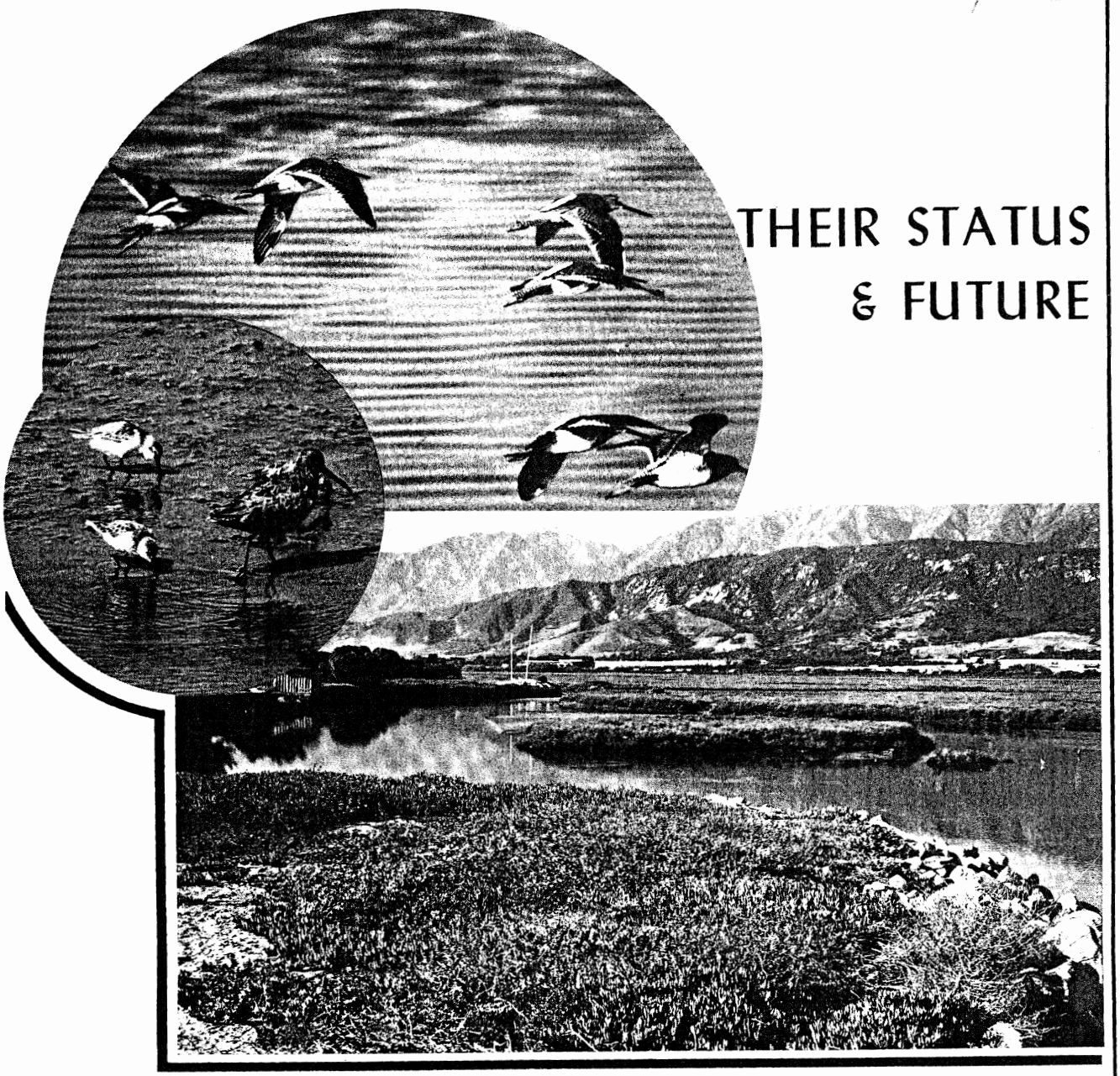
The Natural Resources of CARPINTERIA MARSH

THEIR STATUS & FUTURE



California Department of Fish and Game

U.S. Fish and Wildlife Service

March, 1976

THE NATURAL RESOURCES

OF

CARPINTERIA MARSH

Their Status and Future

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Cover design by Karen Schaff

Carpinteria Marsh

Pacific Western Aerial Surveys, Oct. 1973

ACKNOWLEDGMENTS

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Doris Faust, University of California, Santa Barbara, and Ruth Hurd, Department of Fish and Game, typed the manuscript drafts. Plates and figures were delineated by Karen Schaff, also of the Department.

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INTRODUCTION

A relatively small wetland, alongside El Camino Real, and generally missed by the average motorist passing by, Carpinteria Marsh represents a living remnant of what was once an extensive California coastal wetlands system. Relatively small, but important still--because approximately 60 percent of the tidal wetlands in California has already been destroyed or degraded. And, the future of the remaining coastal wetland habitats continues to be threatened, due to demands placed on the ever-popular coastline by the needs of an ever-increasing human population. Hence, the urgent need for this and similar reports and for sound planning to protect and enhance these valuable coastal natural resources.

The purpose of this report, then, is: 1) to document the natural resources of Carpinteria Marsh, 2) outline the uses those resources receive, 3) enumerate the problems and conflicts of use that affect those resources, and 4) recommend measures that will protect and enhance the marsh and its resources. It is intended as a guide for citizens, planners and administrators of all private and public entities interested in the status and future of the marsh.

This report has been prepared under contract to and fully funded by the Office of Biological Services of the U.S. Fish and Wildlife Service. The goals and purpose of this federal office are to review the impact on fish and wildlife resources of land, mineral and water development practices, such as offshore oil and gas exploration, development and production; construction of inshore pipeline canals and refineries; power plant construction/operation and urban development. This report, and five other southern California reports, covering Agua Hedionda (San

Diego County), Anaheim Bay-Huntington Harbor (Orange County), Mugu Lagoon (Ventura County), the Northern Santa Barbara County Coastal Wetlands and the Nipomo Dunes and Wetlands (San Luis Obispo County), are scheduled to be part of the Department's "Coastal Wetland Series" that includes reports on the natural resources of Upper Newport Bay (Orange County), Goleta Slough (Santa Barbara County), Bolinas Lagoon (Marin County), Elkhorn Slough (Monterey County), San Diego Bay and Los Penasquitos Lagoon (San Diego County), Morro Bay (San Luis Obispo County), Humboldt Bay and the Eel River Delta (Humboldt County), Lake Earl and the Smith River Delta (Del Norte County) and Bodega Harbor (Sonoma County).

SUMMARY

Carpinteria Marsh is a coastal lagoon, salt marsh complex located on the south facing coast of Santa Barbara County. It lies immediately west of the City of Carpinteria and about 75 miles northwest of Los Angeles. The marsh extends east-west along the coast for a little over one mile and varies from a few hundred feet to a quarter of a mile in width. Landward margins are surrounded with urban and agricultural areas and seaward margins and by long, narrow sand spits that also are urbanized.

Carpinteria Marsh lies within the 15,700-acre Carpinteria Valley watershed, that is mostly comprised of the steep, south-facing slopes of the Santa Ynez Mountains. Three main streams drain the watershed: Carpinteria, which empties into the ocean east of the marsh, and Santa Monica and Franklin creeks, that run into and through the marsh. The average annual rainfall is about 14 inches at sea level and 28 inches at the crest of the mountains, but due to the precipitous slopes, heavy storms can cause serious flooding in the watershed and marsh.

The wildlife and scenic values of the marsh have played a central role in its utilization and development. Historically, the marsh was the site of two noted Chumash Indian villages. The Indians engaged in boat building and ocean fishing in the area. During Hispanic occupation (*circa* 1786), Carpinteria Marsh and Valley were part of the early Santa Barbara Mission. The first permanent settlement (Old Town) was made in the 1850's.

The construction of the Southern Pacific Railroad (1887) constituted the first encroachment into the marsh. In 1925, the sandspits were surveyed and their subdivision for exclusive shoreline homes began.

A long history of substantial flooding problems in Carpinteria Valley led to the formation of a flood control district and ensuing flood control projects in the marsh. Historically, under natural conditions, the ocean inlet of the marsh was closed by a sandbar seasonally. Construction, by the Santa Barbara Flood Control District in 1966, of channels through the marsh and rock seawalls at its mouth, stabilized the ocean inlet. These flood control measures enhanced the marsh by increasing tidal prism and flushing and eliminated chronic stagnation, odor and mosquito problems.

Recent floods (1971) deposited an estimated 100,000 tons of silt in the marsh. The Flood District proceeded with emergency authority to unblock the tidal channels and restore the marsh, and since then has obtained flood hazard zoning along both dredged channels of Santa Monica and Franklin creeks. At present, a comprehensive Environmental Impact Statement on present and future flood control measures in Carpinteria Valley (including the marsh) is being prepared by the Soil Conservation Service of the U.S. Department of Agriculture.

Ownership in the 230-acre Carpinteria Marsh is predominantly private, being held by insurance and trust companies, and associations representing the land and home owners. Whereas a small percentage of the wetlands in the marsh is owned by public agencies, the dominance of private land ownership is even more pronounced beyond the perimeter of the marsh, into the adjacent urban and agricultural areas.

Much of Carpinteria Marsh will be publicly owned in the not-too-distant future, if present efforts of the University of California to acquire several wetland parcels are successful. The University, as well as the

Department of Fish and Game, has a long history of efforts to place the marsh into public ownership and, hence, into perpetuity.

Despite being adjacent to the highly urbanized Carpinteria Valley, Carpinteria Marsh has remained in a relatively natural state. Since the 1930's public access to the marsh has been limited by permit to individuals and agencies with legitimate interests. No public or private recreational development has occurred in the marsh. A secondary use of the marsh is flood control, and the wetlands (except the channels) are zoned agricultural. The main channels of Santa Monica and Franklin creeks are designated as flood hazard zones. The existing Santa Barbara County General Plan, as amended in 1973, shows the marsh as an "ecological preserve." Use of the lands adjacent to the marsh is residential, commercial and for transportation. Land use in the watershed is predominantly agricultural and residential. The Carpinteria Valley, in general, continues to undergo rapid urbanization and population growth.

Carpinteria Marsh habitats can be classified into seven types: 1) channels, 2) tidal saltmarsh, 3) sand and mudflats, 4) disturbed (dikes and fill), 5) alluvial fan, 6) salt flats, and 7) freshwater. The ocean beach and sandspit provide additional habitat types, but housing development on the spits has largely replaced native flora with exotics on these latter two types of habitat.

Six vegetative types are found in the marsh: 1) tide flat algae flora, 2) perennial pickleweed, 3) grassland - shrub (on the alluvial fans), 4) disturbed beach and dune flora, 5) adventive flora (on disturbed habitat), and 6) brackish and freshwater marsh vegetation. At least 84 plant species are represented in the marsh.

Data are scarce on the invertebrate fauna of Carpinteria Marsh, but a limited marine fauna dominated by polychaete worms, mollusks and crustaceans does occur. The bentnose and common littleneck are the most abundant clams, and mud and shore crabs are common along the tidal creek banks.

Detailed studies on fish in Carpinteria Marsh are lacking. However, some resident species probably occur, including arrow and tidewater gobies, killifish, California mudsuckers and Pacific staghorn sculpin. Topsmelt are abundant. Several other species like the shiner perch, California halibut and starry flounder, probably move in and out with the tides.

The most conspicuous wildlife at Carpinteria Marsh are the thousands of shorebirds and waterfowl that pass through during their annual migration. Water-associated birds, accounting for at least 49 different species, are the most commonly observed. Gulls, terns, herons and egrets are other water-associated birds common to the marsh. Two endangered species, the light-footed clapper rail and Belding's savannah sparrow occur in the marsh. The extensive areas of disturbed land and upland vegetation provide habitat that attracts a wide variety of land-associated birds, notably hawks, kites and small flocks of insectivorous and seed-eating birds that move freely between the marsh and adjacent upland habitats.

Survey data are lacking on mammals that inhabit the marsh, but several species are observed there and are known to be in adjacent and similar areas. Rabbits are the most conspicuous; but shrews, mice and voles probably are well-represented and larger mammals such as racoons and skunks are known to occur.

A variety of habitat types and adequate tidal flushing in Carpinteria Marsh make it a relatively productive marsh. Hence, it provides food and shelter for many kinds and numbers of birds and mammals. The marsh channels also serve as a nursery area for several fish. Any deterioration of the environmental quality of the marsh will lead to significant floral and faunal changes. Species most critically affected, however, would be those such as the light-footed clapper rail and Belding's savannah sparrow that are most dependent upon the unique features found in Carpinteria and other similar southern California marshes. Vigorous, year-round, tidal flushing is probably the most critical ecological factor in the marsh.

Prior to 1930, some appropriative use of the natural resources, such as small game and waterfowl hunting, occurred in Carpinteria Marsh. Following subdivision, hunting was prohibited and trespass restricted. Since that time, most use in the marsh falls into the category of non-appropriative use, like bird watching, nature study, scientific and educational use, and some limited boating. Some clamming occurs on the sandy beach and mudflats near the ocean entrance to the marsh, but no clamming has occurred within the marsh in recent times. If the University of California is successful in its negotiation to acquire portions of the marsh and tidelands, the potential for increased, but carefully screened, educational and scientific use, will be realized.

The major problems and conflicts of use facing the natural resources and environmental quality of Carpinteria Marsh fall into four groups: 1) sedimentation and flood control, 2) several aspects of water quality, 3) urban expansion and encroachment, and 4) problems relating to access.

The completed and planned phases of the Carpinteria Watershed Project should greatly reduce existing flood control and sedimentation problems. Water quality in the marsh is relatively good at present. Controlled access to the marsh will be provided when Carpinteria Marsh comes into public ownership. There is good reason to believe that the unique and valuable natural resources of Carpinteria Marsh are going to survive the rigors and encroachment of the twentieth century.

RECOMMENDATIONS

Because of the high value of the varied fish and wildlife resources and marsh habitats, the potential of the marsh for scientific and educational use, and because of the critical need by many water-associated wildlife species, including some endangered species, for California's coastal wetlands, the Department of Fish and Game recommends that:

1. All privately-owned wetlands of Carpinteria Marsh be placed in public ownership. The University of California is currently negotiating to acquire approximately 120 acres for inclusion in their university-wide Natural Land and Water Reserves System. The remaining acreage of the marsh should also be placed in public ownership. The Department lists Carpinteria Marsh high on its acquisition priority list.

2. The Carpinteria Valley Watershed Flood Control Project be fully implemented with the provision that Carpinteria Marsh be protected or enhanced by the project. To qualify for funds, the Santa Barbara County Flood Control District, together with the U.S. Soil Conservation Service, is preparing an Environmental Impact Statement (EIS) on the project. The Department has reviewed and supports the project, provided specific recommendations to protect or enhance the marsh (see page 49) are incorporated into the project and included as a commitment within the final EIS. Fully implemented, the project will include maintenance dredging in the upper marsh that should ensure continued tidal flushing of the entire marsh. Elements of the project established in the upper watershed (see page 48) should reduce sedimentation problems in the marsh.

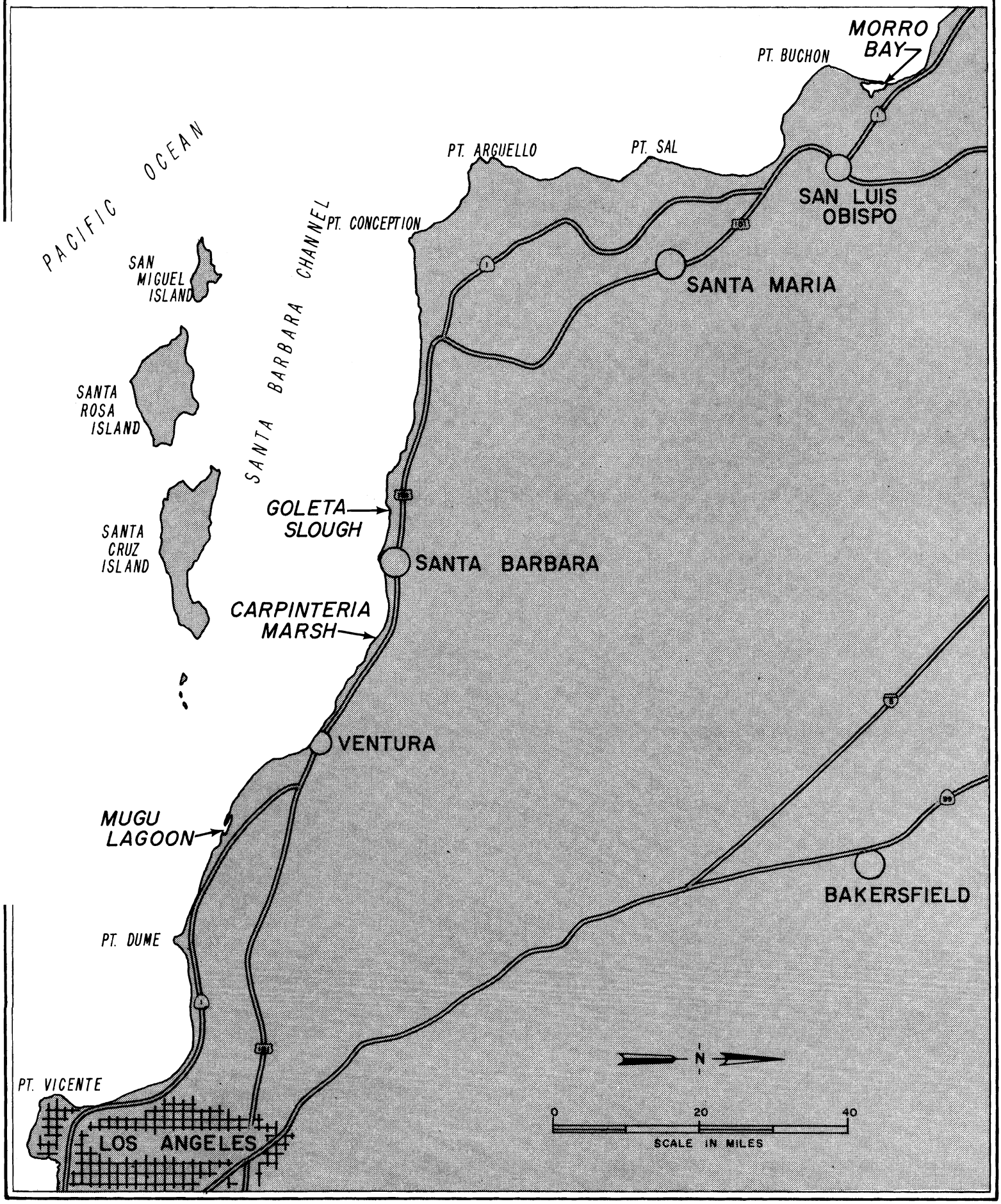
3. The objectives of any development of lands immediately adjacent to Carpinteria Marsh be compatible with maintenance or enhancement of the

natural resource values of the marsh. Carpinteria Marsh is a relatively small lagoon-salt marsh complex, but supports abundant and varied natural resources. The level of encroachment and disturbance should be kept at a minimum to protect this unique and fragile marsh.

4. A land use plan for limited access for recreational, educational and scientific use of the marsh be developed jointly by University of California and Department of Fish and Game. The limited access policies of both the Sandyland Protective Association and the Sandyland Cove Homeowners Association are largely responsible for the relatively undisturbed character of the marsh. However, the marsh will accommodate a limited amount of human use if such use is controlled in a manner to prevent damage to the marsh and disturbance of the animals that live there.

PLATE I

CARPINTERIA MARSH AND VICINITY



CARPINTERIA MARSH AND ENVIRONS

Physical Features

Location

Carpinteria Marsh[1] is a coastal lagoon--salt marsh complex located on the south facing coast of Santa Barbara County, immediately west of the City of Carpinteria and some 75 miles northwest of Los Angeles. The general location of the site and its proximity to other southern California coastal wetlands is shown in Plate 1.

General Description

Pickleweed salt marsh, intertidal flats and subtidal channels dominate the wetlands. Occupying an area of approximately 230 acres, they extend for more than a mile, east-west along the coast and vary in width from over one-fourth of a mile near their eastern boundary, to only a few hundred feet in the west (Plate 2). The landward margins of the wetlands are surrounded by agricultural and urban areas, while to the south they are separated from the ocean by two long narrow sandspits. Both sandspits are occupied by exclusive, single-family residential developments, Sandyland to the west and Sandyland Cove to the east. The City of Carpinteria lies north and east of the site, while the small commercial center of Santa Claus Village is located at its western extremity.

Santa Monica and Franklin creeks drain across an elevated alluvial fan into the eastern portion of the site, traverse the marsh through broad, dredged channels and exit to the ocean via the narrow inlet separating the eastern and western sandspits.

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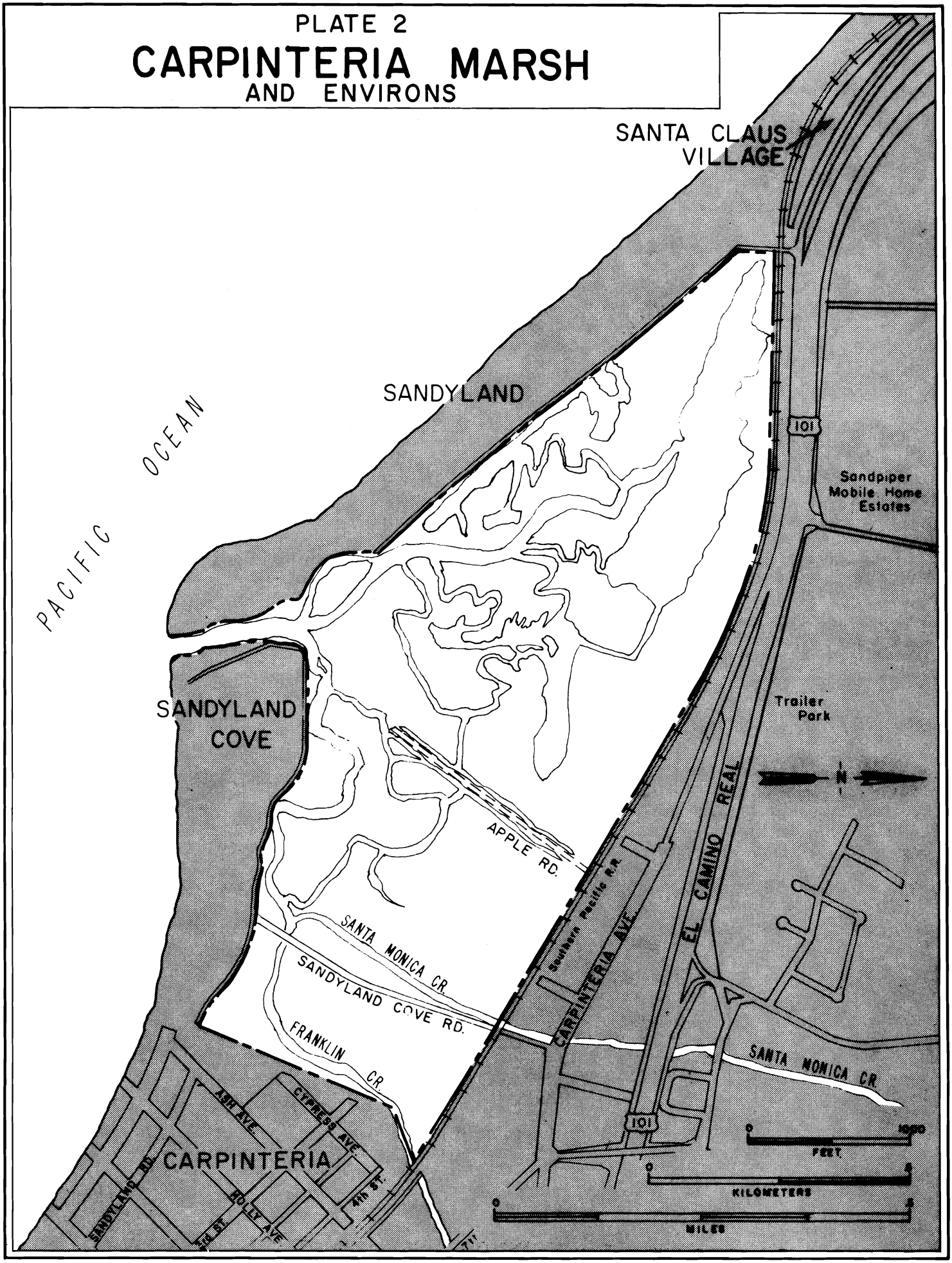
[1]Also locally known as Carpinteria Slough, Sandyland Slough and El Estero.

PLATE 2

CARPINTERIA MARSH AND ENVIRONS



The boundaries include the Southern Pacific Railroad right-of-way and the Carpinteria City Limits, on the north and east. And Spindrift Lane and Avenue Del Mar on the sandspits to the southwest and southeast, respectively.

Drainage

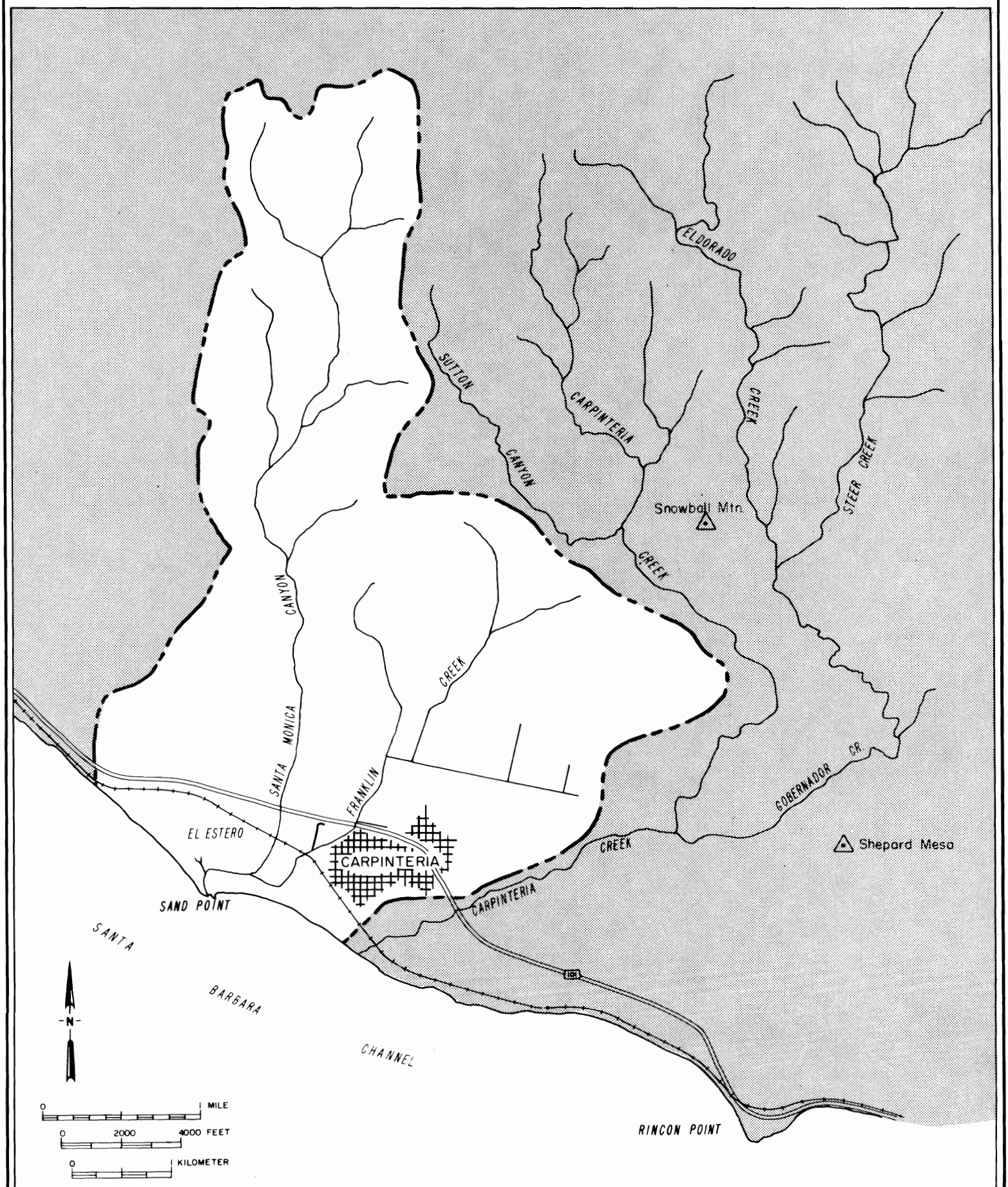
Carpinteria Marsh is included within the 15,700-acre Carpinteria Valley watershed (Santa Barbara County, 1968). The steep, south-facing slopes of the Santa Ynez Mountains account for three-fourths of the watershed. Rising to elevations well above 4,000 feet, this is chaparral brush country. The upper slopes are rough, stony and nearly precipitous in places; the foothills are smooth and gently-sloping with well-rounded ridges. The remaining one-fourth of the watershed occupies the valley floor and is made up of marine and alluvial terraces, alluvial fans and the tidal wetlands.

Three principal streams drain the watershed: Carpinteria, Santa Monica and Franklin creeks (Plate 3). Prior to California's catastrophic 1861 floods, it seems likely that all three creeks emptied into a single shallow coastal lagoon (Plate 4). By 1869, however, alluvial deposition around the mouth of Carpinteria Creek had begun to isolate it from the wetland area to the west. This separation had become complete by the early 1900's (Plate 4). Drainage into the present marsh therefore is limited to that received from the Franklin and Santa Monica creek sub-watersheds (2650 acres and 2150 acres, respectively), and from an additional 780 acres of foothills lands lying immediately north of the wetlands.

Climate

The Carpinteria Valley experiences a Mediterranean climate with 80% of the rainfall occurring from December through March. Average annual rainfall is about 14 inches at sea level but rises to 28 inches at the crest

PLATE 3
CARPINTERIA MARSH WATERSHED



of the Santa Ynez Mountains. The mean daily temperature at nearby Santa Barbara is 60°F with average maximum and minimum temperatures of 71°F and 49°F, respectively. Afternoon on-shore breezes bring in cool, marine air which keeps relative humidity high and temperatures even and moderate. Frosts are infrequent and the relatively long growing season averages 11 months (Santa Barbara County, 1968).

Soils

The mountains consist of unaltered and well-consolidated Tertiary sandstones and shales. The upland soils are shallow and rocky and the texture of the finer fraction varies from loamy sand to clay loam. The foothills include extensive fanglomerate sequencies; large boulders commonly line the creek banks and coarse sandy soils predominate. The valley-floor floodplain and tidal marsh consist of organic silts and clay deposits. The ocean beach and barrier spits consist of clear, well sorted, coarse sands.

The geologic history and structure of the Carpinteria region are fully described in papers by Upson (1949, 1951) and Dibblee (1966).

History

The wildlife and scenic resources of Carpinteria Marsh have played a central role in its utilization and development through three successive eras of California history--Indian, Hispanic and Modern.

Indian Period

Rogers' (1929) early investigation of an extensive archaeological site adjacent to the mouth of Carpinteria Creek indicates that three successive Indian cultures probably utilized the marsh and its environs. The Oak Grove Culture was probably represented as early as 4,000-5,000 B.C.

Their simple food-gathering economy appears to have drawn heavily upon the fish and shellfish resources of Carpinteria Marsh. This group was replaced by the wider-ranging, more active, Hunting People by 2,000 B.C.; and these, in turn, were supplanted by the Chumash Indians between 500-1,000 A.D. Extensive asphalt seeps in the ocean cliffs of Carpinteria, immediately east of Carpinteria Creek, probably attracted the Chumash to the area; for they had developed an advanced maritime culture based on boat-building and ocean fishing, and natural asphalt sources were important to that culture.

Hispanic Period

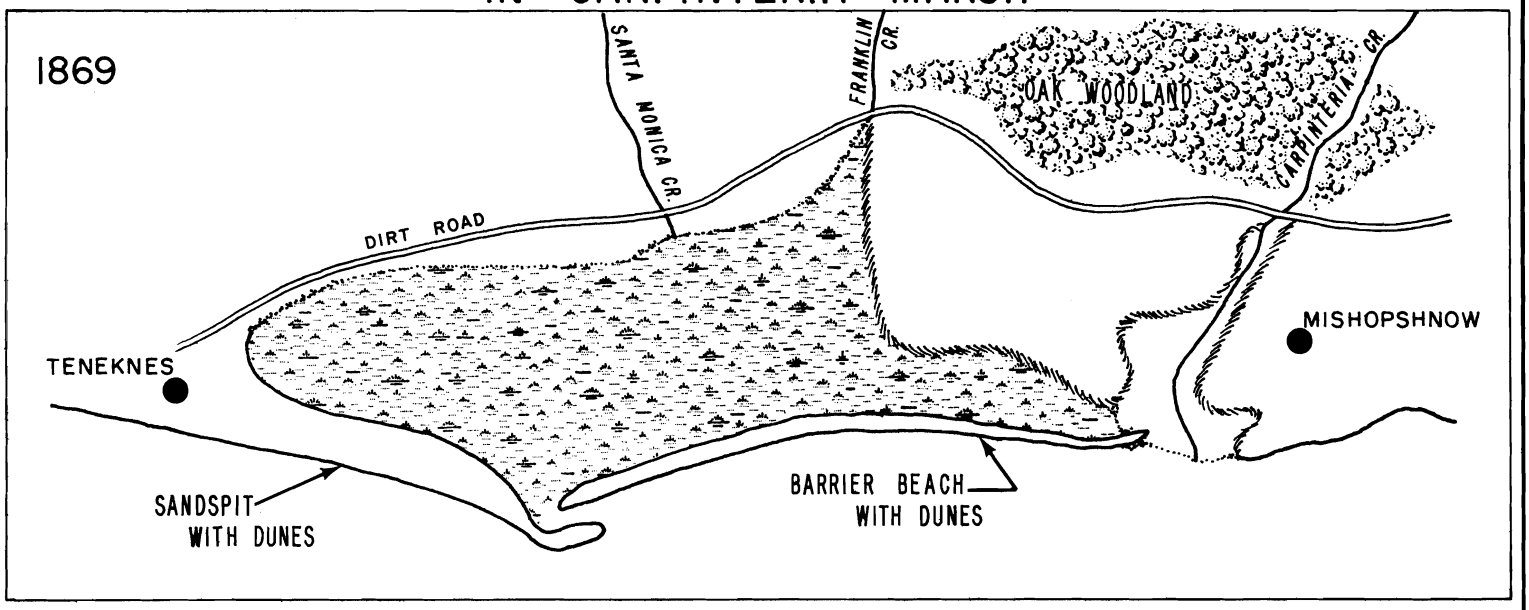
Early European contacts with the Chumash at Carpinteria included visits by Juan Cabrillo in 1542 and by Sabastian Vizcaino in 1692. In 1769 Capt. Portola and Father Crespi passed through the area during their overland expedition between San Diego and Monterey. Portola is reported to have named the area "La Carpinteria"--carpenter shop in Spanish--after the Chumash canoe builders. Crespi reported a village of 38 huts and some 300 inhabitants. Font, visiting the area in 1776, noted two Chumash villages, "Hishopshnow" at the mouth of Carpinteria Creek and "Teneknes" at the western end of the Sandyland spit (Plate 4). He described Carpenteria Valley as having some pasture land and plentiful live oaks, but little water (Rogers, 1929).

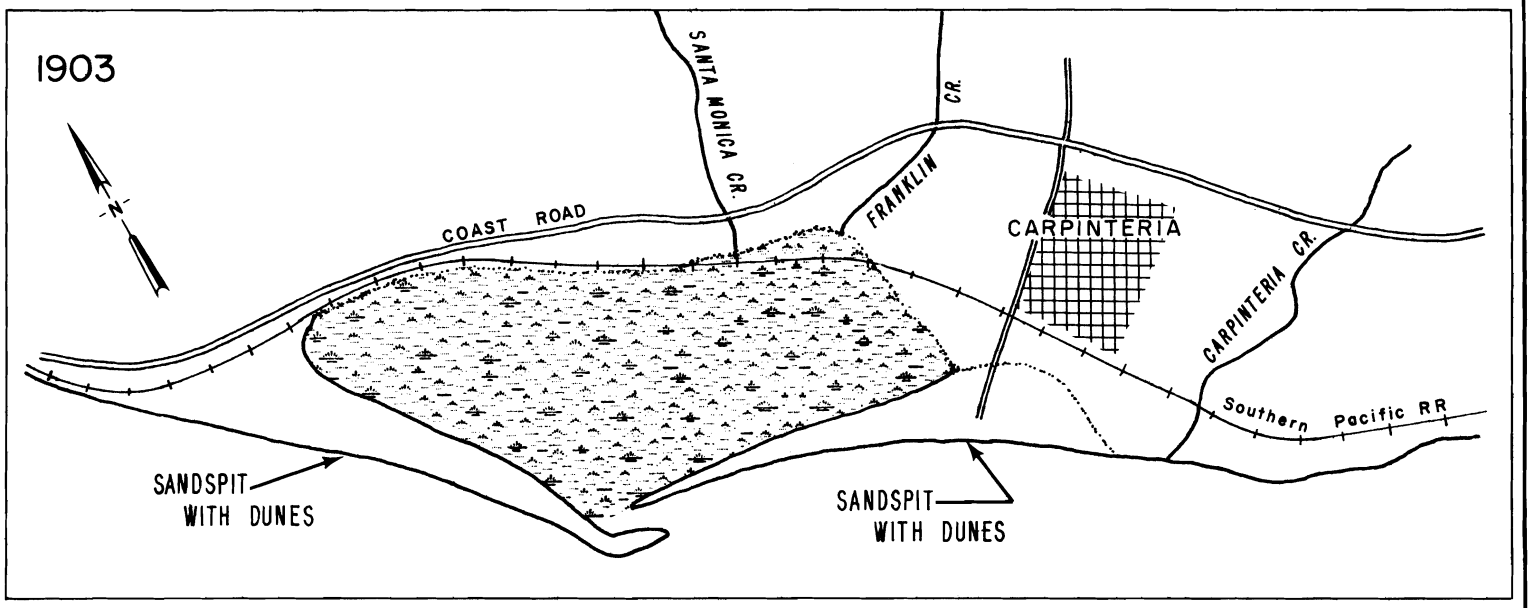
Soon after the founding of Santa Barbara Mission in 1786, all of Carpinteria was deeded to the Mission as part of an extensive Spanish Government Pueblo Lands Grant. Following the Mexican overthrow of Spanish rule in California in 1822, the former Mission Pueblo Lands were ceded to local ranchitas.

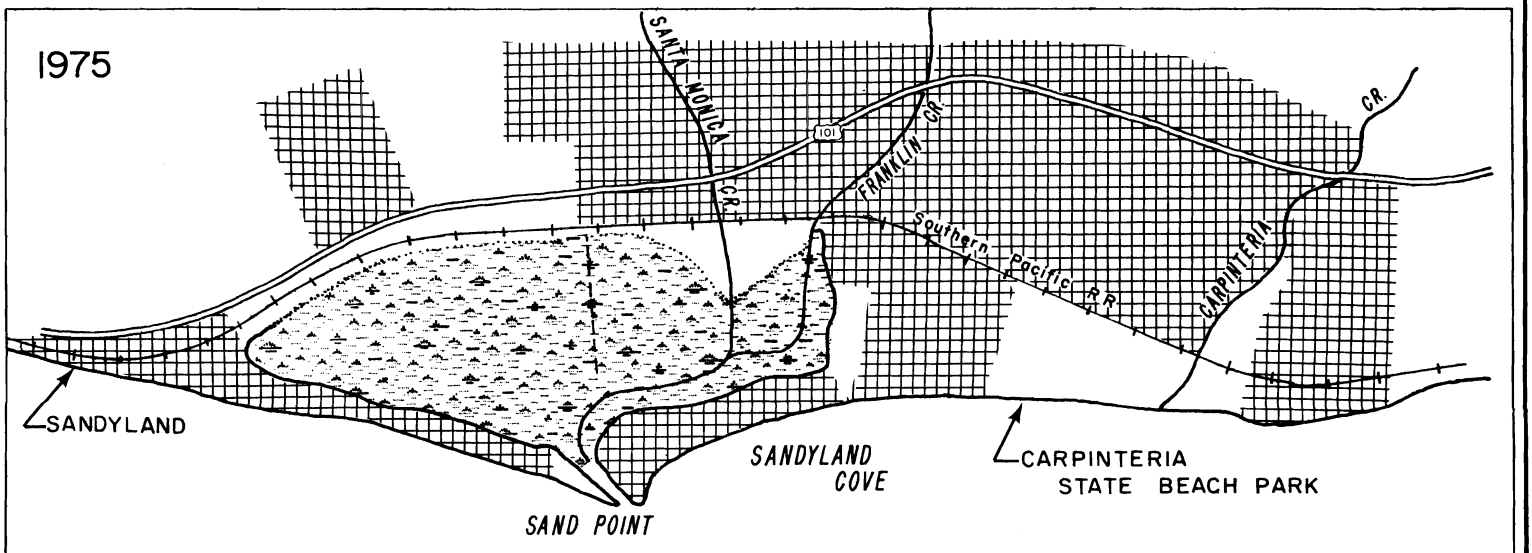
Modern Period

The 1850's saw the first permanent settlement (Old Town) near present-day Carpinteria. Live oak forests gave way to cattle grazing and drylands

PLATE 4
HISTORICAL CHANGES
IN CARPINTERIA MARSH





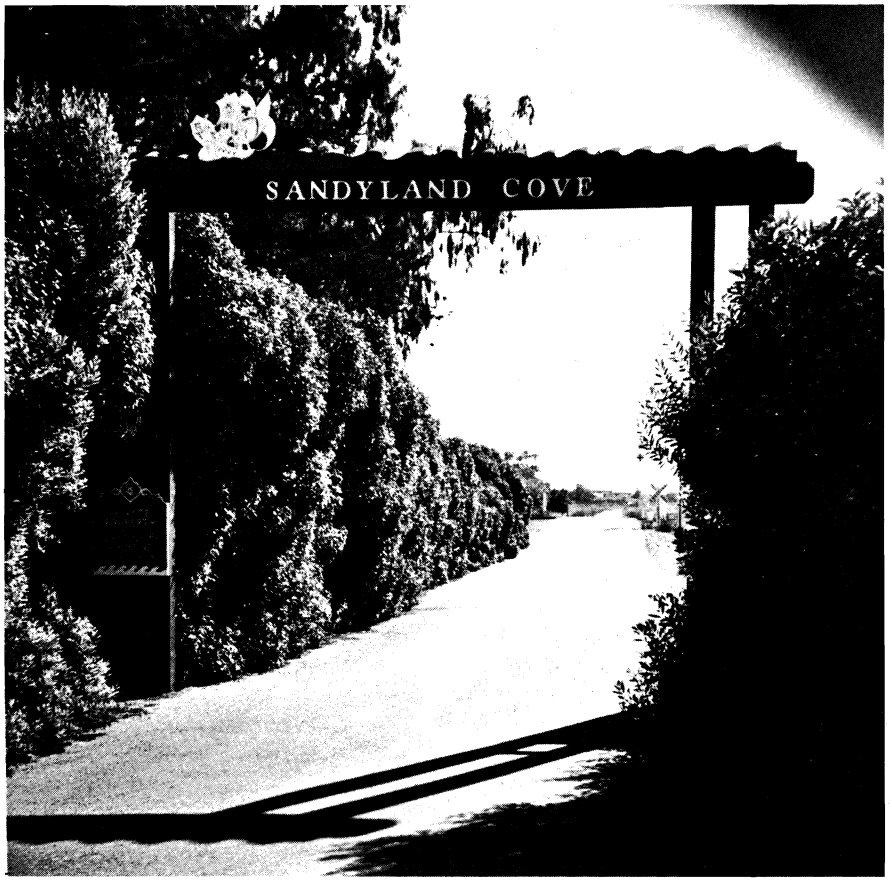


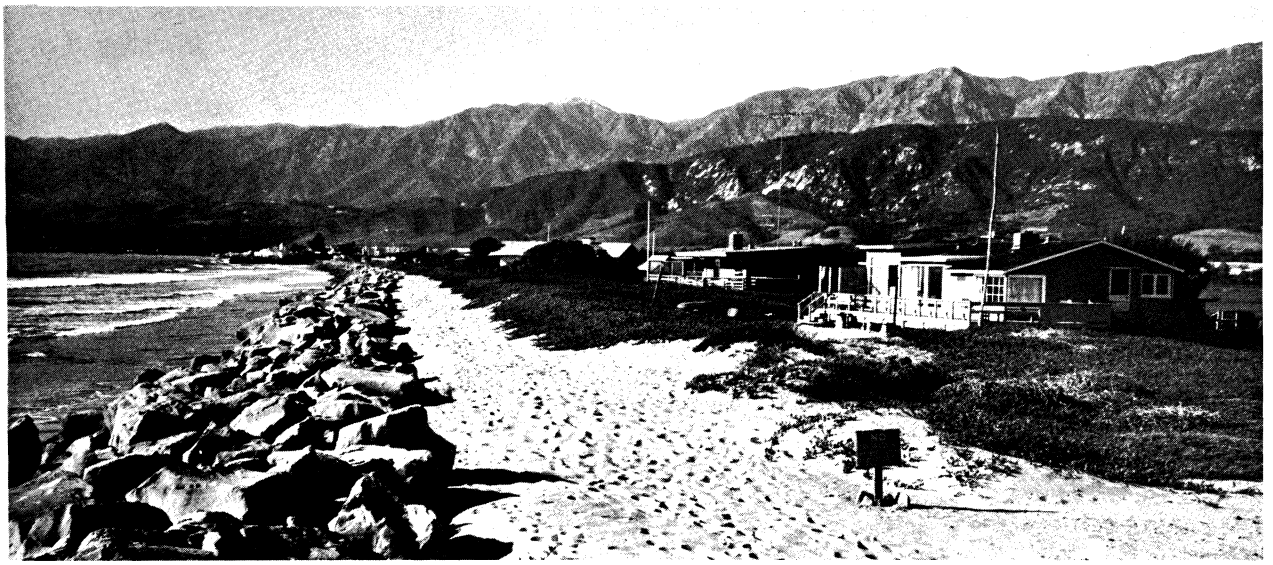
hay farming. Carpinteria was officially founded in 1868 and by the 1870's it had become an established rural, agricultural town. Local produce, including apricots, lima beans and walnuts, was shipped by boat from a pier at La Serena, northwest of Sandyland. The Southern Pacific Railroad--the northern boundary of Carpinteria Marsh--was completed from Newhall to Santa Barbara in 1887. Lemons were introduced into the Valley in the 1900's and orchard and field crops steadily increased in importance through World War II. In 1950 the Carpinteria area still had a population of less than 5,000 residents; the 1960's and 1970's saw increasing population growth and urbanization. The Valley is still a major agricultural area of Santa Barbara County. Major crops now include lemons and avocados, followed by flowers and vegetables.

Marsh-related Developments

Excluding the long history of utilization by local hunters and fishermen, the earliest developments to affect Carpinteria Marsh probably included encroachment from Old Town (1850-1870) and the construction of the Southern Pacific Railroad (1887). Around 1900 commercial quantities of sea salt were also being dried on the site and sold.

Sandyland Sandspit was surveyed and subdivided in 1925 and by 1931 the Sandyland Protective Association had been formed to insure both the privacy of the early homeowners and the ecological preservation of Carpinteria Marsh. It is interesting that in the 1930's the sandspits were major nesting grounds of both the California least tern and snowy plover (W. Abbott, personal communication, 1974). In January 1940, a major Pacific storm destroyed all of the beach houses at Sandyland (Santa Barbara News-Press, 1940). No new construction took place until the late 1940's, but by the





Sandyland Cove and adjacent Sandyland subdivisions were developed to ensure the owners privacy and created an ecological preserve.

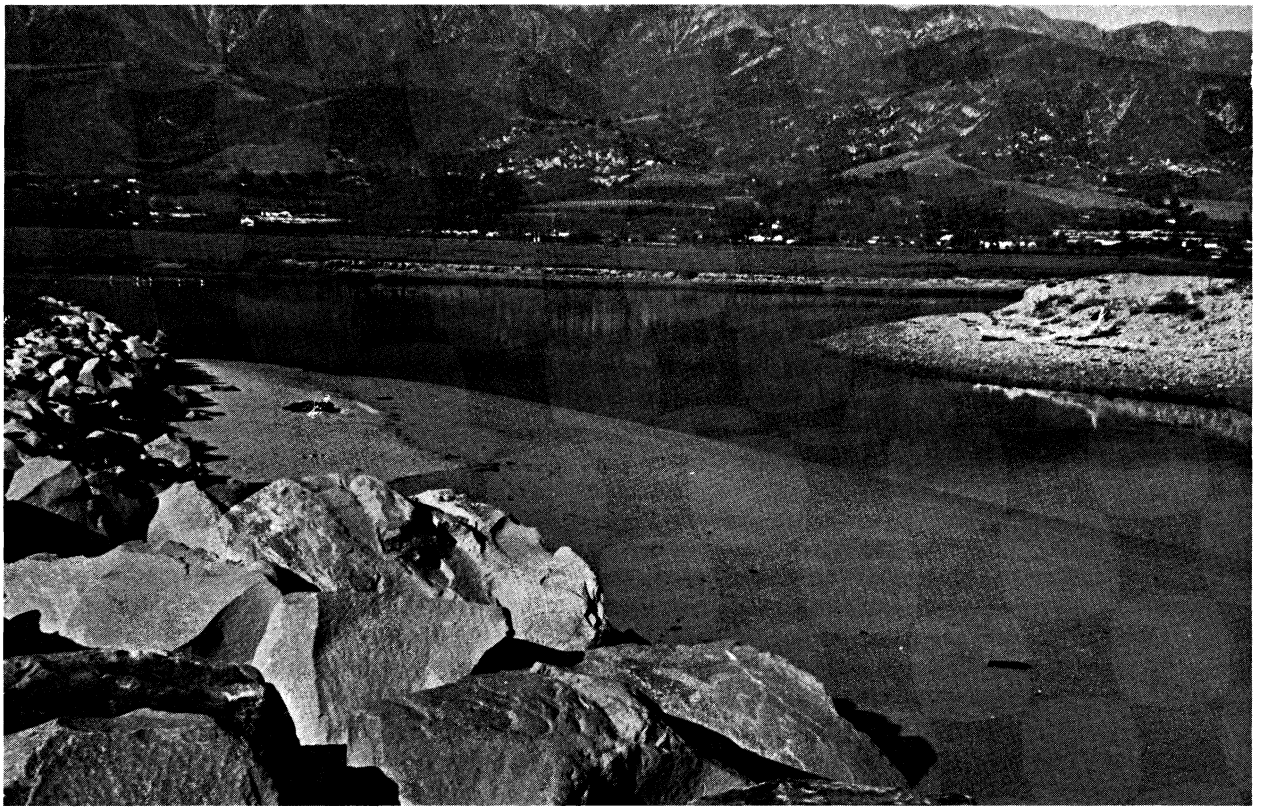
early 1950's seventeen new homes had been built on the Sandyland spit. And Sandyland Cove to the east was also being developed.

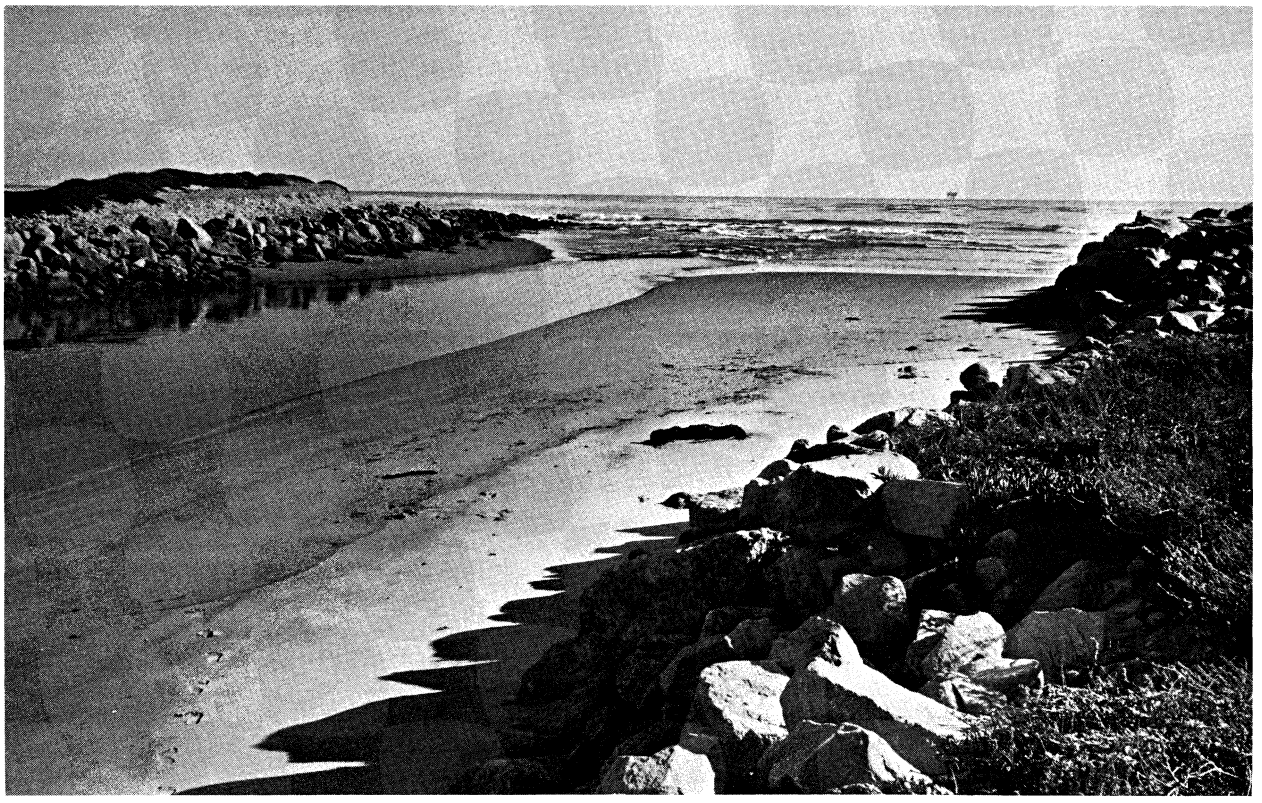
Under natural conditions, the ocean inlet of the Carpinteria Marsh was closed by a sandbar (at least seasonally) for most of the years from 1938-1966. During the summer months the water within the marsh periodically became anerobic causing health and odor problems. There were occasions when Carpinteria beaches were posted as a health hazard because of marsh drainage. A moderate to serious mosquito problem also existed. Early mosquito control techniques included intermittent breaching of the ocean inlet sandbar and ditching of the salt marsh.

In late 1966, the Santa Barbara Flood Control District dredged the channels of Santa Monica and Franklin creeks through the Carpinteria Marsh and the ocean inlet was stabilized through construction of an uncemented rock seawall. The tidal prism was greatly increased by the dredging and with only brief exceptions the ocean inlet has since remained open to tidal flushing action. This tidal action largely eliminated the stagnant water, odor and mosquito problems, and greatly contributed to the restoration of Carpinteria Marsh as a significant wildlife habitat (J. Stubchaer, pers. comm., 1973).

The ocean inlet was briefly diked off in February 1969, following the Santa Barbara Channel oil spill, to prevent possible contamination of the wetlands by floating oil. The inlet also closed briefly early in 1971, but was re-opened again by natural tidal action.

A long history of substantial flooding problems in Carpinteria Valley--aggravated by increasing urbanization--led to joint sponsorship of a more comprehensive flood control project for Santa Monica and Franklin creeks,





The ocean outlet to the marsh is stabilized with a rip-rap seawall that allows permanent year-round tidal flushing in the marsh.

by the local Flood Control and Resource Conservation districts and the City of Carpinteria. The Carpinteria Valley Watershed Work Plan (Santa Barbara County, 1968) was approved by the Federal Government in 1969 and was funded in 1971. The plan included four major elements:

(1) land treatment measures and intensified fire protection in the watershed,

(2) construction of 5.4 miles of concrete-lined drainage channels, and a debris dam on upper Santa Monica Creek,

(3) dredging of Santa Monica and Franklin creek channels through Carpinteria Marsh (1.3 miles) and construction of 0.6 miles of dikes on the eastern banks of the newly dredged channels, and

(4) improvements at the ocean inlet of Carpinteria Marsh.

Severe flooding in December 1971, following the Romero fire in the Carpinteria watershed the previous October, deposited an estimated 100,000 tons of silt in Carpinteria Marsh (Santa Barbara News-Press, 1972). Santa Monica Creek channel was completely blocked, several additional tidal channels were partially filled and areas of the marsh surface adjacent to Santa Monica and Franklin creeks were significantly raised in elevation (J. Stubchaer, pers. comm., 1974). Emergency authority was used to proceed immediately with the dredging of Santa Monica Creek Channel (Franklin Creek channel had already been dredged prior to the flooding). Dredging spoils were dumped along the western bank of Santa Monica Creek obliterating some 15 acres of pickleweed salt marsh. Most of this spoil material was trucked out of the marsh after it had been allowed to dry out for several months. The Flood Control District has since obtained Flood Hazard Zoning along both dredged creek channels. In July 1974, the District applied to the U.S. Army Corps of Engineers for a 10-year blanket permit authorizing

periodic channel maintenance in Carpinteria Marsh (U.S. Army Corps, Public Notice 74-166, dated 6-17-74). A comprehensive Environmental Impact Statement on present and future flood control measures in Carpinteria Valley is being prepared by the U.S. Department of Agriculture, Soil Conservation Service.

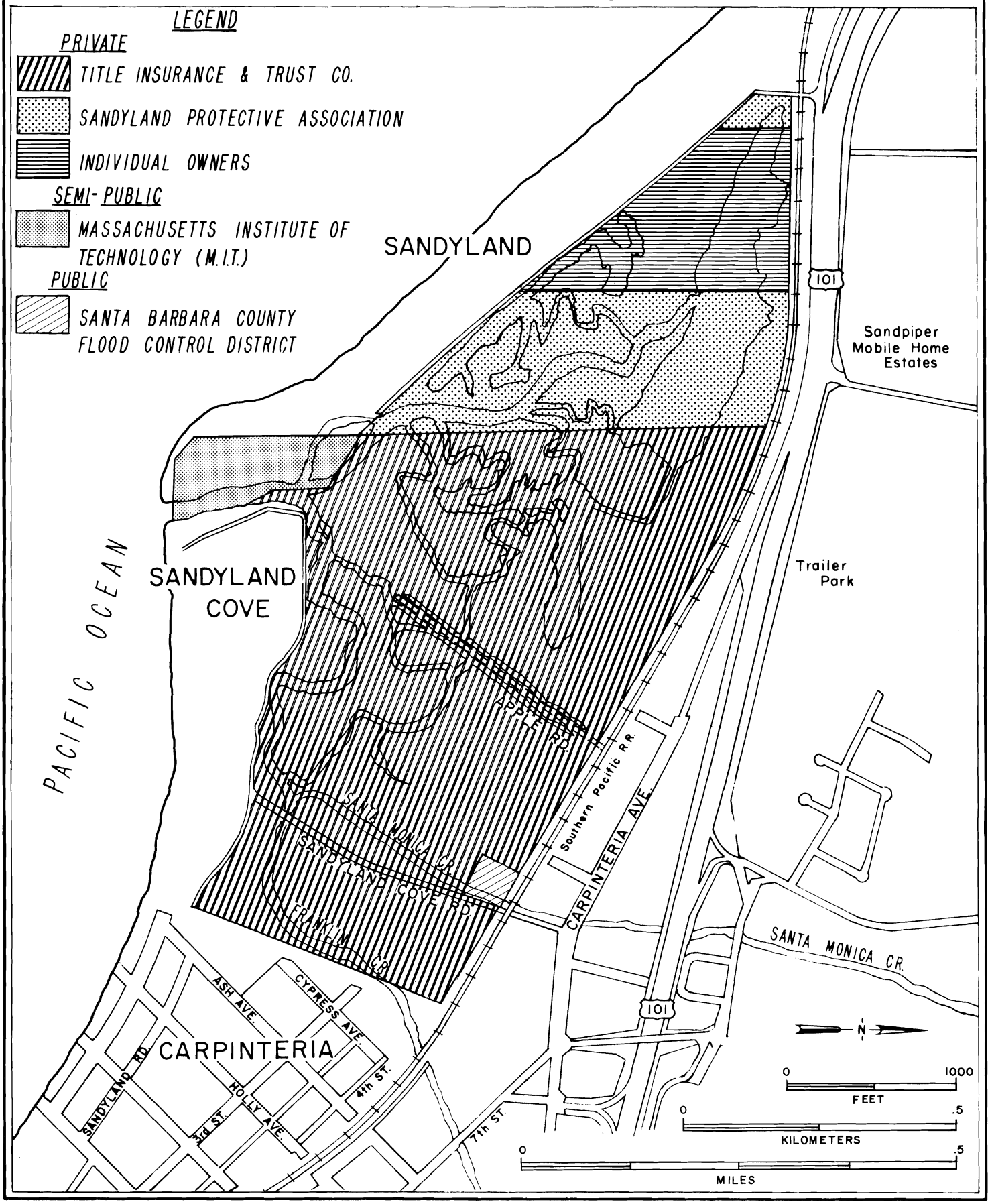
Land Ownership

Present Land Ownership

Land ownership within the 230-acre Carpinteria Marsh is predominantly private (Plate 5). Title Insurance and Trust Company of Los Angeles (representing the ten beneficial owners and Sandyland Protective Association are the largest land holders (Santa Barbara County Assessor's Office, 1975a; 1975b). Together they own nearly 195 acres of marshland and filled areas, with Title Insurance and Trust Company controlling about 155 acres in the eastern and central portions of the slough, and Sandyland Protective Association 40 acres to the west. Ownership of the remaining 35 acres of wetlands is divided between private individuals, the Massachusetts Institute of Technology (M.I.T.), and the Santa Barbara County Flood Control District (S.B.C.F.C.D.). Private individuals own approximately 25 acres, M.I.T. about nine acres, and S.B.C.F.C.D. slightly more than one acre. In summary, nearly 96 percent of land in the Carpinteria Marsh is privately-owned. This includes all lands categorized as salt marsh, intertidal flats, and salt flats, and most of the tidal channels (see Plate 7).

Extending outward beyond the perimeter of the Carpinteria Marsh, the dominance of private land ownership is even more pronounced. Whereas a small percentage of the wetlands in the marsh itself is owned by public agencies and institutions, all lands immediately north, east, and west are privately-owned, as are the sandspit areas to the south (Plate 5). This entrenched

PLATE 5
LAND OWNERSHIP
OF CARPINTERIA MARSH



pattern of private land ownership in and around the slough has permitted limited entry across the marsh, thus effectively denying the general public, and all but a few scientific researchers, access to the wetlands.

Future Land Ownership

Much of the Carpinteria Marsh will be publicly-owned in the not too distant future, if present efforts by the University of California to acquire several wetlands parcels prove successful. The University is currently negotiating with Title Insurance and Trust Company for the acquisition of approximately 120 acres of sloughland for inclusion in the University-wide Natural Land and Water Reserves System. The property, located west of Sandyland Cove Road, comprises parts of four parcels and includes the entrance to Santa Monica Creek (Plates 5 and 11). University representatives are hopeful of concluding negotiations early in 1976 (N. Cheatham, pers. comm., October 1975). Furthermore, the Sandyland Protective Association is also reported to be seriously considering the possible conveyance of property to the University, contingent on the latter's successful acquisition of the 120-acre parcel to the east. Specifically, the Association has indicated an interest in making available some 40 acres of wetlands located immediately adjacent to the larger parcel (W. Travers, pers. comm., October 1975). If the University were to acquire both parcels, over 77 percent of the site would be in public ownership, compared to the present 4 percent.

Land and Water Use

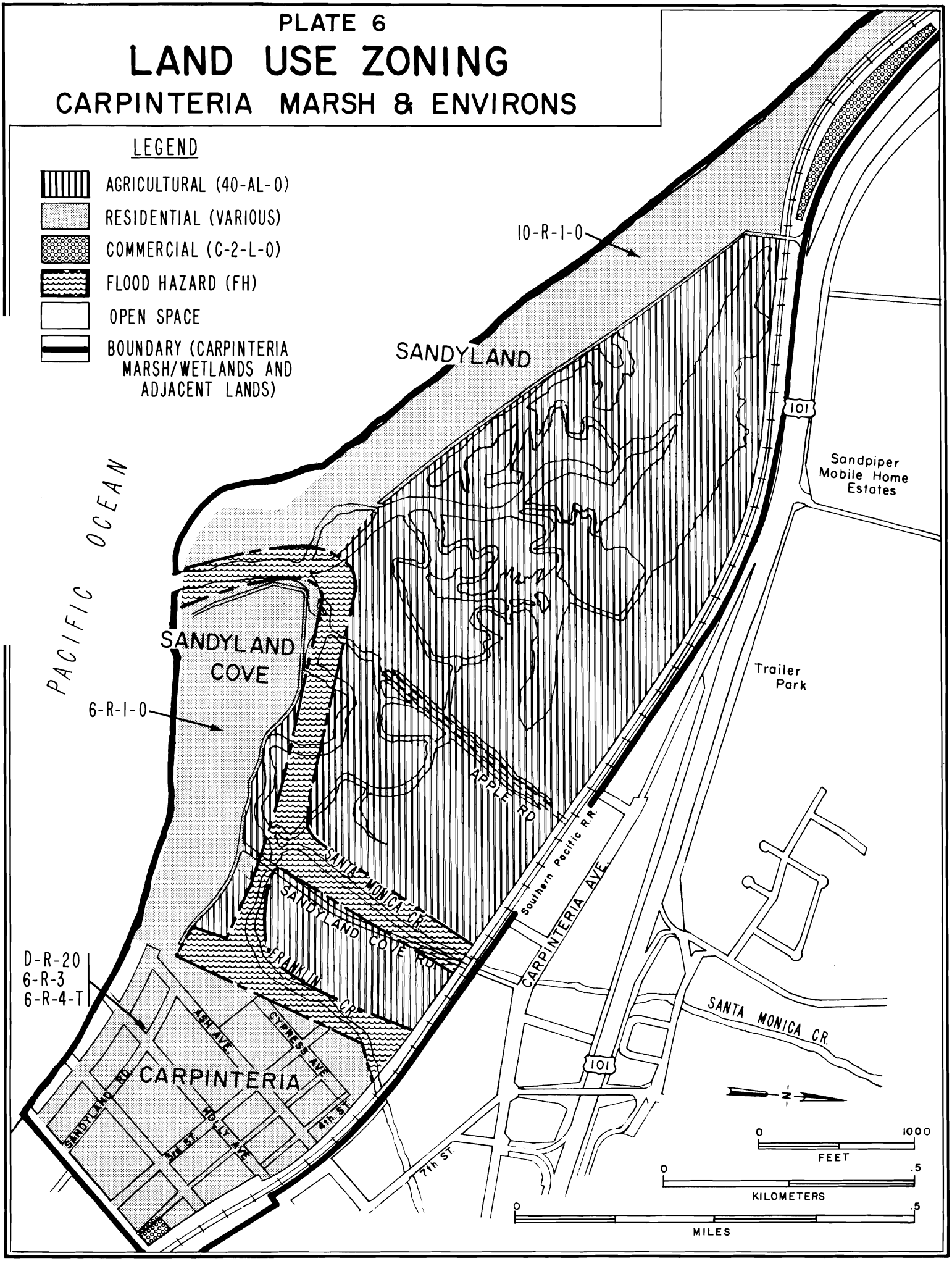
Wetlands

Carpinteria Marsh has remained in a relatively natural state, despite its location adjacent to the highly urbanized Carpinteria Valley. The

PLATE 6

LAND USE ZONING

CARPINTERIA MARSH & ENVIRONS



230-acre site is primarily used as a private ecological preserve; the extensive salt marsh, tidal channels, and intertidal flats providing nesting and feeding grounds for an abundance of waterfowl, shorebirds, and other forms of wildlife. Since the 1930's public access has been limited by permit to individuals and agencies with legitimate interests in the marsh and no private or private recreational facilities have been developed.

A secondary use of the site is flood control. Santa Monica and Franklin creeks drain into the marsh from the northeast, and during those rainy periods when the creeks handle abnormally large volumes of water, the slough tends to dissipate energy and slow the floodwaters. Santa Barbara County Flood Control District periodically dredges the creek channels through the Carpinteria Marsh to increase their capacity to handle flood volumes.

The entire wetlands area, except the main channels of Santa Monica and Franklin creeks, is zoned agricultural (40-AL-0), by the County of Santa Barbara. The channels themselves are designated as flood hazard (FH) zones (Plate 6). Permitted uses under the 40-AL-0 limited agricultural classification include the raising of livestock for commercial purposes and poultry for domestic use. Drilling for oil and gas is also permitted under oil drilling combining regulations. The FH-Flood hazard combining regulations are intended to prohibit construction, excavation, and grading within the area of a designated floodway, except for emergency removal of debris and regular maintenance. The existing County General Plan (Santa Barbara County, 1973b), as amended in 1973, shows the marsh as an "ecological preserve."

Adjacent Lands

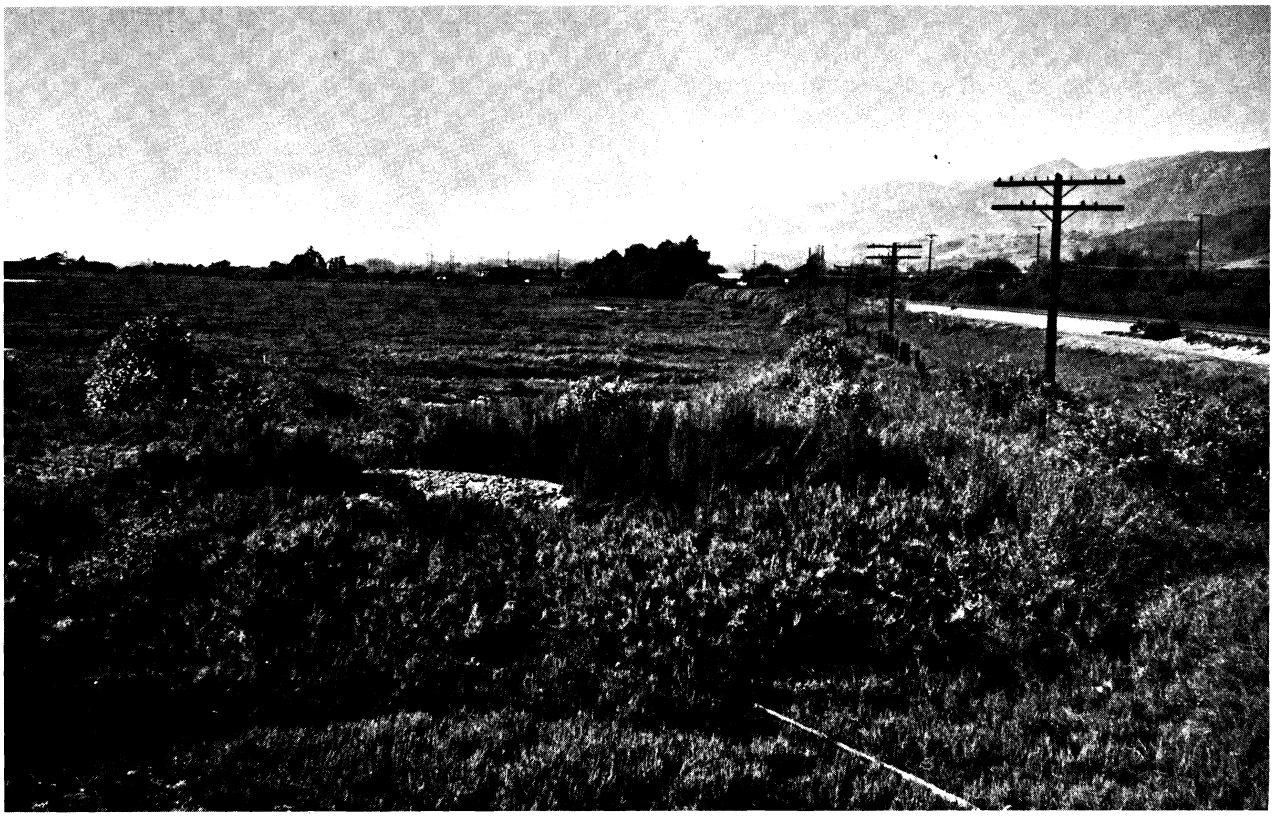
The land adjacent to Carpinteria Marsh supports three general uses: residential, transportation and commercial. Residential development has taken

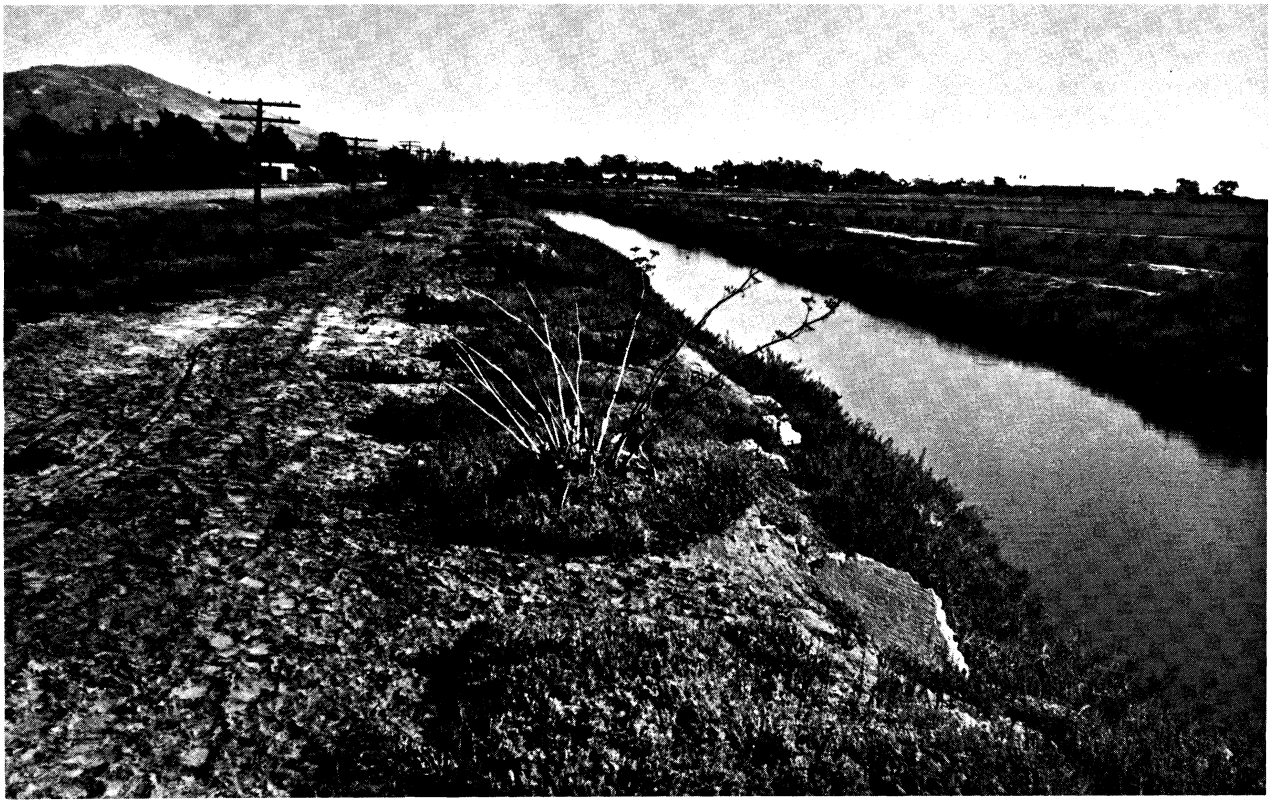
place south and east of the marsh, a transportation corridor spans the northern boundary, and commercial strip development exists to the west (Plate 6).

Residential: The unincorporated communities of Sandyland and Sandyland Cove, located on coastal dunes south of the slough, contain approximately 65 single-family dwellings and second homes. During the peak summer vacation period, the total population of these exclusive developments may reach 150-170. Both areas are currently zoned for residential use by the County of Santa Barbara (10-R-1-0 and 6-R-1-0, respectively). However, new residential construction activity on the dunes has been minimal since the 1960's, due to the non-availability of unimproved lots.

A second area of major residential development is located in the City of Carpinteria along the eastern perimeter of the slough. Again, zoning is residential and the area supports a mosaic of housing types, including single-family dwellings, beach homes, duplexes, apartments and mobile homes. Total population of the three-block area, bounded by the slough on the west, Carpinteria Beach State Park on the east, the Southern Pacific Railroad to the north, and the Pacific Ocean to the south, probably does not exceed 500 individuals. Housing starts in this area have been minimal since 1973, due to restrictions placed on new construction in the coastal zone. The most recent project, a proposed 50-unit condominium to be built on fill land adjacent to the slough, was denied a permit by the State Coastal Commission in June 1975 (Santa Barbara News-Press, 1975).

Transportation: The Southern Pacific Railroad's Coast Line skirts the Carpinteria Marsh along its northern shore from east to west. The railroad right-of-way is maintained as a "clear area," and has provided an effective barrier to intensive development along the northern edge of the slough.





The Southern Pacific Railroad right-of-way has provided an effective barrier to intensive development along the northern edge of the marsh.

Commercial: Santa Claus Village, a commercial development containing restaurants and gift shops, is situated just west of Carpinteria Marsh and south of U.S. Highway 101. The property is zoned commercial (C-2-L-0) and is fully developed.

Watershed Area (Carpinteria Valley)

Land use in the Santa Monica and Franklin creek drainages of the Carpinteria Watershed is predominantly agricultural and residential. In both drainages, the lower reaches (*i.e.*, from north of the Southern Pacific Railroad to U.S. 101) are characterized by older single-family dwellings, trailer parks, and a narrow band of commercial development (along Carpinteria Avenue). In the middle drainages (*i.e.*, from north of U.S. 101 to Foothill Road) newer single-family tract homes and apartments are interspersed with orchards, field crop agricultural operations, and nurseries. In the upper reaches (*i.e.*, from north of Foothill Road to the upper slopes of the Santa Ynez Mountains), orchards give way to open space and naturally vegetated areas (after crossing the Los Padres National Forest boundary).

Smaller, unnamed drainages, which originate on the floodplains north of U.S. 101 and enter the western half of the slough, cross land which is almost entirely in agricultural production (*e.g.*, orchards, nurseries, and field crops). Residential development is minimal, consisting of scattered farmhouses and older single-family dwellings.

The Carpinteria Valley, in general, continues to undergo rapid urbanization and population growth. Between 1960 and 1970, the area population increased by 45.9 percent, from 6,824 to 9,959 (U.S. Bureau of the Census, 1972). Forecasts by the Santa Barbara County Planning Department (1973), estimate

a population of 14,375 by 1980, and 16,688 by 1990. Most new development in the watershed will probably be confined to infilling of older, built-up areas in the City (east of the marsh), and controlled expansion along the Santa Monica Creek and Franklin Creek floodplains (north of the marsh).

The native beach and dune flora on the sandspits has largely been replaced by introduced plants.

RESOURCES

Habitat Types

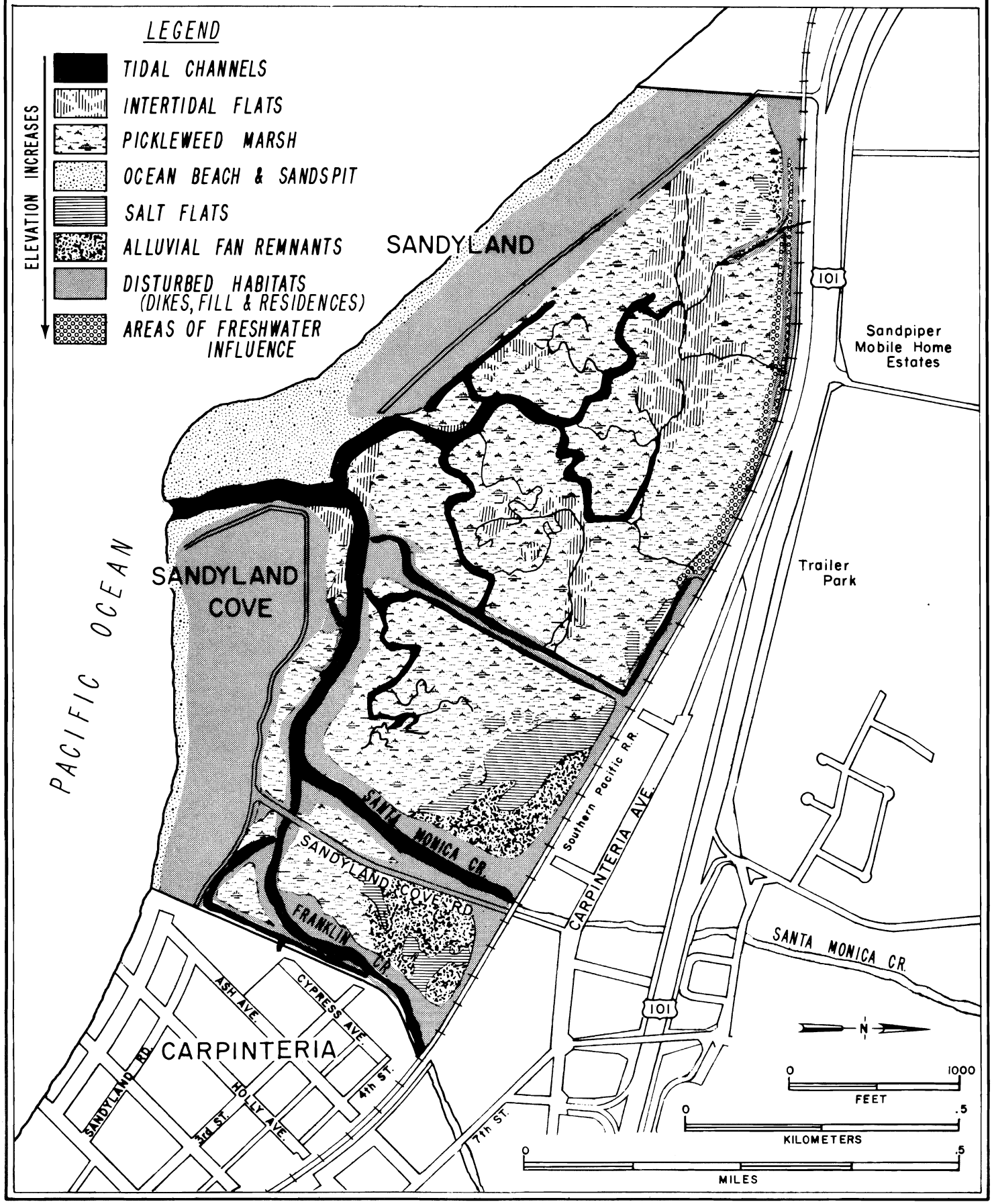
The differing role of ocean tides provides a basis for separating coastal wetland habitats into three groups. Marine habitats remain continually submerged. Littoral habitats are intertidal and as such are subject to alternating periods of exposure and submergence as the tides ebb and flood. Maritime habitats occupy the ecotone (transition zone) between intertidal and upland areas. While elevated above normal tides, they are indirectly influenced by salt spray and unusually high storm tides.

The acreages of marine, littoral and maritime habitats, and sub-habitats, represented at Carpinteria Marsh are tabulated below:

Marine (subtidal)		18.2 acres
Channels	18.2	
Littoral (intertidal)		153.4 acres
Tidal salt marsh	133.0	
Sand and mudflats	20.4	
Maritime (supratidal)		53.6 acres
Disturbed (dikes & fill)	30.2	
Alluvial fan	10.7	
Salt flats	9.4	
Freshwater	3.3	
		225.2 acres

The ocean beach and sandspit habitats that form the southern site boundary occupy an additional 43 acres of land. They are not included in the tabulation above, however, for housing development has largely replaced their original native flora and fauna.

PLATE 7
CARPINTERIA MARSH HABITATS



The distribution of habitats across Carpinteria Marsh is shown in Plate 7. Each habitat is characterized by a somewhat different physical environment and each contains a distinctive assemblage of plants and animals.

Vegetation

Six distinctive vegetation types can be recognized at Carpinteria Marsh: (1) tideflat algal floras, (2) perennial pickleweed (*Salicornia virginica*) salt marsh, (3) grassland-shrub vegetation characteristic of the Franklin and Santa Monica creek alluvial fans, (4) the disturbed beach and dune floras of the ocean sandspits, (5) the adventive floras of disturbed areas such as flood control dikes and mounds of dredge spoil, and (6) brackish and freshwater marsh vegetation. A floral survey of the site conducted by Paul Meyers in 1974, yielded a total of 84 plant species (Appendix A. See also Smith, 1952).

By far the most abundant vegetation type is the tidal salt marsh which covers some 133 acres (50%) of the site. Salt marsh vegetation typically occupies a narrow vertical zone between mean lower high water (MLHW) and extreme high water (EHW). It is adapted to periodic tidal submergence and highly saline, poorly-drained soils. At Carpinteria, the salt marsh extends from 2.0-4.5 feet above mean sea level (MSL) and consists mostly of dense uniform stands of perennial pickleweed with scattered patches of alkali heath.[1] Both plants are commonly parasitized by the vivid orange salt marsh dodder.

Interspersed throughout the salt marsh, particularly towards the western end of the site, are several large areas of lower-elevation tidal flats

[1]Scientific names of flowering plants are included in Appendix A.

Deeper ponds and channels provide resting and feeding areas for some water-associated birds.

Marsh vegetation is replaced on the alluvial fan deposits by barren salt flats and open grass and shrub lands.

(total 20.4 acres). Both the tide flats and the marsh are cut by deep, narrow, sinuous tidal channels (18.2 acres). Submerged flowering plants are absent from the flats and channels, but several marine species of algae are common. Diatoms and algae predominate, particularly sea felt (*Enteromorpha*) and sea lettuce (*Ulva*).

The northeast corner of Carpinteria Marsh is occupied by alluvial fan deposits laid down by flood waters from Franklin and Santa Monica creeks. Ground elevations (3-9 ft. above MSL) are higher here and lie above the level of tidal flooding. With increasing elevation the marsh vegetation is replaced by barren salt flats (9.4 acres). The powdery salt flat soils are encrusted with sea salt deposits and all plants are excluded. The lower margins of the salt flats are characterized by perennial pickleweed and saltgrass. An open grassland with scattered shrubs occupies higher elevations of the alluvial fans (10.7 acres). Short, introduced (non-native), annual grasses such as Italian ryegrass, beardgrass and bromegrass predominate. Scattered herbs and shrubs become increasingly common at higher elevations. Annual sea-blite, Australian saltbush, black mustard, brass buttons, sagebrush, salt marsh sand spurry and sea lavender are all represented.

Along the northwest boundary of the site the salt marsh ends abruptly, adjacent to the Southern Pacific Railroad embankment. Agricultural runoff is retained in a ditch along the foot of the embankment and a narrow strip (approximately 3 acres) of freshwater marsh is developed. Small clumps of willows, alkali bulrush, cattails and alkali weed are present.

The native beach and dune flora on the sandspits at the seaward margin of the site (43 acres; see Smith 1952) has largely been replaced by urban

lawns and ornamental herbs, shrubs and trees. Scattered patches of pickleweed and saltgrass persist, but widespread planting of hottentot fig, an exotic, has choked out most other native species. Native vegetation also has been disrupted by roadways, flood control dikes and mounds of dredge spoil. While these areas often yield a diverse flora of 20 or 30 species, almost all of them are introduced weedy species. Alkali heath, saltbrush, saltgrass and sea-blite are among the native species that persist in these disturbed habitats.

Marine Invertebrates and Fish

Data describing the invertebrate fauna of Carpinteria Marsh are scarce. Reconnaissance studies by Riffle (1971) and Macdonald (1971, unpublished) confirm the presence of a limited marine fauna dominated by polychaete worms, molluscs and crustaceans (Appendix B).

Several species of small burrowing worms (particularly the polychaete worms, *Capitella* and *Polydora*) are abundant in the mudflats and provide an important source of food for migratory shorebirds. Seven species of snails and eight species of clams have been confirmed living at the site. While all three characteristic California salt marsh snails (*Assiminea, Cerithidea* and *Melampus*) are well represented, other common intertidal and subtidal snails are very poorly represented. The bentnose and common littleneck clams, both noted for their tolerance of extreme environments, are the most abundant of the clams. Crabs are common along the tidal creek banks and the sandy tide flats around the ocean entrance yield deep burrowing ghost shrimps. The protected channels, ponds and salt marsh also harbor a diverse and abundant insect fauna, that represents an important additional food resource for both birds and fish.

Migrant wading birds and shorebirds are among the most common and conspicuous wildlife observed in the marsh. Photos by Jack White (top) and William Anderson.

Fish at Carpinteria Marsh are largely restricted to deeper-water, submerged tide flat and channel habitats. Acreages of suitable habitat fluctuate with the tide from a minimum of less than 15 acres to a maximum of 40 acres of more. Water depths rarely exceed a few feet and may be only a few inches along the borders of the salt marsh. While detailed surveys are lacking, the expected fish fauna (Appendix C) would be closely similar to that of nearby Goleta Slough (Speth *et al.*, 1970; Macdonald, 1971b). Resident species probably include arrow and tidewater gobies, killifish, California mudsucker and Pacific staghorn sculpin. Topsmelt are abundant, and other coastal shelf species that move in and out with the tides likely include shiner perch, California halibut and starry flounder.

Haller (1969) notes that the fish fauna at Carpinteria Marsh is of particular scientific interest; for some species, such as the topsmelt and pipefish, are represented by forms intermediate between those of northern and southern California coastal waters.

Birds

By far the most conspicuous wildlife at Carpinteria Marsh are the thousands of migratory shorebirds and waterfowl that pass through the site during their annual journies along the Pacific Coast Flyway. Censuses conducted in 1967, 1969-70, and 1974, amply confirm the importance of Carpinteria Marsh to these migrants (Cook 1967, Jurek 1974, Ervin 1974).

Carpinteria Marsh contains four major habitat groups each frequented by distinctive groups of birds. These habitat groups include the tidal salt marsh (133 acres), the tide flats and channel margins (20-25 acres), the deeper channels and ponds (15-20 acres) and all the remaining drier and more disturbed upland areas (90-100 acres). Water-associated birds, with

PLATE 8

WATER BIRD AND LAND BIRD ABUNDANCE AT CARPINTERIA MARSH, 1967

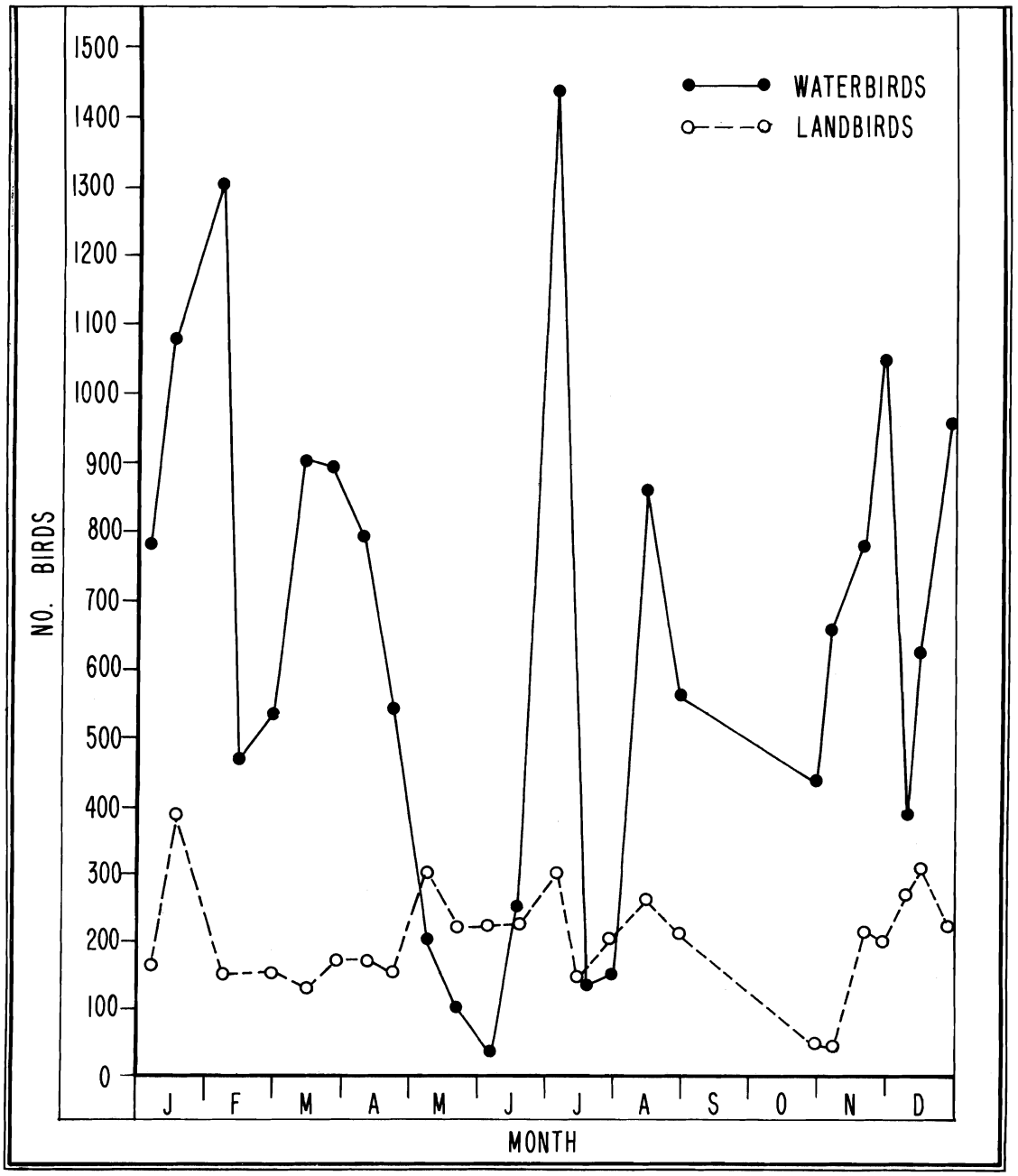
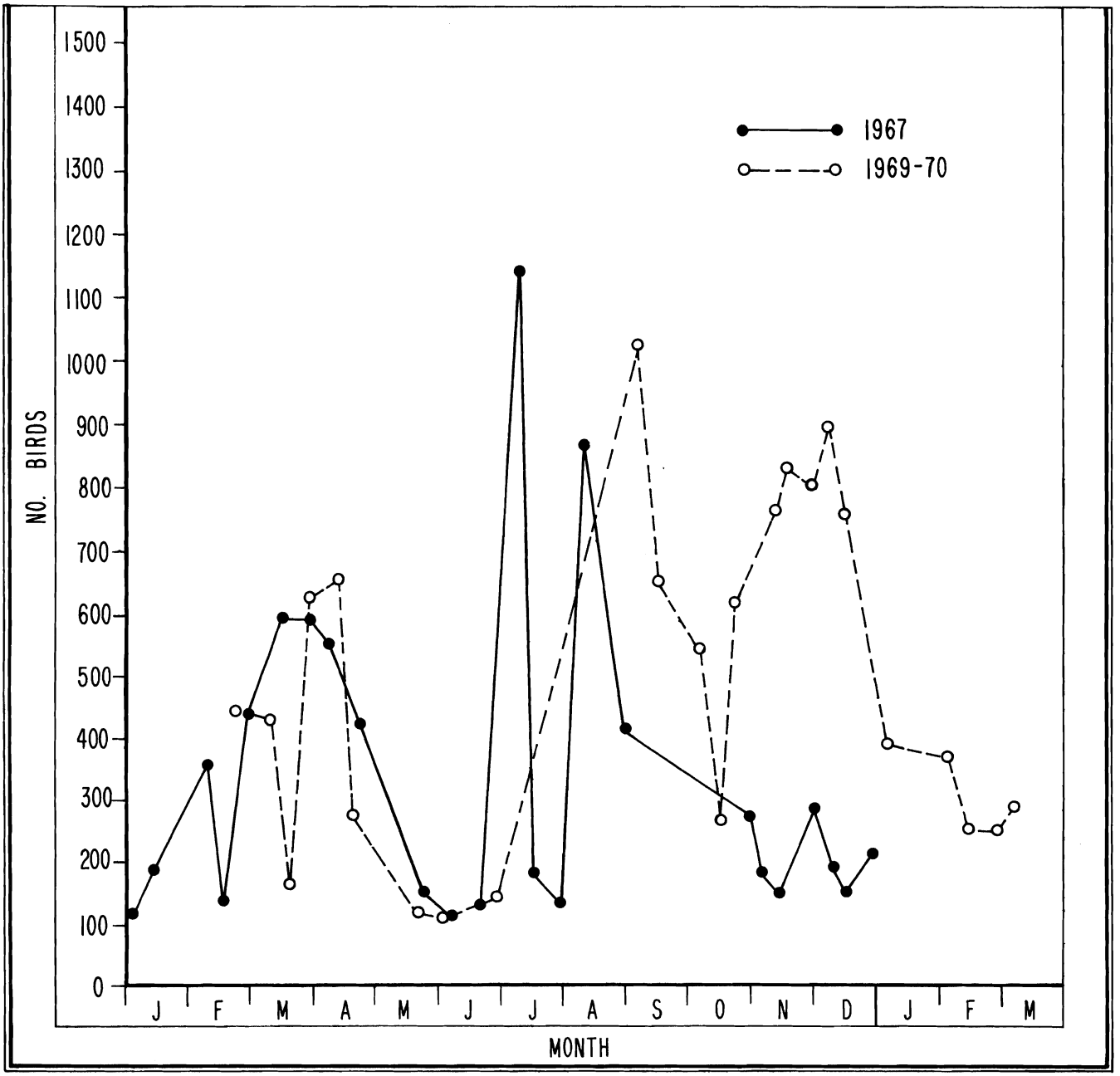


PLATE 9

SHOREBIRD ABUNDANCE
AT CARPINTERIA MARSH, 1967, 1969-70



49 confirmed species (Appendix D), account for the majority of individuals seen. While land-associated birds are less numerous (Plate 8), they still represent many species. Ervin (1974) lists more than 70 land-birds as probable visitors to Carpinteria Marsh and at least 45 of these have been confirmed (Appendix D).

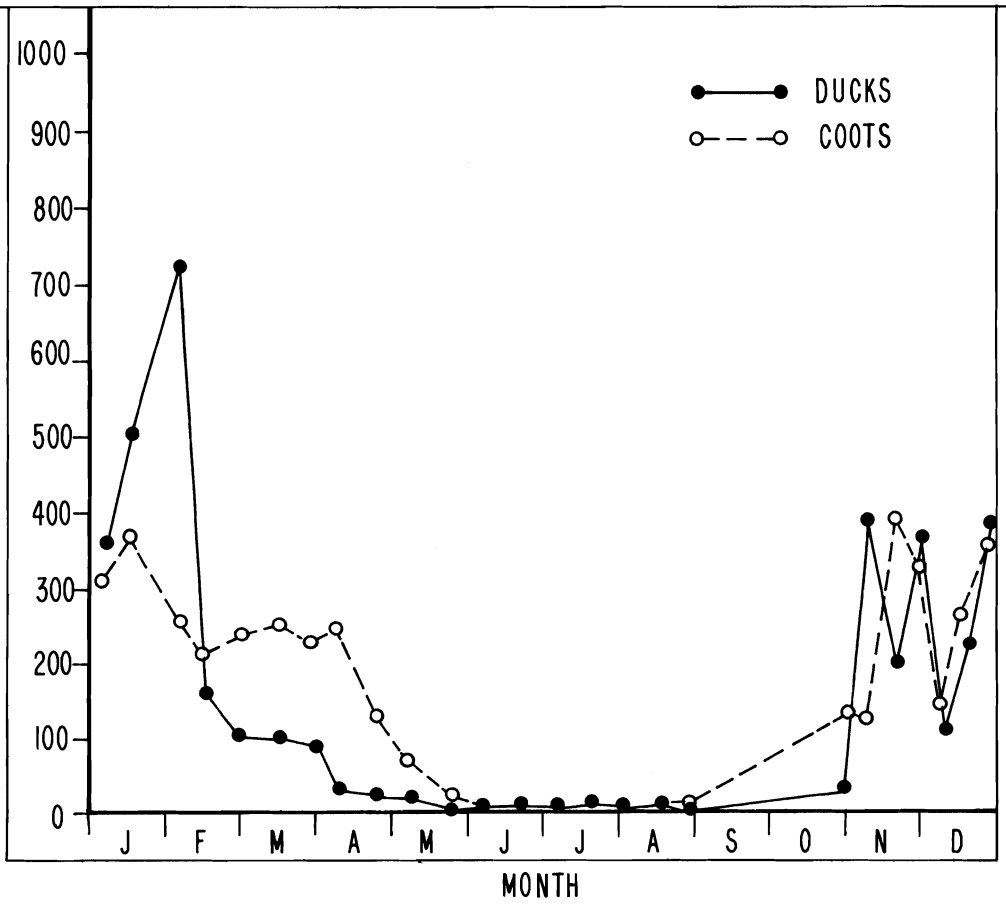
Despite its size, the salt marsh is used by relatively few species. Herons and egrets feed there, while Say's phoebe, swallows, loggerhead shrike and American kestrel hunt across the marsh for insects and small mammals and birds. The sora rail and common gallinule are also sometimes seen.

The light-footed clapper rail (*Rallus longirostris levipes*) and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) are restricted entirely to salt marsh habitats, and both occur in Carpinteria Marsh. Loss and degradation of salt marsh habitats along the southern California coast threaten the existence of these subspecies; both of these birds are designated endangered species by the California Fish and Game Commission (California Department of Fish and Game, 1974b). And, in addition, the light-footed clapper rail is included in the U.S. List of Endangered Fauna (U.S. Department of the Interior, 1973). The population of light-footed clapper rails in Carpinteria Marsh in 1972 and 1973 was estimated to be 5 to 15 birds (Wilbur, 1974). Bradley (1973) censused Carpinteria Marsh on May 10-11, 1973, and reported finding 100 singing male Belding's savannah sparrows.

Tide flats and channel margins provide habitat for larger wading birds such as herons and egrets, and also for shorebirds, gulls and terns. Of these groups the egrets and shorebirds are largely migrants while the others are present year-round. The abundance ranges of the different groups over the 1967-70 census periods are summarized in Table 1 (page 36). Note in particular

PLATE 10

ABUNDANCE OF DUCKS AND COOTS AT CARPINTERIA MARSH, 1967



that upwards of 500-1000 shorebirds per day have often been recorded (Plate 9). The most frequently sighted shorebirds include least and western sandpipers, dowitchers, willets and dunlin. Gulls and terns are also well represented. Eight species of gulls--ring-billed and western being the most common--and five species of terns have been recorded.

The deeper channels and ponds provide habitat for grebes, cormorants, coots and ducks. Kingfishers and an occasional black brant also utilize these areas. Like the shorebirds, the grebes, coots and waterfowl are principally winter migrants. During the migratory season as many as 700 ducks and several hundred coots per day, have been recorded (Plate 10). Pintail, American widgeon, shoveller and cinnamon and green-winged teal--all surface feeding ducks--predominate. Diving ducks are much less common, probably because of the scarcity of deeper water channels and absence of submerged vegetation.

The extensive areas of disturbed upland vegetation provide diverse habitats for a wide variety of land-associated birds. As many as 300 land birds per day, were recorded from Carpinteria Marsh by Cook (1967; see also Plate 8). The uncommon white-tailed kite and several hawks (Cooper's, red-tailed, marsh and kestrel) regularly hunt across the site. Much of the remaining land bird fauna is made up of small flocks of insectivorous and seed-eating species that move freely between Carpinteria Marsh and adjacent urban, agricultural and upland habitats (Appendix D).

Mammals

Bounded on all sides by urban development, Carpinteria Marsh now represents an island of natural habitats largely cut off from other wildlife areas of Carpinteria Valley and the Santa Ynez Mountains. As such

TABLE 1

Group	Survey Period		
	1/67-12/67	2/69-7/69	9/69-3/70
Grebes	0-8		
Cormorants	0-34		
Herons & Egrets	2-38	4-16	6-21
Waterfowl	2-710	0-104	
Coots	0-400	0-44	
Shorebirds	12-1041	12-548	150-920
Gulls & Terns	0-392	0-294	
Land Birds	38-324		
(Savannah Sparrow)	(0-65)	(0-12)	

Major bird groups (plus the endangered savannah sparrow) at Carpinteria Marsh; maximum and minimum daily counts during three survey periods (data from Cook 1967, 1969-70).

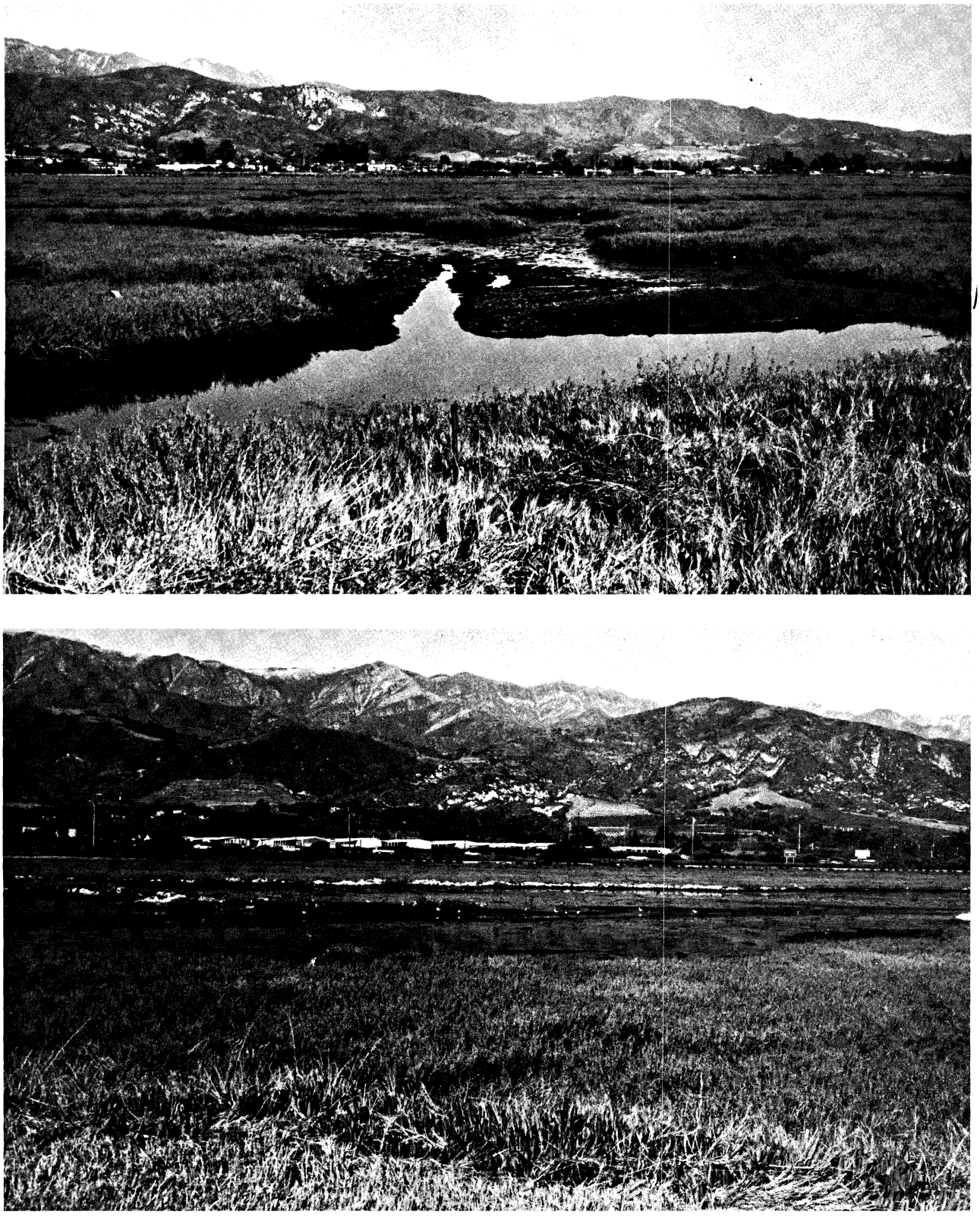
it only supports a remnant of the mammal fauna present in earlier times.

While adequate survey data are lacking, the mammal fauna (Appendix E) is expected to be closely similar to that recorded from nearby Goleta Slough (Speth *et al.*, 1970; Macdonald, 1971b). Rabbits are the most conspicuous species, but several smaller mammals such as shrews, mice and voles are likely to be well represented. Most of the mammals reside in the drier, brush-covered, maritime habitats of the site--the alluvial fans, the older, less disturbed dikes and the ocean sandspits (a total of some 90-100 acres). Several species forage in the salt marsh, where seeds, plants and insects are important food items. The long-tailed weasel is probably the principal predatory mammal at the site. Most mammals probably are represented by relatively small populations.

Ecology

Carpinteria Marsh shares many of the general characteristics of other southern California coastal lagoon-salt marsh complexes (Carpelan, 1969; Speth, *et al.*, 1970; Warme, 1971; Mudie *et al.*, 1974). Both the physical environment and the biological productivity of the site are mainly controlled by tidal flushing characteristics. Stream discharge is markedly seasonal and except for brief periods following winter rains, the salt marsh, tide flats and channels are bathed with undiluted seawater. Salinities rarely fall below 35‰ and high evaporation, particularly during the summer and fall, may raise them considerably higher.

When the volume of the tidal prism is adequate to maintain regular, year-round, tidal flushing, environmental parameters vary continuously with the tides;and biological productivity remains high. The nutrient-rich salt



Mudflats, interspersed throughout the salt marsh, are attractive to shorebirds and provide much of their food.

marsh and shallows support large populations of marine invertebrates, and these in turn provide abundant food for both fish and birds. Fish populations include both resident species highly tolerant of changing water temperatures and high salinity levels (the mudsucker, sculpin and topsmelt, for example), and open coast species that enter Carpinteria Marsh at high tide to feed, or in some cases to use the channels as a nursery area (halibut and flounder, for example). The role of coastal wetlands as fish nursery grounds has been well documented on the East Coast (Clark, 1967); and preliminary studies suggest a similar, though perhaps quantitatively less significant, role for Pacific Coast sites. Changing bird populations reflect both available food supplies (marine invertebrates, insects, plants and seeds) and habitat types. Intertidal flats and shallow ponds favor diving ducks and fish-eaters such as grebes, cormorants and mergansers. Brush-covered upland habitats, and surrounding agricultural areas, support a diverse group of land-birds and also supply food and protective cover to small-mammal populations.

If sedimentation reduces the volume of the tidal prism to the point where tidal flushing can no longer be maintained, littoral drift of beach sand will block off the lagoon's ocean entrance. Environmental conditions inside the lagoon stabilize and circulation is greatly reduced. Algal blooms may recur and the decay of both algae and organic matter on the lagoon floor may reduce dissolved oxygen concentrantions to very low levels. Conditions rapidly become unsuitable for the marine lagoonal fauna and much of it is killed off. While some resident fish will survive, coastal shelf species can no longer enter the lagoon. Populations of water-associated birds will also decline, for not only has their potential food supply been sharply reduced but their principal intertidal feeding areas

now remain permanently submerged. Permanent flooding can also cause low-lying areas of marsh vegetation to die back, thus reducing potential food supplies for land birds and mammals.

Tidal control of ecological "chain-reactions" such as outlined above has already been well-documented at both Los Penasquitos Lagoon, near San Diego (Bradshaw, 1968; Mudie *et al.*, 1974) and at nearby Goleta Slough (Macdonald, 1971a, b). Clearly, if Carpinteria Marsh is to retain its present significance as a feeding and resting area for migrant shorebirds and waterfowl, and as a suitable habitat for inshore fish and a variety of marine invertebrates, then vigorous, year-round, tidal flushing must be maintained.

Any deterioration of the environmental quality of Carpinteria Marsh might lead to significant faunal changes. The species most critically affected, however, will be those whose life-histories are most dependent upon unique features of California coastal lagoon-salt marsh habitats. The light-footed clapper rail and Beldings savannah sparrow, for example, are now in danger of extinction because of the steady decline in coastal salt marsh acreage. Estuarine fish such as the mudsucker and pipefish are becoming scarce because of the loss of coastal lagoon habitats (Mudie *et al.*, 1974). Less obvious to the casual observer are similar declines in the numbers of lagoonal clam beds, in salt marsh snail populations (*Assiminea, Cerithidea, Melampus*), tide flat ghost-shrimp populations and probably among other coastal lagoon and salt marsh invertebrates.

RESOURCE USES

Through the early twentieth century, resource use of the Carpinteria Marsh was basically appropriative.[1] For example, until the 1930's residents of Carpinteria and Santa Barbara regularly hunted waterfowl and small game along the shoreline and on the tidal flats of the salt marsh. Earlier, small commercial quantities of salt occasionally had been extracted from diked areas in the marsh for sale to local residents (Stockton, 1960). Although non-appropriative uses were also common,[2] these were usually carried out in conjunction with hunting or other appropriative uses.

Following subdivision of Sandyland in the late 1920's, resource use of the Carpinteria Marsh was severely restricted. In the early 1930's, a group of homeowners formed the Sandyland Protective Association and prohibited hunting and most public access to the western portion of the marsh. A security guard was hired to patrol the properties, and "no trespassing" signs were prominently displayed in an effort to insure maximum privacy and the preservation of existing natural resources (W. Travers, pers. comm., October, 1975). Later, the Sandyland Cove Homeowners Association instituted a similar program for the eastern half of the slough.

In the intervening years, these security programs have tended to prevent unlimited public access to the slough, and deny most appropriative uses. While some might argue that they have been overly restrictive in their application, the fact remains that stringent enforcement of these policies

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[1] Appropriative uses involve the actual removal of individual units from the ecosystem through hunting, fishing, or other related activites (California Department of Fish and Game, 1974).

[2] Non-appropriative uses involve the enjoyment of the resources within an ecosystem without actually removing individual units. Bird watching, nature study, and boating are examples of this type of use.

has contributed significantly to the maintenance of a relatively undisturbed wetlands habitat, immediately adjacent to an area undergoing rapid urbanization. Furthermore, despite the access restrictions, bird watching and nature study, clamming, boating, and limited scientific and educational uses are conducted with varying degrees of regularity in and around the slough.

Bird Watching and Nature Study

At the invitation of local land owners, members of the Santa Barbara Chapter of the National Audubon Society periodically use the Carpinteria Marsh for bird watching. Normally, the Santa Barbara Chapter schedules two annual *en masse* group trips to Sandyland, while a smaller group of individual members visits the same area three or four times per year on their own. The organized semi-annual outings usually attract from 25 to 40 members; the more restricted quarterly visits from 6 to 8 (V. Puddicombe, pers. comm., October 1975). Besides the estimated 75-105 annual visitors representing the National Audubon Society, several residents of Sandyland and Sandyland Cove frequently use the slough for bird watching (J. Hamber, pers. comm., October 1975). In addition an undetermined number of visitors engage in bird watching activities from look-out areas adjacent to the slough.

Other nature study activites in the general vicinity of the slough are primarily restricted to casual observations of flora and fauna in and around the small tidal channel and tidepools located between the seawalls separating Sandyland and Sandyland Cove. While there are no reliable data available showing intensity of activity in the area of the slough entrance,

public use is probably substantial due to the close proximity of city beaches and Carpinteria State Beach Park.[1]

Clamming

Clamming is confined exclusively to the sandy beach and mudflats near the slough entrance. In particular, the sandbar oceanward of the tidal channel is known to support sizeable clam beds (C. Hetrick, pers. comm., October 1975). As many as three dozen diggers have been noted in this area during extreme low tides (W. Travers, pers. comm., October 1975). However, according to Travers, no clamming activity has taken place within the marsh in recent times.

Boating

The Carpinteria Marsh is not particularly conducive to boating because of the narrow width and shallow depth of most tidal channels. In addition, suitable boat launching areas are available only along the private access roads maintained by Sandyland Cove Homeowners Association and Sandyland Protective Association. Thus unauthorized public launching of small boats is effectively precluded. The limited boating activity that does occur on the slough is confined to the infrequent use of small boats and canoes by local property owners, authorized scientific researchers, and representatives of county, state and federal agencies (*e.g.*, California Department of Fish and Game).

Scientific and Educational Use

Because the lands in and adjacent to the Carpinteria Slough are largely in private ownership, use of these wetlands for scientific investigations

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[1]The slough entrance is within one-half mile of city and State beaches. Visitor use is extremely heavy along this stretch of coastline as evidenced by recent attendance figures for Carpinteria State Beach Park: 304,922 visitor days in Fiscal Year 1973-1974 (Calif. Dept. Parks and Rec., 1974).

Nature study, educational and scientific studies and some limited boating are the principal resource uses in the marsh.

and educational field trips has been extremely limited. However, since 1970, several short-term field surveys in the slough have been completed by faculty members and graduate students at the University of California at Santa Barbara. These include a reconnaissance study of marine invertebrates (Macdonald, 1971c, unpublished), an inventory of plant life in the marsh (Meyers, 1974), and a survey to determine bird species using the local wetlands (Ervin, 1974).

A number of studies have also been carried out by persons not affiliated with the University. Between 1966 and 1967, Leslie Cook of Santa Barbara conducted a year-long, bi-weekly survey of bird populations for California Department of Fish and Game (Jurek, 1973). In 1970, Riffle (1971) completed a brief study of the distribution of mollusks in the slough.

There is significant potential for future use of the marsh by carefully-screened, authorized researchers and school-sponsored field groups, if the University of California is successful in its current negotiations to acquire portions of the marsh and tidelands from private owners. Under proposed plans, acquisition of the local wetlands would result in their preservation as part of the University's Natural Land and Water Reserve System. Although entry would continue to be carefully controlled on a permit basis by the University, access to the slough would be made easier for qualified researchers and field groups (California Dept. Navigation and Ocean Development, 1972; and N. Cheatham, pers. comm., October 1975).

Completion of the Carpinteria Watershed Project should greatly reduce existing flood control and sedimentation problems in the marsh.

PROBLEMS AND USE CONFLICTS

The major problems and use conflicts likely to significantly affect the environmental quality of Carpinteria Marsh fall readily into four groups: 1) sedimentation and flood control, 2) several aspects of water quality 3) urban expansion and encroachment, and 4) problems relating to access. Each of these groups of problems, as well as some possible solutions, is discussed.

Sedimentation and Flood Control

The Problem

The steepness and proximity of the mountainous watershed to Carpinteria Marsh pose serious flooding and sedimentation problems. Storm runoff causes severe erosion in the steep upper watershed and erosion rates are further intensified after major watershed fires (such as the Coyote and Romero fires in 1964 and 1971, respectively). Gravel, cobbles and boulders are transported to the middle and lower watershed where they are deposited as alluvial fans. At lower elevations, overland flow moves down the fans in a cycle of alternating erosion and deposition. While some of the finer sediment is transported through the marsh and out to sea, much of the coarser material remains within Carpinteria Marsh.

At least 23 significant floods have occurred within the Carpinteria Watershed since 1862 (Santa Barbara County, Flood Control District, 1968, 1969). A "hundred-year" flood in 1914 deposited a great fan of sand, gravel, cobbles and boulders adjacent to the lower reaches of Santa Monica Creek (Plate 6). In 1971, flooding following the Romero fire deposited 100,000 tons of silt in Carpinteria Marsh (Santa Barbara News-Press, 1972).

By their very nature coastal wetlands are ephemeral habitats, for sedimentation begins to fill and change them almost as soon as they are created. Each new flood deposits fresh sediments, raising land elevations and filling or diverting tidal channels. Unless sedimentation is slowed or halted, the salt marsh, tide flats and channels at Carpinteria Marsh will gradually become elevated above the level of tidal flooding and a natural succession to upland vegetation and fauna will ensue. The steady reduction in the tidal prism (caused by sedimentation) increases the tendency towards closure of the ocean inlet and also reduces the wildlife support capability of the wetlands.

The Flood Control Plan

The completed and planned phases of the Carpinteria Watershed Project[1] (Santa Barbara County, 1968) should greatly reduce existing flood control and sedimentation problems, and thus significantly slow the ecologically undesirable process of wetlands infilling. Elements of the project beneficial to the marsh would include the upstream debris basin on Santa Monica Creek; concrete-lined, rather then dirt-lined, channels within Santa Monica and Franklin creeks; strict fire prevention in the undeveloped, upper watershed; and technical assistance to farmers, which should result in the implementation of more effective erosion control measures. These measures, which would trap material from the mountainous upper watershed and slow ground water runoff, should be both encouraged and adequately funded. Realigned and dredged stream channels will permit flood flows to reach the ocean more rapidly (as well as reducing the risk of property damage in adjacent urban areas) and the greater water velocity they will provide will allow them to transport

[1]See also, History: Marsh-related Developments, page 8.

a larger sediment load offshore. In addition, the entrances of Santa Monica and Franklin creeks into the marsh will be operated as sediment-settling basins. The resulting reduction in long-term sedimentation rates will preserve the volume of the tidal prism and thus assure future tidal flushing action.

Maintenance

Since the siltation problem cannot be completely eliminated, even with strong watershed management measures, some maintenance of the lower channels will be necessary. Responsibility for this maintenance, as well as flood control, lies with the Santa Barbara County Flood Control District.

The District has requested a 10-year blanket permit for maintenance dredging in the Santa Monica and Franklin creek channels. To qualify for federal funds for the Carpinteria Valley Watershed Project, that includes this maintenance dredging program, the District, together with the U.S. Soil Conservation Service, which provides federal funding, is preparing an Environmental Impact Statement (EIS) on the project. The Department of Fish and Game has reviewed the EIS and has supported the project upon the conditions that the marsh be protected or enhanced by the project. Specifically, the Department recommended that: 1) levees in the marsh be constructed in a manner avoiding impact upon marsh and open water areas; 2) construction of access roads and temporary spoil storage berms be confined entirely within areas where dredge spoils have been placed in the past; 3) a sufficient number of culverts be placed in the levees and service roads to ensure adequate tidal flushing of the marsh's interior; and 4) in order to maximize potential benefits of the project to fish and wildlife resources, flexibility be maintained in the design

of the exact channel alignment and configuration until the time of actual construction. These recommendations are to be incorporated into the project, as well as stated within the final Environmental Impact Statement.

Maintenance dredging will temporarily disrupt the flora and fauna of Santa Monica and Franklin Creek channels--however, the continued tidal flushing promoted by the dredging will enhance the wildlife support capabilities of the remainder of Carpinteria Marsh.

Ocean Inlet Modifications

As set out in 1968, the Carpinteria Watershed Work Plan included modifications to the ocean inlet of Carpinteria Marsh designed to maintain year-round tidal flushing. Construction of a seawall along the west side of the inlet was proposed. The seawall would extend far enough seaward to direct the eastward littoral drift of beach sand around the mouth of the inlet, thus preventing its closure. The modified configuration of the western and eastern sandspits would be generally comparable to the pattern shown in 1869 and 1903 maps of the marsh (Plate 4).[1]

James Stubchaer, County Flood Control Engineer, has indicated (personal communications, 1974, 1975) that the 1971-72 dredging of Santa Monica and Franklin creek channels through the Carpinteria Marsh created a sufficient tidal prism to promote vigorous tidal flushing, thus no modifications of the ocean inlet appear to be needed at the present time. No design studies of construction have been planned for this phase of the original proposal.

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[1]By contrast, in their present configuration the eastern spit extends about 250 feet further seaward than the western spit. Since this pattern interrupts the eastward littoral drift, the inlet channel fills with sand.

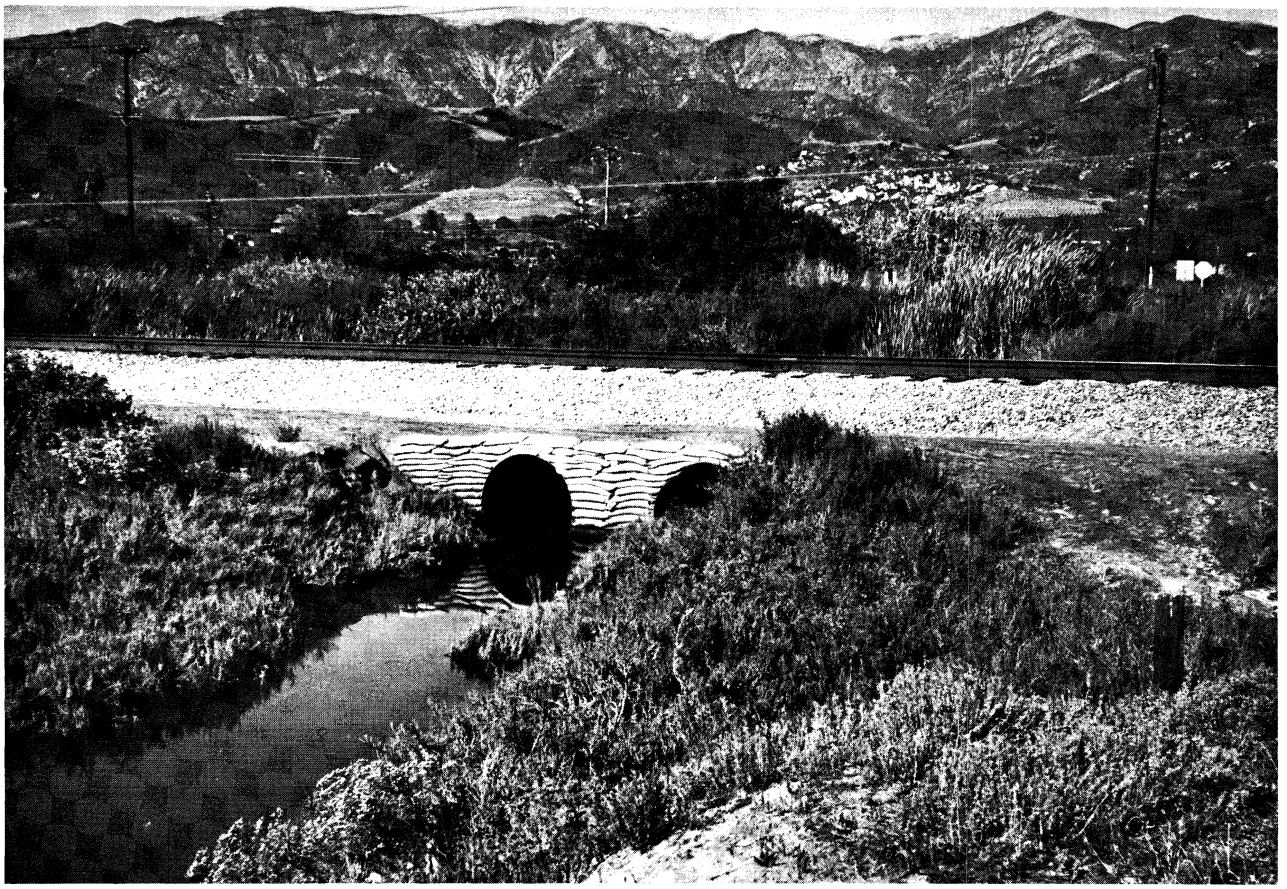
Water Quality

At present water quality is not a major problem in the Carpinteria Marsh, and the site appears to be relatively free of contaminants. In fact, Santa Barbara County Health and Flood Control officials describe the marsh as, "the cleanest it's been in memory" (D. Detwiler and J. Stubchaer, pers. comm., October 1975). This contrasts markedly with the septic and anaerobic conditions that characterized the site before the tidal channel to the Pacific Ocean was permanently opened in 1966. Since that time, regular tidal flushing has occurred in the slough, and the stagnant waters and pungent odors of the 1960's are a thing of the past.

Minor pollution levels undoubtedly still exist in the slough; and any increase in current development, or human use, that involves waste discharge directly into the marsh, or its drainages, could result in reduced water quality. Four potential pollution sources, two general and two specific, have been identified in the vicinity of the marsh. These are: 1) agricultural and urban drainage from the watershed area, 2) sewage discharge from nearby septic systems, 3) mosquito abatement activities within the slough, and 4) the possibility of offshore oil spills. None should cause significant degradation of water quality if properly controlled.

Agricultural and Urban Drainage

The long-term expansion and intensification of agricultural activity in the western Carpinteria Valley, combined with continued urban growth to the north of U.S. 101 along Santa Monica and Franklin creeks, present potential water quality problems for the Carpinteria Marsh. In particular, increased irrigation runoff from agricultural fields and



Agricultural run-off, which creates freshwater marsh habitat, is a minor water quality problem at present, due to adequate tidal flushing.

residential lawns and gardens, is expected to result in the introduction of higher concentrations of chemical residues and other pollutants into the marsh (via its drainage system).[1] Presently, tidal flushing seems to be effectively removing most waterborne pollutants that enter the slough. This is evidenced by laboratory analyses of water samples taken from the slough in 1973 and 1974. In both cases, the samples tested negative for chemical residue traces from pesticides and fertilizers (R. Gillman, pers. comm., October 1975).

While it is assumed that the constant mixing and exchange of water from tidal action will continue to prove effective in removing agricultural and urban-related pollutants from the marsh, a program of regular water quality monitoring for chemical residues is advisable.

Septic Discharge

Overflow drainage from inadequate septic tanks and leach lines has occasionally allowed raw sewage to enter Carpinteria Marsh. In the past, the Santa Claus Village commercial complex, to the west of the site, has been the major source of this pollution. At present the shops and restaurants in the village are served by an outmoded septic system, which often cannot adequately handle the large volumes of effluent generated during peak periods. In addition, the high water table in the area restricts percolation (D. Detwiler, pers. comm., October 1975). When either or both conditions occur, raw or partially-treated sewage may reach the marsh. The Sandyland Cove and Sandyland residential areas also

[1]The Carpinteria Marsh is presently the receiving basin for all surface waterflows from Santa Monica and Franklin creeks, as well as a series of smaller drainages to the northwest. The total drainage area comprises 5,580 acres.

depend on septic systems for waste disposal, and probably contribute smaller volumes of untreated sewage to the wetlands from time to time.

Over the long-term, this problem will be eliminated through the recent annexation of Santa Claus Village to Carpinteria Sanitary District. Construction of a sewer line connecting Santa Claus Village with the District's main line north of U.S. 101 has already begun; once completed, the existing septic system will be abandoned. Thus, except for the infrequent discharge of small volumes of raw sewage from remaining systems in the Sandyland Cove and Sandyland areas, no appreciable volumes of effluents are expected to reach Carpinteria Marsh after 1976.

Mosquito Abatement

Mosquito infestation was a significant problem at Carpinteria Marsh in the early 1960's--particularly when closure of the ocean inlet caused extensive brackish water flooding. Early treatment involved both periodic breaching of the inlet sandbar and ditching of the salt marsh. More recently, regular tidal flushing has greatly reduced the mosquito problem. Two saltwater mosquitoes [*Aedes squaminger* (Jan.-Apr.) and *Aedes taeniorhynchus* (June-Sept.)] and one fresh to saltwater species (*Culex tarsalis*, year-round) are present. The local mosquito abatement district checks the site bi-weekly and spot sprays infested areas with fenthion, an organic phosphate insecticide (Baytex, 0.1 lbs./acre mixed with diesel oil as a carrier). Major aerial spraying has been necessary only twice in the last decade. Native stickleback populations feed on the mosquito larvae; no additional mosquito-eating fish have been introduced (R. Wolfe and J. Standard, pers. comm., October 1975).

Mosquito troublespots include the narrow strip of freshwater habitats adjacent to the Southern Pacific Railroad (Plate 7) and areas outside the marsh, between the railroad and Highway 101. However, existing methods of control are satisfactory and do not present any significant adverse impact to the natural fish and wildlife resource.

Offshore Oil Spills

The Santa Barbara Channel adjacent to the Carpinteria Marsh contains significant petroleum reserves. Early in 1969 an extensive oil spill from a nearby, federally-leased drilling platform caused considerable damage to the intertidal and nearshore flora and fauna of a portion of the Santa Barbara coastline. During the spill a sand dike was hastily thrown up across the ocean inlet of the marsh, preventing possible major contamination of the site by floating crude oil. While revised State drilling regulations have greatly reduced the chances of a similar spill occurring in the future, the possibility should not be ignored. It is important that effective, enforceable, contingency plans be drawn up to protect the Carpinteria Marsh in the event of a future platform oil spill or local tanker mishap.

Urban Expansion and Encroachment

Since the 1950's, considerable urbanization has taken place in the Carpinteria Valley. Between 1950 and 1970, the area population increased over 100 percent (from 4,927 to 9,959), and the City expanded north toward the Santa Ynez Mountains and east toward the Ventura County line (U.S. Bureau of the Census, 1972). During this period, urban expansion was particularly heavy in the immediate vicinity of the Carpinteria Marsh, and within its watershed area. Major housing developments were constructed

The objectives of any development of lands immediately adjacent to Carpinteria Marsh should be compatible with maintenance or enhancement of the marsh's natural resource values.

adjacent to the eastern edge of the site, as well as north of U.S. 101, on the flood plains of Santa Monica and Franklin creeks. Yet, despite a doubling of the area population, and expansion of the urban envelope onto the rich flood plains surrounding Carpinteria Marsh, urban encroachment during the past twenty to twenty-five years apparently has not resulted in visible degradation of the marsh. In fact, Stubchaer (pers. comm., October 1975) has indicated that, in terms of environmental quality, the slough is probably cleaner and more productive than it was in the early 1950's.[1]

In recent years new construction in the valley has slowed considerably. At the present time, building activity is virtually non-existent in and around the slough; and the rate of new housing starts along the watershed drainages is probably at the lowest level in the past decade. While many factors have interacted to create this decrease in building activity, most important have been: 1) recent legislation by the State of California restricting new development in the coastal zone (*i.e.*, Proposition 20 and the California Coastal Zone Conservation Commission; 2) non-availability of undeveloped land in the areas immediately adjacent to the slough; 3) presence of large parcels of relatively inexpensive land in the eastern Carpinteria Valley (resulting in a noticeable shift in new construction activity to that area after 1970); and 4) a general down-turn in the economy, which has affected new construction in all of Southern California.

In the near future, it appears that any expansion in and around the Carpinteria Slough will be limited to construction of single-family dwellings

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[1]It should be noted that the mouth of the slough was often closed prior to 1966, and that tidal flushing was irregular.

on the few lots remaining in Sandyland and Sandyland Cove, and some small apartment units in the area to the east.[1] Most building activity in the watershed areas of Santa Monica and Franklin creeks is expected to be restricted to the gradual infilling of small agricultural parcels located between existing housing tracts, apartment complexes and trailer parks. Unless there is a substantial change in political and economic factors presently influencing growth trends and urban expansion in the vicinity of the slough and its watershed, the possibility of significant disturbance to this coastal wetlands area, through increased urban encroachment, should not pose a major problem.

Access

Public use of the Carpinteria Slough is largely restricted by the private ownership of much of the area, and topographical barriers which separate the marsh from potential pedestrian access points. The present owners maintain strict security programs which are designed to provide maximum protection for their homes, as well as the surrounding wetlands area. For example, both the Sandyland Protective Association and Sandyland Cove Homeowners Association employe full-time watchmen to monitor all movements on and off their respective properties. In addition, locked gates across existing roads into the slough, and "no trespassing" signs prominently posted along the shoreline, represent further controls. Finally, all non-residents having legitimate business in the slough (*e.g.*, University researchers, members of naturalist and conservation groups) are required to obtain written or verbal authorization from representatives of the

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[1] Although the area east of the slough is zoned by the City of Carpinteria to allow construction of apartments and condominiums with up to 20 units per acre, it is unlikely that the State Coastal Commission will approve future developments of this magnitude.

Private ownership and restricted access have contributed significantly to the maintenance of the relatively undisturbed Carpinteria wetlands.

owners associations, and to clear their visits with a watchman before entering the area.

Apart from structured security measures, various topographical barriers in and around the slough tend to discourage unauthorized entry. These natural and man-made obstacles include the sandspit and tidal channel to the south, a flood control channel to the east, the Southern Pacific Railroad tracks and right-of-way fencing to the north, and the freeway and railroad tracks to the northwest. In summary, the present system of monitoring vehicular and pedestrian access to the marsh site, in combination with existing topographical barriers, has permitted private owners to selectively exclude public access to Carpinteria Marsh, and strictly control intensity of use.

While it can be argued that the present restrictions on pedestrian and vehicle access to the slough are too stringent, the fact remains that strict enforcement of these policies over the years has contributed substantially to the maintenance of the marsh as a relatively undisturbed wetlands habitat.[1] Significantly, the University of California has proposed equally stringent access restrictions and controls for the 120 acres of wetlands that it hopes to acquire for its Natural Land and Water Reserves System. Provided that present and proposed security programs remain in effect, the Carpinteria Marsh will continue to be protected from the gradual environmental degradation that often afflicts coastal wetlands receiving unrestricted, or too intensive, public use.

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[1]This accomplishment is even more impressive when viewed against the twin forces of rapid urbanization and population growth, which have characterized the Carpinteria Valley during the past two decades.

STATE AND LOCAL GOVERNMENT PRESERVATION PLANS

Following extended negotiations with property owners, the University of California hopes to acquire, in the near future, approximately 120 acres of wetlands in the Carpinteria Slough. The parcel, which is currently owned by the Title Insurance and Trust Company, trustees for the beneficial owners and trustees for the beneficial owners and maintained as a private natural preserve, is located in the eastern and central portions of the slough (Plate 11). It includes an area of salt marsh, several tidal channels, and the mouths of Santa Monica and Franklin creeks.

Following transfer of ownership to the University, the 120-acre wetlands site would become a part of the state-wide Natural Land and Water Reserves System.[1] Administrative control of the Carpinteria Marsh Reserve would be assigned to the nearby University of California at Santa Barbara campus, and a faculty management committee would be appointed. The primary responsibility of this committee would be to design and implement a comprehensive management plan for the slough. In general, the management plan is expected to emphasize measures that should be taken to insure preservation of the wetlands area in a relatively undisturbed state (J. Haller, pers. comm., October 1975). Although it is anticipated that University ownership would permit greater utilization of the slough by qualified researchers and educational groups, than is presently permitted under private ownership, access will not be unrestricted. Rather, a formal security program would be implemented to control entry. All persons

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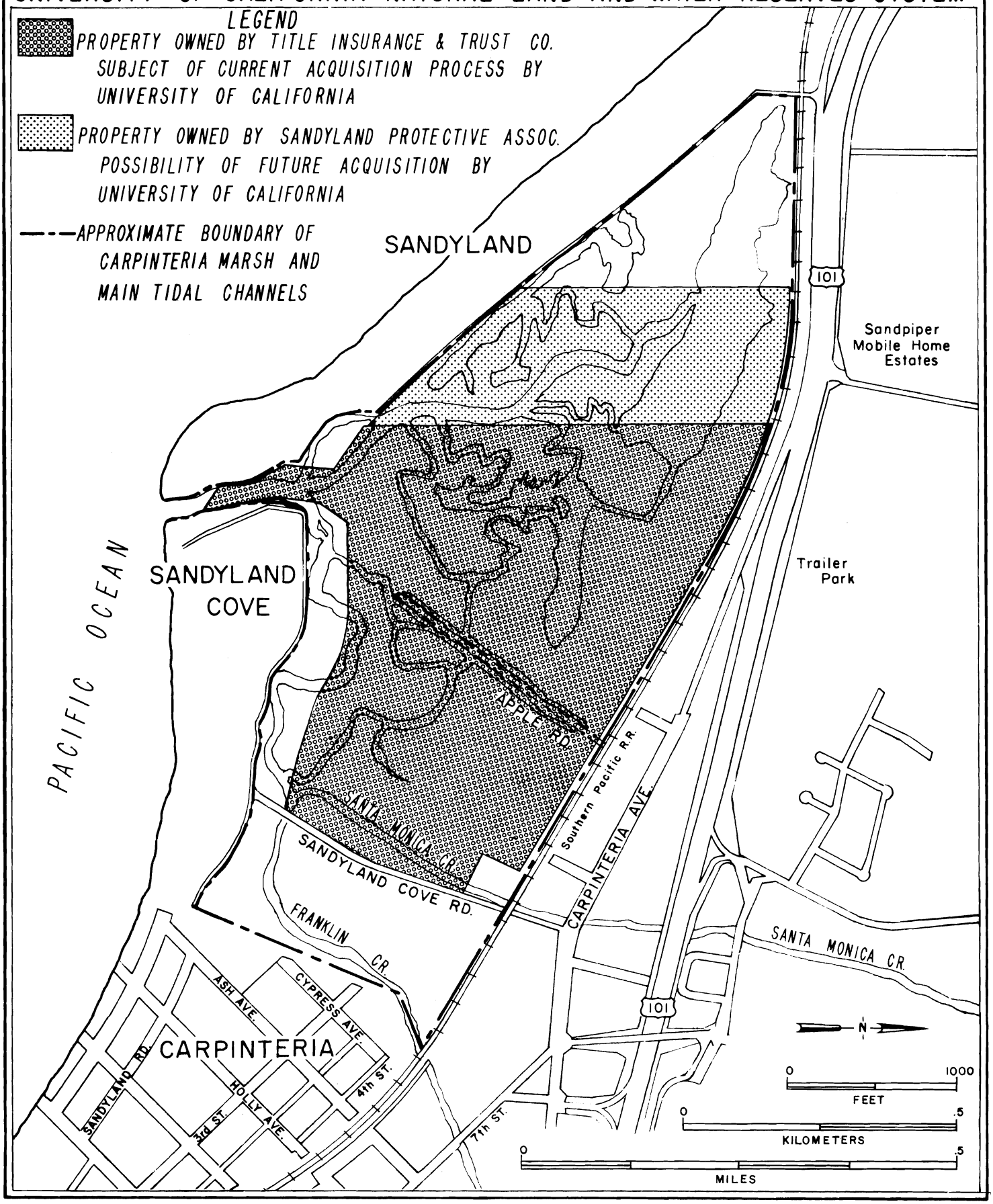
[1]The Natural Land and Water Reserves System was established in 1965 by the University Regents to provide for the acquisition and protection of natural areas for study and research. Since that time, 22 reserves have been acquired through direct purchase, using non-State funds and grants, gifts or use agreements. The only coastal wetland reserve presently in the system is the Kendall-Frost Mission Bay Marsh Reserve, a 20-acre salt marsh in San Diego County.

PLATE II

PROPOSED CARPINTERIA MARSH RESERVE

UNIVERSITY OF CALIFORNIA NATURAL LAND AND WATER RESERVES SYSTEM



interested in using the reserve would be required to obtain permission, in advance, from the Santa Barbara campus.

Ideally, the University of California would like to acquire additional wetlands and buffer areas within the slough, as these become available. Such lands also would become part of the Carpinteria Marsh Reserve, subject to the same management policies and constraints governing the initial 120-acre parcel. Although formal negotiations with other owners are not being conducted at this time, the Sandyland Protective Association has unofficially indicated an interest in making available (to the University) a 40-acre wetlands parcel located to the west of the 120-acre site (Plate 11). This offer would be contingent on the University's acquisition of the initial site from the Title Insurance and Trust Company (W. Travers, pers. comm., October 1975). If the University were able to acquire both parcels, about 70 percent of the slough would be included within the Carpinteria Marsh Reserve (Plate 11).

Except for the Santa Barbara County Flood Control District, which is attempting to purchase about three-tenths of an acre of marshland for flood control purposes, no other public agencies or conservation groups appear to be actively negotiating for land in the Carpinteria Marsh. However, Nature Conservancy Inc., Washington, D.C., made bid to purchase the marsh in 1962. The Department of Fish and Game also approached the owners regarding purchase in 1967, but withdrew in favor of the University's acquisition plan. And, Carpinteria Marsh remains high on the Department's list of priority areas for acquisition. Should the University bid to acquire this valuable coastal wetland fail for any reason, other efforts should be made to place it into public ownership.

ADDITIONAL RESEARCH NEEDS

The present study of Carpinteria Marsh and its environs indicates that at least three areas for significant future research can be defined.

The first of these should be aimed towards gaining a more complete understanding of the physical environment, flora and fauna of the site. Available data are of a recommaissance nature and need to be substantially augmented. Important unanswered questions include the composition and abundance of the marine invertebrate fauna (and if it is truly as sparse as it appears--why so?), the role of the salt marsh in supplying dissolved nutrients to the lagoon and ocean, and the role of the site as a spawning and nursery area for coastal fish.

A second area for research might include field and laboratory model studies of the tidal flushing behavior of the site and of the relationships between the size of the tidal prism and tendency towards closure of the ocean inlet. Measurements of recent and ancient sedimentation rates would also be appropriate here.

A third research area of relevance to the successful preservation of both this site and other California coastal wetlands, would involve meaningful field studies of the effects of various forms of disturbance upon the wildlife. Recovery times following disturbances and the potential for constructive environmental management could be investigated also.

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Personal Communications

Telephone conversations over the period 16-20th October 1975, with the following individuals and agencies also proved invaluable in preparing this report:

Cheatham, N.--Field Representative, Natural Land and Water Reserves System, University of California Systemwide Administration, Berkeley.

Detwiler, D.--Environmental Health Officer, Santa Barbara County.

Gillman, R.--Agricultural Commissioner's Office, Santa Barbara County.

Haller, J.--Chairman, Natural Lands and Water Reserve System Committee, U.C.S.B.

Hamber, J.--Assistant Curator, Santa Barbara Museum of Natural History.

Hetrick, C.--South Central Coast Regional Commission, California Coastal Zone Conservation Committee.

Puddicombe, V.--Santa Barbara Chapter, National Audubon Society.

Standard, J.--Field Foreman, Carpinteria Pest Control District.

Stubchaer, J.--County Flood Control Engineer, Santa Barbara County Flood Control and Water Conservation District.

Travers, N.--President, Sandyland Protective Association.

Wolfe, R.--Director, South Coast Mosquito Abatement District.

APPENDIX A

FLORA OF CARPINTERIA MARSH

(P. Meyers, 1974)

FAMILY	SPECIES	COMMON NAME[1]
Aizoaceae	*Mesembryanthemum crystallinum*	Ice-plant
	M. edule	Hottentot-fig
	Tetragonia expansa	New Zealand spinach
Amaranthaceae	*Amaranthus* sp.	Pigweed
Boraginaceae	*Heliotropium curassavicum* var. *oculatum*	Seaside heliotrope
Caryophyllaceae	*Spergularia marina*	Salt marsh sand spurry
Chenopodiaceae	*Atriplex lentiformis* ssp. *breweri*	Quail brush
	A. patula var. *hastata*	Fat-hen
	A. semibaccata	Australian saltbush
	Beta vulgaris	Cultivated beet
	Chenopodium album	Lamb's quarters
	Salicornia virginica	Perennial pickleweed
	Salsola kali var. *tenuifolia*	Russian thistle
	Suaeda californica	Sea-blite
	S. c. var, *taxifolia*	Sea-blite
	Suaeda depressa var. *erecta*	Sea-blite

[1]Common names from Bailey (1949), Mason (1957) and McMinn (1939), Abrahams (1941, 1944, 1951, 1960).

FAMILY	SPECIES	COMMON NAME
Compositae	*Ambrosia artemisiifolia*	Low ragweed
	Artemisia californica	California sagebrush
	A. douglasiana	Wormwood
	Baccharis pilularis ssp. *consanguinea*	Coyote brush
	Centaurea melitensis	Tocalote
	Conyza canadensis	Horseweed
	Cotula coronopifolia	Brass buttons
	Franseria chamissonis	Beach-bur
	Gnaphalium sp.	Cudweed
	Haplopappus venetus ssp. *vernonioides*	Coast goldenbush
	Hemizonia sp.	Tarweed
	Lactuca serriola	Prickly lettuce
	Sonchus sp.	Sow thistle
	Venegazia carpesioides	Venegazia
	Xanthium spinosum	Spiny cocklebur
	X. strumarium var. *canadense*	Cockle bur
Convolvulaceae	*Convolvulus cyclostegius*	Bindweed
	Cressa truxillensis var. *vallicola*	Alkali weed
Cruciferae	*Brassica nigra*	Black mustard
	Cakile maritima	Sea rocket
	Raphanus sativus	Wild radish
Cyperaceae	*Scirpus robustus*	Alkali bulrush
Euphorbiaceae	*Euphorbia* sp.	Spurge
	Ricinus communis	Castor-bean

FAMILY	SPECIES	COMMON NAME
Frankeniaceae	*Frankenia grandifolia*	Alkali-heath
	Arundo donax	Giant reed
Gramineae	*Avena fatua*	Wild oats
	Bromus mollis	Soft chess
	B. rigidus	Rip-git
	B. rubens	Red bromegrass
	Cynodon dactylon	Bermudagrass
	Distichlis spicata	Saltgrass
	var. *stolonifera*	
	Elymus condensatus	Ryegrass
	Hordeum glacum	Wild barley
	Hordeum uporinum	Wild barley
	Lolium multiflorum	Italian ryegrass
	Monanthochloe littoralis	
	Oryzopsia miliacea	Ricegrass
	Parapholis incurva	Sicklegrass
	Paspalum dilatatum	Jointgrass
	Polypogon monspeliensis	Beardgrass
Pydrophyllaceae	*Phacelia* sp.	Phacelia
Labiatae	*Stachys bullata*	Hedge nettle
Leguminosae	*Lotus* sp.	Trefoil
	Medicago hispida	Bur clover
	Melilotus albus	White sweet clover
	M. indicus	Yellow sweet clover
Malvaceae	*Malva nicaeensis*	Mallow
	Malacothamnus sp.	Malacothamnus

FAMILY	SPECIES	COMMON NAME
Myoporaceae	*Myoporum* sp.	Myoporum
Plantaginaceae	*Plantago lanceolata*	Plantain
Plumbaginaceae	*Limonium californicum*	Sea-lavender
Polygonaceae	*Polygonum aviculare*	Wire grass
	Rumex crispus	Curly dock
	R. acetosella	Sheep sorrel
Rhamnaceae	*Ceanothus megacarpus*	Bigpod ceanothus
Rubiaceae	*Galium aparine*	Bedstraw
Scrophulariaceae	*Scrophularia* sp.	Figwort
Salicaceae	*Salix* sp.	Willow
Solanaceae	*Datura meteloides*	Jimson weed
	Nicotiana glauca	Tree tobacco
	Solanum douglasii	Nightshade
Typhaceae	*Typha* sp.	Cat-tail
Umbelliferae	*Conium maculatum*	Hemlock
	Foeniculum vulgare	Sweet fennel
Urticaceae	*Urtica holosericea*	Nettle
Verbenaceae	*Verbena lasiostachys*	Verbena

APPENDIX B

MARINE INVERTEBRATES OF CARPINTERIA MARSH

(Partly after Riffle 1971)

COMMON NAME	SCIENTIFIC NAME
PROTOZOANS:	PROTOZOA:
Foram	*Ammonia beccarri*
Foram	*Quinqueloculina* sp.
Foram	*Reophax nana*
Foram	*Trochammina inflata*
Foram	*Trochammina macrescens*
POLYCHAETES:	POLYCHAETA:
Polychaete	*Boccardia* sp.
Polychaete	*Capitella capitata*
Polychaete	*Glycera* sp.
Polychaete	*Polydora nuchalis*
Polychaete	Unidentified
OLIGOCHAETES:	OLIGOCHAETA:
Oligochaete	Unidentified
ARTHROPODS:	ARTHROPODA:
Amphipod	*Orchestia traskiana*
Ostracod	*Cythereis* sp.
Hairy mud crab	*Hemigrapsus oregonensis*
Striped shore crab	*Pachygrapsus crassipes*
Ghost shrimp	*Callianassa affinis*

COMMON NAME	SCIENTIFIC NAME
ARTHROPODS--cont.	
Red ghost shrimp	*Callianassa californiensis*
Flies, larvae and adults	Diptera
MOLLUSCS:	MOLLUSCA:
Salt marsh snail	*Assiminea transluscens*
California horn snail	*Cerithidea californica*
Onyx slipper snail	*Crepidula onyx*
Bubble snail	*Haminoea virescens*
Salt marsh snail	*Melampus olivaceus*
Purple olive snail	*Olivella biplicata*
Intertidal snail	*Rissoella* sp.
California soft-shelled clam	*Cryptomya californica*
Bent nose clam	*Macoma nasuta*
California mussel	*Mytilus californianus*
Bay mussel	*Mytilus edulis*
Common littleneck clam	*Protothaca staminea*
Purple clam	*Sanguinolaria nuttallii*
California jacknife clam	*Tagelus californianus*
Gaper clam	*Tresus nutallii*

APPENDIX C

FISH OF CARPINTERIA MARSH *

Key

E = Predominantly estuarine

M = Predominantly marine, enter estuarine shallows to spawn or use as nursery area

COMMON NAME	SCIENTIFIC NAME	
Topsmelt	*Atherinops affinis*	M
Arrow goby	*Clevelandia ios*	E
Shiner surfperch	*Cymatogaster aggregata*	M
Tidewater goby	*Eucyclogobius newberryi*	E
California killifish	*Fundulus parvipinnis*	E
Threespine stickleback	*Gasterosteus aculeatus*	E
Longjaw mudsucker	*Gillichthys mirabilis*	E
Staghorn sculpin	*Leptocottus armatus*	E
California halibut	*Paralichthys californicus*	M
Starry flounder	*Platichthys stellatus*	M
Pipefish	*Syngnathus* sp.	M

* List of fish expected to occur in Carpinteria Marsh waters, based on data from studies in nearby Goleta Slough (Speth, et.al., 1975; MacDonald, 1971b).

APPENDIX D

BIRDS OF CARPINTERIA MARSH

(Cook 1967-70 and Ervin 1974)

Key

A - Abundant (often > 100 birds per census)

C - Common (usually 20-100 birds per census)

U - Uncommon (usually < 20 birds per census)

R - Rare (infrequently seen, usually < 5 birds)

M - Migrant

WATER ASSOCIATED BIRDS

These species are primarily associated with the site's aquatic habitats--salt marsh, tidal channels, sand and mudflats.

COMMON NAME	SCIENTIFIC NAME 1/	
Shorebirds:		
Semipalmated plover	*Charadrius semipalmatus*	UM
Snowy plover	*Charadrius alexandrinus*	U
Killdeer	*Charadrius vociferus*	C
Black-bellied plover	*Pluvialis squatarola*	CM
Black turnstone	*Arenaria melanocephala*	RM
Ruddy turnstone	*Arenaria interpres*	RM
Common snipe	*Capella gallinago*	RM
Long-billed curlew	*Numenius americanus*	UM
Whimbrel	*Numenius phaeopus*	UM
Spotted sandpiper	*Actitus macularia*	U

1/ Scientific names from updated American Ornithologists Union List (A.O.U., 1973).

COMMON NAME	SCIENTIFIC NAME	
Willet	*Catoptrophorus semipalmatus*	CM
Greater yellowlegs	*Tringa melanoleuca*	UM
Lesser yellowlegs	*Tringa flavipes*	RM
Least sandpiper	*Calidris minutila*	AM
Dunlin	*Calidris alpina*	CM
Short-billed dowitcher	*Limnodromus griseus*	AM
Long-billed dowitcher	*Limnodromus scolopaceus*	UM
Western sandpiper	*Calidris mauri*	AM
Marbled godwit	*Limosa fedoa*	UM
Sanderling	*Calidris alba*	UM
American avocet	*Recurvirostra americana*	U
Black-necked stilt	*Himantopus mexicanus*	U
Wilson's phalarope	*Steganopus tricolor*	RM
Northern phalarope	*Lobipes lobatus*	RM
Grebes and Cormorants:		
Horned grebe	*Podiceps auritus*	UM
Eared grebe	*Podiceps nigricollis*	UM
Western grebe	*Aechmophorus occidentalis*	UM
Pied-billed grebe	*Podilymbus podiceps*	UM
Double-crested cormorant	*Phalacrocorax auritus*	UM
Marsh Birds:		
Sora	*Porzana carolina*	U
Common gallinule	*Gallinula chloropus*	UM
American coot	*Fulica americana*	A
Light-footed clapper rail	*Rallus longirostris levipes*	En-dangered

COMMON NAME	SCIENTIFIC NAME	
Wading Birds:		
Great blue heron	*Ardea herodias*	U
Great egret	*Casmerodias albus*	U
Snowy egret	*Egretta thula*	U
Green heron	*Butorides virescens*	U
Black-crowned night heron	*Nycticorax nycticorax*	U
American bittern	*Botaurus lentiginosus*	R
Gulls and Terns:		
Herring gull	*Larus argentatus*	RM
California gull	*Larus californicus*	UM
Mew gull	*Larus canus*	RM
Glaucous-winged gull	*Larus glaucescens*	RM
Western gull	*Larus occidentalis*	CM
Bonaparte's gull	*Larus philadelphia*	RM
Heermann's gull	*Larus heermanni*	RM
Ring-billed gull	*Larus delawarensis*	CM
Forster's tern	*Sterna forsteri*	UM
Common tern	*Sterna hirundo*	UM
Elegant tern	*Thalasseus elegans*	RM
Royal tern	*Thalasseus maximus*	RM
Caspian tern	*Hydroprogne caspia*	UM
Geese:		
Black brant	*Branta nigricans*	RM

COMMON NAME	SCIENTIFIC NAME	
Surface Feeding Ducks:		
Wood duck	*Aix sponsa*	RM
Mallard	*Anas platyrhynchos*	U
Pintail	*Anas acuta*	AM
Green-winged teal	*Anas crecca carolinensis*	CM
Cinnamon teal	*Anas cyanoptera*	C
American widgeon	*Anas americana*	CM
Northern shoveler	*Anas clypeata*	CM
Diving Ducks:		
Lesser scaup	*Aythya affinis*	RM
Surf scoter	*Melanitta perspicillata*	RM
Stiff-tailed Ducks:		
Ruddy duck	*Oxyura jamaicensis*	R

LAND ASSOCIATED BIRDS

These species are primarily associated with the site's drier, upland habitats--the alluvial fan, dikes, surrounding scrub and freshwater areas.

COMMON NAME	SCIENTIFIC NAME	
Kites, Hawks and Falcons:		
White-tailed kite	*Elanus leucurus*	U
Cooper's hawk	*Accipiter cooperii*	R
Red-tailed hawk	*Buteo jamaicensis*	C
Marsh hawk	*Circus cyaneus*	C
American kestrel	*Falco sparverius*	C

COMMON NAME	SCIENTIFIC NAME	
Doves:		
Rock dove	*Columbia livia*	U
Mourning dove	*Zenaida macroura*	U
Hummingbirds:		
Anna's hummingbird	*Calypte anna*	U
Rufous hummingbird	*Selasphorus rufus*	UM
Kingfishers:		
Belted kingfisher	*Megaceryle alcyon*	U
Flycatchers:		
Tropical kingbird	*Tyrannus melancholicus*	R
Western kingbird	*Tyrannus verticalis*	C
Ash-throated flycatcher	*Myiarchus cinerascens*	U
Olivaceous flycatcher	*Myiarchus tuberculifer*	R
Black phoebe	*Sayornis nigricans*	C
Say's phoebe	*Sayornis saya*	UM
Swallows:		
Barn swallow	*Hirundo rustica*	CM
Tree swallow	*Iridoprocne bicolor*	CM
Cliff swallow	*Petrochelidon pyrrhonota*	CM
Bank swallow	*Riparia riparia*	RM
Jays and Crows:		
Scrub jay	*Aphelocoma coerulescens*	C
Common crow	*Corvus brachyrhynchos*	C

COMMON NAME	SCIENTIFIC NAME	
Bushtits:		
Bushtit	*Psaltriparus minimum*	C
Wrens:		
Long-billed marsh wren	*Telmatodytes palustris*	R
Mockingbirds:		
Mockingbird	*Mimus polyglottos*	C
Kinglets:		
Ruby-crowned kinglet	*Regulus calendula*	CM
Waxwings:		
Cedar waxwing	*Bombycilla cedrorum*	UM
Shrikes:		
Loggerhead shrike	*Lanius ludovicianus*	C
Starlings:		
Starling	*Sturnus vulgaris*	C
Wood warblers:		
Yellow rumped warbler	*Dendroica coronata*	UM
Yellow warbler	*Dendroica petechia*	UM
Common yellowthroat	*Geothylpis trichas*	RM
Orange-crowned warbler	*Vermivora celata*	RM
Meadowlarks and Blackbirds:		
Red-winged blackbird	*Agelaius phoeniceus*	C
Brewer's blackbird	*Euphagus cyanocephalus*	C

COMMON NAME	SCIENTIFIC NAME	
Hooded oriole	*Icterus cucullatus*	UM
Brown-headed cowbird	*Molothrus ater*	C
Western meadowlark	*Sturnella neglecta*	C
Finches and Sparrows:		
House finch	*Carpodacus mexicanus*	U
Song sparrow	*Melospiza melodia*	U
Brown towhee	*Pipilo fuscus*	U
Savannah sparrow	*Passerculus sandwichensis princeps*	U
Lesser goldfinch	*Spinus psalttia*	U
American goldfinch	*Spinus ttistis*	U
White-crowned sparrow	*Zonotrichia leucophrys*	CM

APPENDIX E

MAMMALS OF CARPINTERIA MARSH*

COMMON NAME	SCIENTIFIC NAME
Order Marsupiala:	
Virginia opossum	*Didelphis marsupialis*
Order Insectivora:	
Ornate shrew	*Sorex ornatus*
Broad-handed (or California) mole	*Scapanus latimanus*
Order Lagomorpha:	
Black-tailed jack rabbit	*Lepus californicus*
Brush rabbit	*Sylvalagus bachmani*
Order Rodentia:	
Beechey (or California) ground squirrel	*Otospermophilus (Citellus) beecheyi*
California vole	*Microtus californicus*
House mouse	*Mus musculus*
California mouse	*Peromyscus californicus*
Norway rat	*Rattus norveigicus*
Western harvest mouse	*Reithrodontomys megalotis*
Botta (or Valley) pocket gopher	*Thomomys bottae*
Order Carnivora:	
Coyote (possible occasional visitor)	*Canis latrans*
Striped skunk	*Mephitis mephitis*
Spotted skunk	*Spilogale putorius*
Long-tailed weasel	*Mustela frenata*
Raccoon (possible occasional visitor)	*Procyon lotor*

*List of mammals expected to occur in Carpinteria Marsh, based on studies in nearby Goleta Slough (Speth, et.al., 1970; Macdonald, 1971b)