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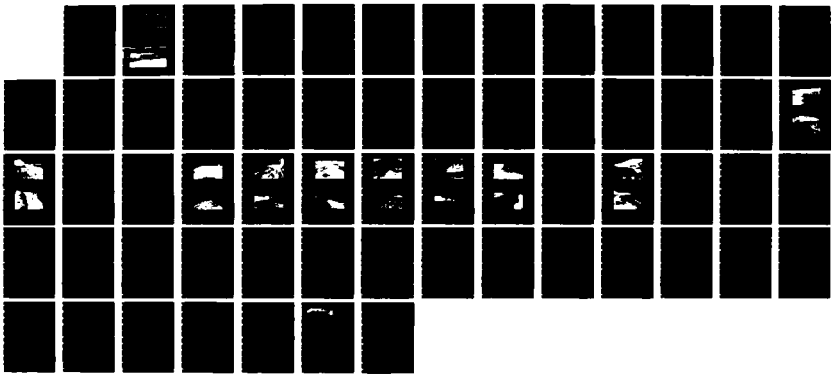

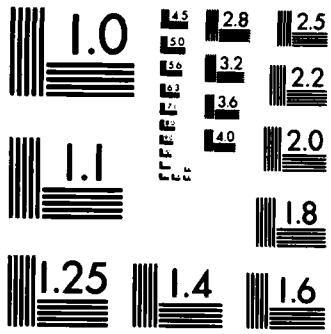

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Survey Report for Beach Erosion Control

main report

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The shoreline of Ventura County, California has been investigated to evaluate the various aspects of beach erosion problems and to determine the extent of federal interest in these problems. The study encompasses Ventura County shoreline from Rincon Points at the Santa Barbara County line down coast to Squit Point near the Los Angeles County line which this report presents.

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DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216, San Francisco, California 94111 8 September 1980

TO: HQDA (DAEN-CWP) WASH DC 20314

I concur in the conclusions and recommendations of the District Engineer.

HOMER JOHNSTONE
Brigadier General, U. S. Army
Division Engineer

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VENTURA COUNTY, CALIFORNIA

SURVEY REPORT FOR BEACH EROSION CONTROL

Prepared by

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

May 1980

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.

The District Engineer also concludes that there is no evidence of shortage of beach area in the foreseeable future.

Analyses of the economic, photographic, and coastal data have determined that, at the present, beach erosion control projects are economically infeasible in all areas. No general 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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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 and Santa Barbara Counties. (See pl. 1.) The shoreline has long been the scene of beach erosion, varying from minor to critical. Concern over the erosion problems prompted representatives from the City of Port Hueneme, the State of California, and Federal agencies to hold meetings resulting in the passage of a resolution dated October 1967 for the study of beach erosion control for the shores of Ventura County. 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 priority for this study. In response, Congress provided 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 local sponsor for this study is the County of Ventura. The Department of Public Works, County of Ventura coordinated its work efforts and provided its technical data and 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 maintained with, and valuable information was obtained from, the State of California, Department of Boating and Waterways, the State Lands Commission, the U.S. Fish and Wildlife Service, and the California Coastal Commission.

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."

A second public meeting was held on December 13, 1978, to present the findings, conclusions, and recommendations of the survey report, and to obtain comments and views of all interested parties relative to this termination report or to potential shoreline improvements. The transcript of the meeting is available for inspection at the Los Angeles District Office of the Corps of Engineers, or may be purchased from the stenographic service, Bowers Reporting Company, 520 S. Sepulveda Blvd, Suite 3205, Los Angeles, Calif. 90049.

PRIOR REPORTS

Prior reports in the general study area prepared by the Corps of Engineers 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 Engineering Research Center (CERC) 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

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 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

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 Harbor, 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) 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 that 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 Harbor, 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 found only 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. The ground water from the mound basin between the City of Ventura and the Santa Clara River is of good quality, and seawater intrusion is not evident. The ground water from the next basin south, the Oxnard Plain basin, is derived from several major aquifers. The uppermost Oxnard aquifer is highly permeable and considered to be the most important water-bearing deposit in the basin. In spring of 1968, salt water with a 500-ppm chloride ion concentration had intruded near Port Hueneme, a distance of 2-1/4-miles inland and at Mugu, about 2 miles inland. In these areas, the water derived from the shallow intruded aquifers is poor to marginal in quality. The water derived from these shallow aquifers elsewhere in the basin and from the deeper aquifers is low in mineral content and adequate for irrigation. The principal beneficial use of water in the Oxnard plain is agriculture.

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.

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 fine sand. The median diameter of the beach sand between Carpinteria and the Santa Clara River ranges from 0.199 to 0.380 millimeter, and the average for the area is 0.248 millimeter or fine sand. The average median diameter of the beach sand between the Ventura and Santa Clara Rivers is 0.275 millimeter or fine sand. A study of the sieve analysis indicates that the mean grain size of the beach sand increases slightly with distance downcoast from Carpinteria to the Ventura River; and that the grain size increases sharply in the delta area of the Ventura River; and 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.

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 Harbor, 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-temperature marine region, this west- and southwest-facing open coast is exposed to severe wave action. High wave energy forces are especially prevalent in winter, creating considerable shoreline instability. The shoreline falls within the Santa Barbara littoral cell (Inman and Frautschy, 1966). This cell of littoral transportation and sedimentation derives its sand from runoff from the numerous short streams draining the south slope of the mountains north and west of the City of Ventura, from the Ventura and Santa Clara Rivers, and from littoral drift from the beaches downcoast of Santa Barbara County. 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 an area that extends upcoast from the mouth of the Ventura River. A portion of these dunes has been incorporated into the Emma Wood State Beach Park.

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, including 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. Among the several rare, threatened, and endangered faunal species, including important avifauna, that are present are the California least tern, the California brown pelican, the southern bald eagle, and the Belding's Savannah sparrow. 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 such other beach activities as fishing, hiking, camping, sightseeing, education, wildlife observation, and some of the best surfing along the 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 apprear to be eligible for inclusion in the National Register of Historic places and for preservation. These sites are located at Emma Wood State Beach, Point Mugu Naval Air Station, and County Line Beach.

Nearshore areas at Rincon Point and 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. Evidence suggests that other areas within the nearshore waters of the Ventura coastline contain cultural remains that represent a considerable time span. 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. Coastal streams are also used for recreational purposes, including fishing. 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 popuation for Ventura County in January 1977 is 459,351. For projections see table 1 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, 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

	July 1978	July 1977
All industries - total	144,200	142,400
Agricultural, 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 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 were 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

Currently there exist six U.S. Army Corps of Engineers projects--four coastal and two flood control--and they are described in downcoast order 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 east bank of the lower Ventura River, protects the City of Ventura from floods on the Ventura River.

San Buenaventura State Beach (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 demonstration of need. Periodically, sand is deposited between the groins during the maintenance dredging of Ventura Harbor. 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 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 Harbor

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 navigational 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 Harbor 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 Experiment 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 east side of 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

The 1954 River and Harbor Act (H. Doc. 362, 83d Cong., 2d sess.) authorized the construction of this small-craft harbor and 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 interests 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 storms of 1977-78, with only small stones being displaced in the parking areas. Caltrans has also recently repaired the old highway revetment from Hobson Park downcoast to Emma Wood State Beach, which was damaged by the winter storms of 1977-78. 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.

PROBLEMS 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 desire 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 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 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. The damage that has occurred is directly attributable to wave-inducted erosion of the shoreline and the lack of protective beach or shoreline protective structures. One of the causes of shoreline erosion is from major runoff-producing sediment-moving storms draining areas of streams and rivers north and west of Oxnard, emptying into the ocean. There were major storms of this type in 1962 and 1969, and somewhat more minor events in 1952, 1956, 1958, 1966, 1973, and 1974. These storms should generally have less impact than those in 1904-1920, and 1930-1941.

The progress report dated November 1977 by the California Institute of Technology--Scripps Institution of Oceanography joint project, "Sediment Management for Southern California Mountains, Coastal Plains, and Shoreline" gives a ballpark estimate of about 30 percent of the sediment transport to the coast as being sand. Their findings suggest that approximately one-fourth of the sand produced by land surface erosion is eventually delivered to the shore.

In order to provide a more detailed description of needs and problems, the Ventura County coastline has been 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 southeast 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, 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 erosion in the winter. The 1977-78 winter storms caused an unusually high degree of erosion and threatened 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 realinement 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 following photographs.

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

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 Harbor 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. Any potential construction may have short-term effects on the grunion that spawn at McGrath State Beach.

Although a considerable amount of beach area does exist between the Ventura Harbor 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 situations during 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. Because of the rapidly increasing popularity of surfing, there is a tremendous need to preserve the existing surfing sites. Ideas have also been expressed in official areas as to the need for a comprehensive surfing study that would result in the creating of more surfing areas. Surfing, because of its importance as a recreational activity, warrants a separate tributary area map. (See app. 2, pl. 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 has 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.

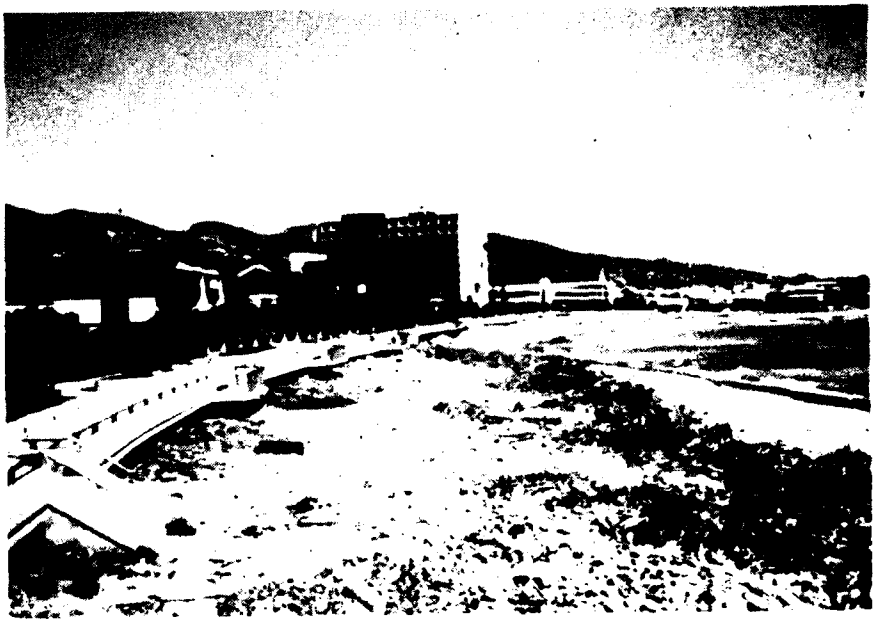
Ormond Beach, an undeveloped beach of 85 acres, of which about 51 acres are owned by the City of Oxnard, has experienced an average erosion rate of about 3.5 feet per year along a 10,400-foot strip, including the Edison property, over the past 45 years. There are no immediate developments planned as of the date of this report, except for the Oxnard General Plan, Scenic Highways Element, Sept. 1975, showing a scenic route in this area.

The following photographs generally show the debris and denuded conditions of the beaches in the central coast subregion immediately after the winter of 1977-78 storms.

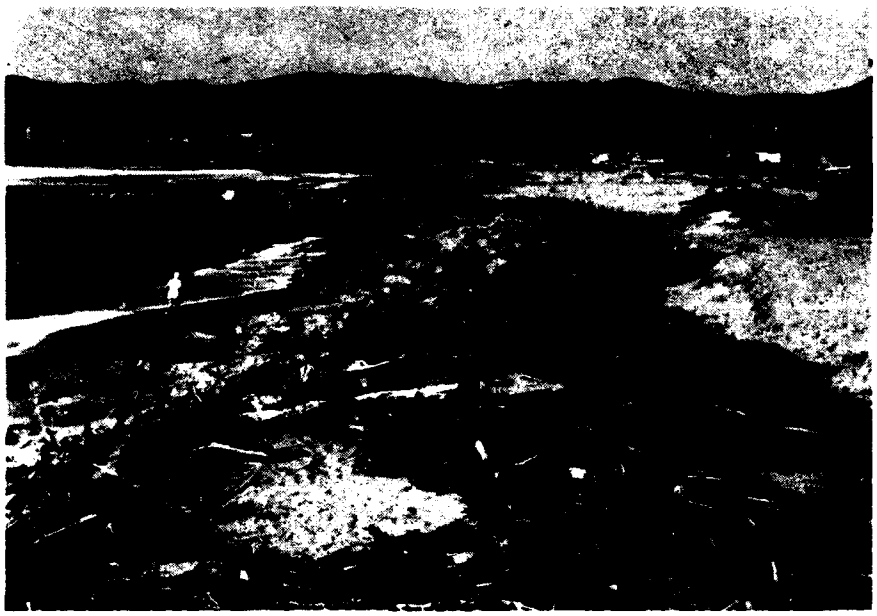
Upcoast view of 31st Agricultural District Association, Mar. 15, 1978

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

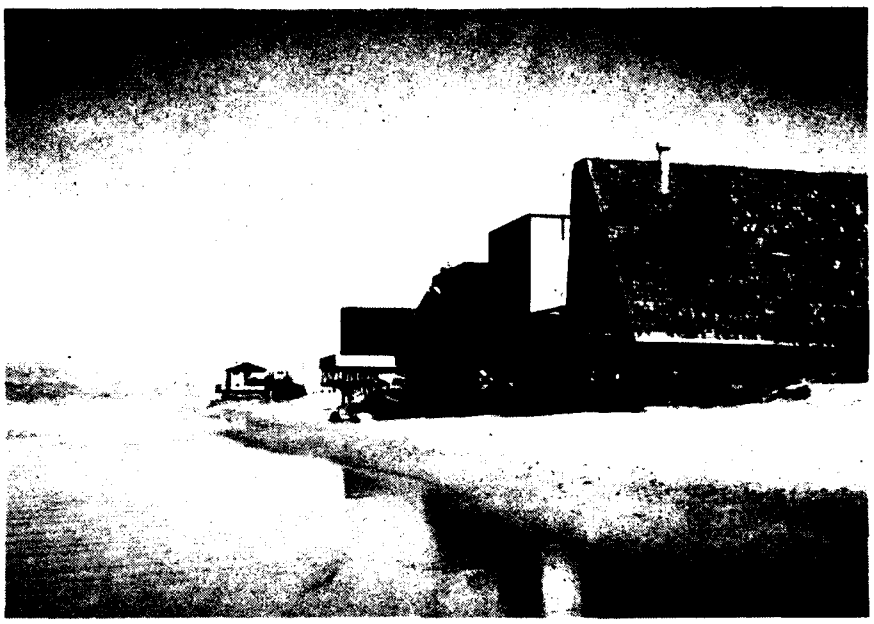


Upcoast view of groin field at San Buenaventura State Beach, Mar. 15, 1978

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 (shown in the following photos) 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 from 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 occuring 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 would 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 oceanviewing opportunities. Damage prevention or reduction and subsequent additional recreational improvements would attract more tourists, directly benefiting the economy.

SOCIOECONOMIC CONCERNS

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

Private owners are concerned that, without the construction of protective projects, damages will occur to their property, as well as to public property, and that the 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.

Whatever improvements may be constructed, the environmental quality of the shoreline should be preserved or enhanced.

Demand is increasing for developed and developable beach frontage in order to accommodate the growing population and its demand for beach recreational areas, especially in the urbanized 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. The archeological survey covered approximately 41 miles of shoreline extending downcoast from Rincon Point to Sequit Point and extending landward to U.S. Highway 1. (See app. 1.)

DEMAND ANALYSIS

The supply of available dry sandy recreational beaches in Ventura County is: North Coast, 32.3 acres; Central Coast, 357.9 acres; and South Coast, 31.3 acres. 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 day-use recreational dry sandy beach areas for Ventura County and a projected demand of 184.7 acres for peak day use by 2020. Allocating the total acreage (421.5) of dry sandy beaches that is available 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 (all for peak day use). 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 dry sandy 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.

Accessibility to public beaches was not incorporated into the benefit determinations. The Coastal Commission states ". . . the main thrust of the Coastal Act, as well as the Local Coastal Plan, is to provide maximum recreational access for the coastline." Implementation of these plans coupled with adequate supply of beach forecasted will result in accessible beach for recreationists in Ventura County.

This study concurs with the findings in the report entitled, "Comprehensive Framework Study, Calif. Region App. XVI, Shoreline Protection and Development," dated June 1971, which states in Tables SC-1 that Ventura County is projected to have a surplus of 7.9 miles of recreational shoreline by the year 2020.

There are numerous undeveloped beaches in the Oxnard-Port Hueneme area. Namely, beginning upcoast at McGrath State Beach, they are: Edison property (Mandalay), Mandalay Beach County Parks, Mandalay Beach development, Ormond Beach, and Edison property (Ormond).

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 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. Recently (June 1978) Oxnard Shores deeded 5.3 areas of beach land to the City of Oxnard. These four separate parcels are available for public use. They were formerly community playgrounds.

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 dry sandy beach use is for the tributary area of Ventura and Los Angeles counties only, and is shown on the following table by subregion for (1) hourly peak demand along with the peak hourly acreage needed, and (2) peak day demand along with the acres needed.

RECREATIONAL DEMAND FOR BEACHES, 1975-2020

Year	Tributary population	Peak hourly demand		Annual visits
		Visitors	Acres	
	North Coast Subregion (32.3 acres available)			
1975	114,200	3426	5.9	548,160
1980	126,400	3792	6.5	606,720
1990	160,800	4824	8.3	771,840
2000	192,900	5787	10.0	925,920
2010	222,600	6678	11.5	1,068,480
2020	242,600	7278	12.5	1,164,480
	Central Coast Subregion (357.9 acres available)			
1975	387,500	11,625	20.0	1,860,000
1980	404,200	12,126	20.9	1,940,160
1990	515,600	15,468	26.6	2,474,880
2000	622,300	18,669	32.1	2,987,040
2010	721,500	21,645	37.3	3,463,200
2020	789,600	23,668	40.8	3,786,880

RECREATIONAL DEMAND FOR BEACHES, 1975-2020--Continued

Year	Tributary population	Peak hourly demand		Annual visits
		Visitors	Acres	
South Coast Subregion Beaches (31.3 acres available).*				
1975	191,858	5755	9.9	920,800
1980	244,900	7347	12.6	1,175,520
1990	303,600	9108	15.7	1,457,280
2000	357,800	10734	18.5	1,717,440
2010	395,900	11877	20.5	1,900,320
2020	471,800	14154	24.4	2,264,640
Total Beach Demand in Ventura County (421.5 acres available)				
1975	693,558	20,806	35.8	3,328,960
1980	775,500	23,265	40.0	3,722,400
1990	980,000	29,400	50.6	4,704,000
2000	1,173,000	35,190	60.6	5,630,000
2010	1,340,000	40,200	69.3	6,432,000
2020	1,504,000	45,100	77.7	7,216,000

*The area measured was the dry sandy beach above the mean high tide line.

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 campsite 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 that will meet the needs and desires of the public, and that will be engineeringly feasible, economically viable, and environmentally acceptable. From among those solutions successfully meeting 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, problems, needs, and concerns were identified). However, a preliminary attempt was made to formulate a plan by looking at all the plans for shore protection usually considered and identifying those that would best meet the needs and desires of the public. The following section describes this analysis.

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, the physical character of the location, and the environmental and esthetic considerations or other expressed needs or desires. Protective vegetation, sand bypassing, and no action were not seriously considered for the following reasons: In many cases because of 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. Sand bypassing also is not applicable except where harbors or shoreline inlets are located. Sand bypassing is already being performed at the harbors in Ventura County (Ventura Harbor and Channel Islands-Port Hueneme), and efforts are underway to find more efficient bypassing systems. No action would only result in continued erosion and some possible property damage. Although the Federal Government is unable to participate in joint projects at this time, the local governments and private organizations should consider other means of implementing the following alternatives for those areas suffering erosion. (See the table entitled "Needs and Possible Alternatives.")

NEEDS AND POSSIBLE ALTERNATIVES.

Location	Needs	Most likely alternatives	Other alternatives considered
Mussel Shoals area	Provide protection for private property.	Rock revetment.	Concrete seawall - relatively very costly (1). Groin system - unesthetic (2). Sand fill - would incur high maintenance cost (3).
Hobson Park	Provide protection for camping sites, preservation	Rock revetment with access to beach.	Concrete seawall - See (1) above. Groin system - See (2) above and would cover tide pools (4). Sand fill - would cover tide pools (4), and would incur high maintenance costs (3)
Faria Park	Do.	Do.	Do.
Faria Beach Colony	Provide protection for water property	Existing seawalls	Do.
Solimar Beach Colony	Do.	Do.	Do.
Emma Wood State Beach	Do.	Do.	Do.
31st Agric. Dist. Assoc.	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 (3) above. Offshore breakwaters - See (1) above.
Surfer's Point	Do.	Do.	Do.
Ventura Marina Beach	Do.	Groin system or rock revetment	Concrete seawall - See (1) above. Sand fill - See (3) above. Offshore breakwater - See (1) above.

NEEDS AND POSSIBLE ALTERNATIVES [illegible]

Location	Needs	Most likely alternatives	[illegible] alternatives considered
San Buenaventura State Beach	Maintain existing recreational beach.	Sand Fill (periodic dredging of sand trap at Ventura Harbor).	No other alternative considered since beach is fairly stable with occasional deposition of sand from Ventura Harbor, 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 Harbor dredging.
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 Harbor continues.
Oxnard Shores	Protection of facilities and property (private and public).	Rock revetment or groin system	Concrete seawall - See (1) above. Sand fill - See (3) above. Offshore breakwaters - See (1) above.
Hollywood Beach Park	Protection of public recreational beach, private homes and public facilities (backshore area).	Beach stabilized by sand trap.	No other alternative considered.
Silver Strand Beach Park	Do.	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.

NEEDS AND POSSIBLE ALTERNATIVES (Continued)

Location	Needs	Most likely alternatives	Other alternatives considered
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 beach. Groin system - See (1) and (2) above.
Ormond Beach	Preserve natural state of backshore area for wildlife, and develop beach sometime in the future.	No action.	No other alternatives considered since no improvements, public or private, exist. Scenic highway may be developed in the future.
Point Mugu State Beach including 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 (3) 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 (3) above. Offshore breakwaters - See (1) above.

Sources of Construction Materials

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.

ECONOMIC ANALYSIS

Economic studies assumed conditions without any beach erosion control measures. Even with beach erosion control measures installed at the eroding areas, there would be no significant increase in the future growth of population, dwellings, and industrial or commercial enterprises. More detailed information on base studies are contained in the appendixes.

Based on the erosion rates tabulated in table 2, appendix 3, "Summary of Annual Rates of Erosion," benefits to the extent of preventable damages and/or recreational benefits were estimated for the various locations and are displayed in the following table, "Benefit-Cost Analysis." 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, 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 to determine benefit-to-cost ratios.

For the public beaches only, values used were $2.25 per camper day. 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 6-7/8 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 6-7/8 percent. The procedures used are in accordance with Corps of Engineers, Engineering Manual 1120-2-108. The following table shows that the costs for revetment in each case 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.

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

For a detailed explanation of methods of benefit calculations, see discussion under Benefit Analysis in Appendix 2, Tributary Area Analysis.

BENEFIT-COST ANALYSIS

Name	Length Ft	Length to protect Ft	Average annual benefits $	Average annual costs $	B/C ratio
Mussel Shoals*	1,900				
Faria Park	900	900	9,300	25,700	0.36
Faria Beach Colony*	7,700				
Solimar Beach Colony*	3,700				
Emma Wood State Beach area	18,400	9,400	50,000	268,400	0.19
31st. Agric. Dist. Assoc.	1,800	500	3,500	14,300	0.24
Surfer's Point*	1,100				
Ventura Marina Park*	600				
McGrath State Beach*	10,400				
Mandalay Beach Park	2,500	2,500	18,700	71,300	0.26
Oxnard Shores (private and public)	6,200	1,400	32,300	39,900	0.81
Hollywood Beach Park*	6,000				
Silver Strand Beach Park*	4,500				
Port Hueneme Beach*	5,200				
Ormond Beach*	5,000				
Point Mugu State Beach*	20,500				
Sycamore Beach (State)	1,600	1,600	15,200	45,600	0.33
County Line Beach	1,800	900	19,300	25,700	0.75

*Benefits and costs were not estimated because erosion rates were minimal (over the 29- and 45-year periods) and, consequently, benefits were negligible. Costs are based on actual length of revetment need for protection.

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.

IMPACT ASSESSMENT

Preliminary social and environmental impacts were considered for those alternative measures that may be suitable in one location or another along the Ventura County shoreline. The social impacts are discussed and displayed in the table entitled "Shore Protection Measures and Their Impacts."

SHORE PROTECTION MEASURES AND THEIR IMPACTS.*

Shore protection measures	Impacts: Beneficial	Impacts: 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	Preferred by some as having a more esthetically pleasing appearance than other structural alternatives.	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.
		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.	May create toe erosion and eventual failure of structure if not designed properly.
Groin system	Provide protection to the backshore by means of a seaward extension of the high water line.	Potential safety hazard.
		Esthetically unpleasant appearance.

*See footnotes at end of table.

SHORE PROTECTION MEASURES AND THEIR IMPACTS (Continued)

Shore protection measures	Impacts: Beneficial	Impacts: Adverse
Groin system (cont'd,)	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.	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.	
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.

SHORE PROTECTION MEASURES AND THEIR IMPACTS (Continued)

Shore protection measures	Impacts	
	Beneficial	Adverse
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 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; and increased economic growth associated with increased recreational uses.

All 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 because of the increased recreational uses.

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

COORDINATION AND PUBLIC INVOLVEMENT

VIEWS OF COORDINATING AGENCIES

U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Fisheries Services (NMFS)

Additional biological studies will have to be performed if Federal participation is contemplated in the future.

U.S. Department of Commerce, Maritime Administration.

Because the Maritime Administration has no legislative responsibility concerning beach erosion control, it does not include anything regarding this subject in its program. The Maritime Administration noted that beach acreage lost because of erosion accompanied by less beach attendance would certainly have a paramount effect on the economy of the county.

Department of the Navy, Pacific Missile Test Center, Point Mugu, Calif.

In order to protect the Navy's activity for effective mission accomplishment, it is essential that this shoreline be protected against erosion. It is requested that continuing action be made to obtain the authorization and funding necessary for sand replenishment and structural measures.

State of California, Department of Water Resources

The Department of Water Resources indicated that the quality of ground water in the beach area is not all highly mineralized and that ground water from deep aquifers and areas not intruded with ocean water is adequate for agricultural use.

California Coastal Commission, South Central Coast Regional Commission

In general, the staff concurs with the study's recognition of the need to consider environmental and esthetic impacts of shoreline erosion control structures. Historically, State and Regional Coastal Commissions have only allowed shoreline erosion control structures when absolutely necessary to protect a large segment of public or private shoreline property from erosion damage. The Coastal Act establishes recreational opportunities as having priority over residential uses. In the Act, residential uses are not considered more valuable than recreational uses.

City of San Buenaventura, Director of Community Development

The report should be reviewed considering the future demand projections of the coastal plans and possible reuse of the fairgrounds. The report should not be finalized until the local coastal programs have been completed.

The Resources Agency of California

The State has no objections to a negative recommendation at this time for beach erosion control measures proposed by the U.S. Army Corps of Engineers. Coastal construction projects may be subject to waste discharge requirements, and notificaton of any proposed beach erosion measures will be sent to the California State Water Resources Control Board.

State of California Department of Parks and Recreation

The State's cursory review indicates a need for clarification on several points. For example, all the State ownership indicated is not usable beach area because of the seasonal fluctuation. The Corps has now utilized in this report the peak attendance figures given by the State and the detailed usage of the beaches and parks given by the State.

City of Oxnard, Office of the Mayor and the Public Works Department

The City of Oxnard believes the study should be revised to indicate corrected information and conclusions concerning erosion and to be more responsive to the Federal Coastal Act requirements. The Los Angeles District has reviewed and corrected the report as required, and has responded in the appendixes

Citizen's Advisory Committee, Ventura County Beach Erosion Study

The chairman of this committee stated at a permit hearing before the South Central Regional Commission of the California Coastal Commission that the Corps report indicated that less than one-third of the available beach would be used by the year 2020.

Friends of the River

Any attempt to arrest the natural erosion along this section of beach at the mouth of the Ventura River, either by construction of groins or the periodic placement of sand, would have significant adverse impacts on marine wildlife resources. Friends of the river are vigorously opposed to any measures that would alter the natural processes and characteristics of this area.

Oxnard Shores Company

The President of Oxnard Shores Company believes that the construction northward that has stripped the Oxnard Shores Beach has caused a loss of valuation to the Company. Because of this loss of valuation, the Corps should take steps to prevent any further stripping of this beach and, in addition, should consider ways and means of building up the beach to its original depth.

VIEWS OF LOCAL SPONSOR

County of Ventura, Public Works Agency, Flood Control and Water Resources Dept.

The local sponsor, County of Ventura, felt that the Corps did not fully respond to the recommendations made by the County at the initial meeting. The Los Angeles District, however, was required to terminate the study upon finding that there were no potential shore protection projects in Ventura County that justify Federal participation. Had the study continued through the normal planning phases, the Corps would have prepared a complete report responding to the county's requests. The county also felt that the report, although it provided a good discussion on the environmental, archeological, and socio-economic concerns, coastal data analysis, wave and longshore climate, and the needs and possible alternative plans, made no recommendation to local coastal interests for erosion control and did not discuss applicable laws and constraints associated with the Corps' effort in the study. A description of technical assistance and a brief explanation of the applicable laws to this study have been added to the discussion titled "Public Views and Responses" in the appendix. Detailed comments and responses thereto are contained in appendix 5.

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 and because of slowing population growth in the tributary area, there is no demand (camping excluded) for additional beach area county-wide in the forseeable future.

b. Beach erosion control projects in the study area are economically infeasible for the present and foreseeable future, with the closest approach to economic feasibility occurring at the private beach areas of Oxnard Shores and County Line Beach, where the benefit-cost ratios are 0.8 and 0.75, respectively.

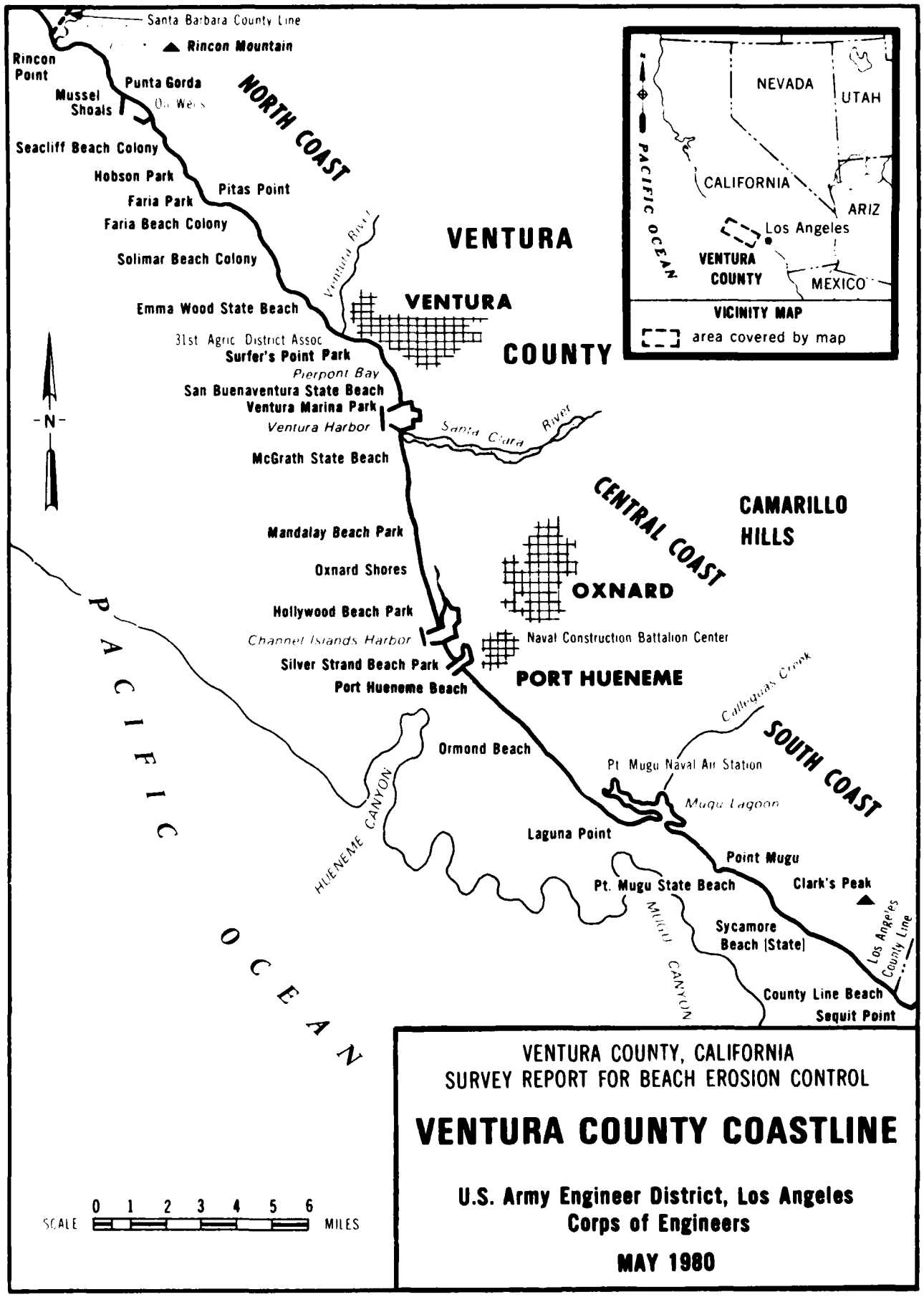
c. Since there is currently no authorization permitting Federal participation in the private beach areas of Oxnard Shores and County Line Beach, and these are the only areas where projects may be economically feasible, Federal participation in the cost of construction of beach erosion control projects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

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

RECOMMENDATIONS

There are insufficient benefits to justify Federal Shore Protection Projects in Ventura County. Consequently, Federal participation in providing beach erosion control measures is not warranted at this time.

GWYNN A. TEAGUE
COL, CE
District Engineer



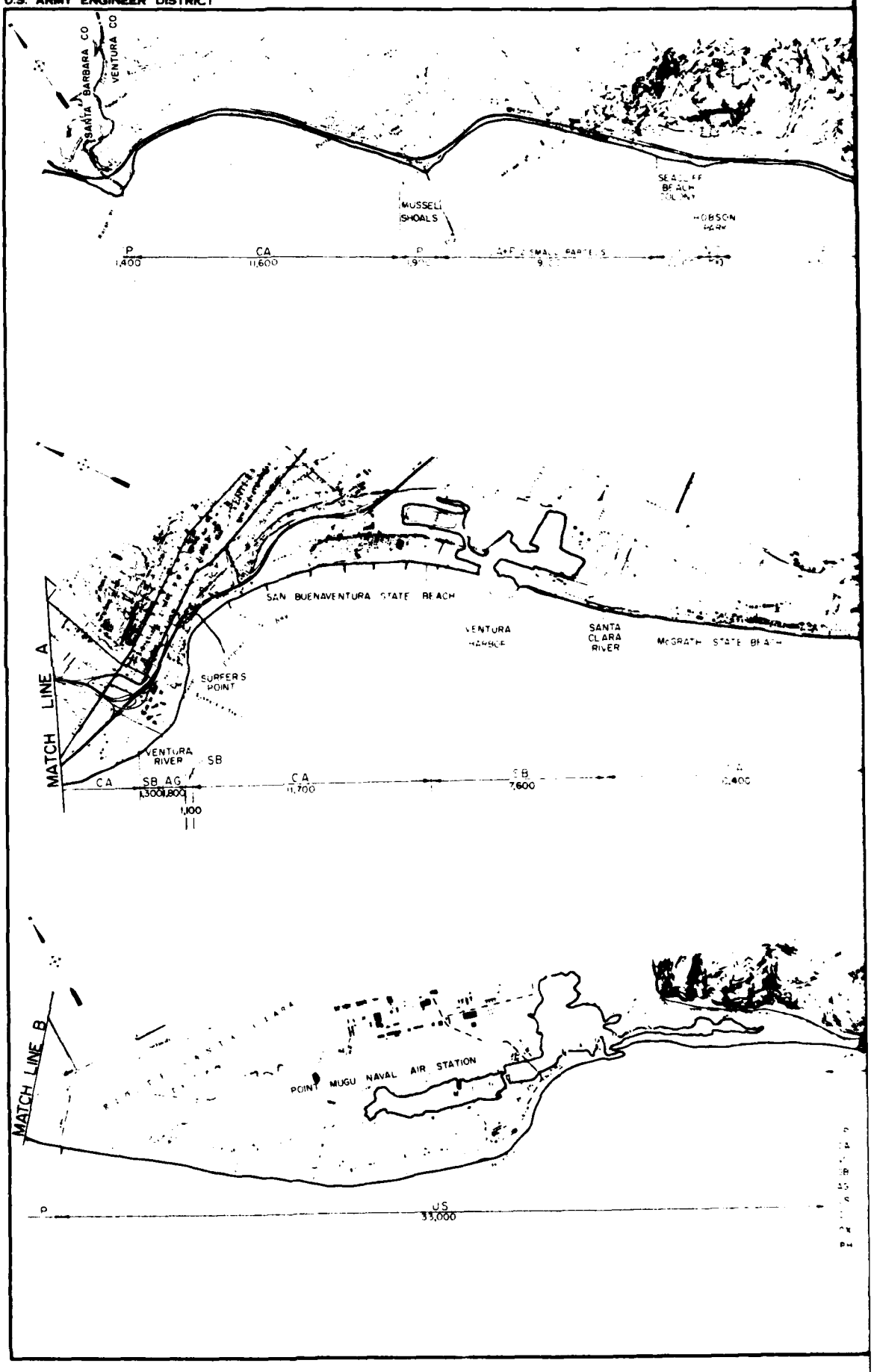
VENTURA COUNTY, CALIFORNIA
SURVEY REPORT FOR BEACH EROSION CONTROL

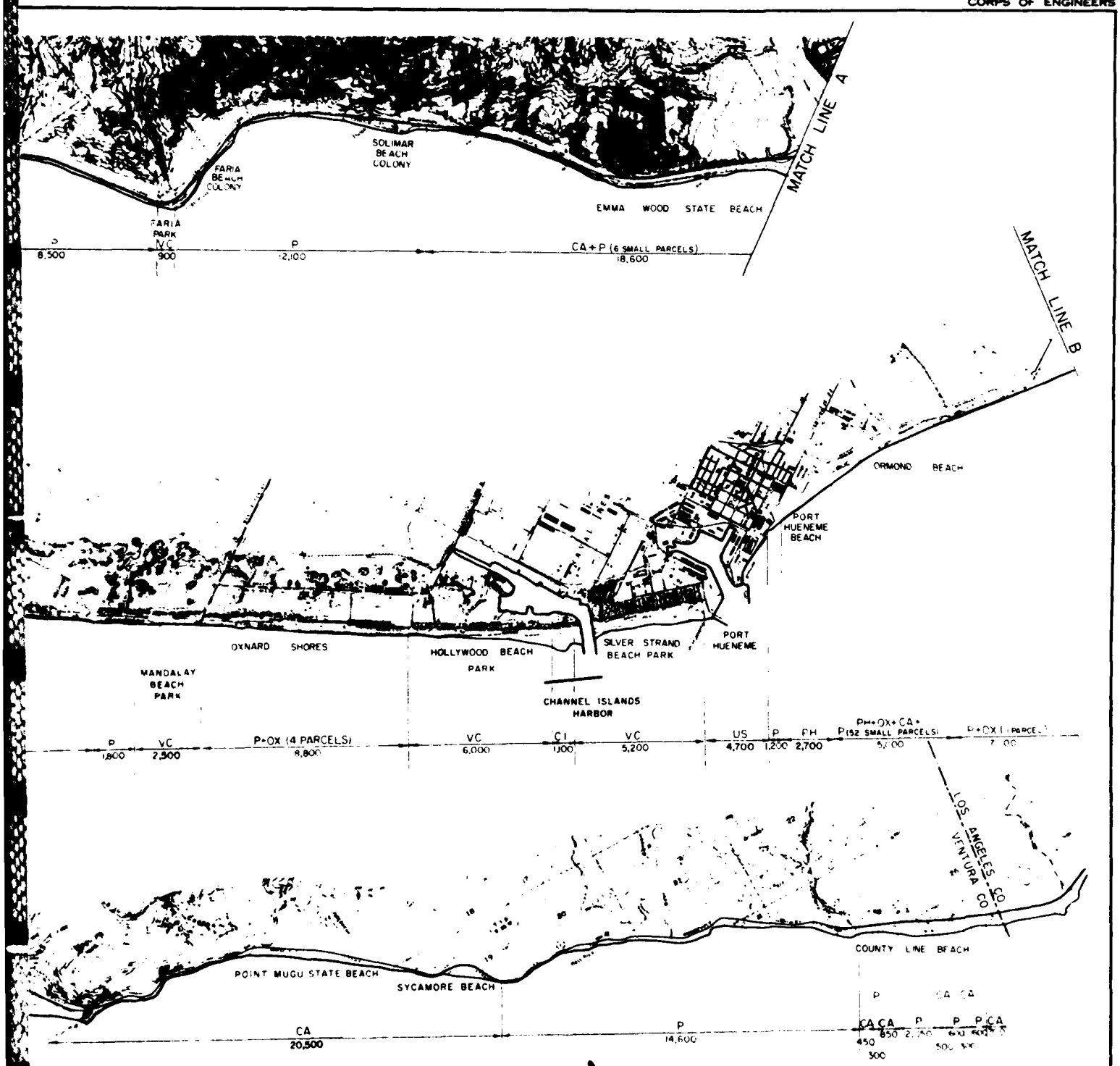
VENTURA COUNTY COASTLINE

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

MAY 1980

U.S. ARMY ENGINEER DISTRICT





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

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

MAY 1980

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