, San Buenaventura State Beach, Mar. 15, 1978



Upcoast view of Mandalay Beach Park Mar. 15, 1978

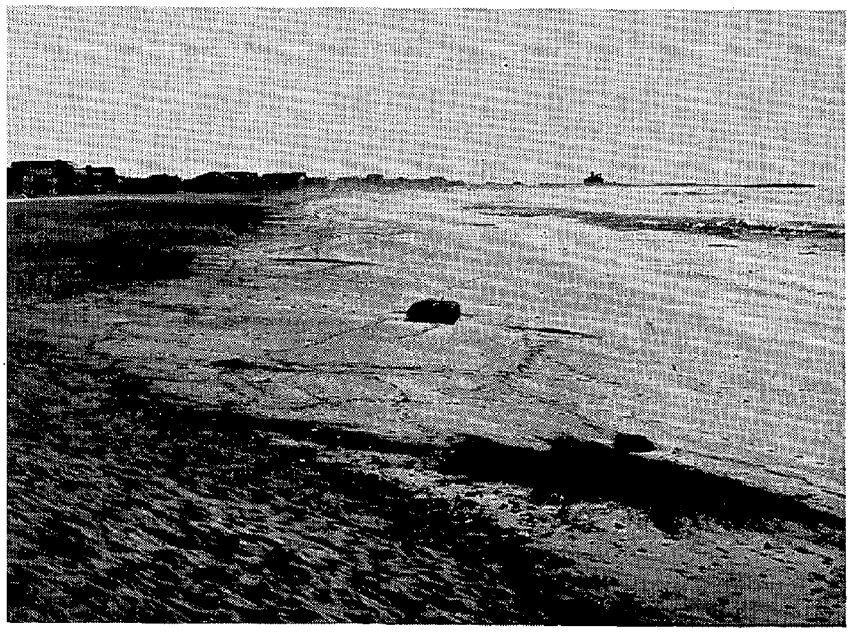


Upcoast view of northern part of Oxnard Shores
adjacent to Mandalay Road, Mar. 15, 1978



Upcoast view of Oxnard Shores, Mar. 15, 1978

Downcoast view of Oxnard Shores, Mar. 15, 1978



Downcoast view of Silver Strand Beach Park Dec. 2, 1976

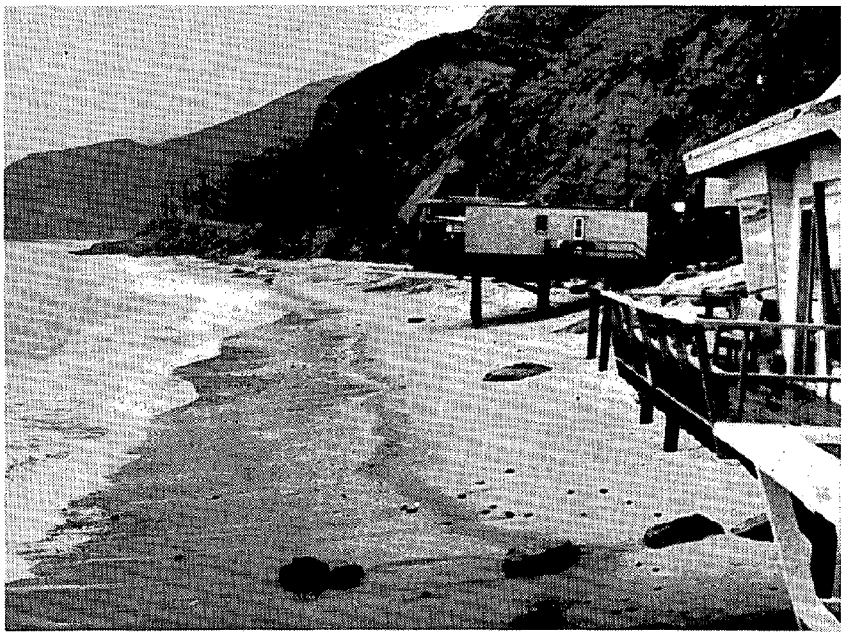
Downcoast view of Port Hueneme Beach, Mar. 15, 1978

SOUTH COAST SUBREGION

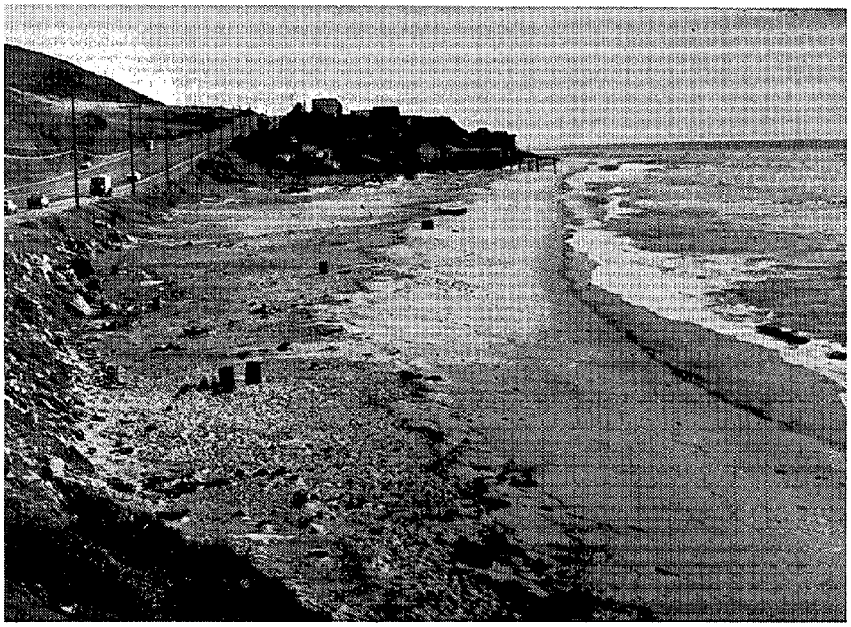
The south coast subregion starts at Point Mugu (adjacent to Point Mugu Naval Air Station) and extends downcoast to Sequit Point (near the Ventura County - Los Angeles County line).

County Line Beach area (see photos on next page) is a very important surfing area. This area, known to the surfing population as "Pete's Reef", was one of the first locations in Ventura County to be surfed. It is very important that surfing areas like County Line Beach have adequate parking and related facilities so that maximum recreational benefit is realized from these areas.

County Line Beach, a private beach 1-1/2 miles upcoast of the Ventura County-Los Angeles County line, suffered erosion (8-10 feet vertically) from the high wave action in September 1972. Seven out of eighteen homes suffered minor to severe damage from the waves. Volunteers placed sandbags to form protection. Approximately 500 tons of rock revetment were placed during this emergency at the owner's expense. This area has a seasonal fluctuation of sand, with its maximum accretion occurring in late summer. About 900 feet of the 2,000 feet of private beach shows a progressing erosion pattern.



Upcoast view of County Line Beach, Sept. 7, 1972



Downcoast view of County Line Beach looking toward Sequit Point, Dec. 2, 1976

IMPROVEMENTS DESIRED

Local interests expressed hope that immediate plans could be developed to control beach erosion in those areas that had suffered erosion damage. The County desires that its beaches be preserved and that more coastal land be developed to satisfy the increasing demand of the public for shoreline recreation. The preservation and additional development of the Ventura County coastline would have many benefits because it would induce more visitors to enjoy the excellent climate and to take advantage of Ventura's many fishing, surfing, camping and ocean-viewing opportunities. Damage prevention or reduction and subsequent additional recreational improvements would attract more tourists, directly benefiting the economy.

SOCIOECONOMIC CONCERNS

Several socioeconomic problems and concerns have been voiced by beach property residents and by other beach users. A major concern is that continual erosion of the shoreline will lead to a degradation of beach recreational opportunities.

There is concern that without the construction of protective projects, damages would occur to private property, as well as public property, and that private owners will receive no help from the Federal Government.

Concern also exists that shore protective structures and improved beaches may be installed without adequate public access, public transportation systems or parking facilities.

There is a desire that whatever improvements may be constructed, the environmental quality of the shoreline should be preserved or enhanced.

There is an increase in the demand for developed and developable beach frontage in order to accommodate the growing population and its demand for beach recreational areas, especially in the urbanizing areas of Oxnard and Ventura.

ENVIRONMENTAL ASPECTS

The Ventura County coastline is an environmentally significant resource. (See app. 1.) The significant physical, biological, and cultural resources along the coastline include wetlands, lagoons, rocky shore, and sandy beaches; State-designated Areas of Special Biological Significance (ASBS), rookeries, kelp and surfgrass habitats, fisheries, and invertebrate resources; onshore and offshore archeological sites; and surfing beaches that receive heavy recreational use. The major environmental concern is that any proposed construction activity should be carefully planned to avoid impacting these resources; if unavoidable impacts should occur, mitigation and compensation would be required. Site-specific studies would have to be conducted at each proposed construction location.

The environmental discussions presented in Appendix 1 are preliminary in nature because specific data required to evaluate the effects of potential construction activities are lacking. Had construction been proposed, in-depth, site-specific studies such as oceanographic, biological, traffic, and recreational use studies would have been required. To date, only archeological studies have been completed along the Ventura County coastline. (See App. 1.)

DEMAND ANALYSIS

By using the method of total demand analysis as incorporated into the Ventura County Recreational Element of 1975, and by applying the 200-day bathing season and EM 1120-2-108, there is an estimated current demand for 72.6 acres of total recreational beach for Ventura County and a projected demand of 184.7 acres by 2020. Allocating these total acres (421.5) in the entire project area in the same percentage as used in the subregional analysis, the north subregion has a supply of 32.3 acres versus an eventual demand in 2020 for 30.6 acres; the central subregion has a supply of 357.9 acres versus an eventual demand for 99.3 acres; and the south subregion has a supply of 31.3 acres versus an eventual demand for 54.8 acres. The south subregion shows a shortage in acreage by year 2020 of 23.5 acres, but the entire study area would have a surplus of 236.8 acres by 2020. This study shows that, by applying the above-mentioned demand analysis for Ventura County, there is no apparent shortage of coastal recreational beaches, except in the south region. This demand analysis is only for the recreational beach area and does not include the camping demand and facilities.

In analyzing the demand for recreational beaches for the entire Ventura coastline, it is recognized that there is not an overall shortage for day use activities. However, developed beaches near the urbanized area in the central coast area are heavily used. Improvements of some beaches (including beach erosion control measures), development of newly acquired or about to be acquired beaches, and improved parking and access to some beaches in the Oxnard area would tend to increase the attendance at these beaches and would relieve some of the pressure at the developed parks and beaches near the City of Ventura. Beach erosion control measures would also prevent continued erosion of private beach property, such as Oxnard Shores. Some usage of the Oxnard Shores area by other than the residents is taking place; however, it is mostly at low tides.

In calculating average and peak day attendance and peak hour attendance, a 200-day bathing season was assumed, with 20 of these days not reflecting normal attendance because of inclement weather. Of the remaining 180 days, 30 days are considered as peak use days. The recreational demand for beach use is for Ventura and Los Angeles counties only, and are shown on the following table by subregion.

RECREATIONAL DEMAND FOR BEACH AREA, 1975-2020
VENTURA COUNTY, CALIFORNIA

Year	Tributary population	Peak demand	Acres needed
North coast subregion beaches (32.3 acres available)			
1975	112,875	3386	5.8
1980	130,125	3903	6.7
1990	168,380	5051	8.7
2000	203,425	6102	10.5
2010	235,775	7073	12.2
2020	268,100	8043	13.9
Central coast subregion beaches (357.9 acres available)			
1975	342,575	10,277	17.7
1980	416,225	12,486	21.5
1990	540,060	16,201	27.9
2000	656,225	19,686	33.9
2010	764,275	22,928	39.2
2020	872,500	26,175	45.1
South coast subregion beaches (31.3 acres available)			
1975	230,050	6,901	11.9
1980	252,150	7,564	13.0
1990	317,960	9,538	16.4
2000	377,350	11,320	19.5
2010	419,450	12,883	22.2
2020	481,400	14,442	24.2
Total beach demand in Ventura County (421.5 acres available)			
1975	685,500	20,564	35.4
1980	798,500	23,953	41.2
1990	1,026,400	30,790	53.0
2000	1,237,000	37,108	63.9
2010	1,419,500	42,884	73.9
2020	1,662,000	48,660	83.9

The need for additional beach camping facilities has been recognized by the California Department of Parks and Recreation Department, by Ventura and other coastal counties, and by the Los Angeles District, U.S. Army Corps of Engineers. In most southern California coastline camping areas, several weeks advance reservation is needed to obtain a campsite during the camping season. Any campsites that might be developed would be used to capacity immediately because of the extremely high demand for camping in beach parks.

PLAN FORMULATION

Plan formulation involves looking at an array of possible solutions to the problems and selecting from that array those alternative plans which will meet the needs and desires of the public, which will be engineeringly feasible, economically viable and environmentally acceptable. From among those solutions which successfully meet this test, the local sponsor, after much public input and scrutiny, endorses a plan that is implementable, in full consideration of the political and institutional restraints.

In this study only the initial stages of the planning effort were completed, that is, the identifying of problems, needs, and concerns. However, a preliminary attempt was made at plan formulation by looking at all the usually considered plans for shore protection and identifying those that would best meet the needs and desires of the public. This analysis is described in the section which follows.

ALTERNATIVES

Several plans of protection could be implemented to remedy erosion problems. Those usually considered are: rock revetments, concrete sea walls, groin systems, sand fills, offshore breakwaters, nearshore breakwaters, protective vegetation, sand bypassing at inlets, and no action. Each of these has use limitations based on the wave climate, physical character of the location, environmental, and esthetic consideration or other expressed needs or desires. Protective vegetation, sand bypassing, and no action were not seriously considered for the following reasons: In many cases due to the rocky character of the beach, planting of the vegetation would be physically infeasible and its effectiveness in combating erosion from persistent wave attacks is questionable; also sand bypassing is not applicable except where harbors or shoreline inlets are located. Sand bypassing is already being performed at the harbors in Ventura County (Ventura Marina and Channel Islands-Port Hueneme), and efforts are underway to find more efficient bypassing systems. No action would only result in continued erosion and property damage. Consequently, except in the case of Ormond Beach (see table), it is not an acceptable alternative.

NEEDS AND POSSIBLE ALTERNATIVES (Continued)
VENTURA COUNTY, CALIFORNIA

Location	Needs	Most Likely Alternatives	Other Alternatives Considered
Mandalay Beach Park	Maintain existing recreational beach.	Nourishment from downcoast littoral transport from feeder beach (McGrath State Beach).	No improvement needed as long as bypassing operation at Ventura Marina continues.
Oxnard Shores	Protection of public facilities and property, private and public, from damaging erosion.	Rock revetment or groin system.	Concrete seawall - See (1) above. Sand fill - See (4) above. Offshore breakwaters - See (1) above.
Silver Strand Beach Park	Protection of public recreational beach, private homes and public facilities (backshore area).	Occasional sand fill from dredging of sand trap at Channel Islands Harbors. This method is informally being used now.	No other alternative seriously considered since beach is stable with occasional deposition of sand. Groin system, though expensive, would be a likely alternative if sand were not available from Channel Islands Harbor dredging.
Port Hueneme Beach	Protection of recreational beach & public facilities.	Sand fill (presently a feeder beach for sand from Channel Islands Harbor dredging).	Rock revetment - would restrict use of recreational beach; also hazardous. Concrete seawall - See (1) above; also would restrict recreational use of of beach. Groin system - See (1) and (2) above.
Ormond Beach	Preserve natural state for wildlife.	No action.	No other alternatives considered since no improvements, public or private, exist and there is a strong desire to preserve this wilderness area.

NEEDS AND POSSIBLE ALTERNATIVES
VENTURA COUNTY, CALIFORNIA

Location	Needs	Most Likely Alternatives	Other Alternatives Considered
Hobson Park	Provide protection for camping sites, preservation of tide pools.	Rock revetment with access to beach.	Concrete seawall - relatively very costly(1) Groin system - unesthetic(2) and would cover tide pools(3) Sand fill - would cover tide pools(3) - would incur high maintenance costs(4)
Faria Park	Do.	Do.	Do.
Emma Wood State Beach	Do.	Do.	Do.
31st Agric. Dist. Association	Provide protection for parking area for sight-seers and surfers. Maintain surfing conditions.	Rock revetment.	Concrete seawall - See (1) above. Groin system - See (1) and (2) above. Sand fill - See (4) above Offshore breakwaters - See (1) above.
Surfer's Point Park	Do.	Do.	Do.
San Buenaventura State Beach	Maintain existing recreational beach.	Sand fill (periodic dredging of sand trap at Ventura Marina).	No other alternative considered since beach is fairly stable with occasional deposition of sand from Ventura Marina, an existing maintenance project.
McGrath State Beach	Do.	Sand fill (existing feeder beach).	No other alternative considered since beach is stable with biennial deposition of sand from Ventura Marina dredging.

NEEDS AND POSSIBLE ALTERNATIVES (Continued)
VENTURA COUNTY, CALIFORNIA

Location	Needs	Most Likely Alternatives	Other Alternatives Considered
Sycamore Beach	Preservation of recreational beach and protection of public facilities in backshore area.	Groin system.	Rock revetment - would restrict use of recreational beach; also hazardous. Concrete seawall - See (1) above Sand fill - See (4) above. Offshore breakwaters - See (1) above.
County Line Beach	Maintain private recreational beach and improvements as well as public facilities in backshore area.	Rock revetment.	Concrete seawall - See (1) above. Groin system - See (1) and (2) above. Sand fill - See (4) above. Offshore breakwaters - See (1) above.

IMPACT ASSESSMENT

Preliminary social and environmental impacts were considered for those alternative measures which may be suitable in one location or another along the Ventura County shoreline. The social impacts are discussed and displayed in the following table in Appendix 1.

SHORE PROTECTION MEASURES AND THEIR IMPACTS*
VENTURA COUNTY, CALIFORNIA

Shore Protection Measures	Impacts	
	Beneficial	Adverse
Rock revetment	Reduce the erosion process by backstopping and gathering transient sand. Minimize interruption of the littoral transport system.	Esthetically unpleasant appearance.
		Inhibit surfing.
		Potential safety hazard.
	Limited new substrate, limited new biological community.	Loss of biological community, destruction of organisms, loss of habitat and productivity, turbidity effects, behavioral modifications, stirring of toxic elements.
	Provide recreational fishing platform.	
Concrete seawall	Esthetically pleasing appearance.	Disruption of existing landscape
	Provide a backdrop for sand collection on the shoreline. Minimize interruption of the littoral transport system.	Inhibit surfing.
		Potential safety hazard.
	Reflect wave energy seaward, thus contributing to the beach replenishment and buildup process.	Loss of biological community, destruction of organisms, loss of habitat and productivity, turbidity effects, behavioral modifications, stirring of toxic elements.
	Limited new substrate, limited new biological community.	

SHORE PROTECTION MEASURES AND THEIR IMPACTS* - (Continued)
VENTURA COUNTY, CALIFORNIA

Shore Protection Measures	Impacts	
	Beneficial	Adverse
Groin system	Provide protection to the backshore by means of a seaward extension of the high water line.	Potential safety hazard.
		Esthetically unpleasant appearance.
	Provide recreational fishing platform.	Loss of biological community, destruction of organisms, loss of habitat and productivity, turbidity effects, behavioral modifications, stirring of toxic elements.
	Limited new substrate, limited new biological community.	
Sand fill	Temporarily provide for maintaining beach recreation by dissipating the energy generated from wave action. No interruption of the littoral transportation system.	Intermittent interruption of beach use.
		Not provide a permanent solution to the beach erosion problem.
	Preservation of beach for surfing, swimming, organisms.	Destruction of organisms, stirring or release of toxic elements, turbidity effects.
Breakwater	Protection from heavy wave action.	Esthetically unpleasant appearance.
	Provide limited shelter for small craft during foul weather.	May need beach fill to prevent erosion of downcoast beaches.
	Provide for additional recreational benefits in areas of fishing, diving, and swimming.	

SHORE PROTECTION MEASURES AND THEIR IMPACTS* - (Continued)
VENTURA COUNTY, CALIFORNIA

Shore Protection Measures	Impacts	
	Beneficial	Adverse
Submerged breakwater	Maintain esthetic beach vista by non-visibility of structure.	Present a hazard to swimmers if built too close to the shoreline.
	Limited new substrate, limited new biological community.	May inhibit the littoral transport of beach sediments leading to erosion of downcoast beaches.
		Inhibit surfing.
		Potential hazard to small craft operators.
Continual beach nourishment	More closely approximate the natural littoral drift. No interruption of the littoral transport system.	Require a constant sand source.
		Long-term degradation of ambient noise levels, air quality, and visual esthetics.
	Preservation of beach for surfing, swimming, and organisms.	Continuous wetting of the discharge areas; discharge line would impede traffic on the beach.

*All of the shore protection measures listed in this table would have the following beneficial impacts: Protection of public and private property; increase in recreational opportunities; temporary economic growth during construction activities; increased economic growth associated with increased recreational uses.

All of the shore protection measures listed in the tables would temporarily degrade or impact existing ambient noise levels; air quality; water quality; recreation; traffic; parking; and esthetics during construction activities. All of the measures may be growth inducing due to the increased recreational uses.

All structural measures would possible destroy archeological-cultural resources. All structures except sand fill could adversely impact on magnetic surveys and mask anomalies that indicate submerged resources.

EVALUATION OF ALTERNATIVES

None of the alternatives considered were found to be economically feasible. However, studies show that rock revetment is the most favored alternative, the major reason being that it is generally the least expensive of the structural measures. It can also be observed that in those locations where protection and preservation of a recreational beach is a paramount need, sandfill is the preferred alternative.

ECONOMIC ANALYSIS

Economic studies assumed conditions without any beach erosion control measures. Even with beach erosion control measures installed at the eroding spots, there would not be any significant increase in the near future growth of population, dwellings, and industrial or commercial enterprises. More detailed information on base studies are available in the Los Angeles District Corps of Engineers' office.

Based on the erosion rates tabulated in Appendix 4, benefits to the extent of preventable damages and/or recreational benefits were estimated for the various locations and are displayed in the table on the following page. Since rock revetment is generally the least expensive of the structural measures, construction costs were estimated for rock revetment on the basis that if the benefits did not exceed the costs for the least expensive alternative, then there is no need to look further at other alternatives.

In order to compute the acreage lost and to reasonably estimate the future losses, the average annual rates of erosion and the length of the beach areas affected, were determined. In formulating plans, damages or losses prevented are taken as benefits. These benefits are used in determining benefit-to-cost ratios.

For the public beaches only, values used were $6.50 per camper day and $1.50 per beach user day (75 square feet of beach allowed per person). Using projected beach attendance figures over a 50 year period using the above-mentioned values, the losses were converted to an average annual equivalent loss at 6-5/8 percent.

For the private property (Oxnard Shores and County Line Beach) and the 31st Agricultural District Association, current market values of the properties being eroded were determined by making a market comparison. After estimating the amount of land that may be lost, assuming the same erosion rate over 50 years, the value of the lost property was converted to an average annual equivalent loss at 6-5/8 percent.

The following paragraphs briefly describe the nature and amount of the losses at each site over a 50 year period:

Faria Park: If the erosion continues at the same rate, about one-half of the campsites would be lost. Using $6.50 per camper day, the average annual equivalent loss amounts to $9,000.

Emma Wood State Beach: After 25 years about one-half of the campsites or one row would be lost. Using $6.50 per camper day, and $1.50 per beach user day, the average annual equivalent loss over the 50 year period amounts to $8,000.

31st Agricultural District Association: Other than the surfing offshore, the property is not used for recreation. Based on the current market value, the average annual equivalent loss is $8,000.

Mandalay Beach Park: Over a 50 year period, about 5 acres may be lost to day time beach users. The average annual equivalent loss amounts to $1,130.

Oxnard Shores (private): If the same rate of erosion continues for 25 years, one row of homes would be lost. Over a 50 year period, the average annual equivalent loss amounts to $36,000.

Sycamore Beach (Pt. Mugu State Beach): The beach is heavily used by fishermen and other day visitors. Using $1.50 per beach user day the average annual equivalent loss is $475.

County Line Beach (private): If the erosion continues at the same rate, one row of homes would be lost. The average annual equivalent loss amounts to $24,000.

The following table shows that in each case the costs for revetment did exceed the benefits resulting in benefit-to-cost (B/C) ratios of less than unity which precludes Federal participation in the construction costs of any beach erosion control improvements in Ventura County.

It is also obvious that the two areas where the benefit-to-cost ratios are close enough to unity to warrant more refined estimates, namely Oxnard Shores and County Line Beach, are private beaches precluding Federal participation in the construction costs of any improvements.

BENEFITS-COSTS ANALYSIS

VENTURA COUNTY, CALIFORNIA

NAME	LENGTH ft.	AVG. ANNUAL BENEFIT $	AVG. ANNUAL COST $	B/C RATIO
Faria Park	900	9,000	24,850	0.36
Emma Wood State Beach Park	18,400	8,000	192,000	0.04
31st Agricultural District Association	1,800	8,000	13,800	0.58
* Surfer's Point				
* McGrath State Beach				
Mandalay Beach Park	4,500	1,130	74,600	0.02
Oxnard Shores (private)	5,000	36,000	39,000	0.92
* Silver Strand Beach Park				
* Hollywood Beach Park				
* Port Hueneme Beach				
* Ormond Beach				
Sycamore Beach (Pt. Mugu State Park)	1,600	475	44,200	0.01
County Line Beach (private)	1,800	24,000	25,000	0.96

* Benefits and costs were not estimated, because erosion rates were minimal and consequently benefits were negligible.

CONCLUSIONS

After analysis of the topographic, hydrographic, photographic, economic and other coastal data presently available, the following conclusions were made.

a. Because of the available supply of recreational beaches (camping excluded) and because of slowing population growth in the tributary area, there is no demand for additional beach area county-wide in the foreseeable future.

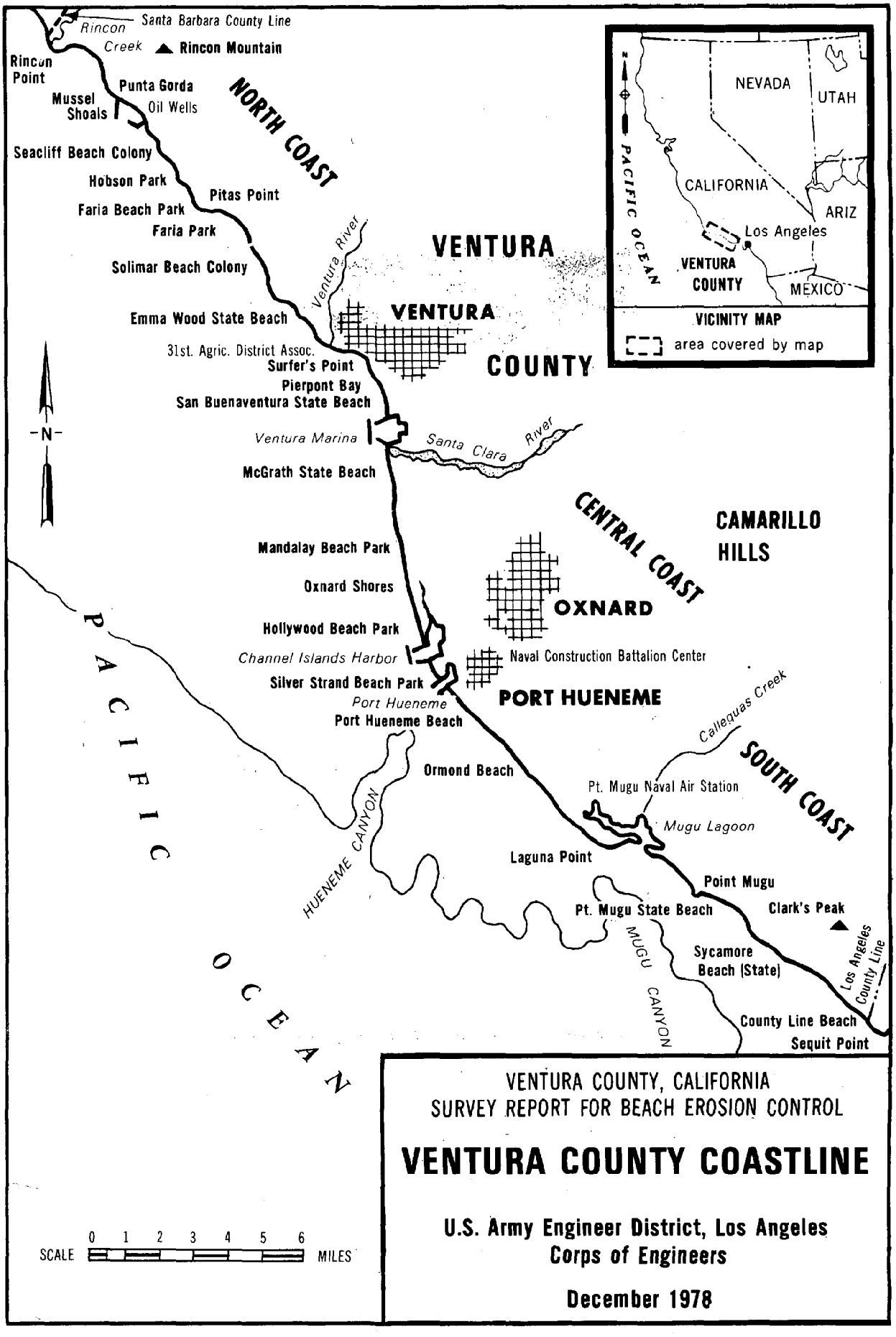
b. Except for the private beach areas of Oxnard Shores and County Line Beach, where severe erosion has occurred, beach erosion control projects are economically infeasible for the present and the foreseeable future.

c. Since there is at present no authorization permitting Federal participation in the private beach areas of Oxnard Shores and County Line Beach, and these are the only areas where projects may be economically feasible, Federal participation in the cost of construction of beach erosion control projects in Ventura is precluded.

d. That the Corps of Engineers should consider giving to the local interests, in accordance with section 55 of Public Law 93-251, if they choose to develop on their own initiative, solutions to the beach erosion problems in Ventura County.

RECOMMENDATIONS

Since there are insufficient benefits to justify Federal Shore Protection projects in Ventura County, the District Engineer recommends that no structural beach control measures be undertaken at this time in Ventura County.



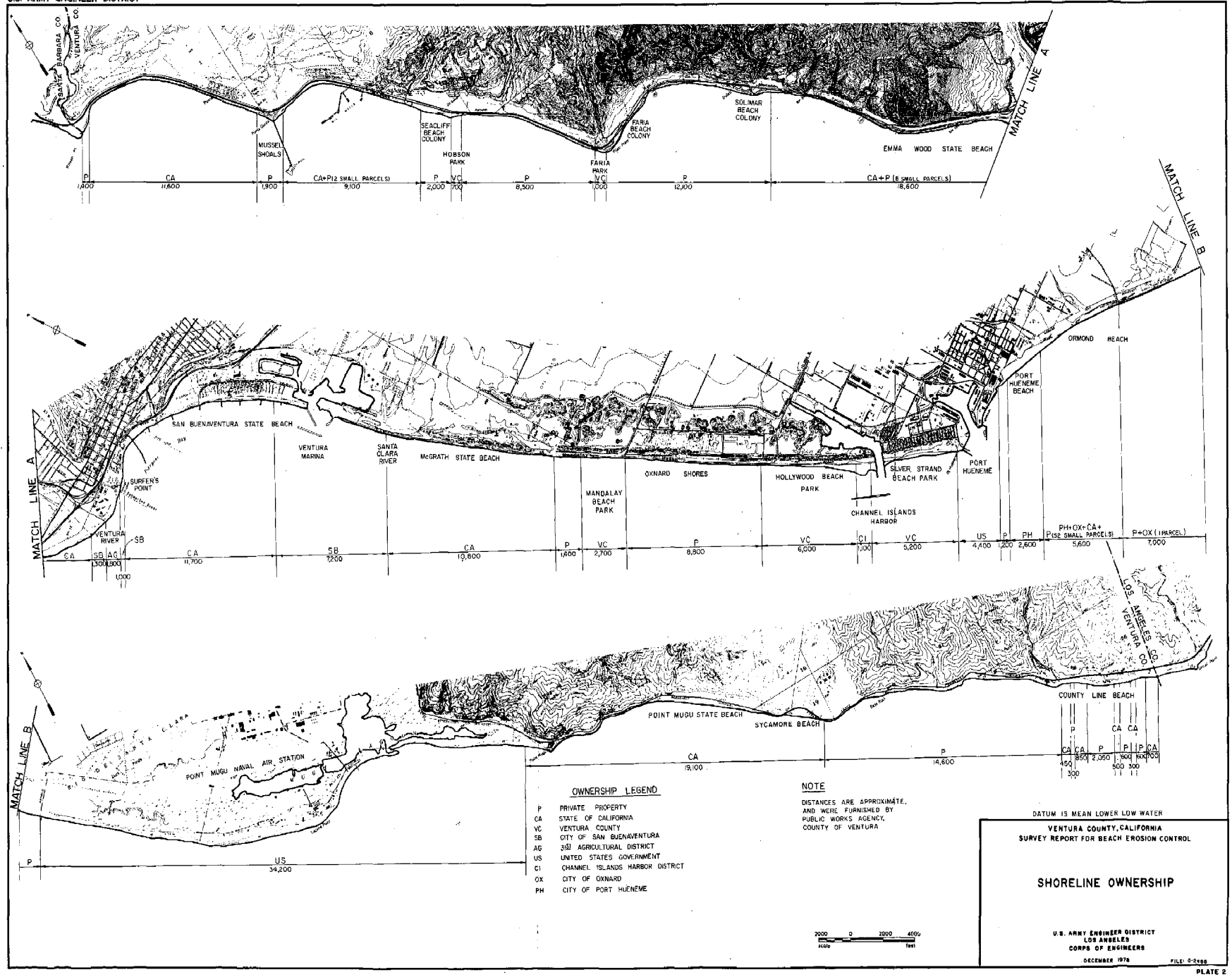
VENTURA COUNTY, CALIFORNIA
SURVEY REPORT FOR BEACH EROSION CONTROL

VENTURA COUNTY COASTLINE

U.S. Army Engineer District, Los Angeles
Corps of Engineers

December 1978

Plate 1



OWNERSHIP LEGEND

P	PRIVATE PROPERTY
CA	STATE OF CALIFORNIA
VC	VENTURA COUNTY
SB	CITY OF SAN BUENAVENTURA
AG	31st AGRICULTURAL DISTRICT
US	UNITED STATES GOVERNMENT
CI	CHANNEL ISLANDS HARBOR DISTRICT
OX	CITY OF OXNARD
PH	CITY OF PORT HUENEME

NOTE

DISTANCES ARE APPROXIMATE, AND WERE FURNISHED BY PUBLIC WORKS AGENCY, COUNTY OF VENTURA

2000 0 2000 4000
scale feet

DATUM IS MEAN LOWER LOW WATER

VENTURA COUNTY, CALIFORNIA
SURVEY REPORT FOR BEACH EROSION CONTROL

SHORELINE OWNERSHIP

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DECEMBER 1978

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PLATE 2

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