A BIOLOGICAL EVALUATION OF MORE MESA

SANTA BARBARA COUNTY CALIFORNIA

A REPORT TO
The Department of Resource Management
Santa Barbara County, California

by

Environmental Research Team
THE HERBARIUM
The Department of Biological Sciences
University of California, Santa Barbara

A BIOLOGICAL EVALUATION OF MORE MESA SANTA BARBARA COUNTY CALIFORNIA

WAYNE R. FERREN, JR.
EDITOR
PROJECT MANAGER

DALE M. SMITH
PRINCIPAL INVESTIGATOR

ENVIRONMENTAL RESEARCH TEAM
THE HERBARIUM
DEPARTMENT OF BIOLOGICAL SCIENCES
UNIVERSITY OF CALIFORNIA, SANTA BARBARA

FINAL REPORT

31 AUGUST 1982

UCSB ENVIRONMENTAL RESEARCH TEAM

Dr. Dale M. Smith, Principal Investigator
(Professor of Botany)

Mr. Wayne R. Ferren, Jr., Project Manager
(Senior Museum Scientist)

Dr. Gary L. Hannan, Vegetation and Habitat Specialist
(Research Associate)

Ms. Kelly P. Steele, Flora Specialist
(Museum Scientist and Graduate Student)

Mr. Paul Lehman, Bird Specialist
(Research Associate and Graduate Student)

Mr. Gary N. Fugle, Mammal Specialist
(Museum Scientist and Graduate Student)

Dr. Samuel S. Sweet, Herpetofaunal Specialist
(Assistant Professor of Zoology)

Mr. Fred Roberts, Field Assistant and Graphic Artist
(Lab Assistant and Undergraduate Student)

Ms. Linda Leum, Field Assistant
(Lab Assistant and Graduate Student)

Mr. John McManus, Field Assistant
(Graduate Student)

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A BIOLOGICAL EVALUATION OF MORE MESA
SANTA BARBARA COUNTY, CALIFORNIA

I N T R O D U C T I O N

Wayne R. Ferren, Jr.

PURPOSE - The goal of this evaluation is to provide a biological sensitivity analysis of More Mesa, Santa Barbara County, California. The Environmental Research Team of the UCSB Herbarium assessed various physiographic areas in the study site for their sensitivity to the impacts of residential development and conducted an analysis of the relative sensitivities of the various areas. Specific objectives associated with this analysis are as follows:

1. To inventory, classify and map the vegetation and habitats of More Mesa, and evaluate the sensitivity of various plant communities, including wetlands, oak woodland, grasslands, and coastal scrub.
2. To inventory the vascular plants and assess populations of any species of special concern (e.g., rare, threatened, or endangered).
3. To inventory the birds and assess the importance of various portions of More Mesa for species of special concern, particularly the White-tailed Kite, Burrowing Owl, Short-eared Owl, Marsh Hawk, and Merlin.
4. To inventory the mammals, determine the presence of any species of special concern, evaluate the importance of portions of More Mesa as habitats of special concern for these animals, and investigate

the relationship between small mammal populations and the foraging of raptors.

5. To inventory the herpetological fauna (reptiles and amphibians), determine the presence of any species of special concern and evaluate the importance of portions of More Mesa as habitats of special concern for these animals.

6. To delineate environmentally sensitive habitats throughout More Mesa as determined by the Coastal Act of 1976.

7. To determine the relative importance of More Mesa and its sensitive habitats to similar areas in the Goleta Planning Area.

8. To evaluate the residential development potential of More Mesa based on our findings.

9. To recommend mitigation measures and locations of buffer zones designed to protect environmentally sensitive habitats should residential development of portions of More Mesa be considered feasible.

BACKGROUND - More Mesa is an oceanfront parcel located in the Goleta Planning Area of Santa Barbara County, California. It is approximately 300 acres in size, extends almost a mile in length and one-half mile in width and is adjacent to and west of Hope Ranch Park (Fig. 1). More Mesa is one of the few remaining, large, oceanfront parcels in the urbanized South Coast area which has not been developed.

The previous zoning applied to More Mesa was Design Residential which permits residential development at two dwelling units per gross acre which in this case was 600 units. Since More Mesa is in the Coa-

Fig. 1. MORE MESA, SANTA BARBARA COUNTY, CALIFORNIA: The study site includes the eastern portion of More Mesa (outlined area), a marine terrace comprising about 300 acres of undeveloped land situated on the urbanized South Coast. More Mesa is situated on the southern margin of the geographic area known as the Goleta Valley and, as illustrated here, is bounded on the south by the Pacific Ocean (Santa Barbara Channel), on the north by Atascadero Creek and related bottomlands, on the east by Hope Ranch Park, and on the west by developed or cultivated portions of More Mesa. Santa Cruz Island occurs to the south (background), Goleta Slough lies just out of view to the west, and the photograph was taken to the north from the Santa Ynez Mountains.

stal Zone, any development of it is subject to the policies of the Coastal Act and the County's Local Coastal Program. Under the County's Coastal Land Use Plan, More Mesa is now zoned for Planned Development with a maximum of 300 dwelling units permitted on the site. As part of the County's Local Coastal Program (Santa Barbara County, 1982) the County has required (Section 4.5.3.b) a habitat study of More Mesa prior to the filing of any plans for development. Although portions of More Mesa are designated as Environmentally Sensitive Habitat Areas (Santa Barbara County, 1979, 1981), the question remains as to whether or not there are other environmentally sensitive habitats on the property. Likewise, the question remains whether or not More Mesa as a whole constitutes an environmentally sensitive habitat area. Prior to this study, no thorough biological investigations had been conducted at the site, although studies on the White-tailed Kite were conducted by Waian (1973), an EIS was written for a project proposed for the site previously (Dames & Moore, 1972), and an EIR was written for a project adjacent to the site (Environmental Science Associates, 1980). It was unknown to what extent development of the site would result in the loss of valuable habitat for many species and, therefore, might result in the extirpation of species, not only from More Mesa, but perhaps from the entire South Coast of Santa Barbara County. Therefore, a special study of More Mesa was needed to provide information on the sensitive habitat areas of the site. Appropriate siting strategies and mitigating measures also are needed if the County is to allow development to occur in the vicinity of the identified environmentally sensitive habitats in a manner consistent with the requirements of the Coastal Act.

This study has been designed and conducted to examine the various

portions of More Mesa, and the area as a whole, to provide evidence that will suggest answers to the questions of the environmental sensitivity of this area.

THE STUDY AREA

LOCATION - More Mesa is located adjacent to the Goleta Valley, along the South Coast of Santa Barbara County, California, approximately 1.5 miles southeast of downtown Goleta and in the vicinity of latitude 34^{0} 25'N and longitude 119^{0} 47' 30"W (Fig. 2). The entire physiographic feature known as More Mesa extends westward from Hope Ranch Park along the Pacific Ocean to the mouth of Goleta Slough, an estuary into which flows the various streams that drain the Goleta Valley. One of these streams, Atascadero Creek, forms the northern boundary of More Mesa, and receives runoff from several small tributaries that drain the Mesa.

The actual study site, eastern More Mesa, consists of 300 acres and is bounded on the east by Hope Ranch Park, on the west by homes and businesses situated along Orchid Drive, on the north by Atascadero Creek, and on the south by the Pacific Ocean (Fig. 3). This eastern portion is approximately 1 mile in length (east-west) and 1/2 mile in width (north-south). Parcels contained within the study site are located on the Santa Barbara County Zoning Map 65-32 (Fig. 4). These parcels consist of two major divisions: that parcel belonging to the Austin Estate (parcel 4, including all property north of the western section of the proposed extension of Vieja Drive); and those parcels belonging to Columbia University and under lease to Mr. Donald Simonsen for possible development. This includes parcels 1, 2, 7, 8, 9, and 10,

Fig. 2. GOLETA VALLEY, SANTA BARBARA COUNTY, CALIFORNIA.

The Goleta Valley is a coastal basin into which flow numerous streams that drain the adjacent Santa Ynez Mountains and associated foothills. More Mesa (1) the study site, occurs on a marine terrace which separates the Valley from the Pacific Ocean to the south. Other features of the area include the following: (2) Southern California Gas Company Property on western More Mesa; (3) Goleta Slough; (4) Main Campus of the University of California, Santa Barbara; (5) Isla Vista; (6) Santa Barbara Airport; (7) Goleta; and (8) Hope Ranch Park. The base map for the figure is the USGS 7½' Goleta Quadrangle.

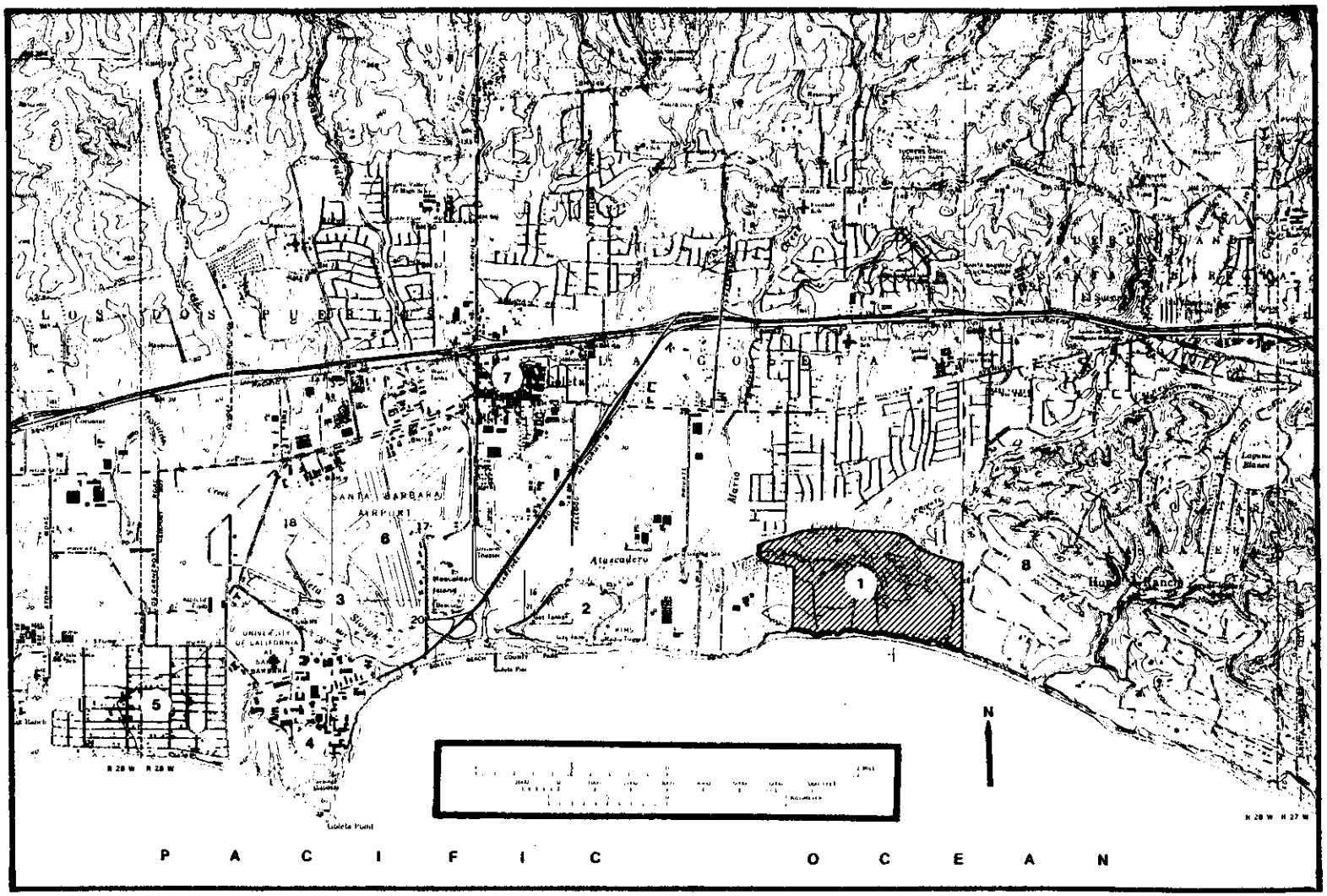

L O S P O S P U E B L O S
SANTA BARBARA AIRPORT
Goleta
Atascadero
Mesa
Hope Ranch
N
P A C I F I C O C E A N

Fig 3. EASTERN MORE MESA.

The study site on eastern More Mesa consists of about 300 acres and is bounded on the east by Hope Ranch Park, on the west by homes and agricultural business situated along Orchid Drive, on the north by Atascadero Creek, and on the south by the Pacific Ocean.

Note: The ocean bluffs and beach along the southern boundary of More Mesa are excluded from the study site.

Fig. 3. EASTERN MORE MESA.

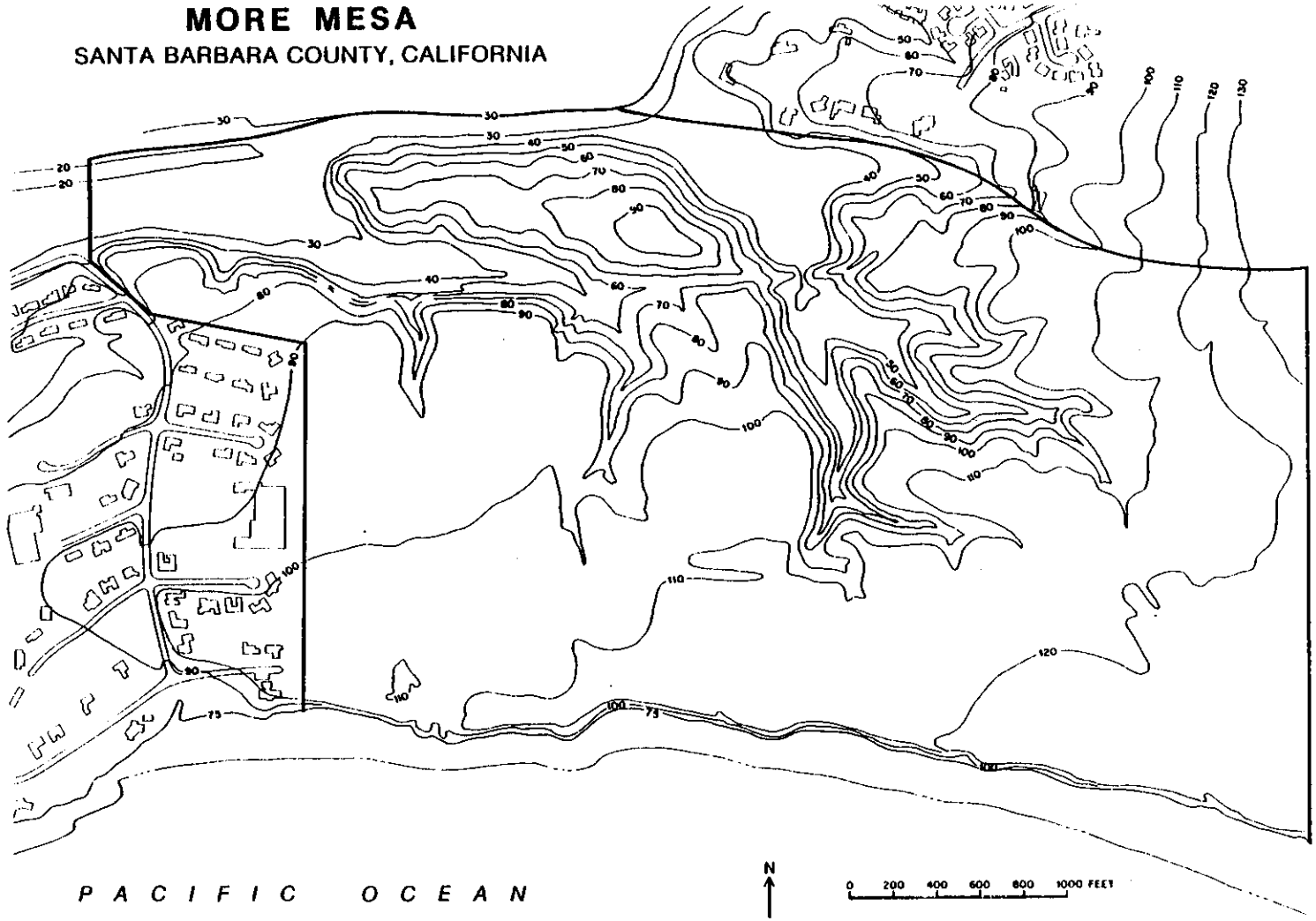
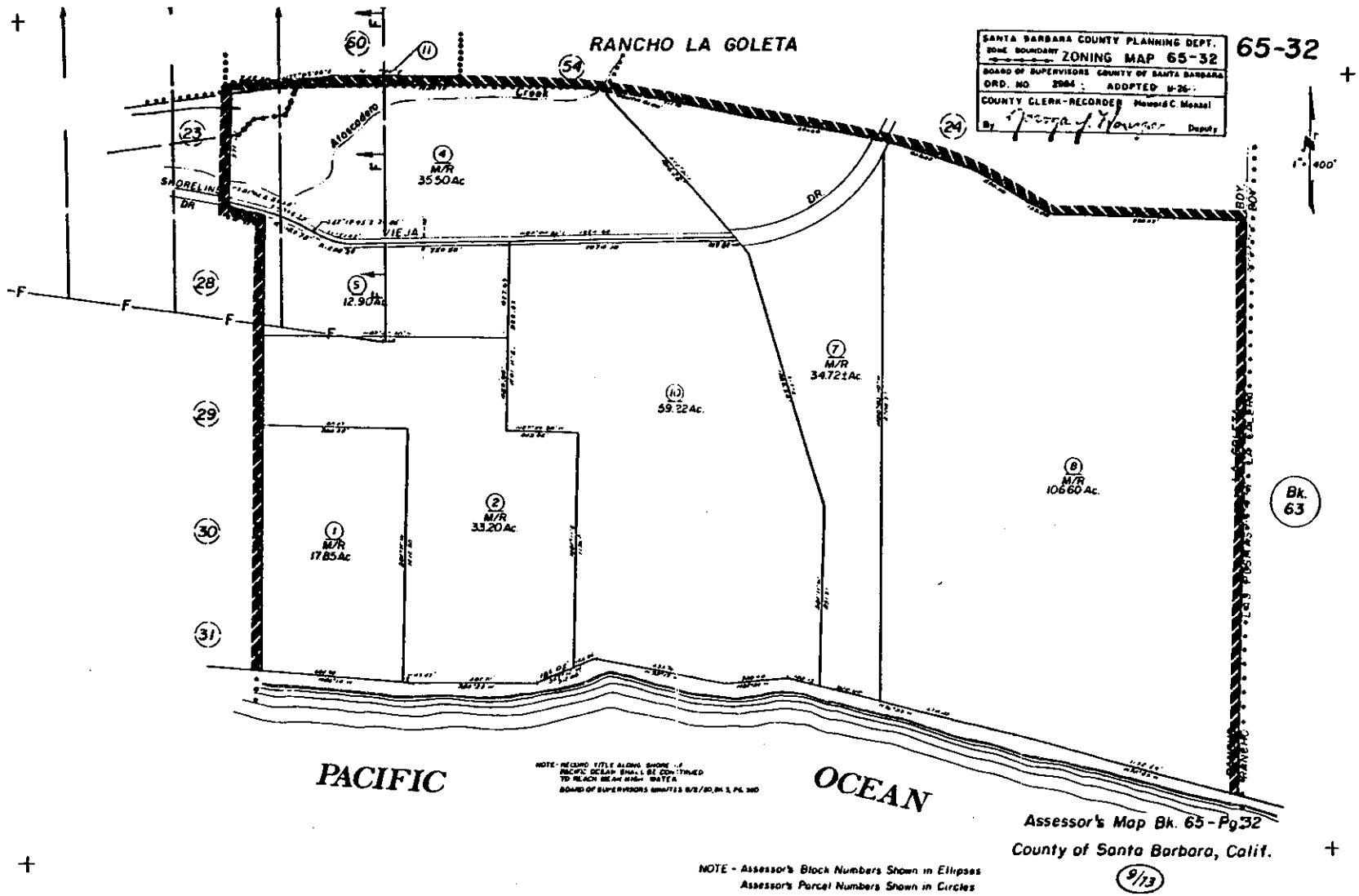


Fig. 4 MORE MESA PARCEL MAP

The various parcels of the study site are illustrated on Zoning Map 65-32. Of the 300 acres contained in the area, approximately 35 acres (parcel 4) belong to the Austin Estate, and approximately 265 acres (the remaining parcels) belong to Columbia University and are under lease to Mr. Donald Simonsen.


RANCHO LA GOLETA
SANTA BARBARA COUNTY PLANNING DEPT.
ZONE BOUNDARY ZONING MAP 65-32
65-32
BOARD OF SUPERVISORS COUNTY OF SANTA BARBARA
ORD. NO. 2984 ; ADOPTED 11-26-
COUNTY CLERK-RECORDER Howard C. Menzel
Deputy
1" = 400'
Atascadero Creek
SANDPIPER DR
VIEJA
DR
BOY
BOY
M/R 35.50 Ac
5 12.90 Ac
M/R 34.72± Ac
59.22 Ac
M/R 106.60 Ac
M/R 33.20 Ac
M/R 17.85 Ac
Bk. 63
PACIFIC OCEAN
NOTE - RECORD TITLE ALONG SHORE IS SUBJECT TO EACH BEACH AREA SHALL BE CONTINUED TO REACH BEACH WITHIN STATE BOARD OF SUPERVISORS MINUTES 8/8/50, BK. 3, PG. 380
Assessor's Map Bk. 65 - Pg. 32
County of Santa Barbara, Calif.
9/13
NOTE - Assessor's Block Numbers Shown in Ellipses
Assessor's Parcel Numbers Shown in Circles

and all property (265 acres) south of the western section of the proposed extension of Vieja Drive and north and south of the eastern section of the proposed extension of Vieja Drive. While this study is being funded by the potential developer of the area, as mandated by the County's Local Coastal Program (Santa Barbara County, 1980), this study is not restricted to his property but covers the entire undeveloped eastern portion of More Mesa, including the Austin property and property west of Orchid and Shoreline Drives (Fig. 3).

Topographically, the study site is a portion of a terrace surrounded on the north, west and south by bottomlands of the Goleta Valley, the Goleta Slough, and the Pacific Ocean, respectively. In general, it contains a relatively flat-topped portion ranging between about 80 and 130 feet in elevation and two ravine systems which drain into Atascadero Creek (Fig. 3). The topography and physiographic description of More Mesa will be covered in detail in the Physiographic Areas, Habitats and Vegetation portion of this report.

CLIMATE - Climatic information reported herein has been obtained from Dibblee (1966), Dames and Moore (1972), National Oceanic and Atmospheric Administration (1973), California Department of Food and Agriculture (1978), Shipman (1981), and Haller (pers. comm.). Most of the information has been summarized from data recorded at either the Santa Barbara Waste Water Treatment Plant (about 13 miles east of More Mesa at elevation 5 feet) or at the Santa Barbara Airport (about 1.5 miles west-northwest of More Mesa at elevation 9 feet).

More Mesa occurs in the northwestern portion of the southern California region and is characterized by a Mediterranean climate with cool,

wet winters and warm, dry summers. Mild temperatures prevail throughout the South Coast region of Santa Barbara County. The yearly average temperature recorded at the Santa Barbara Airport and at Santa Barbara during a thirty year period (1941-1970) is 58.8° and 60.3°F, respectively. Monthly averages recorded at the airport are as follows: Jan. - 51.6°; Feb. - 53.3°; Mar. - 54.7°; Apr. - 57.3°; May - 59.7°; June - 62.0°; July - 65.1°; Aug. - 65.7°; Sep. - 65.0°; Oct. - 61.6°; Nov. - 57.0°; Dec. - 52.8°. Seasonally, the average temperature for a similar period was as follows: Winter - 54°; Spring - 58°; Summer - 65.2°; Fall - 62.5°. A yearly mean maximum of 99° and an average daily maximum of 69.3°, and a yearly mean minimum of 26° and an average daily minimum of 47.9° was recorded. In the narrow South Coast region, freezing temperatures are relatively infrequent due to the marine influence. The average date of the last 32° reading is in late January, while the average date of the first freeze of the year is in late December.

Precipitation of the South Coast is concentrated in the six month period from November to April, with very little occurring during the rest of the year. The yearly average recorded at the Santa Barbara Airport and at Santa Barbara during a thirty year period (1941-1970) is 15.53" and 17.41" respectively. Total rainfall recorded in the Goleta area for the 1981-82 season was 14+" in Isla Vista (Haller, pers. comm.) and 15.54" in Ellwood (Hannan, pers. comm.). Monthly averages recorded at the Airport are as follows: Jan. - 3.47"; Feb. - 3.02"; Mar. - 2.39"; Apr. - 1.54"; May - 0.18"; June - 0.03"; July - 0.04"; Aug. - 0.01"; Sep. - 0.07"; Oct. - 0.35"; Nov. 1.94"; Dec. 2.49". Most of this precipitation comes primarily from Pacific storms; summer thundershowers sometimes occur although they do not provide much rain. Seasonal totals

of precipitation vary considerably from year to year; for example, a rainfall record for Santa Barbara for 104 years shows a low of 4.49" in the 1976-77 season and a high of 45.21" in the 1940-41 season.

A land-sea breeze system prevails in the region and is characteristically light. For example, winds at the Santa Barbara Airport blow from a southern quadrant most of the time. The winds average about 6 miles per hour most of the year, increasing to 8 and 9 miles per hour in April and May. Typically, the wind blows gently from the southeast during the morning, swings through the south into the west-southwest by early afternoon and attains its maximum speed during mid-afternoon, decreasing to a very light drainage flow from the northeast at night. The latter is best developed during winter months, while the southeast and west-southwest winds occur in the spring and summer with greatest persistence. However, the area often experiences warm, dry, gusty, northerly winds (Santa Anas) off the adjacent Santa Ynez Mountains. They usually occur from about September to April, with the most intense winds from October to December. The most likely time of day for these is evening, especially for the milder occurrences, but the stronger Santa Anas may blow around the clock. High winds are infrequent; but gusts to 50 miles per hour occur annually, and more infrequently gusts to 80 miles per hour have been recorded. Strong winds occur not only from these northerly Santa Anas associated with high barometric pressure and clear skies, but also from the west and northwest, associated with clearing skies after the passage of a frontal system; and from the southeast, associated with the approach of a major frontal system from the west.

Cloudiness associated with migrating storms is minimal in the area,

but there is a considerable amount of stratus cloudiness along the immediate coast. The area of More Mesa is characterized by low cloudiness and fog from the ocean during late night and morning hours of late spring and summer; but this usually dissipates during the late morning hours, or occasionally persists to mid-afternoon. The sun shines 60 to 70 percent of the time in the Santa Barbara area, and nearly 80 percent of the time in the fall. There are about 60 to 80 days of the year that are cloudy and the rest are either partly cloudy or clear.

GEOLOGY - Aspects of the geology have been investigated and reported by various researchers: e.g., Dibblee (1966), Norris (1968), Dames and Moore (1972). A brief summary of the geology of More Mesa, based on these reports, is presented below.

More Mesa is an uplifted marine terrace that slopes gently to the north. Nearly all of the generally flat upper surface of the eastern portion drains northwestward into Atascadero Creek. Similarly, parts of the southern portion drain northward into the creek. More Mesa is bounded on the seaward or southern side by a steep, almost vertical cliff over 100 feet high. A sand beach about 100 feet wide is located at the base of most of this cliff. Headward erosion by tributaries of Atascadero Creek have dissected much of the northern portion of the study area (Fig. 3) and have produced as much as 60 feet of relief in some of the ravines. The seaward half of the terrace is relatively undissected and only a few small gullies have been cut into it from the cliff edge. However, sea cliff retreat in portions of the area (Santa Barbara formation) has been demonstrated (Norris, 1968) to be about 10 inches a year, the highest rate observed along this portion of the South

Coast.

More Mesa is an uplifted portion of the narrow coastal plain of the region and, thus, is a continuation of the southward-dipping structures of the Santa Ynez Mountains. These mountains are the western portion of the Transverse Ranges that form a conspicuously east-west trending physiographic province in California. The Santa Ynez Mountains are an anticline with a major fault along their axis. However, because the south limb is more prominent than the north, many geologists refer to the range as a south-dipping homocline with beds strongly overturned to the north (Norris, 1976).

Many faults which parallel the main axis of the Santa Ynez Mountains have broken the structure of the deposits of the coastal plain. The More Ranch Fault is one such prominent fault which occurs along the northern boundary of all of More Mesa and along the southern margin of much of the Goleta Valley. Movement along this fault has uplifted the More Mesa block by more than 2000 feet during Pleistocene times (Dames and Moore, 1972). Movement along this fault produced the escarpment along the northern edge of More Mesa.

Older consolidated sediments occur beneath the younger surface deposits and are folded, as exposed along the sea cliff. The axes of the folds, and faults parallel to them, trend northwest across the study site and are occasionally disrupted by faults. Dibblee (1966) and Dames and Moore (1972) have provided geologic maps of the area.

The Monterey Shale, which is of Miocene age and is the oldest material at More Mesa, is exposed at the sea cliff in the extreme eastern portion of the study site and probably underlies those areas which have adobe clay soils. This formation is composed largely of

thin-bedded siliceous shale, but much of it has the characteristic of very firm clay. The Monterey Shale is basically a series of chemical and chemical-organic sediments that accumulated in an open sea. The lack of sands and gravels indicates that the nearby land mass and associated rivers of the time did not contribute sediments to these deposits.

The Sisquoc Formation contains massive, low-density siltstone and is of Pliocene or late Miocene age. Unfractured material of this formation has the characteristics of very firm clay and silt. In the area south of the Santa Ynez Mountains the Sisquoc Formation accumulated in a deeper, open sea than did sediments of the Formation in northern coastal Santa Barbara County. Material of this formation also crops out at the eastern portion of the sea cliff, but is obscured by several landslides.

The Santa Barbara Formation is exposed along the western three-quarters of the sea cliff of the study site. It is a dense but poorly consolidated sand deposit with a silt and clay pan. Also present in the exposure of this formation are layers of siltstone, sandstone, gravel, and cobble. The formation tends to peel off the cliff face in large slabs and produces new vertical cliffs. It is of late Pliocene or Pleistocene age, but is older than the surface alluvial deposits. It was deposited in a shallow sea that received sandy sediments from the Santa Ynez Mountain uplift and erosion.

In addition to recent deposits in basins, stream beds and floodplains, the youngest deposits are unconsolidated Marine Terrace gravels and sands of Pleistocene age. These occur over most of the Mesa and were deposited on a wave-formed surface that was cut into the underlying formations when the uplifted block was at a much lower elevation. These

alluvial soils will be discussed further in the soil section of this report. Other deposits include low sand ridges that occur along the upper edge of the sea cliff along the southern boundary of most of the study area and into portions of the western and eastern terrace. This sand is thought to be the much-eroded remnant of a coastal dune ridge system formed before More Mesa was uplifted to its present height (Dames and Moore, 1977; Shipman, 1981). As will be documented in the results of our study, some of these sandy areas support typical coastal dune vegetation.

SOILS - Soils of More Mesa occur in three major types: loamy sand, sandy loam, and clay (Fig. 5). The loamy sand is derived from beach sand deposits, the sandy loam is derived apparently from the Sisquoc and Santa Barbara Formations on which it lies, and the clay soil is derived principally from Monterey Shale. Descriptions of these soils follow, as provided by Shipman (1981).

Baywood loamy sand, 2 to 9% slope, is a gently to moderately sloping soil on marine terraces in areas near the ocean where wind deposits from the beach have covered old terrace soils. The surfaces tend to be hummocky because of wind movement of sand. Generally, the soils consist of 40 inches to many feet of sandy material. The following are potentials listed for various habitat elements: grain and seed crops - fair; grasses and legumes - good; wild herbaceous plants - fair; shrubs - fair; wetland plants - very poor; and shallow water areas - very poor. The following are potentials for habitats for wildlife groups: openland - fair; wetland - very poor; and rangeland - fair. In general these soils are excessively drained and the vegetation is annual grasses,

forbs (herbaceous plants other than grasses), and brush.

Camarillo fine sandy loam is a poorly drained soil of flood plains. It is nearly level, occurs in low positions a few feet above sea level, has a water table at a depth of one or two feet during the winter with some ponded areas during prolonged rains. Runoff is slow and most areas are subject to flooding and deposition. Most examples have a slight to moderate salinity in the subsoil. The following are potentials listed for various habitat elements: grain and seed crops - fair; grasses and legumes - fair; wild herbaceous plants - good; shrubs - good; wetland plants - good; and shallow water areas - good. The following are potentials for habitats for wildlife groups: openland - fair; wetland - good; and rangeland - good. In general vegetation of these soils is water-tolerant, consisting of grasses, forbs, tules and willows.

The Concepcion series consists of moderately well-drained soils on low terraces that parallel the coastline. Three types of Concepcion soil occur at More Mesa. Concepcion fine sandy loam, 2 to 9% slopes, occurs on gently sloping to moderately sloping areas of coastal terraces. Most areas of this soil type have been cultivated and may contain gullies and rills. Runoff is medium and the hazard of erosion is moderate. Some water is available to plants from a layer that develops above the clay subsoil. Areas covered by this soil have been used for range and dry farm grain, and hay.

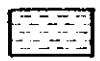
Concepcion fine sandy loam, 9 to 15% slopes, eroded, is a strongly sloping soil along drainageways that have dissected old terraces. Runoff of this soil is rapid and the hazard of erosion is high. Gullies and rills usually occur on the side slopes and, like the above, water is available to plants from a layer that develops above the clay subsoil.

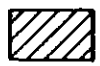
Fig. 5. SOILS OF MORE MESA

Soils of More Mesa include loamy sands, sandy loams and clays. This map was modified after Shipman (1981).


Baywood loamy sand, 2-9% slopes.


Camarillo fine sandy loam.

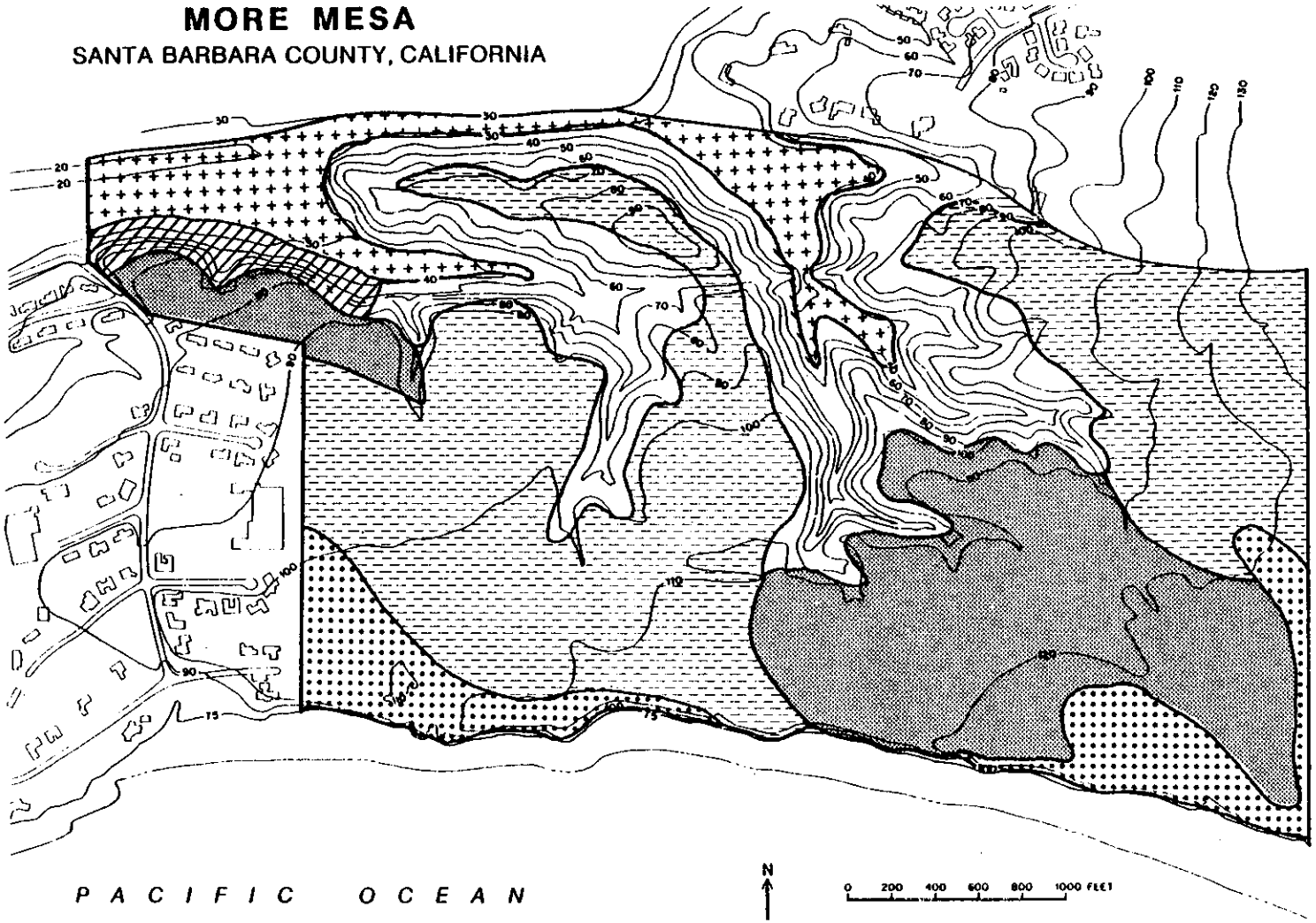

Concepcion fine sandy loam, 2-9% slopes.


Concepcion fine sandy loam, 9-15% slopes.


Concepcion fine sandy loam, 15-30% slopes.


Diablo clay, 2-9% slopes.

Fig. 5. SOILS OF MORE MESA



Areas covered by this soil have been used for range.

Concepcion fine sandy loam, 15 to 30%, slopes, eroded, is a steeply sloping soil on terrace breaks along drainageways. Deep-fluted gullies are common in the bottom of the drainageways and on side slopes. Runoff is rapid and hazard of erosion is very high. As in the other Concepcion soils there is a clay subsoil, and the soils can be used for range.

These Concepcion soils have the following potentials for various habitat elements: grain and seed crops - poor; grasses and legumes - fair to good; wild herbaceous plants - good; shrubs - good; wetland plants - poor to very poor; shallow water areas - poor. The following are potentials for habitats of wildlife groups: openland - fair to good; wetland - very poor; rangeland - good. In general the vegetation is composed of annual grasses and forbs.

Diablo clay, 2 to 9% slopes, is a soil of gently to moderately sloping low terraces and terrace-like hills. When situated on low hills the runoff is moderate and the soil is well-drained. However, at More Mesa the soil occurs on the gently sloping eastern portion, is poorly-drained on occasion, and is subject to ponding in localized situations. The following are potentials for various habitat elements: grain and seed crops - fair; grasses and legumes - good; wild herbaceous plants - poor; shrubs - poor; wetland plants - very poor; and shallow water areas - very poor. The following are potentials for habitats of wildlife groups: openland - fair; wetland - very poor; rangeland - poor. Vegetation of the Diablo clay is often annual grasses, forbs and scattered oaks.

POTENTIAL VEGETATION - The potential vegetation of More Mesa is that vegetation which is to be expected at the site, given the soil type and optimum growing conditions without development, cultivation, overgrazing and excessive recreational or other use. The following discussion has been modified from Shipman (1981).

Sandy soils of More Mesa (e.g., Baywood loamy sand) potentially support an open cover of brush and a sparse to moderately dense understory of herbaceous plants. Trees and shrubs could be abundant on north slopes, and brush cover could be dense in upland areas. Under good range conditions about 70% of the cover would be grasses, including Soft Chess (Bromus mollis), Wild Oat (Avena spp.), Ripgut Grass (Bromus diandrus) and others, and forbs, including Filaree (Erodium spp.), Lupine (Lupinus spp.), Tarweed (Hemizonia spp.), and others; and about 30% would be California Sagebrush (Artemisia californica), Goldenbush (Haplopappus spp.), California Buckwheat (Eriogonum fasciculatum), Deervetch (Lotus scoparius), and other shrubs.

The sandy loams of More Mesa (e.g., Concepcion Series) are underlain by a claypan subsoil that gives the soil low permeability. They potentially support an open cover of grass and scattered shrubs or occasional scattered Coast Live Oaks (Quercus agrifolia var. agrifolia), and good range conditions. About 70% of the plant cover would be a mixture of Wild Oat, Soft Chess, Filaree, Needlegrass (Stipa spp.) and others; about 20% would be Ripgut Grass, Foxtail Fescue (Festuca megalura), and others; and about 10% would be Red Brome, California Sagebrush, California Buckwheat and others. Tarweeds and various hydrophytes (plants with affinities for wetland soils) can occur in poorly drained areas.

The clay soils of More Mesa (e.g. diablo clay) have low

permeability and are characterized by deep fissures during dry periods. They potentially support an open cover of grass with scattered oak trees or shrubs. Under good range conditions about 70% of the plant cover would be Wild Oats, Soft Chess, Burclover (Medicago polymorpha), Filaree, native perennial grasses such as Needlegrass, and others; about 20% would be Ripgut Grass, Foxtail Barley (Hordeum leporinum), and others, and about 10% would be Wild Mustard (Brassica sp.), Lupines (Lupinus sp.) and others. When soils are moist, late in spring, annual weeds may make up more than 10% of the plant cover.

The potential vegetation of More Mesa as indicated by soils is primarily grassland with various forms of scrub scattered in the area and occasional Coast Live Oaks either scattered on the terrace or on slopes. Additionally, basins, ravine beds, streams and other wet areas potentially support various wetland vegetation.

LAND USE

Early Historic - Archaeological sites at More Mesa have been investigated by Craig (1978) and Wilcoxen, Erlandson and Stowe (1982). Additional information has been provided by the Archaeological Clearing House, Department of Anthropology, UCSB.

Five archaeological sites have been located at the study site. One of these is apparently a minor residential midden that might have been used seasonally. The others are low density sites and probably reflect non-residential or special activity use. Artifacts found at several sites are from an early period, and reflect use that is at least 3,000 and perhaps as much as 6,000 years old. Although the eastern portion of More Mesa appears to have not had intensive use by Native Americans, the

adjacent Goleta Slough area, including the western portion of More Mesa, was the most heavily populated region in California or Baja California, as reported by Spanish explorers of the 16th Century. Thus, it is probable that Native Americans utilized the study site for residential and other purposes for several thousand years prior to the establishment of the Santa Barbara Mission in 1786.

Historic (1786-1960) - The Spanish, Mexican and American history of the More Mesa portion of Goleta Valley has been described previously (Thompson & West, 1883; Tompkins, 1966; Dames and Moore, 1972). An important event in the Spanish period was the designation of lands over which the Santa Barbara Mission had jurisdiction. The Goleta Valley was included in the Los Dos Pueblos royal rancho and although many Native Americans continued to live here at this time, most had left or died by the beginning of the 19th Century.

Upon the overthrow of Spanish rule in 1822 and the formation of the Republic of Mexico, which included California, parts of the Goleta Valley were divided into parcels for families of soldiers. Daniel Hill and his wife Rafaela, daughter of Don Jose Vicente Ortega, apparently qualified for one of these and in the 1830's built a summer home near Goleta Slough. In 1846 Governor Pio Pico granted them ownership of the Rancho La Goleta which included 4,426 acres or most of the Goleta Valley east of Fairview Avenue. More Mesa was a portion of this Mexican land grant and the eastern boundary of the study area is the eastern boundary of Rancho La Goleta. Cattle were grazed in the Goleta Valley at this time and it is possible that they were introduced to More Mesa at this early date.

Daniel Hill deeded 400 acres of bottomland along Atascadero Creek

to his son-in-law, Thomas Wallace More, in 1857. Subsequently, More purchased 1000 acres from Hill in 1864, including the terrace that came to be called More Mesa. John Finley More bought the More Ranch from the heirs of T.W. More in 1879 and it was under his ownership that the More Ranch became one of the most productive in the Goleta Valley.

In addition to Tompkins (1966), numerous residents of Goleta Valley, particularly in the vicinity of the More Ranch, have provided information about land use on More Mesa during the late 19th and 20th Centuries. They are gratefully listed in the acknowledgments of this report. The following is a brief summary of the pertinent information about land use which undoubtedly has affected the current status of the area.

An early map of the area (U.S. Coast Survey, 1870) shows the eastern portion of More Mesa as grassland, although areas north of Atascadero Creek are cultivated. Subsequently, More Mesa became a high yielding lima bean and barley field during the John More ownership in the late 19th and early 20th Centuries. Additionally, lemon and walnut groves were planted in the bottomlands north of the Mesa, olive and orange trees were grown near the ranch house west of the study site, and Blue Gum (Eucalyptus globulus) trees were planted along the northwestern bluffs of the Mesa, perhaps including those trees now occurring on the northern margin of the study area. Nothing was grown on the Mesa that required irrigation, as only one well existed for livestock and domestic needs. Apparently, cattle grazed portions of the Mesa at this time.

In 1887 the Southern Pacific Railroad, Coast Division, was extended west of Santa Barbara through More Mesa to the Goleta Depot. The tracks emerged onto More Ranch at the current intersection of Vieja and Puente

Drives, just north of the study site. The route crossed the eastern drainage system of the mesa, went through a cut that was made into a drainage divide, and continued west along the northern More Mesa bluffs above Atascadero Creek. However, a shortcut between Santa Barbara and the Bishop Ranch was completed in 1900 and in 1901 the More Mesa alignment was abandoned. The railroad right-of-way is still traceable on More Mesa and now serves as an access road through several northern sections of the study site.

John More died in 1919 and Mrs. Austin, his sister, inherited what is now called the Austin property, part of the study site discussed previously in this report (see - The Study Area: Location). Portions of More Mesa, including the Austin property, continued to be farmed for many decades. Personal accounts by residents of the area and farmers of the land, and aerial photographs (available from 1928 to the present) have provided some insight to the use of the study area during the 20th Century. Information contained in the following comments on land use has come from these sources.

More Mesa continued to be cultivated through to the 1940's. Tomatoes were planted on the Austin property and at least 40 acres of More Mesa were planted with oats and hay for horses during the 1940's. Cattle were grazed on portions of the Mesa late in this decade and the northeastern section was cultivated with flowers. However, aerial photographs indicate that portions of the area were not cultivated at this time and evidence of vehicle use on the Mesa is evident by an increase in roads and exposed soil. Channelization of portions of Atascadero Creek are evident on a 1943 photograph, although much of it was still lined with willows and clearly not as disturbed as it is today. Natural

gas had been discovered beneath More Mesa in the 1930's and in a 1947 photograph, portions of the current gas facility on western More Mesa are evident. Eventually a pipline was installed through the study site along much of the path of the old railroad bed. Subdivision of More Mesa as a whole had begun during the late 1940's; for example, a 1954 aerial photograph illustrates well-established subdivision of cultivated lands occurring between the More Ranch house and the study area.

Many of the terrace soils were tilled during the 1950's, including those of ravine banks and basins in the eastern drainage system of the study area. Scrub-shrub Wetland vegetation (probably consisting largely of willows) had been removed from basins, leaving the upper ravines separate and no longer connected by contiguous vegetation of this type. By the end of the decade, vegetation under Coast Live Oaks, along Atascadero Creek, and in ravines appears particularly sparse in aerial photographs. This was probably the result of grazing by cattle, at least 50 head of which utilized the area. During this period it has been suggested that Harding Grass (Phalaris aquatica) was planted, particularly in the southeastern portion, as grazing material for the cattle. Additional land use and related activities during the late 1950's is as follows: much of the scrub-shrub vegetation along Atascadero Creek was removed, presumably related to flood control activities; there was an increase in off-road vehicle use as illustrated by an increase in dirt roads and trails; the erosion of soils in the railroad cut became more obvious; greenhouses were constructed on the western boundary of the study site; homes were constructed along Vieja Drive on land just north of the northeastern portion of the study site; and residential development had begun on bottomlands north of Atascadero Creek on property that

had been cultivated previously. During the late 1950's western More Mesa was leased for farming and it continues to be cultivated today.

Recent (1960-1980) - During the early 1960's houses were built to the west of the study site along Orchid Drive, and development continued to the north of Atascadero Creek, along Vieja Drive, and east of More Mesa in Hope Ranch. Thus, residential development became an important land use on three sides of eastern More Mesa. An aerial photograph from 1965 shows much of the study area that was previously cultivated had been abandoned for a few years and supported grassland vegetation. More vehicle trails appeared during this time and erosion continued to worsen in the railroad cut. In 1966 a portion of the western study site was graded for a model airplane landing strip. However, this western portion of the terrace was cultivated the following year, and the landing strip was moved to its present site on the eastern portion of the terrace. By the end of the decade much of the undergrowth beneath the oaks and in ravines had returned to the area; however, various trails and roads were evident throughout much of More Mesa, and the western portion of the study site remained cultivated.

More Mesa in the 1970's was characterized by continued cultivation on the western terrace and recreational use of the eastern terrace of the study area. Early in the decade there was a general decline in the condition of the surface of the eastern terrace as illustrated by disturbances seen on aerial photographs, particularly that of 1972. In general, evidence suggested that the area appeared to have more vehicle and general recreational use than it does today. Some cultivation occurred in the northeastern corner of the study site at this time. Condominiums were built adjacent to the site on the north bank of

Atascadero Creek by 1974, and cultivation of the western terrace was restored in 1975 after a few years of abandonment. Cultivation of this area continued apparently through 1978, as did cultivation of the northeastern corner. While the former area was planted with various garden crops, the latter was planted with Babies Breath (Gypsophilia sp.). Additionally, the hill on the Austin property was cultivated with tomatoes between about 1974 and 1978. The western terrace was control burned occasionally, perhaps to remove grassland vegetation, and reports from residents of the area indicate that rarely a year has passed during the last 20 when at least some portion of the study site did not burn.

During this decade the development potential of More Mesa also was explored in detail, and several proposals for residential development were initiated. Columbia University acquired the mesa, excluding the Austin property, following the default of a previous owner-developer, and the area was leased to Mr. Donald Simonsen to explore further the development potential of the site. Corresponding to the increased interest in the development potentials, there also has been an increase in the recreational use of the site, including the following activities: traversing of the area for beach access, particularly along the eastern boundary; off-road vehicle use, including motorcycles and 4-wheel drive vehicles; use of trails and roads by joggers, horseback riders, and bicyclists; and the traversing of various portions of the area by natural history-oriented users including both laymen and scientists. The More Mesa Land Trust was founded in 1978 to investigate avenues of preservation for the area.

Current (1980-Present) - The current and potential use of More Mesa has been affected significantly by the Santa Barbara County Local

Coastal Program which has delayed potential development of the property until this biological evaluation has been completed and the Department of Resource Management has recommended how the site is to be used. Thus, agricultural practices, model airplane recreation, and development plans have been curtailed for about two years. However, some disturbances have occurred recently. For example, portions of the area were disced in 1979 and 1980, during which as many as 100 acres of grassland were disturbed (Santa Barbara News Press, 1980), including portions of the northeastern and southeastern terrace as well as a small wetland along the eastern boundary. Additional development along the northeastern boundary of the study site has been approved recently for property outside of the Coastal Zone. Today, More Mesa stands as an extensive, 300 acre parcel surrounded on three sides by residential and some agricultural development. Various recreational activities as listed previously continue to characterize the land use of this site. A generalized land use map (Fig. 6) has been developed to illustrate environmental disturbances that have taken place at More Mesa.

Fig. 6. LAND USE TYPES, LOCATIONS, AND DATES

During at least the past 100 years eastern More Mesa has received various and extensive environmental impacts resulting from land uses, principally of the agricultural and recreational types. However, flood control measures, a railroad alignment, and natural gas pipeline are examples of additional activities that have altered the natural status of the area. The following are specific examples of land use at More Mesa.

portions cultivated and/or grazed (at least as early as 1880 to about 1965.

portions recently cultivated or disced (about 1970 to 1980) eastern and western margins as late as 1979 to 1980.

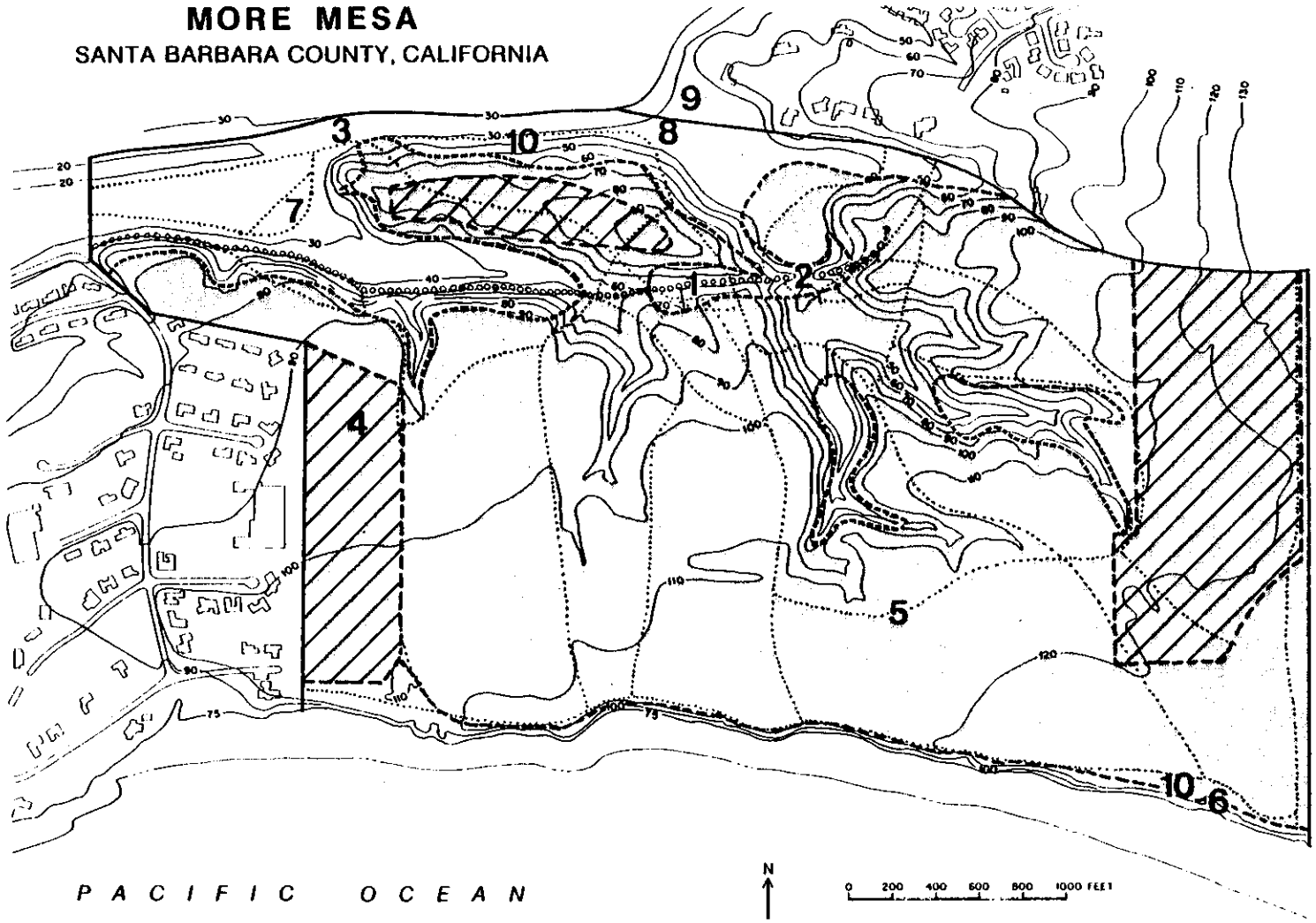
------ approximate boundary.

°°°°°°°° abandoned railroad alignment (1887-1901); current dirt access road and natural gas pipeline route.

..... dirt roads and paths, ca. 1945 to present.

1. - area excavated for railroad bed.
2. - old railroad bridge.
3. - channelized Atascadero Creek ca. 1943 to present.
4. - old model plane landing strip (1966-1969).
5. - recent model plane landing strip (1969 to present).
6. - primary beach access route and stairway.
7. - berms and associated access roads along Atascadero Creek; dredge spoil.
8. - mosquito abatement ditch.
9. - dredge spoil.
10. - planted Eucalyptus trees (post 1890?)

Fig. 6. LAND USE TYPES, LOCATIONS, AND DATES.



THE BIOLOGICAL EVALUATION

INTRODUCTION

Wayne R. Ferren, Jr.

The biological evaluation of More Mesa has been conducted within limits of a contract as awarded by the County of Santa Barbara on 17 July 1981. The study was conducted during a period of almost one year, with a draft report due on 30 June 1982. The biological evaluation is restricted to vascular plants and plant communities and terrestrial vertebrate animals, and excludes all other biota. The contract received a maximum of $10,000 in funding, as provided by Mr. Donald Simonson, the potential developer of More Mesa, and as mandated by the Santa Barbara County Local Coastal Program (Santa Barbara County, 1980). The investigation must be completed prior to the filing of specific plans for the property. It is within these time, scope, and funding limitations that this project was conducted.

The primary goal of the project was to provide information on the sensitive habitat areas of More Mesa and to recommend measures necessary to protect the sensitive habitat areas from the adverse impacts of residential development should any be feasible for the site. To meet this goal, the Environmental Research Team was formed by the Project Manager to conduct specific portions of the study according to the expertise of individual team members. Team members and their contract titles and University positions are provided below.

Principal Investigator: Dr. Dale M. Smith, Professor of Botany

Project Manager: Mr. Wayne R. Ferren Jr., Senior Museum Scientist

* * *

Vegetation Specialist: Dr. Gary L. Hannan, Staff Research Associate

Flora Specialist: Ms. Kelly P. Steele, Museum Scientist, Graduate Student

Field Assistants: Mr. Fred Roberts, Lab Assistant, Student
Mr. John McManus, Student

* * *

Bird Specialist: Mr. Paul Lehman, Staff Research Associate, Graduate Student

Mammal Specialist: Mr. Gary N. Fugle, Museum Scientist, Graduate Student

Herpetofaunal Specialist: Dr. Samuel S. Sweet, Assistant Professor of Zoology

Field Assistant: Ms. Linda Leum, Lab Assistant, Graduate Student

As stated in the County Request for Proposals, the Project Manager of the Local Coastal Program, Ms. Kimberly Schizas, served as Project Director of the More Mesa investigation. Project Manager, Mr. Wayne Ferren, also served as the spokesperson of the contract team and acted as liaison between the team and County LCP staff.

This biological evaluation was designed to provide information on as many resources of More Mesa as feasible within the limitations of the study as discussed previously. Thus, baseline data such as a catalogue of the vascular plants and vertebrate animals was compiled through detailed inventories of the biota. We did not restrict our study to previously acknowledged plants, animals, or habitats, but gathered data as objectively and thoroughly as possible from the following resources: habitats and vegetation; vascular plants; and vertebrate animals, including birds, mammals, and herpetological fauna. While various

specific habitats at More Mesa have been suggested to be environmentally sensitive (e.g. Dames and Moore, 1972; Santa Barbara County, 1979, 1981), our approach was to examine various resources of the study area and relate them to the ecosystem of More Mesa as a whole, in addition to evaluating the significance of individual habitats. Therefore, should any environmentally sensitive habitats be delineated by our team, their relationships within More Mesa or to the region of the Goleta Valley could be interpreted and the value of the entire study site expressed according to the scope of this project. Alternatively, the importance of individual sites can be expressed, based on the integrated values of the various biological resources found throughout the Mesa. The result is a sensitivity analysis of habitats throughout the site and of the ecosystem of More Mesa.

The following sections contain the objectives, methods, results, and some discussion of the individual resource evaluations conducted by team members. Subsequent to the following portion of our report is the environmental sensitivity analysis of More Mesa based upon the findings of the project. Methods used in the analysis are contained in that section.

PHYSIOGRAPHIC AREAS, HABITATS, AND VEGETATION

Gary L. Hannan

OBJECTIVES - This part of the More Mesa biological evaluation has three objectives: 1) to provide a detailed description of the site and divide it into usable physiographic sections; 2) to discuss the occurrence and general features of all habitats of the site, including habitats of special concern to the Local Coastal Plan; and 3) to describe all plant communities on the site and evaluate the significance of each. By providing a breakdown of the site into small sections, locations within the site can be referred to following a standardized set of names, which will make integration of all parts of the report easier and more comprehendable. The descriptions of the physical setting will serve as an introduction to the entire site. Habitat descriptions will offer background information useful in evaluating the relationships among the plant community, floristic, and faunistic studies. Finally, the plant community descriptions will present an inventory of communities in all sections of the site, with comments on the significance of each community in the site.

Physiographic Areas

METHODS - A base map at the scale of 1:24000 (1"=200') with 5 foot contour intervals was produced by tracing maps obtained from the U.S. Army Corps of Engineers and the Santa Barbara County Department of Resource Management. In order to simplify and standardize discussion of areas within the study site and to facilitate the integration of information

from all aspects of the study, physiographic areas were defined within the site. Boundaries of physiographic areas were chosen based on the presence of 1) topographic features (e.g. hills, ravines, basins), 2) obvious distinct plant communities (e.g. vernal pools, oak woodland, grassland, wetlands), and 3) roads or trails. It was also required that areas be small enough to be meaningful in describing locations but not too numerous to be unwieldy. Ultimately, 21 physiographic areas were defined and a hierarchical system of descriptive names was developed for referring to them (Fig. 7).

RESULTS - The varied topography of the study site provided many features upon which to base physiographic areas. The following discussion includes a brief description of the topography of each area, or areas, and serves as an introduction to the physical setting of the site.

1. Atascadero Creek

Atascadero Creek forms part of the northern boundary of the study site and receives most of the drainage from the entire site. The creekbed is a relatively broad, flat channel of unconsolidated sand with its northern bank made of concrete. Its current course is partly a result of relocation, particularly at the west end of the site where it historically flowed along a course now marked approximately by a dirt road that roughly divides in half the Central Basin (3a) of the West Drainage. During winter and spring the channel bottom is partly covered with shallow, slow-moving water, or following storms with relatively swift-moving water.

2. West Mesa

The West Mesa comprises three physiograhic areas (Coastal Section (2a), West Section (2b), and East Section (2c)) and is mostly a rather flat, gently northward-draining marine terrace upland containing clay, fine sandy loam, and loamy sand soil types. It is dissected at its northern end by two small ravines (West Drainage System: West Ravine (3c) and East Ravine (3d)) and bounded on the north by a steep slope or escarpment (West Drainage System: Central Basin Slope (3b)) and on the southern edge by the coastal bluff. The West Mesa is dissected by numerous trails and dirt roads, some of which serve as convenient boundaries for areas within it. The west end and southern margin of the Coastal Section (2a) is a loamy sand soil type; the East Section (2c) is sandy loam; the West Section (2b) is fine sandy loam with its northwestern extension being clay. A prominent sand hill stands near the southwest corner of the Coastal Section (2c).

3. West Drainage System

The West Drainage System comprises two ravines, an escarpment and a large basin ultimately draining into Atascadero Creek.

Central Basin - The Central Basin (3a) contains fine sandy loam deposited in the Atascadero Creek drainage. It is poorly drained and is wet to very wet during winter and spring. The Central Basin consists of two quite distinct parts. The eastern half is a flat, narrow, relatively undisturbed area bounded on the west end by a dirt road on a levee. Adjacent to this road, on its east side, is a deep channel which probably was once the main channel of Atascadero Creek. The western half of the Central Basin is surrounded by a levee with a single outlet to Atascadero Creek at its northwest end. Much of this part of the

Figure 7. PHYSIOGRAPHIC AREAS OF MORE MESA

1. Atascadero Creek

2. West Mesa
    a. Coastal Section
    b. West Section
    c. East Section

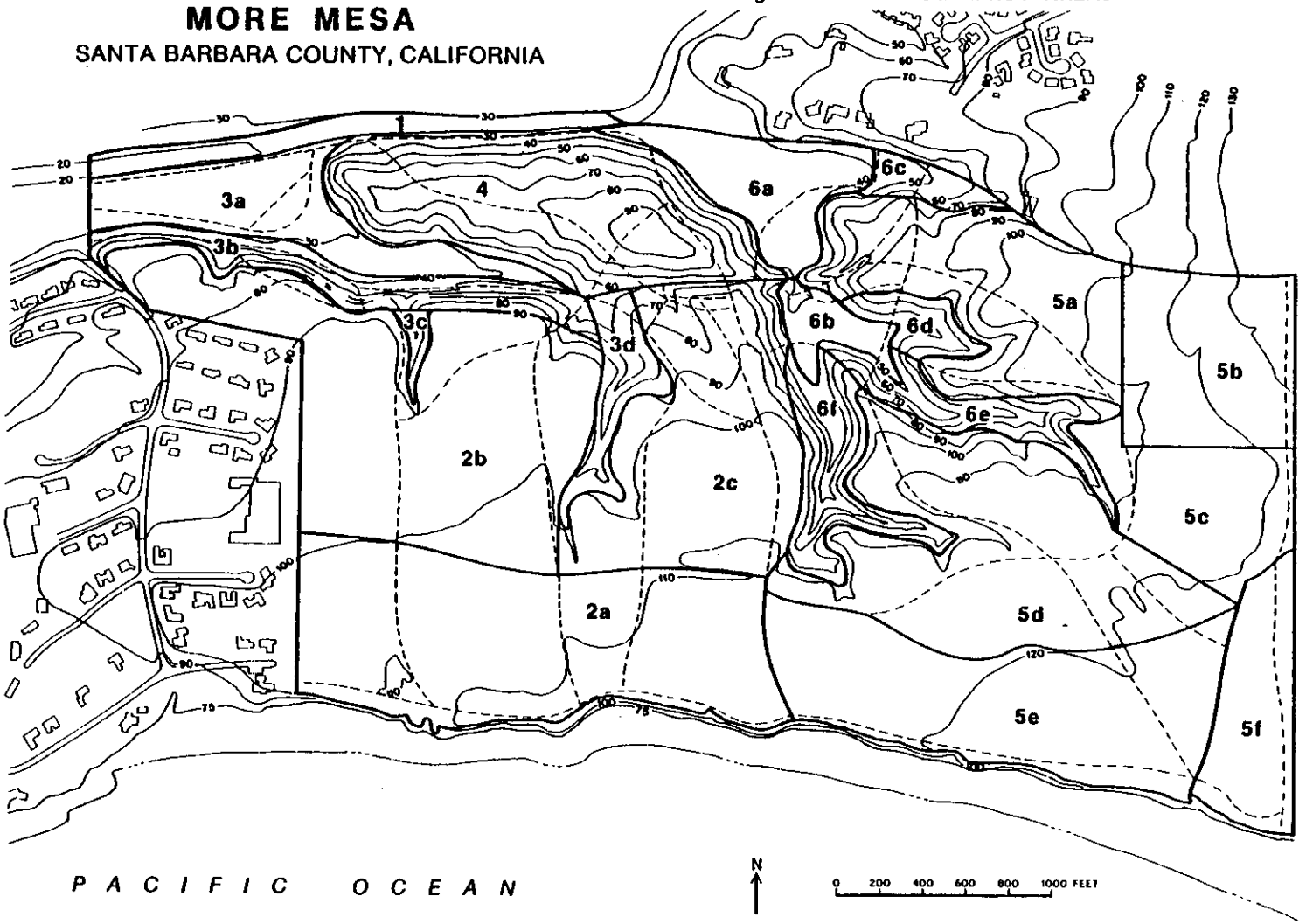
3. West Drainage System
    a. Central Basin
    b. Central Basin Slope
    c. West Ravine
    d. East Ravine

4. Central Hill

5. East Mesa
    a. Northwest Section
    b. Northeast Section
    c. East Central Section
    d. West Central Section
    e. Coastal Section
    f. Southeast Section

6. East Drainage System
    a. North Basin
    b. South Basin
    c. North Ravine
    d. North Central Ravine
    e. South Central Ravine
    f. South Ravine

Fig. 7. PHYSIOGRAPHIC AREAS



basin has evidence of human disturbance, in addition to the surrounding levees. Most obvious is the large amount of trash dumped in this section.

Central Basin Slope - The Central Basin is bordered on the south by the Central Basin Slope (3b). Most of this area is a steep escarpment which also forms the southern boundary of the West Mesa. The Central Basin Slope runs in an east-west direction with the surface of the slope facing north. It is largely composed of fine sandy loam, the steep slope providing rapid soil drainage. A dirt road runs along the slope near its base.

West Ravine - The West Ravine (3c) is a small, narrow ravine cut into the West Mesa from the Central Basin Slope. Its banks are steep, offering very good drainage.

East Ravine - The East Ravine (3d) is a large, broad ravine with its head near the Coastal Section (2a) of the West Mesa draining north to the Central Hill (4). It has fine sandy loam soil and is much less steep than the West Ravine.

4. Central Hill

The Central Hill (4) was historically a continuation of the East Section (2c) of the West Mesa until the excavation of a railroad bed between the Central Basin (3a) of the West Drainage System and the East Drainage System. The axis of the hill runs east to west, therefore offering both north-facing and south-facing slopes. The hill rises more than 60 feet above adjacent Atascadero Creek and both East and West Drainage Systems. The lower slopes on the north side are moderately steep; the southern slope is more gentle. The summit of the hill is rounded gently. The soil is fine sandy loam.

5. East Mesa

The East Mesa is a large, mostly flat upland covering much of the eastern half of the site and is cut by deep north- and west-draining ravines. Approximately half of the East Mesa (West Central (5d), Coastal (5e), and Southeast (5f) Sections) is of the Diablo Clay soil type, except for the loamy sand along the coastal bluff edge and the southeast corner of the Southeast Section. The remaining areas (Northwest (5a), Northeast (5b), and East Central (5c) Sections) are fine sandy loam. The Northwest Section slopes down to the East Drainage System. Numerous small depressions retain standing water in winter and spring, the largest and most significant being a large vernal pool at the southern end of the Southeast Section (5f). The Northeast Section (5b) consists of a field plowed as recently as the year preceeding this study. Public access to the beach exists along the eastern boundary of the East Mesa.

6. East Drainage System

North Basin (6a) - This basin is a broad, flat, low-lying extension of the Atascadero Creek drainage. Its alkaline, fine sandy loam soil is saturated with water during winter and spring and offers poor drainage. Within the study site the basin is bordered by the Central Hill (4) and the Northwest Section (5a) of the East Mesa. A small drainage channel has been dug along the west edge of the basin with an outlet to Atascadero Creek at the northwest end of the basin.

South Basin (6b) - This basin is much smaller than the North Basin and represents the upper portion of the North Basin. The railroad bed nearly separates the two basins. The South Basin receives water from the North Central (6d), South Central (6a), and South Ravines (6f) which then flows directly into the North Basin. Deep channels at the north

end of the South Basin retain standing water well into spring. The remainder of the basin is nearly flat.

North Ravine (6c) - This ravine lies at the northern boundary of the study site adjacent to the Northwest Section (5a) of the East Mesa and drains into the North Basin (6a). It is a relatively broad ravine, but receives enough runoff to support wetland shrub or tree species. It occurs in fine sandy loam soil found in part of the East Mesa.

North Central Ravine (6d) - This is a very broad, shallow, gently sloping ravine that might just as readily be considered a continuation of the Northwest Section (5a) of the East Mesa. It has the same sandy loam as that section, but is somewhat steeper than most of the East Mesa.

South Central Ravine (6e) - This is one of the two largest and steepest ravines on the study site. It runs east to west with its head near the east end of the site and its outlet at the South Basin (6b). Its upper end forks at an oblique angle, increasing the size of the ravine. Along much of its length the bottom of the ravine has cut 30 to 50 feet below the Mesa surface. Its 2 springs are the only source of fresh water on the Mesa, other than Atascadero Creek and runoff. Much of the soil in the ravine is fine sandy loam.

South Ravine (6f) - This is the other large ravine on the study site. It runs south to north with its head in the West Central Section (5b) of the East Mesa and its outlet at the South Basin (6b). It is broader and less steep than the South Central Ravine (6e). Although the South Ravine has no spring, it is deep enough to provide enough moisture to support forested wetland, as does the South Central Ravine. Both ravines have similar soil.

Habitats of More Mesa

METHODS - Using the 1:24000 topographic base map, all areas of the study site were visited in fall, 1981, for the purpose of identifying the locations and overall aspects of different habitats. Various characteristics, such as slope, direction of slope, presence of streams or other apparent wetlands, and vegetation types were used to define habitats. In winter and spring, 1982, vegetation of all habitats was re-examined and all areas were examined for presence of standing water or water-saturated soil.

RESULTS - The More Mesa study site contains a great diversity of habitats. The topography of the site, with its flat marine terrace, numerous ravines running in various directions, low-lying basins, and the presence of Atascadero Creek, provides a variety of slopes, exposures, and moisture conditions supporting several distinct habitat groups. In addition, soil types include fine sandy loam with a clay pan, loamy sand, and clay, each with different moisture-holding characteristics. The combinations of soil types and topographic features result in different plant communities (see Vegetation) and dominant species which, in turn, affect the fauna of each area.

1. Atascadero Creek

The section of Atascadero Creek (1) within the study site consists of a broad, flat streambed of unconsolidated sand bordered on the north by a concrete embankment. The south bank has not been concreted, but past dredging has altered the original bank. Running water, or at least pools of standing water, is present all year. The streambed supports algae and mixed vascular plant communities along with a rooted vascular

aquatic bed community (see Plant Communities). Temporarily flooded margins of the creek support a non-persistent, mixed vascular emergent wetland. The distinction between this community and the streambed mixed vascular community is not clear due to seasonal and yearly fluctuation in water level.

2. Basins

Three basins are defined in this study. All are flat areas seasonally flooded in winter and spring and support many species typical of salt marsh habitats. The Central Basin (3a) of the West Drainage System is an extension of Atascadero Creek oriented east to west. The eastern half of the basin is a seasonally flooded, persistent emergent palustrine wetland. This half of the basin supports a large stand of Western Goldenrod (Solidago occidentalis) with bordering areas of other characteristic salt marsh species. Near the center and along the southern margin of the basin is a linear depression containing Tule (Scirpus californicus), Cattail (Typha latifolia), and Bur-reed (Sparganium eurycarpum). This depression follows an old channel of Atascadero Creek. The west half of the basin is a large disturbed area surrounded by levees with a single outlet to Atascadero Creek. Many marsh species occur here in addition to a number of introduced species, giving it the appearance of a disturbed area transitional between persistent emergent wetland and upland. Human activities have apparently altered the soil moisture conditions and consequently the plant cover is responding to this change. The southern margin of this basin supports Scrub-shrub/Forested Wetland dominated by Arroyo Willow (Salix lasiolepis var. lasiolepis), with Yellow Willow (S. lasiandra) and Red Willow (S. laevigata var. laevigata) also scattered in the western end of the area.

The North Basin (6a) of the East Drainage System is also an extension of the Atascadero Creek system (Fig. 8). It supports a mosaic of typical salt marsh species (see species list for area in Appendix I), in addition to a large area of Harding Grass (Phalaris aquatica) at its upper end. Introduced weedy species, such as Curly Dock (Rumex crispus) and Ox Tongue (Picris echioides) have become established in parts of the basin, which might indicate some degrading of the original wetland.

The South Basin (6b) of the East Drainage System represents the southern extension of the North Basin (6a) and is connected to it by a narrow channel under the Southern California Gas Company pipes running under the old railroad bed. Ditches at its northern end hold standing water longer than other parts of this area and support Bulrushes (Scirpus maritimus). The central part of the area contains some of the salt marsh species found in the North Basin (6a). Much of the remaining area is dominated by Harding Grass. The northern margin of the South Basin (6b) supports Scrub-shrub/Forested Wetland consisting of Arroyo Willow.

3. Ravines

Six ravines are defined in this study (physiographic areas 3c,d; 6c-f; Fig. 7). Three of these (West Drainage System: East (3d) and West (3c) Ravines; East Drainage System: South Ravine (6f)) run in a north-south direction, cutting into the Mesa surface toward the ocean (Fig. 9). The other three (East Drainage System: North (6c), North Central (6d) and South Central (6e) Ravines) run in an east-west direction with their heads nearest the eastern boundary of the study site. While all ravines have some willows or oaks along the bottoms, only the North (6c), South Central (6e), and South (6f) Ravines of the East Drainage

System contain dense Scrub-shrub/Forested Wetland, which consists primarily of Arroyo Willow. Soil moisture availability is probably the most important physical factor in the ravine habitat. Only the relatively narrow and deep ravines (West Ravine (3c) of the West Drainage System and the North (6c), South Central (6e), and South (6f) Ravines of the East Drainage System) are moist enough to support many trees, the others are broader and shallower with less surface moisture available to support Scrub-shrub/Forested Wetland. The largest ravine (South Central Ravine (6e)) contains two springs providing water even in late summer. The upper slopes of most ravines support large expanses of Sweet Fennel (Foeniculum vulgare) and lesser amounts of Coyote Brush (Baccharis pilularis ssp. consanguinea) that apparently require less water than oaks and willows that are restricted to ravine bottoms. Upper margins of the North (6c) and North Central (6d) Ravines of the East Drainage System contain Harding Grass instead of Sweet Fennel.

4. Slopes

The southern margins of Atascadero Creek, the Central Basin (3a) and the Northern Basin (6a) are bounded by steep, densely vegetated north-facing slopes (Central Basin Slope (3b) of the West Drainage System and part of the Central Hill (4)). As is typical of the South Coast Region, these north-facing slopes support vegetation characteristic of more mesic conditions than is found in adjacent sites. Both slopes are covered by oak woodland but differ in species composition and species diversity. The north edge of the Central Hill (4; Fig. 8) consists almost exclusively of native Coast Live Oak (Quercus agrifolia var. agrifolia) and introduced Blue Gum (Eucalyptus globulus). A few woody understory species occur under the oaks, while annual species occur

Fig. 8. HABITATS OF MORE MESA: View from Northwest Section of East Mesa (5a) looking northwest across a basin (6a) towards a northeast-facing slope of the Central Hill (4). Atascadero Creek lies in the central background and residential development and the Santa Ynez Mountains occur to the north and west.

Fig. 9. HABITATS OF MORE MESA: View from Central Hill (4) looking south towards a shallow ravine (3d) and portions of the West Mesa.

under the Blue Gum. The Central Basin Slope (3b) also supports Southern Coastal Oak Woodland but only part of the area is densely covered by oaks. Much of the area contains only scattered oaks with a dense understory of perennial species typical of this plant community, such as California Blackberry (Rubus ursinus), Poison Oak (Toxicodendron diversilobum), Poison Hemlock (Conium maculatum), and Elderberry (Sambucus mexicana). The lower margins of each slope adjoins Scrub-shrub/Forested Wetland consisting mostly of Arroyo Willow.

5. Mesa (Marine Terrace)

Much of the study site occurs on top of the flat, gently sloping marine terrace surface (East and West Mesa areas; Fig. 9). The Mesa slopes down to the north, the highest edge being the ocean bluff and portions of the Northeast Section. Several soil types are found including sandy loam, loamy sand, and clay, each with its own moisture holding characteristics. Many dominant grassland species are most abundant on particular soil types resulting in a mosaic of dominance types on the grassland-covered Mesa.

Along the ocean bluff and in the westernmost quarter of the Coastal Section (2a) of the West Mesa is sandy soil supporting plants characteristic of Stabilized Coastal Dunes and Southern Coastal Bluff Scrub communities. A relatively large area of sandy soil also appears at the bluff edge near the eastern boundary of the site and contains several Southern Coastal Bluff Scrub species.

Much of the West Mesa is fine sandy loam soil covered with Wild Oat (Avena fatua) and some Ripgutgrass (Bromus diandrus), two species characteristic of Cismontane Introduced Grassland. The coastal half of the Coastal Section (2a) of the West Mesa, which contains sandier soil

than other parts of this area, supports additional species such as Harding Grass, Ribgrass (Plantago lanceolata), and Coyote Brush.

The West Central (5d), Coastal (5e), and Southeast (5f) Sections of the East Mesa are heavy clay soil and support a mosaic of dominant grassland species, with Harding Grass being most common. Large areas of Wild Oat occur on the western half of the Coastal Section (5e) of the East Mesa. Sweet Fennel is abundant on the southern half of the West Central Section (5d) of the East Mesa. A large vernal pool exists on the heavy clay soil on the southern part of the Southeast Section (5f) of the East Mesa. The Northeast Section (5b) of the East Mesa is a recently cultivated field filled with numerous introduced weedy species.

The Central Hill (4) is an extension of the East Section (2c) of the West Mesa containing many of the same plants, but it is notable for the occurrence of native perennial grasses, including California Brome (Bromus carinatus) and California Barley (Hordeum californicum). These occur on a north-facing slope toward the east end of the hill which probably has not been cultivated recently.

6. Local Depressions

Numerous local depressions that contain standing water during winter and spring exist on the Mesa surface. Many of these are little more than rutted areas along dirt roads, while some are more extensive depressions, parts of which are deepend by tire tracks. Some depressions contain species common in areas of standing water or waterlogged soil. Part of the East Central Section (5c) of the East Mesa is an alkaline vernal flat containing plant species characteristic of alkaline soils saturated with water during winter and spring. A large vernal pool occurs at the southern end of the Southeast Section (5f) of the

East Mesa (Fig. 26). This pool, in spring 1982, contained 8-12 inches of standing water at its deepest point with a surrounding zone transitional between vernal pool wetland and upland grassland. Many characteristic, and a few uncommon, vernal pool species occur in the vernal pool.

7. Sand Deposits

A large sand area occurs at the southwestern corner of the Coastal Section (2a) of the West Mesa. This has the appearance of an old sand dune largely stabilized by a number of coastal dune plant species. In addition, some coastal bluff species occur on part of the dune system. This sand dune system is unique on the More Mesa site, although the entire bluff edge has sandy soil. North of the dune area is a zone apparently transitional to the more widespread Wild Oat/Ripgut Grass grassland found on the fine sandy loam of the rest of the West Mesa.

8. Coastal Bluff

Although mostly outside the study area, some elements of this habitat occur at the edge of the site. The coastal bluff habitat typically occupies the steep, rocky, unstable cliff faces above the beach (Fig. 11). At More Mesa the vegetation on the bluff is a rather depauperate Southern Coastal Bluff Scrub community lacking larger shrubs, such as Lemonadeberry (Rhus integrifolia). Rapid erosion of the cliff face at More Mesa may be partly responsible for the lack of a diverse coastal bluff vegetation. However, Opuntia oricola, a cactus native to coastal southwestern North America, reaches its northwestern limit of distribution in the vicinity of More Mesa, and occurs on the bluffs there (Philbrick, pers. comm.).

Vegetation

METHODS - Using the topographic base map (Fig. 3), shrubby and forested areas were mapped using the most recent available aerial photographs in the U.C. Santa Barbara Map and Imagery Laboratory (USDA 24-615070 #96,97,98 and PW SB1 #16). Photographs were projected onto the topographic base map using a Map-O-Graph and shrubby and forested areas were traced onto the map. Using this preliminary vegetation map as a guide, alterations and additions were made during visits to all physiographic areas. The site was visited at least once each month from September, 1981 to June, 1982 for a total of approximately 20 visits and 87 hours in the field. Visits were most frequent in spring, 1982. Woody vegetation and wetlands were mapped area by area during fall, 1981 and winter, 1982. Grassland areas were mapped in spring, 1982 when dominant species could be identified.

RESULTS - Plant communities of More Mesa were defined and named following previous classification schemes. Wetlands were classified following Cowardin, et al. (1979), with minor modifications and consistent with California Coastal Commission (1981). Upland, or non-wetland, communities were defined using Cheatham and Haller (1975) as a guide, with minor modifications. Information gathered from aerial photographs and visits to the site was compiled to produce a general map of vegetation of the study site (Fig. 10).

Upland Communities

All non-wetland vegetation is included in this category. Within uplands, four general vegetation types are included: scrub, woodland, grassland, and introduced trees. The classification of Cheatham and

Figure 10. GENERAL VEGETATION OF MORE MESA

The vegetation of More Mesa has been divided into five general types. The occurrence of specific types of grassland and wetland vegetation is illustrated in Figures 17 and 26, respectively.

Wetland

Oak Woodland

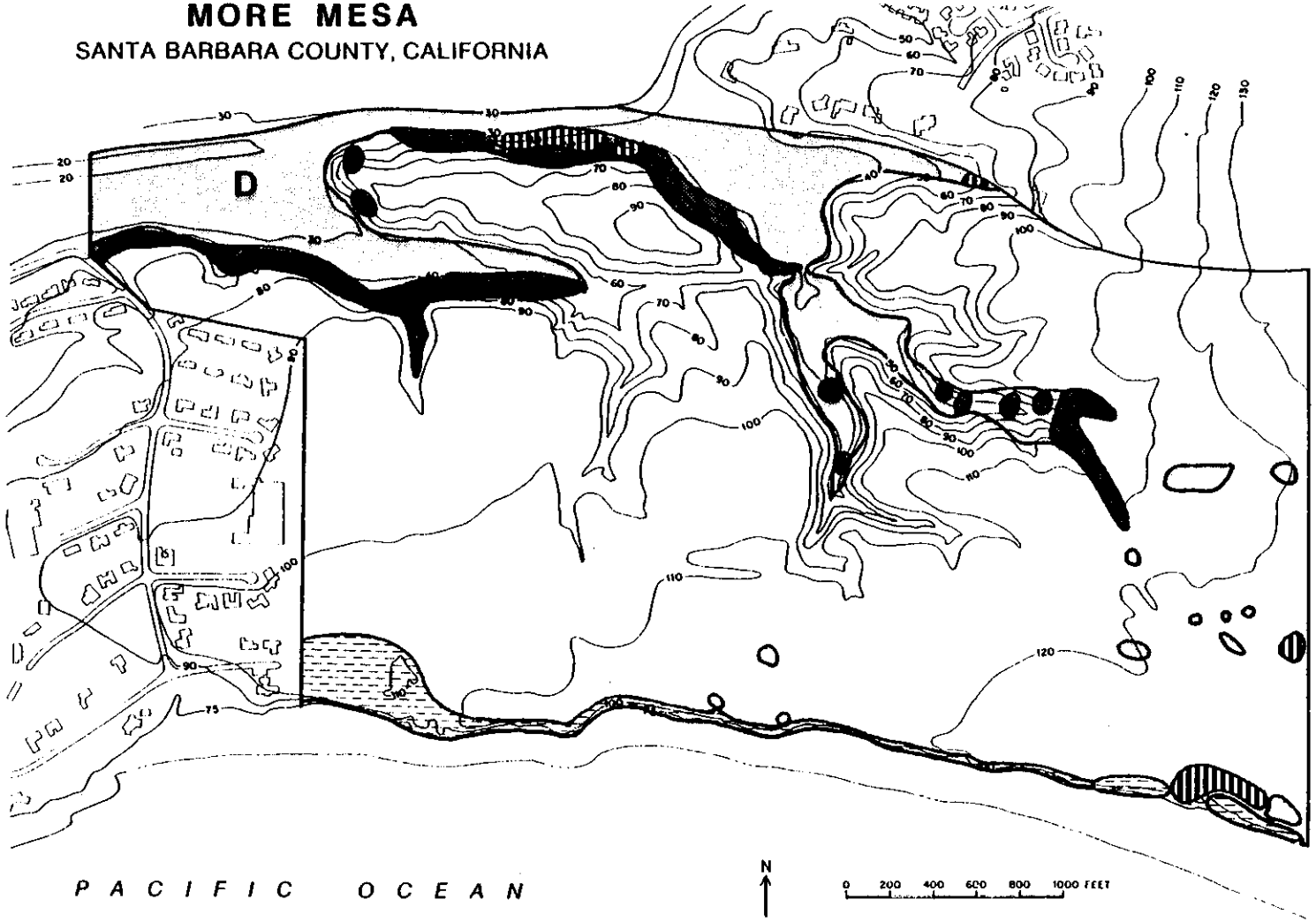
Grassland

Coastal Scrub

Eucalyptus

D area includes wetland, transition upland and dredge spoil.

Fig. 10. GENERAL VEGETATION OF MORE MESA



Haller (1975) includes two communities of scrub found on the site - Southern Coastal Bluff Scrub and Southern Coastal Dune Scrub. For the purpose of plant community mapping and preparing species lists these two communities are combined to form a Coastal Scrub community. At More Mesa the distinction between these communities is not clear. Southern Coastal Oak Woodland is the only upland woodland recognized and is used in the same way as in Cheatham and Haller (1975). The grassland on the site falls within the Cismontane Introduced Grasses category and contains a number of different dominance types within it. The major introduced tree is Blue Gum (Eucalyptus globulus). A final upland vegetation feature of the site during this study was the abandoned plowed field at the northeast corner of the site containing many introduced weeds. More Mesa upland communities as modified after Cheatham and Haller (1975) are as follow:

Southern Coastal Bluff Scrub
Stabilized Dune Scrub
Southern Coastal Oak Woodland
Cismontane Introduced Grasses

Southern Coastal Bluff Scrub (Figs. 11, 12) - This plant community occurs along the face of the cliff forming the southern boundary of the study site. Although mostly outside the study area, plants from this community extend over the bluff edge just onto the Mesa surface at the west end of the Coastal Section (2a) of the West Mesa and at the east end of the Coastal Section (5e) of the East Mesa. The most abundant plants of this community occurring within the study site are Deerweed (Lotus scoparius), Australian Salt Bush (Atriplex semibaccata), Califor-

Fig. 11. PLANT COMMUNITY: Coastal Bluff Scrub; HABITAT: Coastal Bluff; PHYSIOGRAPHIC AREA: adjacent to West Mesa, Coastal Section (2a); DOMINANTS: Seacliff Buckwheat, Australian Saltbush and Deerweed.

Fig. 12. PLANT COMMUNITY: Coastal Bluff Scrub (background) adjacent to wetland vegetation (Vernal Pool); HABITAT: Coastal Bluff; PHYSIOGRAPHIC AREA: East Mesa, Southeast Section (5f); DOMINANTS: Coyote Brush, Coastal Sagebrush, and California Bush-Sunflower.

nia Bush Sunflower (Encelia californica), and Seacliff Buckwheat (Eriogonum parvifolium). In addition, the bluff edge at the southern end of the Southeast Section (5f) of the East Mesa is dominated by Coastal Sagebrush (Artemisia californica), a species characteristic of Coastal Sage Scrub. This patch of vegetation is included here because it lacks all other dominant species of Coastal Sage Scrub and therefore is best characterized as Southern Coastal Bluff Scrub, containing only one species typical of Coastal Sage Scrub.

Southern Coastal Bluff Scrub occurs along much of the south coast region whenever coastal bluffs are found. Well-developed, more diverse scrub occurs on the bluffs of western More Mesa on the Southern California Gas Company property.

Stabilized Coastal Dune Scrub - This community is essentially the Southern Coastal Dune Scrub of Cheatham and Haller (1975), but at More Mesa it occurs on what appears to be an uplifted sand dune at the southwest end of the Coastal Section (2a) of the West Mesa. At this location this community merges with the adjacent Southern Coastal Bluff Scrub, with some species of each community growing together. The most notable dominant species are Croton (Croton californicus), Beach Primrose (Camissonia cheiranthifolia ssp. suffriticosa), Deerweed (Lotus scoparius), and Phacelia (Phacelia ramosissima var. austrolitoralis). Coyote Brush (Baccharis pilularis ssp. consanguinea) has colonized part of the prominent sand hill at the northeast end of this community.

Coastal Dune Scrub occurs only on loose, very sandy soil along the coast, as on backdunes and along very sandy bluff margins. Its occurrence at More Mesa is not unique nor is it more diverse here than in other parts of Goleta Valley, but it is a significant addition to the

Fig. 13. PLANT COMMUNITY: Southern Coastal Oak Woodland; HABITAT: North-facing Slope; PHYSIOGRAPHIC AREA: West Drainage System, Central Basin Slope (3b); DOMINANT: Coast Live-oak. View includes old railroad bed and current access road with roadside vegetation.

Fig. 14. PLANT COMMUNITY: Southern Coastal Oak Woodland; HABITAT: North-facing Ravine; PHYSIOGRAPHIC AREA: West Drainage System, West Ravine (3c); DOMINANTS: California Blackberry, Poison Oak, Nettle, Poison Hemlock, Coffeeberry, and Coast Live-oak.

habitat diversity of the study site.

Southern Coastal Oak Woodland (Figs. 13-16) - This community occurs in three separate physiographic areas of the study site: Central Basin Slope (3b) and West Ravine (3c) of the West Drainage System, northern and northeastern slopes of the Central Hill (4), and the eastern end of the South Central Ravine (6e) of the East Drainage System (Fig. 10). Each of these areas contain different assemblages of oak woodland and non-oak woodland species. In general this community is characterized by the presence of trees and shrubs such as Coast Live Oak (Quercus agrifolia var. agrifolia), Elderberry (Sambucus mexicana), Toyon (Heteromeles arbutifolia), and Coffeeberry (Rhamnus californicus). An understory of woody and herbaceous species is typical, including Poison Oak (Toxicodendron diversilobum), Poison Hemlock (Conium maculatum), California Blackberry (Rubus ursinus), and Nettle (Urtica holosericea). In Southern California, Coastal Oak Woodland generally occurs on north- or east-facing slopes or in canyon bottoms where water is more abundant than in adjacent areas.

Within the More Mesa study site the most extensive oak woodland occurs along the Central Basin Slope (3b) adjacent to the western access road (Fig. 13). Dense understory plants, primarily Poison Hemlock, Poison Oak, and California Blackberry occur in the West Ravine of the West Drainage System (Fig. 14) and in all but the eastern end of the Central Basin Slope. Two small sections of the slope support dense stands of Coast Live Oak; the remaining area contains only scattered oaks with occasional Coffeeberry and Elderberry and a dense cover of understory plants. Annual grassland of the West Mesa is adjacent to the southern margin of the oak woodland, while Scrub-shrub/Forested Wetland adjoins

Fig. 15. PLANT COMMUNITY: Southern Coastal Oak Woodland; HABITAT: North-facing Slope; PHYSIOGRAPHIC AREA: Central Hill (4); DOMINANT: Coast Live-oak. View also includes Emergent Palustrine Wetland vegetation of East Drainage System, North Basin (6a).

Fig. 16. PLANT COMMUNITY: Southern Coastal Oak Woodland; HABITAT: Ravine; PHYSIOGRAPHIC AREA: East Drainage System, South Central Ravine (6e); DOMINANT: Coast Live-oak. View also includes Scrub-shrub and Forested Wetlands of the ravine, and Cismontane Introduced Grasses of the East Mesa, Northwest Section (5a).

the oak woodland on the north.

The oak woodland on the western third of the Central Hill (4) is similar to that of the Central Basin Slope (3b) in having a dense understory of Poison Oak and California Blackberry, but the understory is less diverse in this woodland. The middle third of this woodland area lacks a shrubby understory and has both Coast Live Oak and Blue Gum (Eucalyptus globulus) forming a canopy. Herbaceous annual species form the understory.

The eastern third of the oak woodland on the Central Hill is a dense stand of Coast Live Oak (Fig. 15) with an understory of annual herbs such as Ripgut Grass (Bromus diandrus), Pholistoma (Pholistoma auritum), and Garden Nasturtium (Tropaeolum majus). At the base of this slope is Scrub-shrub/Forested Wetland and at the top of the Central Hill is annual grassland.

The eastern end of the South Central Ravine (6e) of the East Drainage System supports the third Southern Coastal Oak Woodland area (Fig. 16). In this area the oak trees do not form a continuous canopy, but a dense cover of understory species, such as Poison Oak, California Blackberry, and Poison Hemlock, has developed. Other trees and shrubs characteristic of oak woodland, such as Coffeeberry, Elderberry, and Toyon, also occur. Arroyo Willow is also abundant, presumably in the wetter sites, giving this area the aspect of a transitional oak woodland and Scrub-shrub/Forested Wetland.

Most oak woodland areas on the study site appear relatively undisturbed, except for the part of the Central Hill where Blue Gum is prevalent. Saplings and seedlings were seen as evidence that these woodland areas are maintaining themselves. The large size of many trees and

evidence from old aerial photographs indicate that the oak woodland areas are not a result of recent human activity.

Although many areas of oak woodland still exist in the Goleta Valley and the Santa Barbara area in general, very few such localities are both near the coast and isolated from developed areas. One similar situation is the oak woodland that occurs along the "North Bluffs" of the UCSB Campus, adjacent to Goleta Slough. The fact that oak woodland at More Mesa is relatively small in area probably makes it more susceptible to any disturbance and such disturbance would probably reduce the diversity of the plant community in a short time. This would consequently have a negative impact on the considerable diversity of the fauna as well.

Cismontane Introduced Grasses - This plant community on the More Mesa study site is a complex mosaic of many dominant species (Fig. 17). For the purposes of this study, nine dominance types will be considered, each dominance type corresponding to the most abundant and conspicuous species or combination of species present in each area. The grassland dominance types are as follows: Wild Oat, Wild Oat/Ripgut Grass, Ripgut Grass, Harding Grass, Sweet Fennel, Harding Grass/Sweet Fennel, Coyote Brush, Italian Rye Grass, and California Brome/California Barley. Each of these types is dominated by a different species or combination of species depending on interactions between soil type, slope, and moisture conditions.

In addition to the dominant grasses constituting many of the dominance types, numerous native and introduced forbs occur in most areas (Fig. 18). Common grassland plants such as Clover (Trifolium hirtum), Wild Radish (Raphanus sativus), Lupine (Lupinus bicolor and L. nanus

Figure 17. GRASSLAND DOMINANCE TYPES OF MORE MESA

Numbers refer to dominance types listed below. Two numbers in the same area indicate a combination of dominant species with the more abundant species listed first.

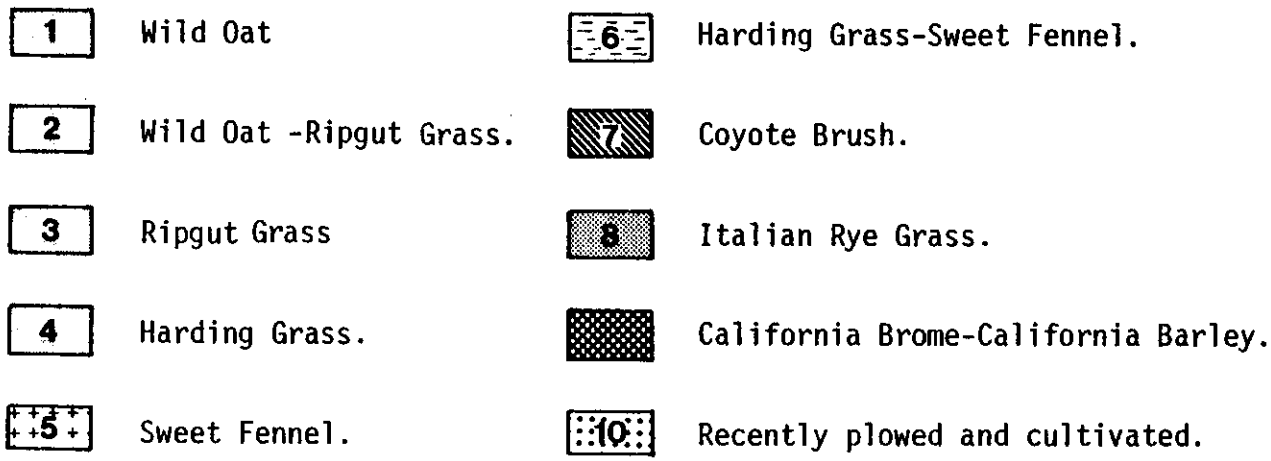
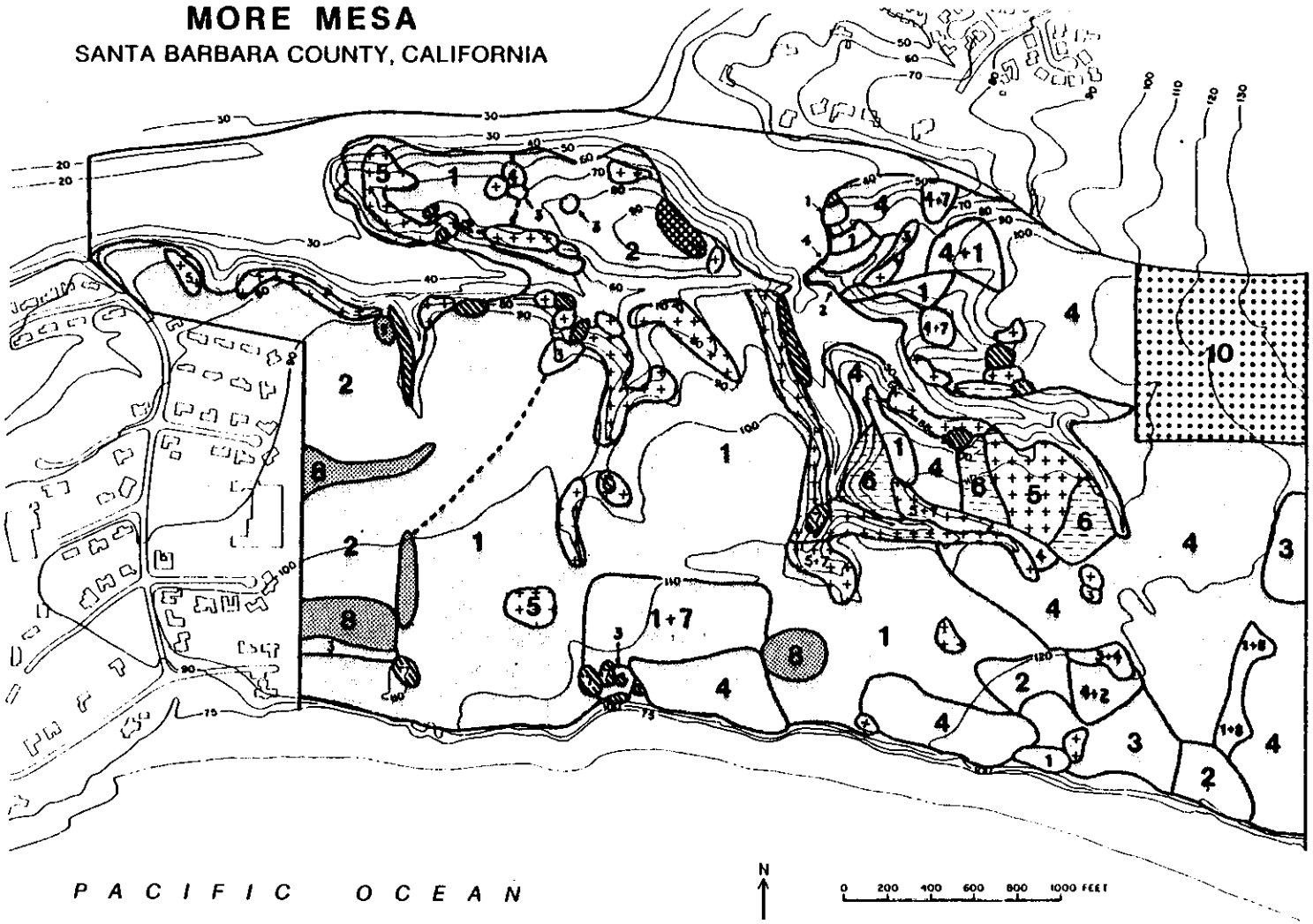


Fig. 17. GRASSLAND DOMINANCE TYPES



var. nanus), Spring Vetch (Vicia sativa), Cat's Ear (Hypochoeris glabra and H. radicata), Fiddleneck (Amsinckia intermedia) and many others were locally common in many grassland areas (see species lists for physiographic areas, Appendix IB).

Wild Oat grassland is dominated by Wild Oat (Avena fatua) and contains smaller quantities of Ripgut Grass (Bromus diandrus), Italian Rye Grass (Lolium perenne ssp. multiflorum), and other annual herbs. This dominance type occurs over a large part of the West Mesa in all three sections, but is replaced near the coastal bluff and in the western end of the West (2b) and Coastal (2a) Sections by other species and plant communities (Fig. 17).

Wild Oat/Ripgut Grass grassland contains a mixture of Wild Oat and Ripgut Grass in similar proportions, with smaller amounts of Italian Rye Grass and, in some areas, Ribgrass (Plantago lanceolata), Clover (Trifolium hirtum), and other herbaceous species. Wild Oat/Ripgut Grass grassland occurs in the western portions of the Western (2b) and Coastal (2a) Sections of the West Mesa (Fig. 17). Part of the western quarter of the Western Section (2b) is a complex mixture of Wild Oat, Ripgut Grass, Italian Rye Grass, and Ribgrass. Wild Oat/Ripgut Grass grassland also occurs in the northeast part of the East Section (2c) of the West Mesa on the north-facing slope adjacent to the Central Hill (4). Smaller patches of this dominance type occur near the center and southeastern corner of the Coastal Section (5e) of the East Mesa (Fig. 17). In most cases this mixed dominance type grades into an adjacent Wild Oat grassland area and has an abrupt boundary with some other grassland type along other parts of its border.

Ripgut Grass grassland (Fig. 19) is dominated by Ripgut Grass with

Fig. 18. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: East Mesa, Coastal Section (5e); DOMINANTS: naturalized grasses such as Barley (background), naturalized forbs such as Clover (foreground) and Spurry (background), and native forbs such as Lupine (dominant foreground).

Fig. 19. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: East Mesa, Coastal Section (5e); DOMINANT: Ripgut Grass.

small amounts of other annual species. It is much less common than either Wild Oat or Wild Oat/Ripgut Grass grassland and occurs only as small, isolated patches within the grassland mosaic (Fig. 17). It occurs near the northeast corner of the West Section (2b), near the bluff edge in the center of the Coastal Section (2a), and at the north end of the Southeast Section (5f) of the East Mesa. The largest Ripgut Grass grassland area is in the southeast corner of the Coastal Section (5e) of the East Mesa on sandier soil than the adjacent heavy clay soil. A small patch also occurs near the center of the West Central Section (5d) of the East Mesa.

Harding Grass grassland (Fig. 20) is the most widespread dominance type on the East Mesa and occurs in only one area of the West Mesa at the southeastern corner of the Coastal Section (2a; Fig. 17). Within most areas of Harding Grass grassland other species are present in low frequencies. Within the East Mesa, Harding Grass grassland occurs near the center of the Coastal Section (5e), much of the Southeast Section (5f), the eastern half of the West Central Section (5d), most of the East Central Section (5c), and much of the Northwest Section (5a; Fig. 17). The single patch of Harding Grass grassland on the West Mesa is atypical in that it is a mixture of Harding Grass, Sweet Fennel (Foeniculum vulgare), and Sorrel (Rumex angiocarpus).

Sweet Fennel grassland (Fig. 21) is a common dominance type consisting of mostly Sweet Fennel which often grows in nearly pure stands in many parts of the study site. It also occurs on most slopes of the West Drainage System, parts of the Central Hill (4) slopes, on slopes of much of the East Drainage System, and in patches in the Northwest (5a), West Central (5d), and Coastal (5e) Sections of the East Mesa (Fig. 17).

Fig. 20. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: East Mesa, West Central Section (5d); DOMINANTS: Harding Grass and other associates including Sweet Fennel and Curly Dock.

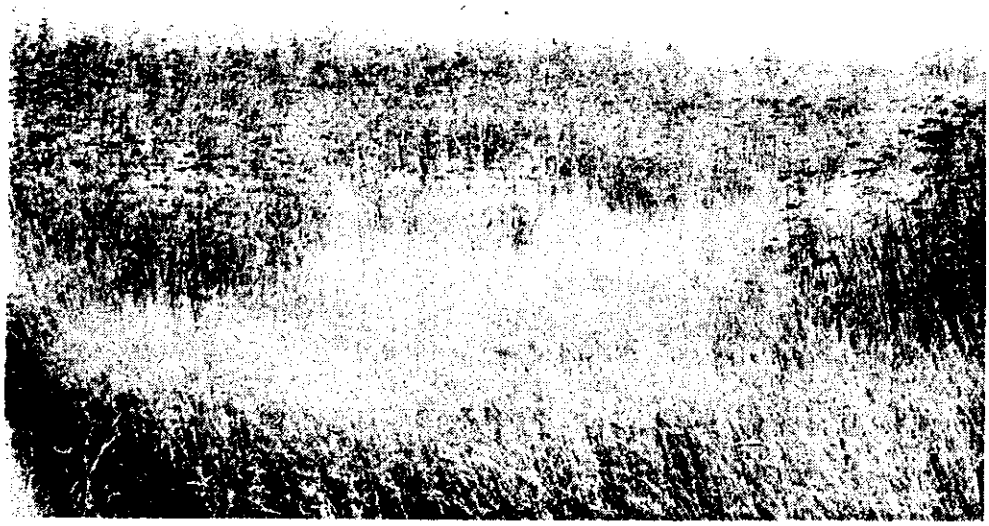


Fig. 21. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: East Mesa, West Central Section (5d); DOMINANTS: Sweet Fennel (background), Harding Grass (foreground).

On the west half of the site it is almost entirely restricted to ravine slopes, while on the east half it is also found on the Mesa surface, possibly due to the heavy clay soil found on this part of the Mesa.

Harding Grass/Sweet Fennel grassland occurs primarily as an intermediate dominance type between Harding Grass and Sweet Fennel dominance types in the West Central Section (5d) of the East Mesa and in the southeast corner of the Coastal Section (2a) of the West Mesa (Fig. 17). It is found both on ravine slopes and on the Mesa surface.

Coyote Brush (Baccharis pilularis ssp. consanguinea) grassland (Fig. 22) is not a true grassland, but the sporadic and often sparse occurrence of this shrub within grasslands make it convenient to discuss it in the context of the grassland community. Coyote Brush grassland occurs in patches on most of the ravine slopes and hillsides between the wetland or oak woodland at the bottom and grassland at the top of the slopes. It also grows in the Coastal Section (2a) of the West Mesa in a few dense patches near the bluff and as scattered individuals within the Wild Oat grassland in the eastern half of this section (Figs. 17, 22).

Italian Rye Grass grassland usually occurs in wetter soils than other grassland types at More Mesa, except Harding Grass grassland which also occurs in wetlands. Italian Rye Grass is the dominant species (Fig. 23) but Ribgrass is often present also. Except for a small patch of Italian Rye Grass grassland in the Southeast Section (5f) of the East Mesa, this grassland type occurs mostly on the West Mesa (Fig. 17). It is particularly abundant on the western part of the West (2b) and Coastal (2a) Sections of the West Mesa in slight depressions or on part of the sandy soil probably overlying clay soil.

Native California Brome/California Barley grassland (Figs. 24, 25)

Fig. 22. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: West Mesa, Coastal Section (2a); DOMINANTS: Coyote Brush (foreground), Sweet Fennel (center), grasses including Wild Oat, Ripgut Grass, and others.

Fig. 23. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa; PHYSIOGRAPHIC AREA: East Mesa, Coastal Section (5e); DOMINANTS: Italian Rye Grass, other grasses, and forbs such as Vetch.

is characterized by the presence of California Brome (Bromus carinatus) and California Barley (Hordeum californicum) and represents what remains of native grassland in this area. Introduced species such as Wild Oat, Ripgut Grass and Italian Rye Grass are also present. This dominance type is found only on the northeast slope of the Central Hill (4) above the oak woodland (Fig. 17). Each of the two native species occurs in other areas of the study site, but not in combination or in such conspicuous densities.

The Cismontane Introduced Grass community of the More Mesa study site is a complex association of many locally dominant species. The western end of the Coastal Section (2a) of the West Mesa is a particularly complex mixture of Wild Oat, Ripgut Grass, Italian Rye Grass, Sorrel, and Ribgrass not found in other areas. Other than the native California Brome/California Barley dominance type, the grassland areas of the study site are typical of many grassland areas in the Goleta Valley. Other parts of More Mesa, including the Southern California Gas Company property at the west end of More Mesa, no longer support grassland but are developed agriculturally or residentially.

Wetland Vegetation

The definition of "wetland" is extremely difficult both biologically and legally. Many definitions exist, but none is satisfactory for all locations and all purposes. Wetlands are defined in the California Coastal Act (State of California, 1976) as "Lands which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats and fens" (Public Resource Code Section 30121). In preparing the vegetation and plant community inventory of the More Mesa

Fig. 24. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa slope; PHYSIOGRAPHIC AREA: Central Hill (4); DOMINANTS: California Brome, Wild Oat, Ripgut Grass, Italian Rye Grass, Soft Chess, and forbs such as Blue-eyed Grass and Vetch.

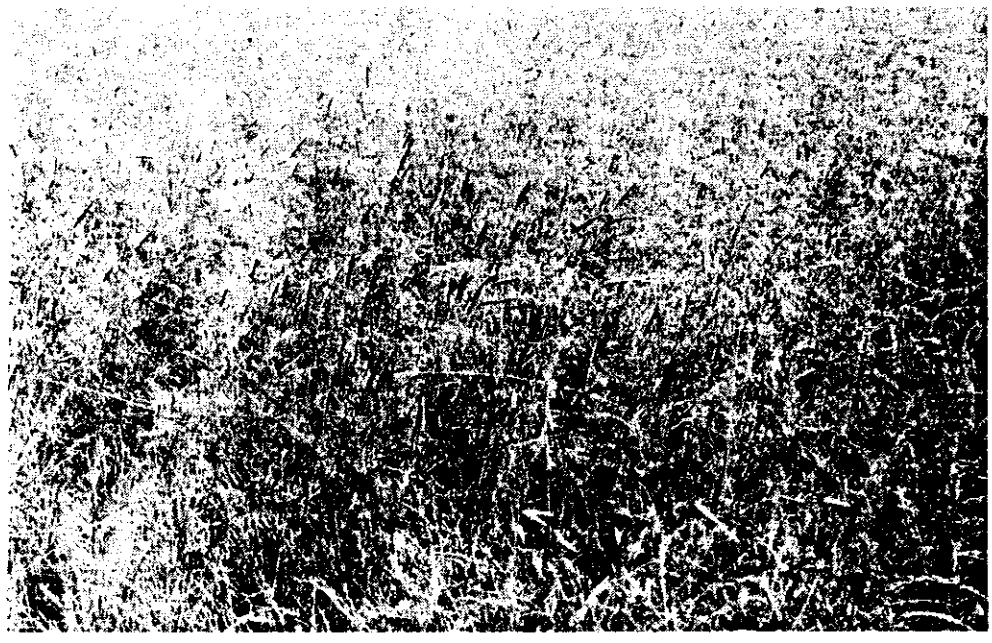


Fig. 25. PLANT COMMUNITY: Cismontane Introduced Grasses; HABITAT: Mesa slope; PHYSIOGRAPHIC AREA: Central Hill (4); DOMINANTS: California Barley, Wild Oat, Italian Rye Grass, Soft Chess, and forbs such as Blue-eyed Grass and Vetch.

study site, this definition has been interpreted broadly to simplify the application of community classification schemes. This also allows the use of the wetlands classification of Cowardin, et al. (1979) which treats all wetlands in a single, comprehensive system of descriptive names. This system was modified slightly by combining scrub-shrub wetland with forested wetland. The lack of distinction between shrubs and trees of Arroyo Willow (Salix lasiolepis var. lasiolepis), the predominant member of this community, justified this combination. A map (Fig. 26) illustrating major wetland communities has been developed for More Mesa, and a classification (Cowardin et al. 1979) of the wetland types is listed below.

System Riverine - Subsystem Intermittent/Seasonally Flooded

1 - Class Aquatic Bed, Subclass Rooted Vascular

2 - Class Streambed, Subclass Vegetated (Seasonally Flooded)

3 - Class Streambed, Subclass Vegetated (Temporarily Flooded)

System Palustrine -

4 - Class Emergent Wetland, Subclass Persistent (Seasonally Flooded)

5 - Class Emergent Wetland, Subclass Persistent (Temporarily Flooded)

6 - Scrub-shrub/Forested Wetland, Subclass Broad-leaved Deciduous (Seasonally and Temporarily Flooded)

Rooted Vascular Aquatic Bed (Fig. 27) - This community occurs only at the extreme northern end of the study site in Atascadero Creek (Fig. 26). Only one species, Zannichellia palustris has been found, but it is the only known extant locality for this species in the Goleta Valley. Other submerged aquatics that characterize South Coast streams and which could occur here include Pond Weeds (Potamogeton pectinatus; P. foliosus).

Seasonally Flooded Vegetated Streambed (Fig. 27) - This community is composed of numerous nonpersistent species, including Atriplex patula ssp. hastata, Brass-buttons (Cotula coronopifolia), Lythrum hyssopifolia, Knotweed (Polygonum aviculare), Polypogon monspeliensis, Sandsperry (Spergularia marina), and others. This community is flooded each year following rains and re-establishes itself as the water level drops. It occurs only along the length of Atascadero Creek in the study site and merges along the south bank of the creek with an Emergent Wetland. Few occurrences of creeks with year-round running or standing fresh water are known in Goleta Valley and for this reason this section of Atascadero Creek is significant.

Temporarily Flooded Nonpersistent Emergent Wetland (Fig. 27) - This community includes species such as Atriplex patula ssp. hastata, Chenopodium ambrosioides, Barnyard Grass (Echinochloa crusgalli), and Polygonum punctatum and occurs on the lower shores of Atascadero Creek just above the seasonally flooded streambed. The distinction between these two communiites is not always clear on the study site. Periodic flooding and sand movement cause shifting of suitable locations for this community (Fig. 28). This wetland type is uncommon in the Goleta Valley, although the section of Atascadero Creek within the study site is highly modified by dredging and spraying with herbicides. The Nonpersistent Emergent Wetland is often transitional to the Persistent Emergent Wetland of the Palustrine System.

Seasonally Flooded Persistent Emergent Palustrine Wetland (Fig. 29, 30) - This marsh plant community is the most diverse and one of the more abundant native plant communities on the study site. It contains a large number of annual and perennial herbs, including Aster (Aster

Figure 26. WETLANDS OF MORE MESA

Wetland classification follows Cowardin, et al. (1979).

System: Riverine.

 Including Aquatic Bed, Streambed, and Emergent (Nonpersistant) Wetlands.

System: Palustrine.

 Emergent, Seasonally Flooded.

 Emergent, Temporarily Flooded [vernal pool (1) and local depressions].

 Emergent, Temporarily Flooded [vernal alkaline flats].

 Scrub-Shrub-Forested.

D - area includes wetland, transition upland and dredge spoil.

Fig. 26. WETLANDS OF MORE MESA

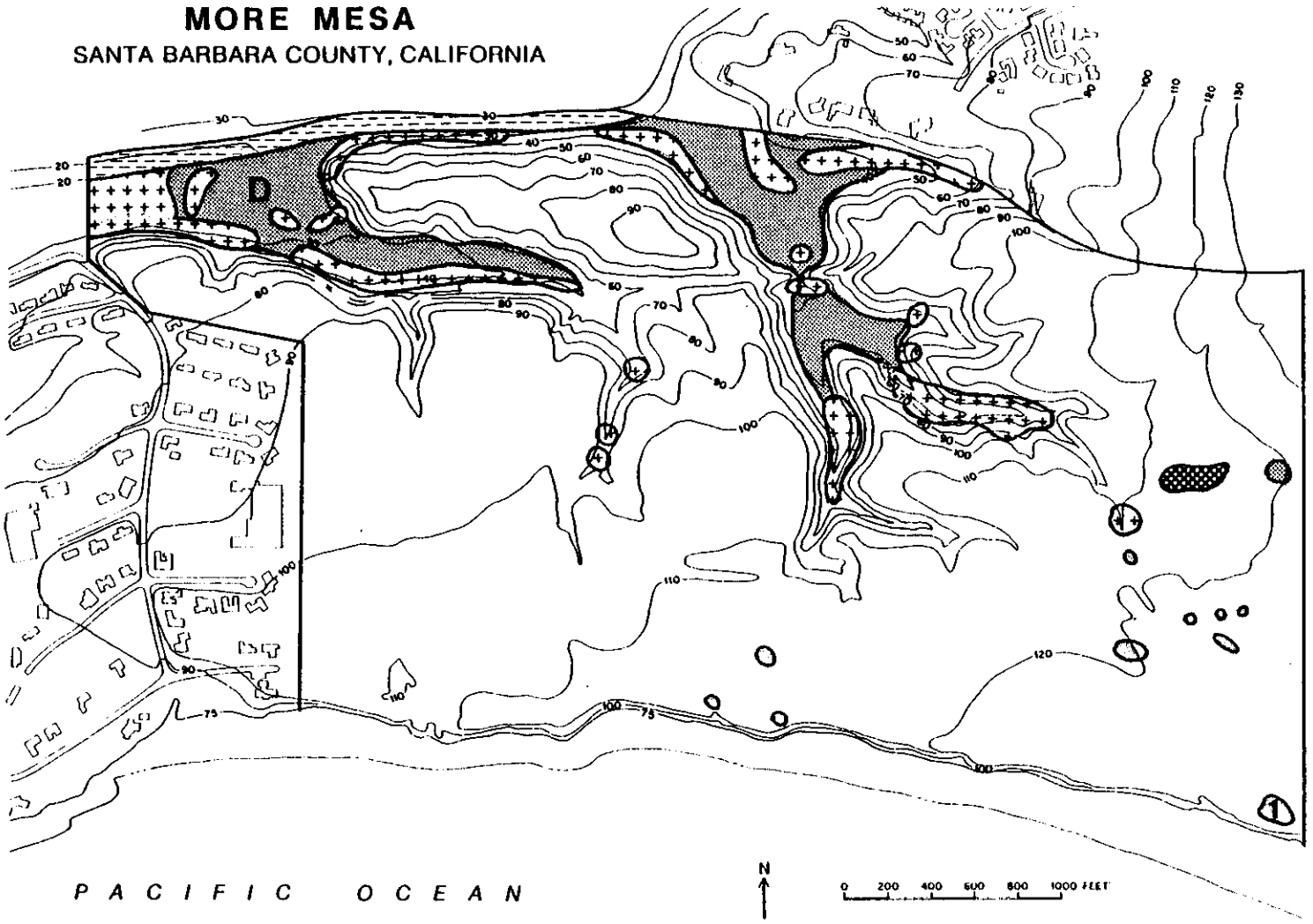


Fig. 27. WETLAND VEGETATION: Emergent, Nonpersistent and Aquatic Bed Riverine Wetlands of Atascadero Creek (foreground); Emergent and Scrub-shrub Palustrine Wetlands along creek (center) and Forested Palustrine Wetlands of South Drainage System (6a) (background), adjacent to Southern Coastal Oak Woodland on slope of Central Hill (4).

Fig. 28. WETLAND VEGETATION: Emergent Palustrine Wetland dominated by Tule and scattered in a Riverine Wetland of Atascadero Creek. Scrub-shrub and Forested Palustrine Wetlands occur in East Ravine System (6a) in Central background.

Fig. 29. WETLAND VEGETATION: Emergent, Persistent, Seasonally Flooded, Palustrine Wetland; HABITAT: Basin; PHYSIOGRAPHIC AREA: East Drainage System, South Basin (6b); DOMINANTS: Bulrush, Aster, Curly Dock, Harding Grass, and others.

Fig. 30. WETLAND VEGETATION: (A) Emergent, Persistent, Seasonally Flooded, Palustrine Wetland (foreground); HABITAT: Basin; PHSYIOGRAPHIC AREA: East Drainage System, North Basin (6a); DOMINANTS: Pickleweed, Spear-leaved Saltbush, Frankenia and Bulrush. (B) Scrub-shrub Palustrine Wetland (center and left center); DOMINANTS: Arroyo Willow and *Baccharis* spp.. Southern Coastal Oak Woodland occurs in left background.

exilis), Cressa (Cressa truxillensis var. vallicola), Frankenia (Frankenia grandifolia), Harding Grass, Pickleweed (Salicornia virginica), Bulrush (Scirpus maritimus), and Western Goldenrod (Solidago occidentalis). It occurs in the Central Basin (3a) of the West Drainage System, North (6a) and South (6b) Basins of the East Drainage System, and one small area of the East Central Section (5c) of the East Mesa (Fig. 26). All areas have soil waterlogged in winter and spring with some parts having standing water in the lowest areas.

This community type is not common in the Goleta Valley and on the More Mesa site it is very diverse compared with other occurrences in the area. The Western Goldenrod-dominant marsh in the West Drainage is particularly significant since it is not known elsewhere in Santa Barbara County. The areas occupied by this community are also among the most floristically diverse areas of the More Mesa site and contain a relatively high proportion of native species. The salt marsh species present in basins and both drainage systems apparently represent remnant stands of estuarine vegetation that mark historic arms of the Goleta Slough estuarine system.

The central and southern parts of the Central Basin (3a) of the West Drainage System contain a deep channel of standing water through the spring which supports a dense growth of Cat-tail (Typha latifolia), Tule (Scirpus californicus) and Bur-reed (Sparganium eurycarpum). The latter species' occurrence is one of few known localities in the Goleta Valley. A similar occurrence exists below the "North Bluffs" of the UCSB Campus where a permanent flooded ditch supports a comparable emergent wetland.

Vernal Pool (Fig. 31-34) - This Temporarily Flooded, Persistent,

Fig. 31. WETLAND VEGETATION: Emergent, Persistent, Temporarily Flooded, Palustrine Wetland (Vernal Pool); HABITAT: Local depression; PHYSIOGRAPHIC AREA: East Mesa, Southeast Section (5f). A Palustrine Wetland dominated by Harding Grass occurs adjacent to the vernal pool, and cultivated Blue Gum trees are in the background.

Fig. 32. WETLAND VEGETATION: Vernal Pool; DOMINANTS: Spike Rush and Canary Grass.

Emergent Palustine Wetland is found only in the Southeast Section (5f) of the East Mesa (Fig. 26) wetland dominated by Harding Grass on the north, east, and west. A trail borders the southern margin of the pool. This wetland contains several species common in most of the few other known vernal pools in the Goleta Valley, such as Eryngium (Eryngium vaseyi), Popcorn Flower (Plagiobothrys undulatus), and Spike Rushes (Eleocharis acicularis and E. palustris). In addition, two species uncommon anywhere within the Goleta Valley or Southern California occur here: Pacific Foxtail (Alopecuris howellii), and Canary Grass (Phalaris lemmonii).

Few vernal pools are known in the South Coast region of Santa Barbara County and some of these are too shallow to support the assemblage of species found in the More Mesa vernal pool. Adding to the importance of this vernal pool is the presence of regionally rare plants.

Vernal Alkaline Flat - This community represents a second manifestation of Temporarily Flooded, Persistent Emergent Palustrine Wetlands characterized by alkaline soil that becomes saturated with water in winter and spring, drying out in summer. At More Mesa it supports Brass buttons (Cotula coronopifolia), Toad Rush (Juncus bufonius), Harding Grass, Rabbitsfoot Grass (Polypogon monspeliensis), Alkali Mallow (Sida leprosa var. hederacea), and Sand-spurrey among others. It occurs in the West Central Section (5c) of the East Mesa (Fig. 26).

At More Mesa the habitat for this community appears to have been created by removing surface soil, exposing alkaline subsoil, and constructing a ridge surrounding the graded area. It is surrounded by Harding Grass grassland. No comparable alkaline flat areas were found on the More Mesa site.

Fig. 33. WETLAND VEGETATION: Vernal Pool; DOMINANTS: Pacific Foxtail, Spike Rush, and Popcorn Flower.

Fig. 34. WETLAND VEGETATION: Vernal Pool; DOMINANTS: Eryngium, Spike Rush, Pacific Foxtail, and Popcorn Flower.

Scrub-Shrub/Forested Wetland (Fig. 35, 36) - This wetland type is one of the most widespread wetlands on More Mesa (Fig. 26). In the West Drainage System it is found along the margin of the Central Basin (3a), except along the southern edge of the Central Hill. A diverse Scrub-Shrub/Forested wetland occurs in the western end of the Central Basin. In addition to the abundant Arroyo Willow, Narrow-leaved Willow (Salix exigua), Red Willow (S. laevigata var. laevigata) and Yellow Willow (S. lasiandra var. lasiandra and var. lancifolia) occur, and juvenile Cottonwoods (Populus fremontii, P. trichocarpa) also have been located. The lower margin of the Central Hill along Atascadero Creek is lined with Arroyo Willow. In the East Drainage System, Arroyo Willow forms a Scrub-Shrub/Forested Wetland on the western and northern edges of the North Basin (6a), in the North Ravine (6c), in the bottom of the South Ravine (6f), and the northern edge of the South Basin (6b). The South Central Ravine (6e) is predominantly Arroyo Willow with scattered Coast Live Oaks, but the eastern 1/4 of the ravine is best classified as Southern Coastal Oak Woodland with some willows in the wetter locations. Scattered Arroyo Willows occur in other locations (Fig. 26) but do not form continuous stands. Together, these communities have been referred to as "riparian" vegetation.

Within the Goleta Valley, stands of relatively undisturbed Scrub-Shrub/Forested Wetland are uncommon. Although most of these wetland areas on More Mesa support few species, the extensive wetland at the west end of the Central Basin (3a) of the West Drainage System is notable for its diversity of willow species. This small area contains four species not found growing together anywhere else on More Mesa. Unfortunately, parts of this area are rather highly disturbed by trash

Fig. 35. WETLAND VEGETATION: Forested Palustrine Wetland; HABITAT: Basin; PHYSIOGRAPHIC AREA: West Drainage System, Central Basin (3a); DOMINANTS: Arroyo Willow, and others including Red Willow and Yellow Willow. View from Central Hill westward across basin to north-facing slope (3b) of Southern Coastal Oak Woodland. Scrub-shrub and Emergent Palustrine Wetlands also are present.

Fig. 36. WETLAND VEGETATION: Forested Palustrine Wetland; HABITAT: Basin; PHYSIOGRAPHIC AREA: East Drainage System, North Basin; DOMINANT: Arroyo Willow. View also includes Emergent Palustrine Wetland.

dumping and foot traffic, but is of considerable interest for its diverse wetland communities.

VASCULAR PLANTS

Kelly P. Steele

OBJECTIVE - To inventory the vascular plants and assess populations of any species of special concern.

METHODS - Field surveys were conducted to compile a complete list of the vascular plants of More Mesa and representative lists of dominant species of each physiographic area. A total of eleven visits from July, 1981 to May, 1982 were made to More Mesa for a total of about 36 hours. Information gathered separately in the field by the Project Manager, Wayne Ferren, or by Gary Hannan or Fred Roberts was also used for this section of the report.

Notes taken during these field surveys, identification of the plant species collected, and information from references including Munz (1959, 1968, 1974), Bailey Hortorium (1976) and Smith (1976) were used to prepare the following results.

RESULTS - A catalogue of the vascular plant species is located in Appendix I-A. Information contained in this catalogue includes the following for each species: scientific and common name; whether or not the species is native, naturalized, or cultivated; the growth habit; abundance in each of four general plant communities discussed earlier; general flowering time; and the voucher number of the plant specimen collected from More Mesa and deposited in the UCSB Herbarium.

Species lists for each physiographic area (Fig. 7) also were compiled and are located in Appendix I-B. These lists contain primarily

the dominant or distinctive species of each area and were useful in the sensitivity analysis of each physiographic area. However, these lists do not contain all species found in every geographic area.

The flora of More Mesa consists of 195 species in 134 genera in 51 plant families. Some of the larger plant families include the Sunflower Family (Asteraceae) with 15% of the total species, the Grass Family (Poaceae) with 13% of the total species and the Pea Family (Fabaceae) with 7% of the total species. Other common families with about 4% of the total species include the Goosefoot Family (Chenopodiaceae), and Wild Buckwheat Family (Polygonaceae) and the Willow Family (Salicaceae). Of the 195 species, 45% are native and 55% are naturalized - mostly from Europe. Different physiographic areas within More Mesa have different absolute numbers and/or proportions of native species. Areas such as the North (6a) and Central (3a) Basins contain a greater number of native species and a larger relative proportion of native species than do many other areas such as the West Mesa as a whole. These differences were used in the sensitivity analysis of each physiographic area.

DISCUSSION - No species listed as rare, threatened or endangered at the state or national levels (e.g., Ayensu and Defilipps, 1978; USDI, 1981), or listed by the California Native Plant Society (J. Smith et al., 1980; J. Smith, 1981) were found on More Mesa during this study. However, species of special concern at the local or regional levels do occur here.

The following eight species merit individual discussion. Among these, Pacific Foxtail (Alopecurus howellii), and a species of Eryngium (Eryngium vaseyi), Canary Grass (Phalaris lemmonii) and Popcorn Flower

(Plagiobothrys undulatus) are common in the vernal pool in the Southeast Section (5a) of the East Mesa (Fig. 37). In the Goleta Valley all four species are confined to vernal pools and are uncommon in distribution although they may be locally abundant where found.

Pacific Foxtail (Figs. 33, 34) is reported from only a few other localities in Santa Barbara County (Smith, 1976). It is found in one other local vernal pool in Isla Vista. This species extends from San Diego County north to Oregon (Munz, 1959).

The species of Eryngium (Fig. 34) on More Mesa is common in other vernal pools in the Goleta Valley (i.e., at Ellwood Mesa and in Isla Vista) but is rare in other parts of the county. This species occurs in the Salinas and San Joaquin Valleys south to Santa Barbara County. Current information indicates that the More Mesa locality may be the southern limit of this species range. However, in the Goleta area it has affinities to E. aristulatum, a species of uncertain distribution, occurring from Ventura County south to San Diego County and San Benito County north to Humboldt County.

The species of Canary Grass (Fig. 32) in the vernal pool is known only from a few sites in Santa Barbara County (Smith, 1976). It is found in two of the local vernal pools (Isla Vista, Ellwood Mesa) and may be locally common. The range of the species is from San Diego County north to Butte County (Munz, 1959).

The species of Popcorn Flower (Figs. 33,34) also is found in other vernal pools in the Goleta Valley and is known from a few other sites in Santa Barbara County. The type collection of this species was collected near Santa Barbara in 1907 (Smith, 1976). The species is found from San Diego County north to Mendocino County.

Fig. 37 NOTEWORTHY PLANT SPECIES

The following plant species occur at More Mesa and are rare in South Coast Santa Barbara County. Numbers designate localities for these plants. All species are restricted to wetlands except Dwarf Brodiaea, a grassland species.

1. Dwarf Brodiaea (*Brodiaea jolanensis*).

2. Horned Pondweed (*Zannichellia palustris*).

3. Pacific Foxtail (*Alopecurus howellii*).

   Canary Grass (*Phalaris lemmonii*).

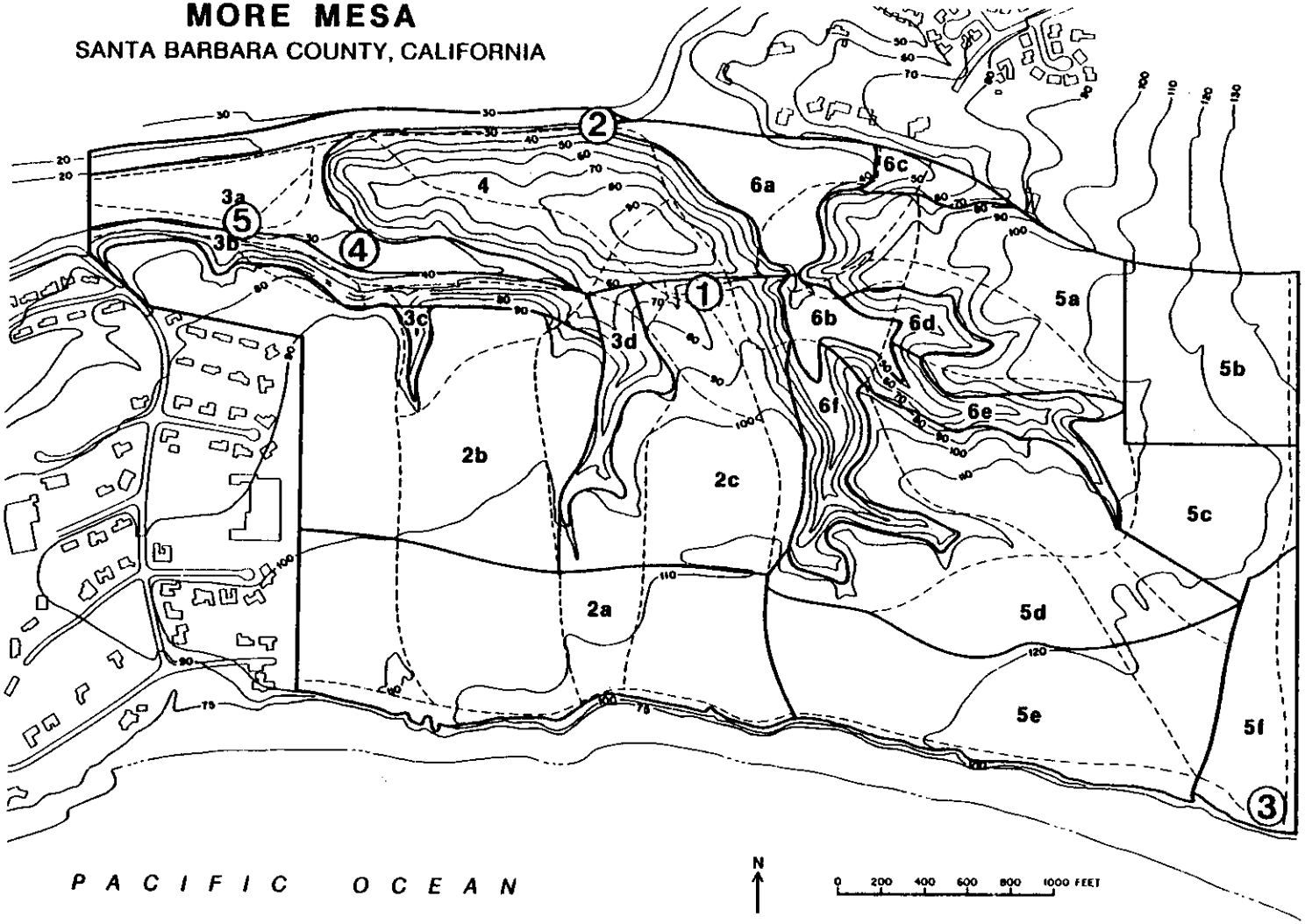
   Popcorn Flower (*Plagiobothrys undulatus*).

   Eryngium (*Eryngium vaseyi*).

4. Western Goldenrod (*Solidago occidentalis*).

5. Bur-reed (*Sparganium eurycarpum*).

Fig. 37 NOTEWORTHY PLANT SPECIES



Dwarf Brodiaea (Brodiaea jolonensis) is found in the grassland in the northern part of the East Section (2c) of the West Mesa. (Fig. 37). This species occurs on margins of vernal pools of Isla Vista and is known from several other sites in Santa Barbara County (Smith, 1976). However, it is quite uncommon in the Goleta Valley. The total range of the species is from San Diego County north to Monterey County.

Horned Pondweed (Zannichellia palustris), a submerged aquatic, is found in the Riverine Wetland of Atascadero Creek (Fig. 37). While this species is found in a few other localities in Santa Barbara County, it is not now known from any other location in the Goleta Valley. This species is found scattered throughout California and, overall, has a world-wide cosmopolitan distribution.

Western Goldenrod (Solidago occidentalis) is found in the emergent wetlands of the Central Basin (3a) of the West Drainage System and the North Basin (6a) of the East Drainage System (Fig. 37). Carpinteria Salt Marsh is the nearest other locality for this primarily salt marsh species. There are a few other sites known for Santa Barbara County (Smith, 1976). However, the species is widely distributed throughout the West (Munz, 1959).

Bur-reed (Sparganium eurycarpum) can be found in the Central Basin (3a) Emergent Wetlands (Fig. 37). This species is found at two other sites in the Goleta Valley: Goleta slough and a marsh southeast of the Santa Barbara Airport Terminal. The specific habitat occupied by this species is relatively uncommon. There are some other known sites for Bur-reed, primarily in northern Santa Barbara County. The species as a whole, ranges to British Columbia and the eastern coast of the United States.

Much of More Mesa consists of the Mesa habitat which supports a grassland community of little consequence to the status of the native flora. However, several habitats, such as the vernal pool and other Emergent Palustrine Wetlands, are regionally significant because these uncommon habitats support species of special concern for the South Coast area.