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Final

Recovery Strategies for Six Coastal Plant Species on the Monterey Peninsula

Prepared for:

California Department of Fish and Game

Prepared by:

Jones & Stokes Associates, Inc.

May 1996

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PURPOSE AND INTRODUCTION

Six species of rare plants endemic to California's central coast were identified by California Department of Fish and Game (DFG) for development of recovery recommendations because of their narrow distributions and immediate threats from coastal development (Table 1). The six rare species described in this report are coastal dunes milkvetch (*Astragalus tener* var. *titi*), Pacific Grove clover (*Tifolium polyodon*), Monterey clover (*Trifolium trichocalyx*), Hickman's cinquefoil (*Potentilla hickmanii*), Yadon's rein orchid (*Piperia yadonii*), and Gowen cypress (*Cupresus goveniana* var. *goveniana*).

The purpose of this study was to:

- collect baseline information to determine plant distribution, population, and habitat characteristics and
- develop site-specific protection and recovery recommendations to be incorporated into a formal recovery plan for each of the six species.

This report provides essential information for development of protection and recovery strategies to ensure long-term viability in the wild of these six coastal plant species. All six species are of extremely limited distribution and are threatened throughout their ranges by residential and resort development, aggressive exotic plant species, and recreational activities. The small and isolated nature of the remaining populations makes them extremely vulnerable to elimination.

The tasks involved in this study included:

- conducting thorough field surveys of suitable habitats on the Monterey Peninsula to determine the distribution of the six species;
- studying basic features of all occurrences to characterize habitat, soil types, predators, competitors, and associated species;
- developing recovery recommendations suitable for inclusion in a formal recovery plan; and
- preparing draft and final reports.

The "Methods" section of this report explains the survey strategy. Six sections that separately describe each of the six target rare species are contained in the "Results and Recovery Recommendations" section of this report. The "Concluding Remarks" section provides a summation of conclusions. Appendices contain field survey notes, field data forms, and photographs of species and habitats.

Table 1. Listing Status of Plant Species Address in the Report

Common Name	Scientific Name	Listing Status[a] Federal/State/CNPS
Coastal dunes milk vetch	*Astragalus tener* var. *titi*	PE/E/1B
Pacific Grove clover[b]	*Trifolium polyodon*	C1/R/1B
Monterey clover	*Trifolium trichocalyx*	PE/E/1B
Hickman's cinquefoil	*Potentilla hickmanii*	PE/E/1B
Yadon's rein orchid	*Piperia yadonii*	PE/--/1B
Gowen cypress	*Cupressus goveniana* ssp. *goveniana*	PT/--/1B

[a] Status explanations:

Federal

C1 = Category 1 candidate for federal listing. Category 1 includes species for which the U.S. Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat to support proposals to list them.
PE = proposed for listing as endangered under the Endangered Species Act.
PT = proposed for listing as threatened under the Endangered Species Act.

State

E = listed as endangered under the California Endangered Species Act.
R = listed as rare under the California Native Plant Protection. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.
-- = no status.

California Native Plant Society

1B = List 1B species: species considered rare, threatened, or endangered in California and elsewhere.

[b] U.S. Fish and Wildlife Service no longer considers Pacific Grover clover to be a candidate for listing as threatened or endangered because of questions of its taxonomic validity as a species (Rutherford pers. comm.).

METHODS

Rare plant surveys were conducted in April-June 1995 by Jones & Stokes Associates botanists and Jane Holte, a consulting botanist, under contract to Jones & Stokes Associates. The botanists completed standard California native species field survey forms for DFG's Natural Diversity Data Base (NDDB) for all rare plant occurrences encountered, including previously recorded known occurrences. The project was initiated by conducting surveys of known occurrences of the species with Vernal Yadon, Mary Ann Matthews, David Allen, and Joey Dorrell, individuals knowledgeable of these species. Habitat characteristics were observed at the site of each occurrence to identify common habitat patterns among occurrences of each species. Habitat characteristics include vegetation type, soil type, hydrology indicators, evidence of predation, associated plant species, potential competitors, and evidence of vegetation or ground disturbance. These habitat characteristics were used to focus the surveys for new populations to sites most likely to support the species, to identify threats, and to develop recovery recommendations.

The study area is shown in Figure 1. Specific locations of Jones & Stokes Associates survey sites are shown in Figures 2-5. Each survey site is coded with a number in Figures 2-5 and the number codes of these sites are used throughout the report as a quick reference to specific locations. Survey sites were chosen based on specific combinations of geologic and vegetation features of sites on the Monterey Peninsula and inland at Monterra Ranch. A geologic map of the Monterey Peninsula at a scale of 1:24,000 (Dupré 1990) was used to identify sites of geomorphic surfaces correlated with target plant occurrences. See Jones & Stokes Associates (1994a) for descriptions of the geomorphic surfaces of the Monterey Peninsula and their relationship to soil and vegetation patterns. False-color infrared aerial photographs at a scale of 1:12,000 were used to identify sites supporting vegetation appropriate for target species. As new occurrences of target species were identified, the habitat at these sites was characterized and the definition of suitable habitat modified, if necessary.

Potential suitable habitat for coastal dunes milkvetch was identified as sites supporting grassland habitat on the first marine terrace. Potential suitable habitat for Pacific Grove clover was identified as sites supporting grassland habitat on the first through fourth marine terraces and swales in dune formations. Potential suitable habitat for Monterey clover was identified as sites supporting recently burned Monterey pine forest or pygmy forest on the fifth and sixth marine terraces and intervening slopes. Potential suitable habitat for Hickman's cinquefoil was identified as sites supporting grassland or open-canopied Monterey pine forest with grassy understory on the second through fourth marine terraces.

Data on occurrences of Yadon's rein orchid were gathered from David Allen's surveys conducted for the Pebble Beach Company (Allen pers. comm.) and from other sources (Natural Diversity Data Base 1995). Known occurrences (Natural Diversity Data Base 1995, Allen pers. comm.) of Yadon's rein orchid were surveyed and habitat was characterized by the Jones & Stokes Associates botanists at The Nature Conservancy's (TNC's) Bloom Ranch Preserve, Huckleberry Hill Preserve at the Presidio of Monterey, S.F.B. Morse Botanical Reserve, Huckleberry Hill Natural Area, and Pebble Beach Equestrian Center. Data on occurrences at the Old Capitol Site and along Jack's Peak Ranch were obtained by Jones & Stokes Associates from David Allen (Allen pers. comm.). The

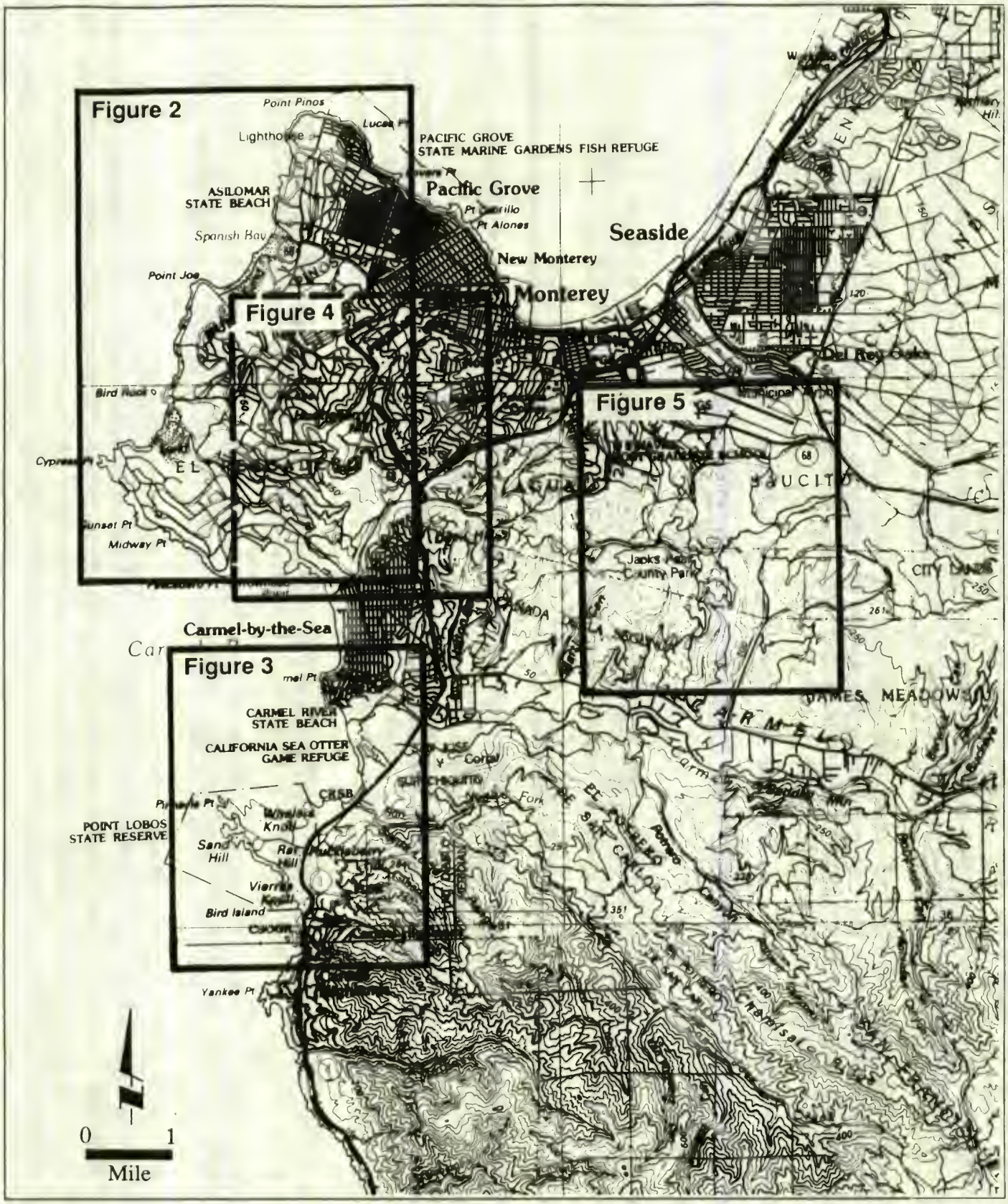

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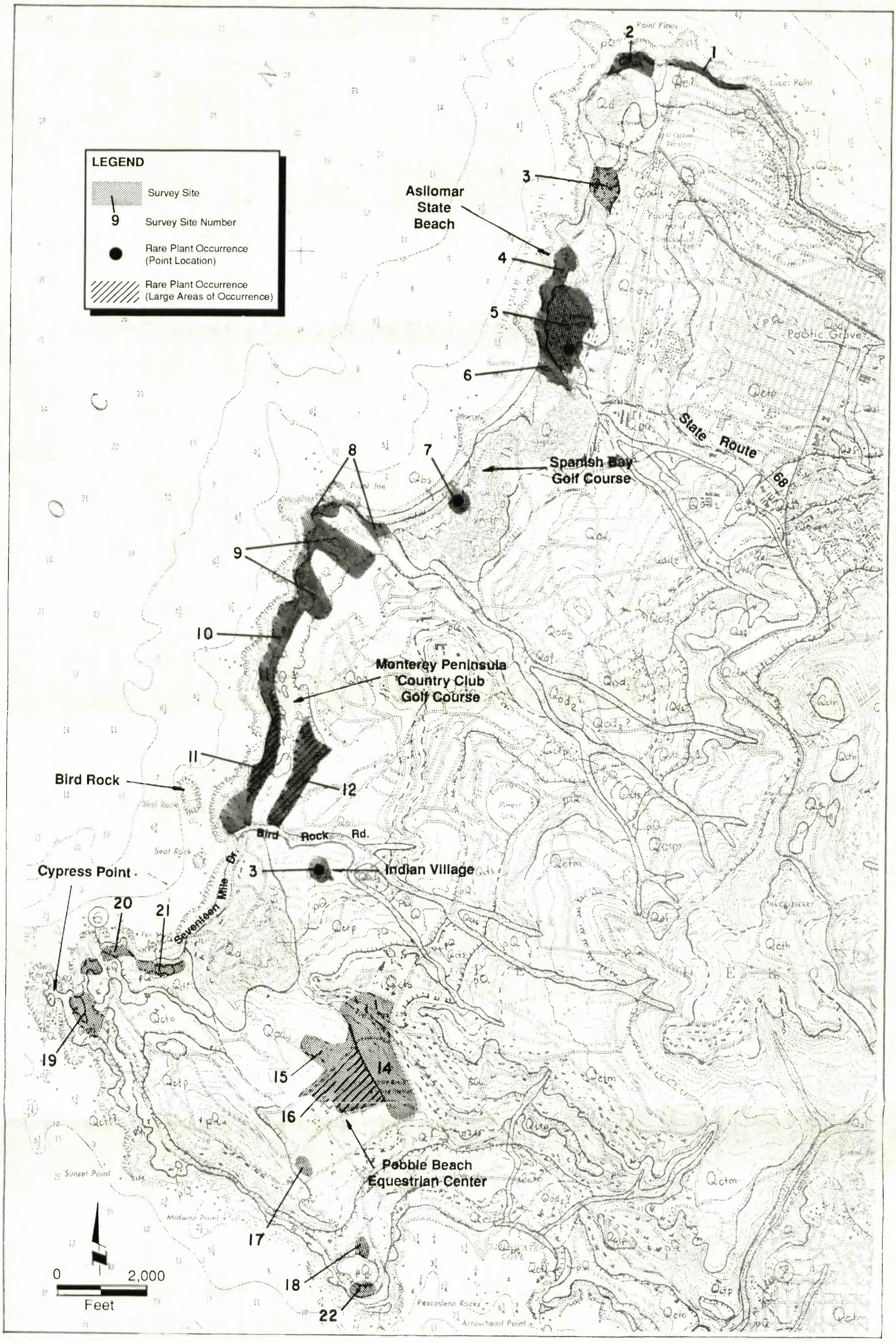
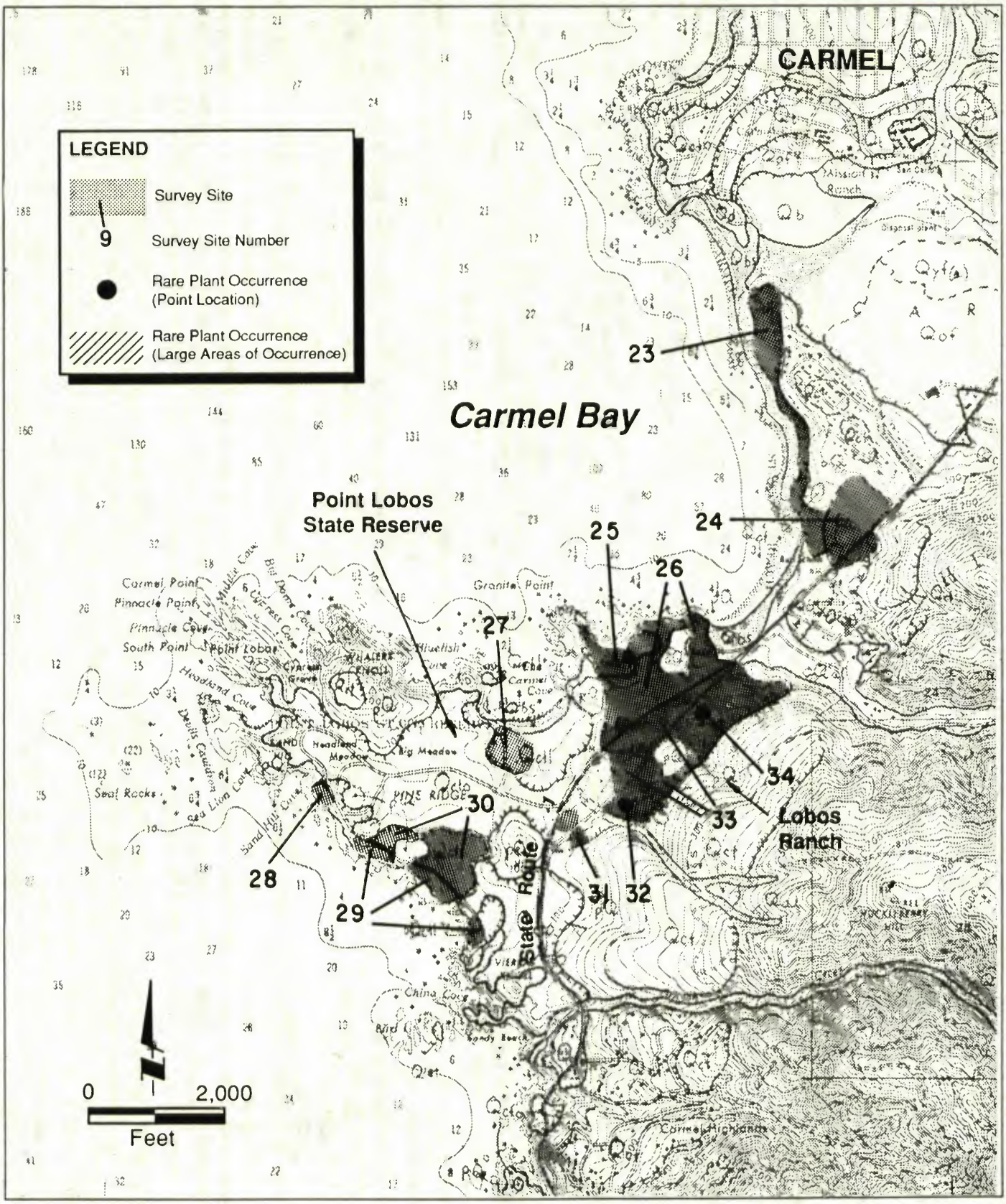
Figure 1
Overview Map of Study Area



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

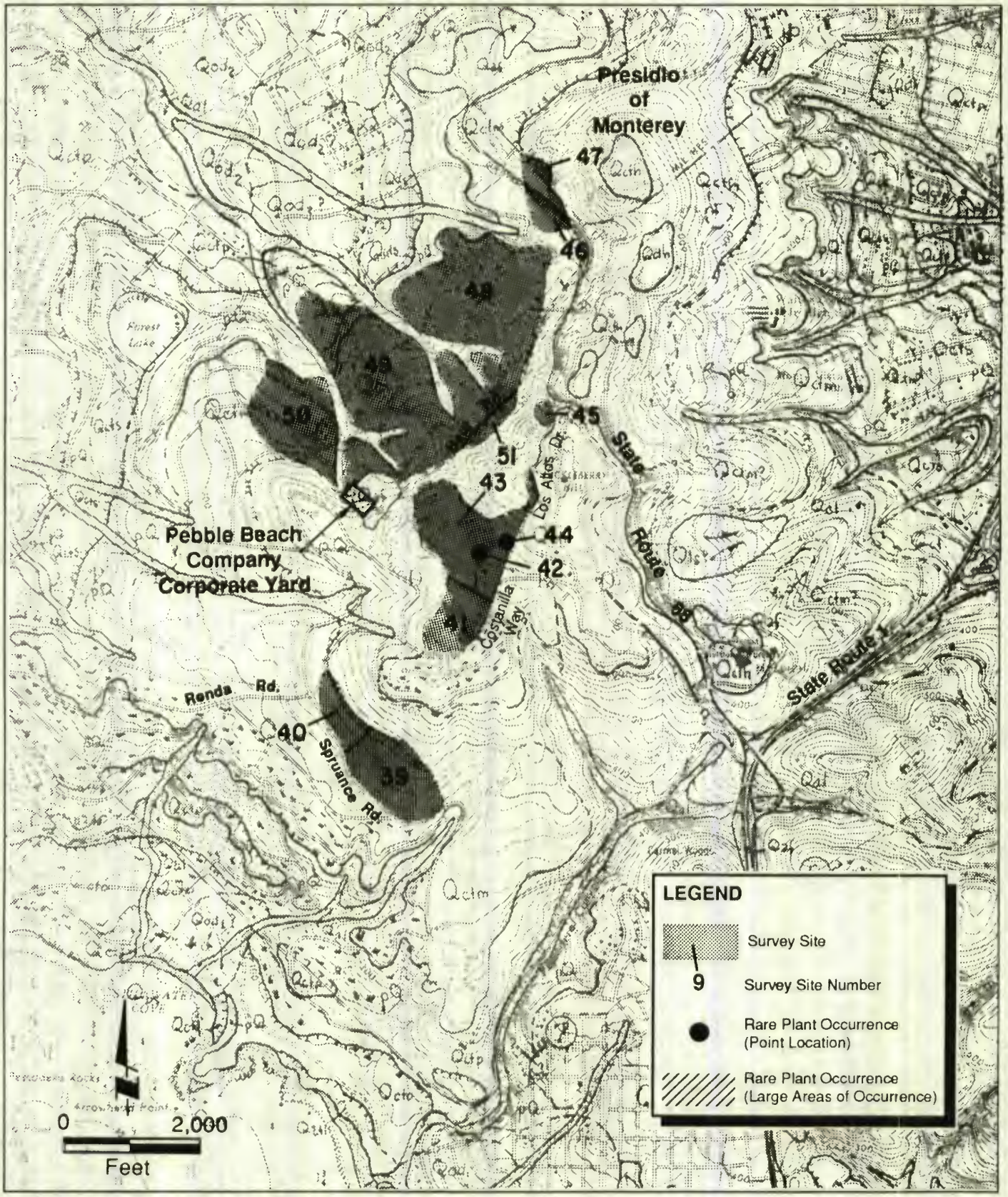
Figure 2
Rare Plant Survey Sites: Coastal Monterey Peninsula



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

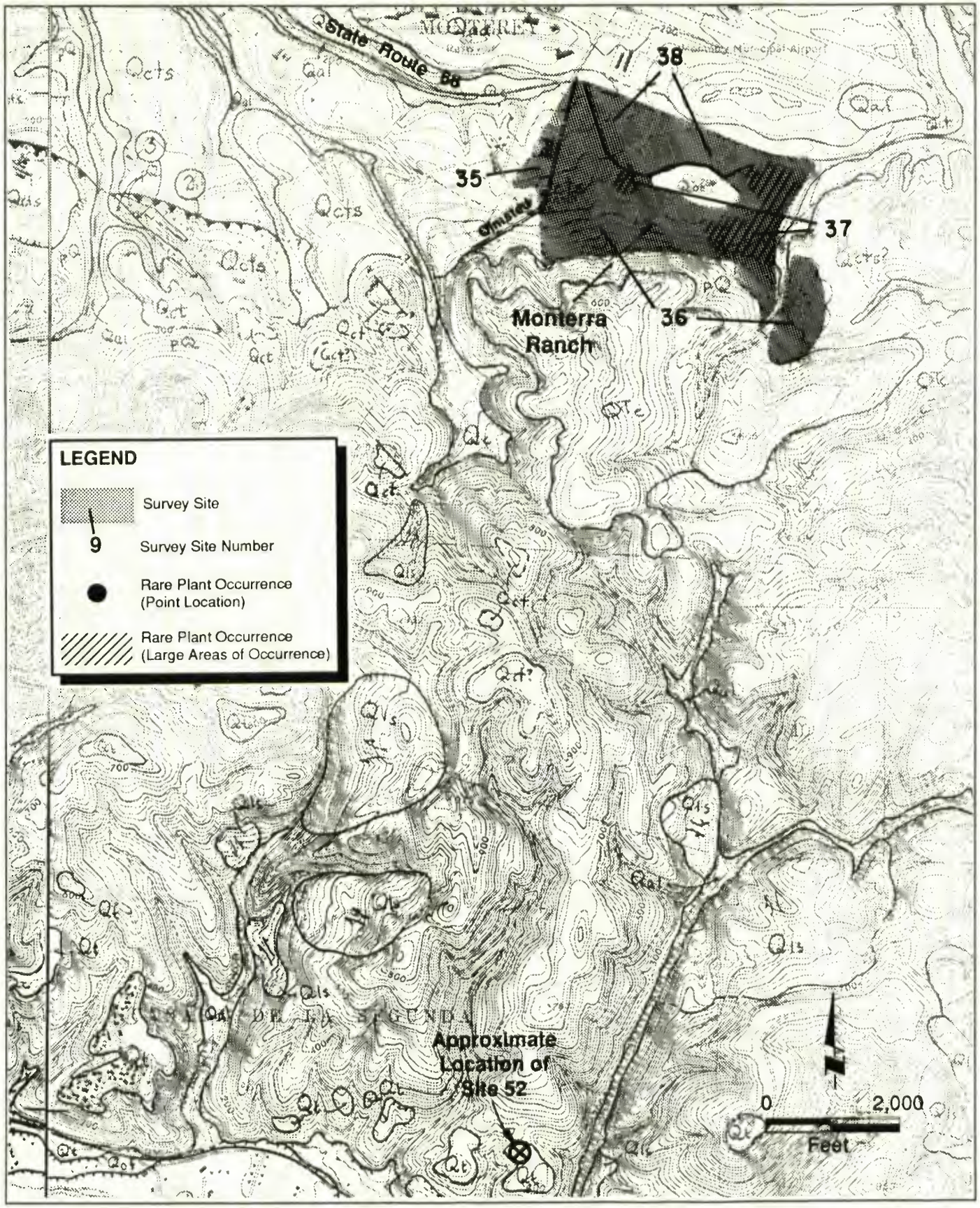
Figure 3
Rare Plant Survey Sites: Point Lobos and Carmel Bay



Source: Yadon pers. comm. Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 4
Rare Plant Survey Sites: Central Monterey Peninsula



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 5
Rare Plant Survey Sites: Monterra and September Ranches

site of an NDDB record for Yadon's rein orchid at Fort Ord was surveyed by the Jones & Stokes Associates botanists, but no specimens were found.

Data on occurrences of, and habitat for Gowen cypress were gathered by Jones & Stokes Associates during 1995 from site investigations and from file data from previous investigations of Gowen cypress and pygmy forest habitat (Jones & Stokes Associates 1994a).

Taxonomic nomenclature used in this report follows Hickman (1993). Common names for species were derived from Hickman (1993), U.S. Department of Agriculture (1986), and Matthews (1992).

All onsite surveys were conducted with prior permission from landowners. Potential habitat on private land for which entry approval had not been received was surveyed from offsite to assess habitat suitability for target species.

RESULTS AND RECOVERY RECOMMENDATIONS

This section describes the results of field surveys, literature reviews, and contacts with knowledgeable individuals for each of the six rare species. The following aspects are described for each species:

- description and taxonomy,
- listing status,
- distribution,
- ecology and habitat requirements,
- reasons for decline and threats to survival, and
- recommendations for habitat and population recovery.

Coastal Dunes Milkvetch

Description and Taxonomy

Coastal dunes milkvetch is a small annual in the legume family (Fabaceae). Stems are 2-12 centimeters (cm) long. The leaves are pinnately compound and 2-7 cm long, with seven to 13 leaflets. Leaflets are wedgelike to oblanceolate and 5-16 millimeters (mm) long. Flowers are borne in subcapitate racemes with two to seven flowers per inflorescence. The petals are purple. The fruit is a straight or curved legume 6-14 mm long. (Hickman 1993, California Native Plant Society 1987.)

Coastal dunes milkvetch is conspecific with alkali milkvetch (*Astragalus tener* var. *tener*), which occurs inland in alkaline, grassy flats in the Central Valley, San Francisco Bay region, and the lower Salinas Valley (California Native Plant Society 1987). Coastal dunes milkvetch is distinguished

from alkali milkvetch by its smaller banner (5.2-6 mm versus 7.8-11.8 mm in length) and typically fewer seed per fruit (five to11 seeds/fruit versus eight to 16 seeds/fruit) (Hickman 1993). Black hairs on the calyx are also a distinguishing characteristic (Yadon pers. comm.).

Listing Status

Coastal dunes milkvetch was proposed for federal listing as endangered under the Endangered Species Act in August 1995 (60 FR 148:39326-39337, August 2, 1995). It was listed as endangered under the California Endangered Species Act in February 1982. The California Native Plant Society (CNPS) considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

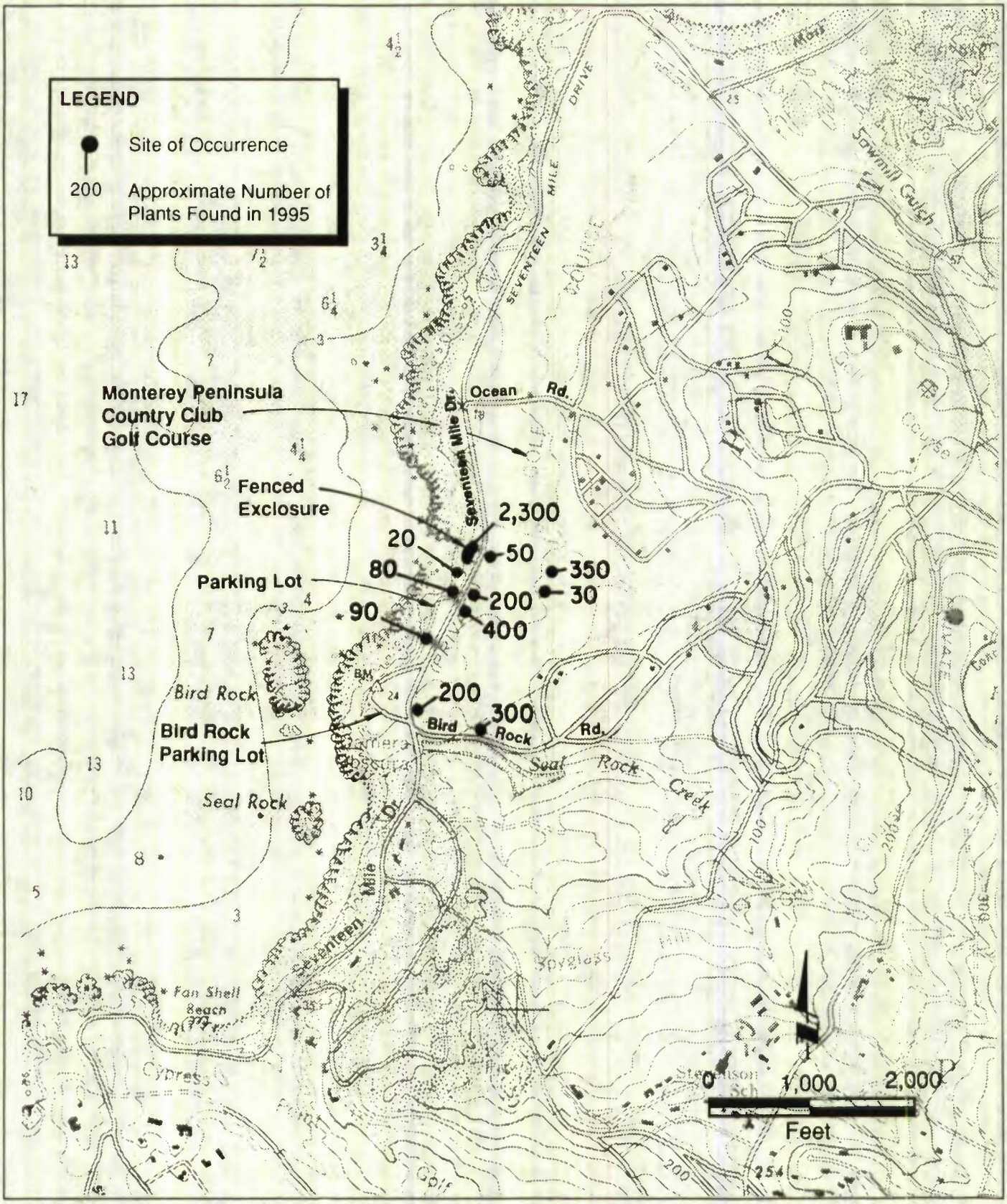
Distribution

Coastal dunes milkvetch historically occurred in a disjunct distribution at coastal sites in Monterey, Los Angeles, and San Diego Counties. The Los Angeles County occurrences are presumed extirpated and the San Diego County occurrences have not been documented since the 1970s, even though efforts were made in the 1980s to relocated them (Skinner and Pavlik 1994; Ferreira 1995; Natural Diversity Data Base 1995). Only one extant occurrence of coastal dunes milkvetch is known, on Seventeen Mile Drive near Bird Rock (Sites 11 and 12) on the Monterey Peninsula (Figure 6). This occurrence includes eleven scattered patches of plants, totaling approximately 4,000 individuals, on each side of Seventeen Mile Drive, along Bird Rock Road, and at a horse jumping area on the Monterey Peninsula Country Club Golf Course (Table 2). Prior to this study, coastal dunes milkvetch had not been identified at the horse jump area and along Bird Rock Road in survey Site 12. Milkvetch at Sites 11 and 12 is treated here as a single fragmented occurrence. Eleven patches that support milkvetch were identified within the two sites of this occurrence (Figure 6; Appendix B).

Ecology and Habitat Requirements

Coastal dunes milkvetch occurs on the first marine terrace, primarily on Antioch soils, with a few small stands on compacted Sheridan soils. The milkvetch occurs on moist sites within coastal prairie habitat preferring shallow depressions, swales, and the intermound areas in mima mound terrain. At the fenced exclosure on Site 11, the soil is the Antioch series and supports a sandy A horizon with a dense clay B horizon at about 23-inches depth. The clay layer is mottled, indicating periodic saturation and drying. Because of the exposure to ocean spray, it appears that coastal dunes milkvetch is likely tolerant of slightly saline soil conditions.

Coastal dunes milkvetch occurs in vegetation of very low stature, less than 6 inches tall and mostly less than 4 inches tall. Vegetative cover is moderate to high, encompassing about 80%-100% of the surface but with little overlapping of plant shoot systems. Shoot competition for space and light appears to be low where the milkvetch grows. Surrounding mound areas support taller, grass-dominated vegetation with more dense cover. Coastal dunes milkvetch is found at sites dominated



Base map: USGS Monterey, California 7.5-minute quadrangle photorevised 1983.

Jones & Stokes Associates, Inc.

Figure 6
Known Distribution of Coastal Dunes Milkvetch

Table 2. Coastal Dunes Milkvetch Occurrences Observed during 1995 Survey

Site Number	Site Name	Approximate Number of Plants	Geomorphic Surface	Habitat	Landowner
11	Seventeen Mile Drive	3,300 (in eight patches)	First marine terrace	Wet depressions	Pebble Beach Company (west of Seventeen-Mile Drive) Monterey Peninsula Country Club (east of Seventeen-Mile Drive)
12	Monterey Peninsula Country Club Golf Course	680 (in 3 patches)	First marine terrace	Wet depressions	Monterey Peninsula Country Club

by cut-leaved plantain (*Plantago coronopis*), California oatgrass (*Danthonia californica*), and tufted hairgrass (*Deschampsia cespitosa* ssp. *holciformis*). The occurrence of cut-leaved plantain and goldfields (*Lasthenia minor*) is a good indicator of appropriate microhabitat conditions for the milkvetch. Other plant species associated with the milkvetch are listed on the data forms in Appendix B.

Coastal dunes milkvetch flowers from March to May. Pollinators were not observed but, based on the floral structure, small bees are likely pollinators.

Reasons for Decline and Threats to Survival

Urban development has resulted in the loss of historical occurrences of coastal dunes milkvetch in southern California and possibly historical occurrences in Monterey. The construction of Seventeen Mile Drive and the Monterey Peninsula Country Club Golf Course resulted in the loss of individuals and habitat and fragmented the Bird Rock population of milkvetch.

Coastal dunes milkvetch occurs on land owned by the Pebble Beach Company west of Seventeen Mile Drive (Site 11) and on land owned by the Monterey Peninsula Country Club east of Seventeen Mile Drive (Sites 11 and 12).

Threats to the survival of coastal dunes milkvetch includes trampling, mowing, modifications in hydrology, and competition from other plant species. In 1989, Pebble Beach Company constructed an exclosure fence around part of the coastal dunes milkvetch population at Bird Rock to control access to the site. Competition from larger or more aggressive plants may threaten milkvetch populations. Pansa sedge (*Carex pansa*) is spreading within the fenced area and could overgrow milkvetch habitat. African ice plant (*Carpobrotus edule*) growing in the immediate vicinity could expand into milkvetch habitat and crowd out the milkvetch. The non-native cut-leaf plantain, a plant of similar size to the milkvetch, grows mixed with most of the milkvetch population and could represent a competitive threat (Ferreira 1995, Yadon pers. comm., Dorrell pers. comm.). Improvements or maintenance of Seventeen Mile Drive could result in hydrologic modifications to coastal dunes milkvetch habitat (e.g., increased ponding of runoff could degrade milkvetch habitat). Use of trails by pedestrians, horses, golf carts, and dogs result in trampling of milkvetch plants and horse races also take place on the trail. The milkvetch occurs on the trail side and not in the heavily used trail path. Any increase in use of the trail could result in the loss of plants and habitat. Mowing at the horse jumping area on the Monterey Peninsula Country Club Golf Course may be removing milkvetch plants.

Because it occurs at only one location, coastal dunes milkvetch is susceptible to extinction from random catastrophic events. Examples of possible events that could result in extinction are the introduction of a disease into the population, or a major storm that results in wave erosion of the terrace or tidal surges onto the site. Increases in recreational use or new development could quickly eliminate this species.

Recommendations for Habitat and Population Recovery

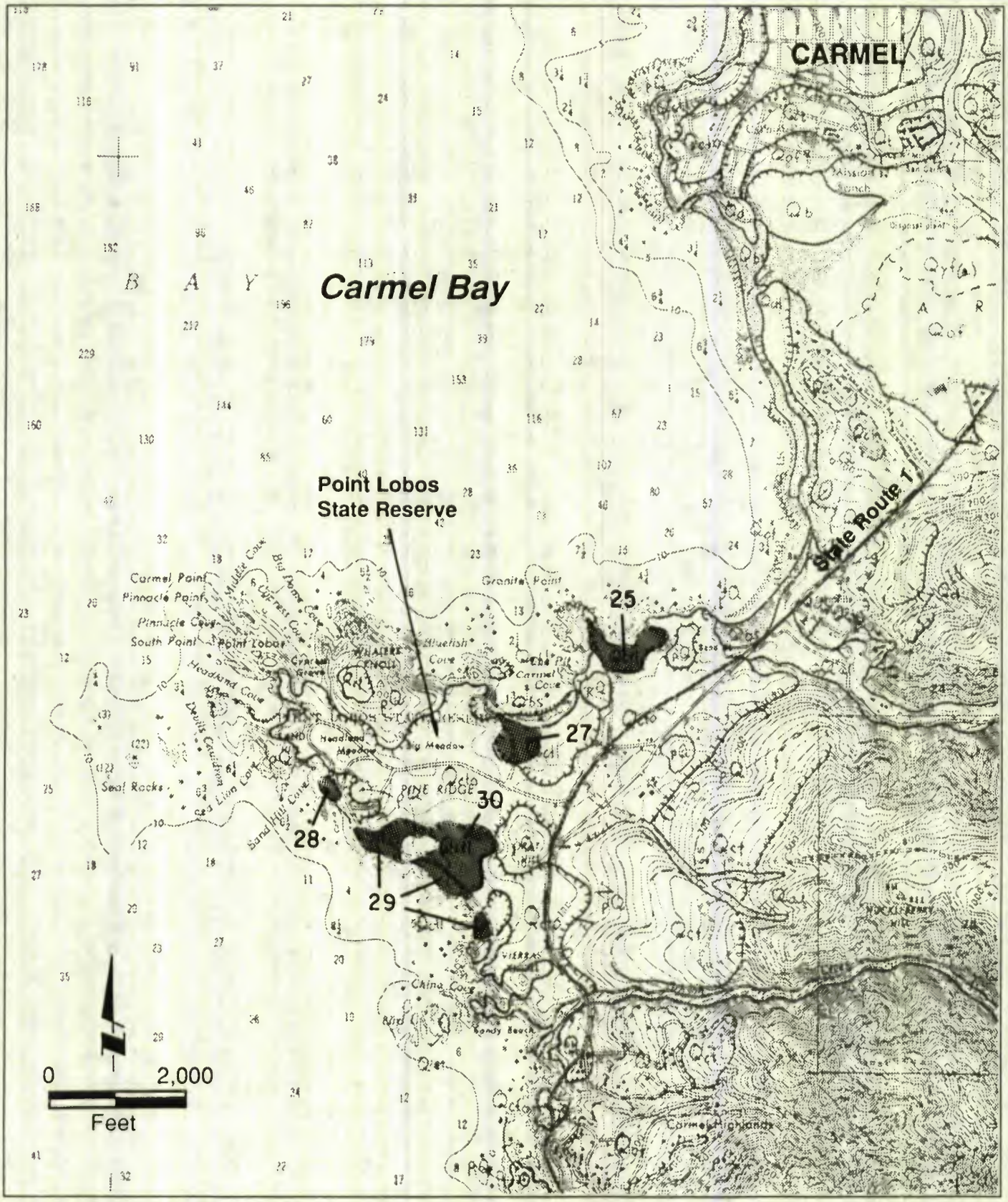
Recovery of coastal dunes milkvetch should focus on establishment of new populations at protected sites. Additional protection measures for the existing population are needed, but are mostly infeasible. The extant Bird Rock population has maintained itself at its existing site for at least the last 90 years and likely much longer. This site, however, has been seriously degraded by the construction of roads, parking lots, a golf course, and trails; invasion by non-native plants; and exposure to the activities of people including tourism, beach going, golfing, horseback riding, and dog walking. Property owners should be encouraged to control access at this site to avoid or reduce adverse affects on coastal dunes milkvetch. Approximately 4,000 individuals of coastal dunes milkvetch were observed during Jones & Stokes Associates surveys in 1995. Only about 2,300 of these individuals were within the fenced exclosure on the Pebble Beach Company property and this exclosure offers only limited protection of plants. The following measures could be taken to protect the existing milkvetch population:

- construct post and cable fence between trails and milkvetch populations;
- discourage horse racing on the trail, especially during the winter and spring months when the ground is wet and the plants are growing;
- control invasive species such as African ice plant and pansa sedge.

DFG should approach the Pebble Beach Equestrian Center and explore the possibility of changing the timing of the Los Altos Hunt from its present scheduling in mid-spring to a July or August running. Approximately 200 horses run in this annual race and the trampling during flowering and fruiting of milkvetch could reduce reproduction.

A program to control invasive species should be initiated at the Bird Rock site. Control of pansa sedge and African ice plant with herbicides or hand pulling would increase suitable habitat for the milkvetch. Pansa sedge should be removed from within the exclosure. African ice plant should be removed from within the exclosure, sites north and south of the exclosure, and suitable milk vetch habitat along the east side of Seventeen Mile Drive. DFG should request that the Pebble Beach Company make these weed control actions an ongoing part of their maintenance program at these sites.

A program should be initiated to introduce and establish populations of coastal dunes milkvetch at other sites on the first marine terrace that support suitable soil and vegetation conditions. Coastal dunes milkvetch can be successfully grown from seed in pots (Yadon pers. comm.). Several sites (Sites 25, 27, 28, 29, and 30) at Point Lobos State Reserve meet these criteria and should be investigated as potential establishment sites (**Figure 7**). Sites 25 and 29 appear to offer the highest quality suitable habitat. Site 29 appears to be especially promising because the site is on the first marine terrace immediately adjacent to the beach, Antioch soils with mima mound relief are extensive there, and many of the common associates of coastal milkvetch are found in the intermound habitat. DFG should coordinate with California Department of Parks and Recreation (CDPR) to develop a



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 7
Potential Sites for Establishing New Coastal Dunes Milkvetch Populations

milkvetch population establishment program at Point Lobos State Reserve. The milkvetch population establishment program should include the following elements:

- seed collection strategy to ensure genetic diversity in seeds collected and avoid overharvesting;
- seed propagation program for increasing the amount of seed for field dispersal;
- site evaluation to locate specific sites for seed introduction with appropriate soil, hydrology, and vegetation characteristics;
- seed dispersal protocol, including several sowing methods should be tested andcompared for efficacy; and
- monitoring and data management program.

DFG should coordinate with CDPR in developing and implementing the milkvetch establishment program at Point Lobos State Reserve. Other sites should be investigated along the California coast that are potentially suitable for establishment of coastal dunes milk vetch. The Hearst Ranch or other sites in coastal San Luis Obispo County may support suitable habitat (Ertter pers. comm.). Seeds of coastal dunes milk vetch are stored at Rancho Santa Ana Botanical Garden.

Pacific Grove Clover

Description and Taxonomy

Pacific Grove clover is a small annual in the legume family. The stems are semi-prostrate and 2-4 decimeters (dm) long. The palmately compound leaves have three obovate to wedge-shaped leaflets. Flower petals are light purple with paler tips, 8-10 mm long in small flower heads. Fruits are two-seeded pods.

Pacific Grove clover has been recognized as a separate species (Munz 1968). The most recent taxonomic treatment, however, identifies Pacific Grove clover as a phase of whitetip clover (*Trifolium variegatum*), a highly variable species (Hickman 1993). Pacific Grove clover is identified in Isely's treatment of clovers as "phase 4" of whitetip clover and Isely speculates that Pacific Grove clover is of hybrid origin (Hickman 1993). DFG and CNPS continue to recognize Pacific Grove clover as a distinct taxonomic entity. The distinguishing characteristic of Pacific Grove clover is its three-toothed calyx lobes. Flowers of Pacific Grove clover tend to be smaller and paler in color than those of whitetip clover and the plants are typically smaller overall. Many of the populations of Pacific Grove clover occur with whitetip clover as well as several other clover species. Pacific Grove clover was clearly distinguishable from the other clover species at sites where populations were identified in this study. For the purposes of this report, Pacific Grove clover will be treated as a separate taxonomic

entity. If this clover is confirmed as a hybrid, then the recovery recommendations presented here would not be applicable.

Listing Status

Pacific Grove clover was a federal Category 1 candidate for listing as threatened or endangered under the Endangered Species Act (58 FR 188:51144-51190, September 30, 1993); however, U.S. Fish and Wildlife Service no longer considers Pacific Grove clover to be a candidate for listing as threatened or endangered because of questions of its taxonomic validity as a species (Rutherford pers. comm.). Pacific Grove clover was listed as rare under the California Native Plant Protection Act in September 1979. CNPS considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

Distribution

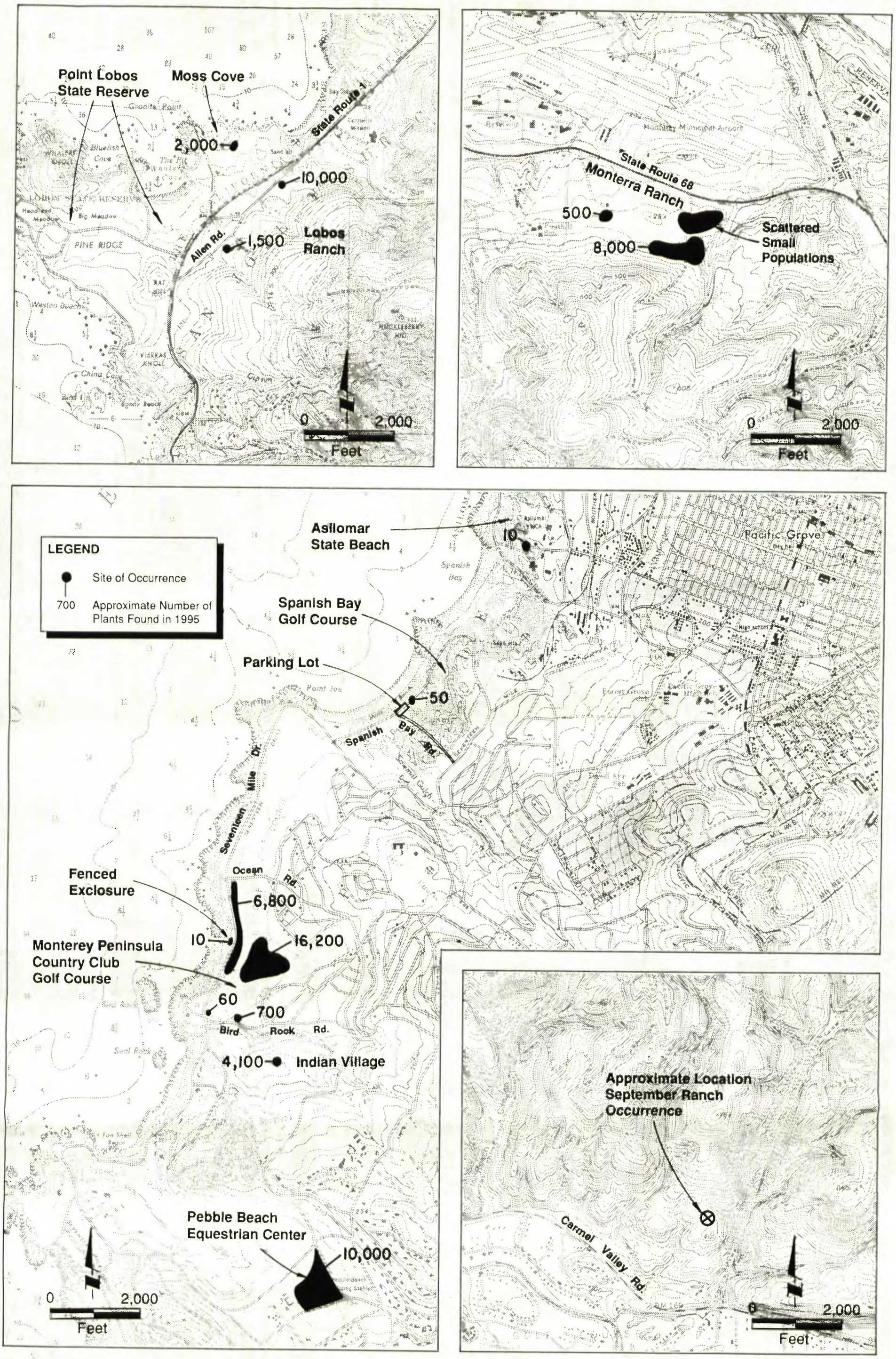
Pacific Grove clover is known only from the Monterey and Point Lobos Peninsulas and sites immediately inland of these areas (Figure 8, Table 3). Before the Jones & Stokes Associates surveys, Pacific Grove clover had been identified at the following five sites :

- Seventeen Mile Drive near Bird Rock (Site 11) (NDDB 1995),
- Indian Village (Site 13) (NDDB 1995),
- Asilomar State Beach (Site 5) (Moss pers. comm.),
- Monterra Ranch (Site 37) (Yadon pers. comm.), and
- September Ranch (Site 51) (Mori pers. comm.).

Six additional occurrences were identified in the Jones & Stokes Associates study at the following sites:

- Spanish Bay Golf Course (Site 7),
- Monterey Peninsula Country Club Golf Course (Site 12),
- Pebble Beach Equestrian Center parking lot and grandstands (Site 16),
- Point Lobos State Reserve on the Moss Cove trail (Site 25),
- Lobos Ranch at the south end of Allen Road (Site 32), and
- Lobos Ranch at the north end of Allen Road (Site 34).

The occurrence of Pacific Grove clover at Monterra and September Ranches indicates that it is possible that additional populations of Pacific Grove clover could be found through surveys focused at inland sites in grassland habitat along the Carmel River Valley and Canyon Del Rey (State Route 68). The finding of a large number of new populations of this clover along the coast by Jones & Stokes Associates in 1995 was the result of a focused effort targeted at potentially suitable habitat on coastal marine terraces.



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 8
Known Distribution of Pacific Grove Clover

Table 3. Pacific Grove Clover Occurrences Observed during 1995 Survey

Site Number	Site Name	Approximate Number of Plants	Geomorphic Surface	Habitat	Landowner
5	Asilomar State Beach	10	Recent dunes	Swale in old roadbed	California Department of Parks and Recreation
7	Spanish Bay Golf Course	50	Recent dunes	Swale in old roadbed	Pebble Beach Company
11	Seventeen Mile Drive	6,870	First marine terrace	Wet depressions	Pebble Beach Company (west of Seventeen-Mile Drive); Monterey Peninsula Country Club (east of Seventeen-Mile drive)
12	Monterey Penninsula Country Club Golf Course	680	First marine terrace	Wet depressions	Monterey Peninsula Country Club
13	Indian Village	4,100	Second marine terrace	Wet meadow	Del Monte Forest Foundation
16	Pebble Beach Equestrian Center	10,000	Third marine terrace	Wet meadow (parking area)	Pebble Beach Company
25	Moss Cove Trail	2,000	First marine terrace	Swale and wet depressions	California Department of Parks and Recreation
32	Lobos Ranch - Allen Road South	1,500	Second marine terrace	Wet meadow (pasture)	Big Sur Land Trust
34	Lobos Ranch - Allen Road North	10,000	Second marine terrace	Wet meadow (wetland seep)	Big Sur Land Trust
37	Monterra Ranch	10,000	Fourth marine terrace	Wet depressions	Monterra Ranch Company
51	September Ranch[a]	100	Pleistocene fluvial terrace	Grassland	September Ranch

[a] Mori pers. comm.

Ecology and Habitat Requirements

Pacific Grove clover is known from the first, second, third, and fourth marine terraces; recent (Holocene) dunes in swales; and old (Pleistocene) fluvial terrace. It prefers moist sites such as swales and wet depressions in coastal prairie and annual grassland habitats. At some sites this clover is the dominant species over small areas forming a dense carpetlike cover. It has been found on Antioch, Santa Ynez, and Narlon soils. Pacific Grove clover is tolerant of vegetation disturbance and soil disturbance. It has been found in pastures, trails, horse training areas, parking areas, picnic grounds, and abandoned roads and under grandstands. Disturbance regimes where the clover occurs include horse and pedestrian trampling, vehicle traffic and parking, mowing, and horse and cattle grazing.

During the surveys, Pacific Grove clover was always found in association with other clovers, including whitetip clover, cow clover (*Trifolium wormskioldii*), bearded clover (*Trifolium barbigerum*), pin-point clover (*Trifolium gracilentum*), shamrock (*Trifolium dubium*), and thimble clover (*Trifolium microdon*). Cut-leaf plantain, common toad rush (*Juncus bufonius*), and iris-leaved rush (*Juncus phaeocephalus*) are also typical associates of Pacific Grove clover and indicators of potentially suitable habitat.

Pacific Grove clover is found mainly (eight of 11 occurrences) associated with grassland habitat on marine terraces. The two populations found on dunes were in swales that developed in compacted soils of abandoned roadbeds (Sites 5 and 7). These two populations supported a total of only about 60 individuals. The one population found on a fluvial terrace by Mori was not surveyed by Jones & Stokes Associates and supported about 100 individuals (Mori and Morgan pers. comms.).

Pacific Grove clover flowers from May to June. No pollinators were observed, but small bees are likely important pollinators.

Reasons for Decline and Threats to Survival

Pacific Grove clover has declined from its historical extent because of residential, golf course, and other development on the Monterey Peninsula.

Pacific Grove clover occurs on lands owned by the following:

- Pebble Beach Company,
- Monterey Peninsula Country Club,
- Del Monte Forest Foundation,
- California Department of Parks and Recreation,
- Big Sur Land Trust,
- Monterra Ranch Company, and
- September Ranch.

Approximately 45,000 individuals of Pacific Grove clover were identified at 11 sites in spring 1995 (Table 3). It should be noted that 1995 was a wet year with mild temperatures that produced large populations of spring wildflowers. Future springs are not likely to produce this many plants very often. About 2,000 of the Pacific Grove clover plants were in permanently protected sites (Sites 5 and 25) owned by CDPR. Approximately 10,000 plants were at Lobos Ranch (Site 34) in areas slated to be transferred to CDPR. Although several of the largest populations of Pacific Grove clover are on private lands that undergo frequent vegetation and ground disturbance (Sites 11, 13, and 16), the clover has persisted and thrived probably because of the disturbance rather than despite it. Development at these sites could eliminate these important populations. Populations on grazing lands at the south end of Allen Road on Lobos Ranch, Monterra Ranch, and September Ranch are not threatened by the present land use practices; however, development at these sites could eliminate the populations.

A large number of individuals and several new populations of Pacific Grove clover were found in 1995. The likelihood for extinction of this species is not considered to be high in the near term. However, the majority of occurrences and individuals of this clover occur on privately owned land where land use could change and threaten the species persistence.

Recommendations for Habitat and Population Recovery

Caution should be taken in making attempts to change the existing disturbance regimes at sites where Pacific Grove clover is presently found because it appears to be persisting and thriving with the artificial vegetation and ground-disturbing activities at these locations (Sites 11, 12, 13, 16, 32, 37, and 51). The disturbance regimes at these sites are uncontrolled and a gradual transition to controlled disturbance management is recommended where landowner approval and participation can be achieved. An example of controlled disturbance management would be the use of grazing livestock or mowing at a specific intensity and timing, as opposed to uncontrolled recreational use that can vary greatly in intensity and time of vegetation disturbance.

The occurrences at Asilomar State Beach (Site 5) and Spanish Bay Golf Course (Site 7) are small populations on marginal habitat (interdune swales created in abandoned roadbeds). These populations should be monitored but are apparently not important to the species persistence. No population or habitat enhancement actions are recommended at these sites.

At Seventeen Mile Drive (Site 11), Pacific Grove clover occurs along the horse/pedestrian trail. This use does not appear to adversely affect the clover, and the vegetation disturbance from trampling may be of benefit through the reduction of competitive cover. The present recreational use could continue, but increases in horse or pedestrian traffic (especially horse racing) should be discouraged.

At the Monterey Peninsula Country Club Golf Course (Site 12), Pacific Grove clover also occurs in areas of horse and pedestrian traffic and horse jumping. These activities could continue without threatening the population. Other activities, especially golf course maintenance activities, could adversely affect this population and should be controlled. Activities such as dumping of lawn

clippings, herbicide spraying or drift, expansion of greens, or other changes in use of these sites should be discouraged.

At the Indian Village site (Site 13), Pacific Grove clover occurs in areas used for picnicking, parking, and other activities and adjacent to the volleyball and horseshoes courts. This site is mowed regularly. A fenced exclosure at this site supports Hickman's cinquefoil (see discussion under the section "Hickman's Cinquefoil"), but no Pacific Grove clover. The exclosure is not mown and supports tall grass, likely inhibiting establishment of the clover. Recreational activities and maintenance mowing at this site could likely continue without threatening the clover population. However, increases in recreational use or a change in the use of the site could reduce or eliminate the population. The clover population at this site should be monitored and recreational activities should be kept to the present type and levels of use. Mowing could continue but should be discontinued during the flowering and fruiting stages of the clover. Alternatively, mowers could be set to a height that avoids cutting the low-growing clover flower heads.

At the Pebble Beach Equestrian Center (Site 16), Pacific Grove clover occurs in the parking and grandstand areas. The heavy ground disturbance in these areas has not kept the clover from occurring here. Soils in the parking area are compacted Narlon soils with a heavy clay layer (Bt horizon) starting at 17 inches depth. The soil compaction could favor the clover by creating more wet areas. Much of the clover habitat at the equestrian center may be of artificial origin and artificially maintained by heavy disturbance. A large number of plants occur here, roughly estimated at 10,000 individuals. This site could be used for experimental studies of the relationship between the clover and various vegetation and ground disturbance levels. With landowner cooperation, infrequently used or unused areas at the equestrian center could be set aside for Pacific Grove clover protection. These sites could be fenced and managed for an appropriate disturbance regime based on the results of experimental studies, to favor clover habitat.

The Moss Cove trail occurrence (Site 25) of Pacific Grove clover is within Point Lobos State Reserve. This population should be monitored. No change in present management practices should be made unless the population declines. Signs should be placed at the trailhead encouraging hikers to stay on the trail because of the presence of sensitive species. The specific population location should be withheld to avoid vandalism.

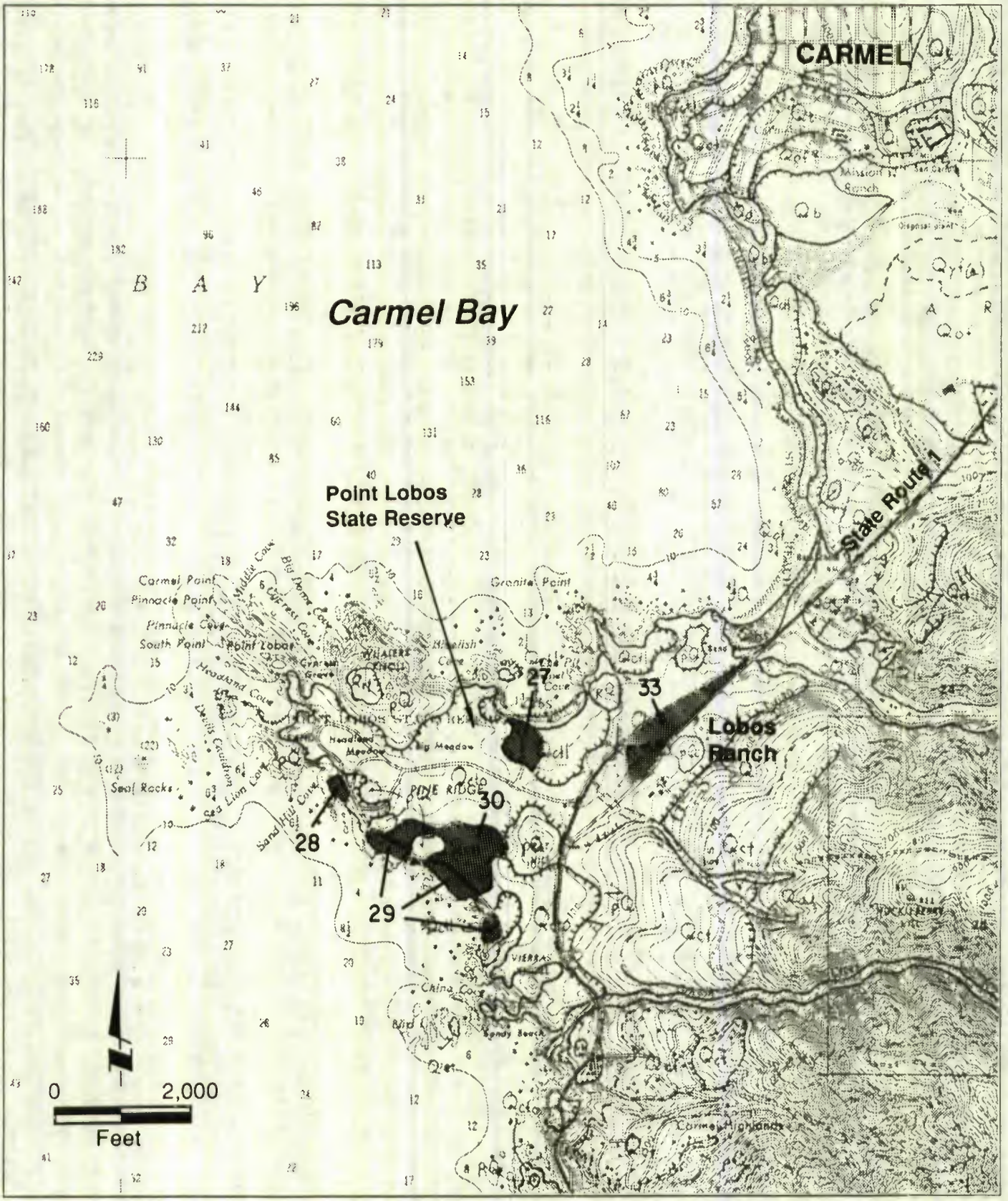
The occurrences at Lobos Ranch (Sites 32 and 34) are in horse pastures, although the Allen Road north site (Site 34) apparently has not been grazed in several years. Pacific Grove clover grows unusually large and tall (about 2 feet tall) among tall vegetation at the Allen Road north site. This site is also the wettest site on which the clover was found; it has a black soil matrix (N2/0 on the Munsell color chart), indicating hydric soil conditions. The clover populations at both sites should be monitored annually and experimental studies of vegetation management techniques, such as various grazing intensities, should be conducted. The Big Sur Land Trust should bring these two sites under appropriate management, based on the results of experimental studies, for Pacific Grove clover as soon as possible. Care should be taken not to overgraze the Allen Road south site (Site 32). The Allen Road south population (Site 32) is in the proposed Whisler subdivision and could be removed for development of this project. Impacts on this population should be avoided, if feasible, in the final design of the project. The conditions at the Allen Road north site are unusual for Pacific Grove clover,

but grazing should be conducted over portions of the site to test its effect on the clover population. CDPR should continue management of the Allen Road north population when the land is transferred to Point Lobos State Reserve.

At the Monterra Ranch (Site 37), the population of Pacific Grove clover was roughly estimated at 10,000 individuals. The site supports annual grassland grazed by cattle with the clover in natural wet depressions, drainages, and an old roadbed. This population has been known since 1994 and the large number of individuals and large area of occurrence of clovers indicates that it has likely been here much longer. The clover population will likely persist under present land management. With landowner permission, the population should be monitored and studied. This site offers a good opportunity to study the effects of different intensities of cattle grazing on clover success. This privately owned site supports a large area of relatively level or gently sloping terrain and could be developed, reducing or eliminating the clover population. The largest stand (about 8,000 individuals) of Pacific Grove clover in the eastern portion of the ranch could be protected through fee acquisition or conservation easement.

At the September Ranch (Site 52), Pacific Grove clover occurs in areas grazed by cattle and horses. This occurrence was observed by Mori and Morgan on May 12, 1995, and supports about 100 individuals. This occurrence is on a Pleistocene fluvial terrace (Dupré 1990). The site was not surveyed by Jones & Stokes Associates and specific soil conditions at the population site have not been characterized, but the site is mapped as Santa Lucia soil series (U.S. Soil Conservation Service 1978). This site could be developed resulting in the loss or elimination of the population. Not enough information is available to identify specific management recommendations; however, the general recommendations provided for the Monterra Ranch site also could be applied here.

Potential suitable habitat for Pacific Grove clover occurs at survey Sites 8, 17, 19, 20, 27, 28, 29, 30, 33, and 38 where populations of clover are not presently known. Of these sites, only Sites 27, 28, 29, and 30 are on public land at Point Lobos State Reserve. These four sites should be considered for establishment of new populations of Pacific Grove clover (Figure 9). Portions of Site 33 that are slated to be transferred to CDPR also should be considered for establishment of new populations. Seed for new population establishment should be collected from the nearest sites supporting Pacific Grove clover populations, populations from which a natural dispersal would be most likely. Seed should not be overharvested from existing populations. Clover could be propagated in pots to increase the amount of seed for field sowing. Pacific Grove clover has been grown successfully from seed in pots (Ferreira 1995, Yadon pers. comm.). New populations may require some form of artificial disturbance regime, such as livestock grazing, to maintain the quality of the habitat for Pacific Grove clover. High-quality habitat for establishment of coastal dunes milkvetch populations should take precedence over the use of these sites for establishment of new Pacific Grove clover populations because of the extreme rarity of the milkvetch.



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 9
Potential Sites for Establishing New Populations of Pacific Grove Clover

Monterey Clover

Description and Taxonomy

Monterey clover is a small annual in the legume family. Its stems are spreading and 2-4 dm long. The palmately compound leaves have three wedge-shaped leaflets that are 5-10 mm long. The flower head has up to 10 pink to lavender, 6-mm-long flowers. The calyx is hairy and 6-7 mm long with the lobes generally longer than the tube. (Hickman 1993, California Native Plant Society 1994).

Monterey clover is recognized as a separate species (Munz 1968, Hickman 1993). Identifying characteristics of Monterey clover include the presence of a conspicuous involucre, a long hairy calyx, and calyx lobes that are long relative to the calyx tube (Hickman 1993). Monterey clover also has been reported to differ from whitetip and other clovers because it has seven-seeded fruit as opposed to two-seed fruits (Ferreira 1995). Monterey clover is considered to be most closely related to whitetip clover and Isely speculates that Monterey clover may be a hybrid of whitetip clover and a non-involucrate species of clover (Hickman 1993). Monterey clover is distinguished from whitetip clover by its hairy calyx and smaller, more deeply cut involucre (Hickman 1993).

Listing Status

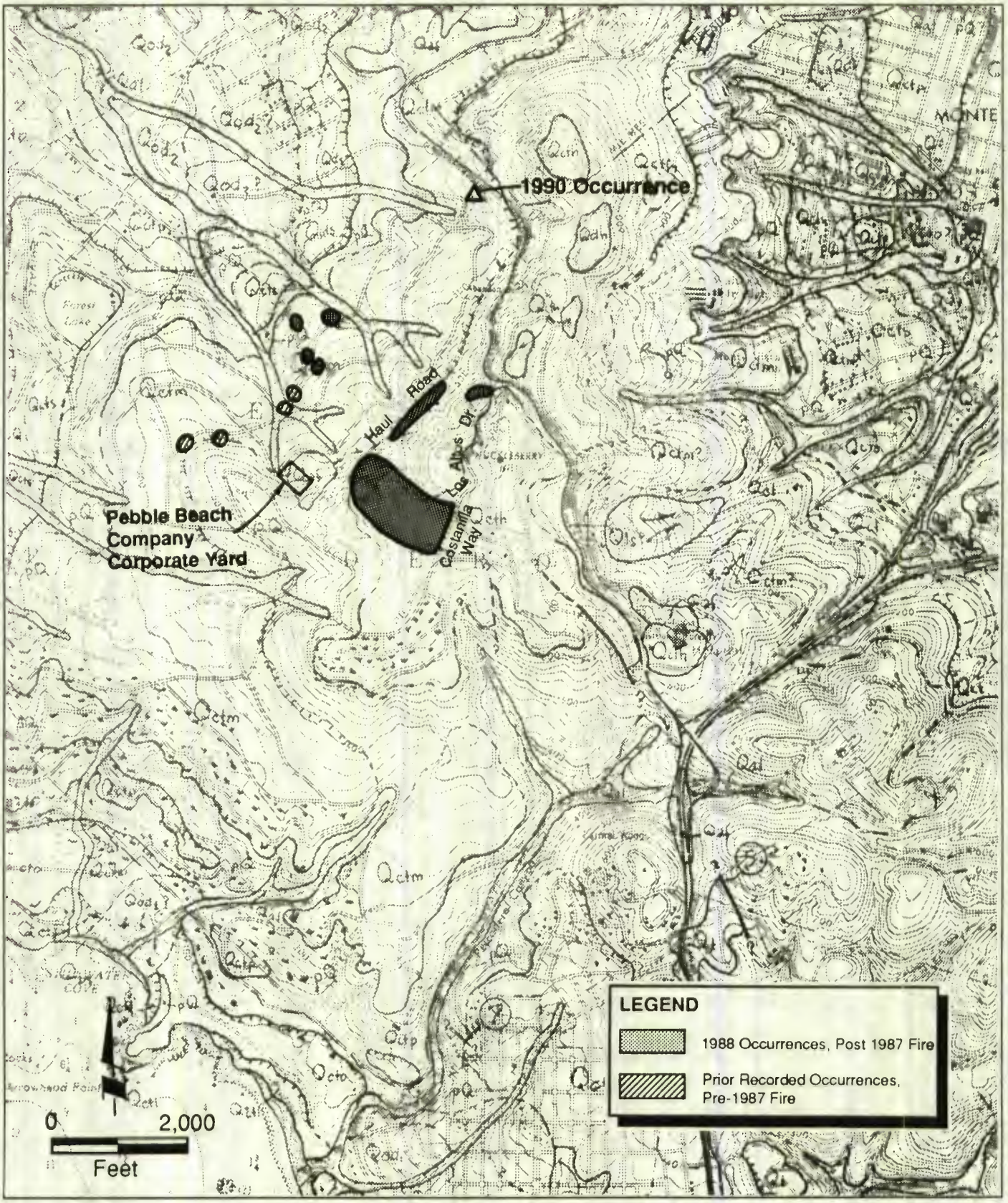
Monterey clover was proposed for federal listing as endangered under the Endangered Species Act in August 1995 (60 FR 148:39326-39337, August 2, 1995). It was listed as endangered under the California Native Plant Protection Act in November 1979 and is also protected as an endangered species under the California Endangered Species Act. CNPS considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

Distribution

Monterey clover is known only from the central portion of the Monterey Peninsula (Figures 10 and 11). Before the 1987 fire at Huckleberry Hill, Monterey clover was known only from occurrences at the S.F.B. Morse Botanical Reserve and near State Route 68 (Yadon pers. comm.) (Figure 10). In spring 1988, much larger populations were identified along Costanilla Way and Los Altos Road and in the S.F.B. Morse Botanical Reserve (Yadon pers. comm.) (Figure 10). A small number of plants were observed near State Route 68 following a fire in 1990 (Yadon pers. comm.) (Figure 10). Jones & Stokes Associates surveys in 1995 identified two occurrences of Monterey clover with a total of 22 plants along Costanilla Way (Sites 42 and 44) (Figure 11, Table 4).

Ecology and Habitat Requirements

Monterey clover occurs on the fifth and sixth marine terraces and the intervening slope between these terraces. The largest populations observed in 1988 were on the sixth marine terrace



Source: Yadon pers. comm. Base map: Dupre´ 1990.

Jones & Stokes Associates, Inc.

Figure 10
Occurrences of Monterey Clover Reported in 1988, 1990, and before 1987

Table 4. Monterey Clover Occurrences Observed during 1995 Survey

Site Number	Site Name	Approximate Number of Plants	Geomorphic Surface	Habitat	Landowner
42	Costanilla Way at Fire Road	9	Sixth marine terrace	Grassy opening in Monterey pine forest	Pebble Beach Company
44	Costanilla Way at Los Altos Drive	13	Sixth marine terrace	Grassy opening in Monterey pine forest	Pebble Beach Company

Base map: USGS Monterey, California 7.5-minute quadrangle photorevised 1983.

Jones & Stokes Associates, Inc.

Figure 11
Known Distribution of Monterey Clover in 1995

(Figure 10). Populations observed in 1995 were on the sixth terrace on Narlon and Huckleberry soils. Huckleberry soils are a variant of the Narlon series with bright red mottles in the Bt horizon (Jones & Stokes Associates 1994a). These soils support a thin or no A horizon, a leached E horizon, and a Bt horizon of massive, compacted sandy clay at 10-12 inches depth. Water accumulates on the clay layer.

Monterey clover is a fire follower, only appearing in large numbers after fire has removed the vegetative cover. It occurs in greatest numbers in the spring following crown fires in Monterey pine forest and pygmy forest dominated by a mix of Bishop pine (*Pinus muricata*) and Gowen cypress. A large fire in May 1987 burned stands of Monterey pine and pygmy forests on the fifth and six marine terraces and intervening slopes at the S. F. B. Morse Botanical Reserve and Huckleberry Hill Natural Area. Monterey clover appeared the following spring in large numbers on the sixth terrace (Sites 41 and 43) in recovering Monterey pine forest and in smaller numbers at scattered locations on the fifth terrace (Site 49) in recovering pygmy forest and on intervening slopes (Sites 51 and 45) in recovering Monterey pine forest. Following a fire in 1990, a few individuals of Monterey clover were found south of State Route 68 in recovering Monterey pine forest on the fifth terrace (Sites 46 and 47) (Yadon pers. comm.).

As forests recover, the dense stands of pine and cypress seedlings and recovering shrubs shade and crowd Monterey clover, and the clover populations decline rapidly. In spring 1989, only a few Monterey clover plants could be found at the sites of 1988 occurrences, with much of the previous year's clover habitat dominated by foothill deer vetch (*Lotus humistratus*) (Yadon pers. comm.). All sites known to support Monterey clover during the 1980s and 1990s were surveyed in 1995 and only two occurrences were found in small grassy clearings. Where approximately 1,000 individuals were estimated to occur in 1988, only 22 individuals were found in 1995.

Woody species most often associated with Monterey clover are Monterey pine *(Pinus radiata)*, Hooker's manzanita (*Arctostaphylos hookeri* var. *hookeri*), shaggy-barked manzanita (*Arctostaphylos tomentosa*), and huckleberry (*Vaccinium ovatum*). Where Monterey clover occurs in pygmy forest, it is associated with Bishop pine and Gowen cypress. Herbaceous species often associated with Monterey clover are wild oats (*Avena* spp.), annual fescues (*Vulpia* spp.), Australian fire weed (*Erechtites argula*), and thimble clover.

Monterey clover flowers from April to June. No pollinators were observed, but small bees are likely important pollinators as they are with other clovers.

In summary, Monterey clover regenerates from seed following fires in Monterey pine and pygmy forest. It appears to prefer Huckleberry and Narlon soils on the fifth and six marine terraces and intervening slopes. The clover appears to be most strongly associated with Monterey pine forests on the sixth terrace (Figure 10). By the second year of vegetation recovery following a burn event, clover populations decline rapidly. Small populations may persist for several years in clearings, but these will likely disappear with closure of the forest canopy. Scattered individuals may persist or occur periodically at disturbed sites, such as fire roads, as recorded in the pygmy forest prior to the 1987 fire (Natural Diversity Data Base 1995) (Figure 10). Monterey clover is obviously dependent on long-term seed dormancy for survival. It is not known what factor(s) cause the release of seeds

from dormancy; possible factors are light, soil nutrient pulse following fire, and destruction of germination-inhibiting compounds by heat.

Reasons for Decline and Threats to Survival

The historical extent of Monterey clover is not known. Based on its association with the fifth and sixth marine terraces, the loss of potential habitat from residential and golf course development on the Monterey Peninsula has been about 69%, from a historical extent of 1,754 acres to a present extent of 539 acres (estimated using data from Jones & Stokes Associates 1994b). Fire suppression prevents Monterey clover from germinating and producing new generations. The seed bank would be expected to decline over time as seeds age and succumb to disease.

Residential development is proposed by the Pebble Beach Company (Subdivision #6, Area G) for a portion of the largest known historical occurrence of Monterey clover between Costanilla Way and Haul Road (EIP Associates 1995). This occurrence of clover was estimated to support 1,000 individuals in spring 1988 (Yadon pers. comm). The subdivision plan includes open space areas that would provide protection for portions of Monterey clover habitat. As proposed, this development would result in the removal of nine Monterey clover plants identified in 1995 next to the fire road at Site 42.

A 150-foot wide fuelbreak, proposed for the west side of Costanilla Way and Los Altos Drive could result in the loss of one clover occurrence (Site 44) and potentially adversely affect the clover seed bank. The fuelbreak project was initiated in 1995 with Monterey pine trees removed to thin the stand, lower limbs removed from remaining trees to reduce the fuel ladder, and groundcover cut to a height of 18-36 inches. The fuelbreak project, however, could offer an opportunity for Monterey clover management (see "Recommendations for Habitat and Population Recovery").

Many of the past occurrences and a soil seed bank of the clover are in the Huckleberry Hill Natural Area, owned by the Pebble Beach Company, and the S.F.B. Morse Botanical Reserve, owned by the Del Monte Forest Foundation. One occurrence of Monterey clover recorded in 1980 is presumed to have been extirpated as a result of the development of Poppy Hills Golf Course in 1980 (60 FR 148: 39326-39337, August 2, 1995).

Recommendations for Habitat and Population Recovery

Fire is the pivotal factor in the ecology of Monterey clover. However, because development surrounds the known occupied habitat of Monterey clover, the use of fire for habitat management only should be considered in light of appropriate measures to avoid an unacceptable risk to life and property. Lower risk methods of burning to create clover habitat could be used. For example, Monterey pine forest could be cut and chipped or cleared and ground fires set, within areas confined by fire roads, to open habitat for clover. The appropriate seasonal timing of burns for maximum reproduction of Monterey clover should be investigated and the results incorporated into the fire

management action. Any use of controlled burning, however, involves the risk of escape and may be determined to be an unacceptable action by local or state agencies or the public.

Germination requirements for Monterey clover needs to be studied. Clover seed should be collected for research purposes from natural populations in spring 1996 and from private or publicly held material. If Monterey clover seeds are found to respond to cues other than fire, it may be possible to develop habitat management techniques that do not require fire as a management tool and therefore avoid the risks of fire use near developed areas. Monterey clover has been grown successfully from seed in pots without the use of heat treatment (Yadon pers. comm.).

Sites supporting potential suitable habitat for Monterey clover could be used to establish new populations. Some of these sites may support Monterey clover seed in the seed bank. Sites supporting large stands of Monterey pine forest on the fifth or sixth marine terrace include portions of the following:

- Pescadero Tract;
- Huckleberry Hill Preserve at the Presidio of Monterey; and
- Gibson Creek unit of Point Lobos State Reserve, including sites with pygmy forest and Monterey pine forest (Figure 12).

Controlled fire could potentially be used at the Gibson Creek site because of its more isolated location and public ownership. Management at the Gibson Creek site should combine clover habitat creation and management with Gowen cypress habitat management (see discussion of Gowen cypress in this report).

Although Monterey clover has not been observed on the fourth marine terrace, the fourth marine terrace supports soils, Monterey pine forest, and understory vegetation with many similarities to the fifth and sixth terraces (Jones & Stokes Associates 1994a). A large stand of Monterey pine forest remains on the fourth terrace on Santa Ynez soils at the Monterra Ranch (Figure 12). If the landowner is amenable, test manipulations of habitat and introductions of Monterey clover could be conducted at the ranch. Because of its inland location, different soil characteristics, or other features, this site may prove to be unsuitable for Monterey clover. However, if the site proves viable as clover habitat, its isolation from development makes the use of fire for management potentially more acceptable at this site than at other sites discussed above. Development is proposed for the Monterra Ranch. Land acquisition, conservation easements, or other methods could be used to protect sites of newly established populations of Monterey clover at Monterra Ranch and these areas could be connected to conservation areas for known populations of Pacific Grove clover. Proposed development at Monterra Ranch is expected to include set-aside areas for habitat.

The proposed 150-wide fuelbreak along the west side of Costanilla Way and Los Altos Drive provides an opportunity to manage the Monterey clover habitat. The fuelbreak location includes areas of past and present occurrences of clover and is entirely within areas of potentially suitable clover habitat. Various vegetation manipulation methods and seed sowing techniques should be tested within

the fuelbreak site. Successful establishment and management methods should then be incorporated into the overall management of the fuelbreak. The fuelbreak site should be monitored each spring for occurrences of Monterey clover.

The largest known past and present occurrences of Monterey clover are in the Monterey pine forest site between Haul Road and Costanilla Way (see survey Site 43 on Figure 4). Portions of this area are proposed for development by Pebble Beach Company. This site should be protected to preserve what is likely the largest seed bank of the clover. Although the use of fire as a management tool may not be acceptable at this site, other vegetation management techniques that create openings suitable for Monterey clover germination should be tested on a small scale. Manipulation of habitat at this site should be kept to a minimum until more is known about the ecology of Monterey clover and new clover populations have been successfully established at other sites. Because of its importance to the survival of the species, efforts should be made to bring this site into permanent protective status.

Research on the germination requirements and management methods for Monterey clover is needed. Ecological requirements and management techniques that should be investigated include identifying:

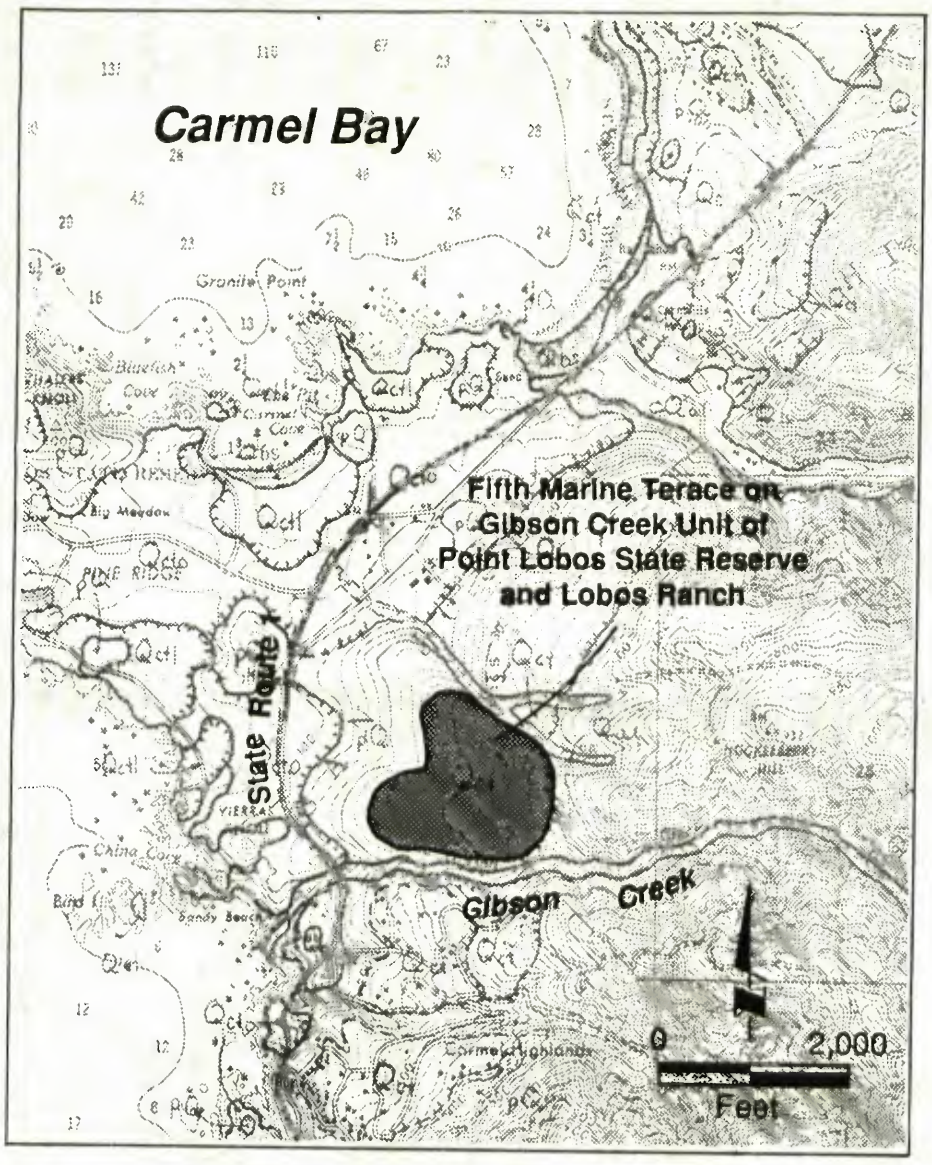
- the seasonal timing of fire that results in the greatest Monterey clover regeneration response;
- spot-burning techniques that could be used in Monterey clover habitat where larger controlled fires may not be feasible; and
- nonfire vegetation management, such as canopy clearing and mowing, that results in regeneration of Monterey clover.

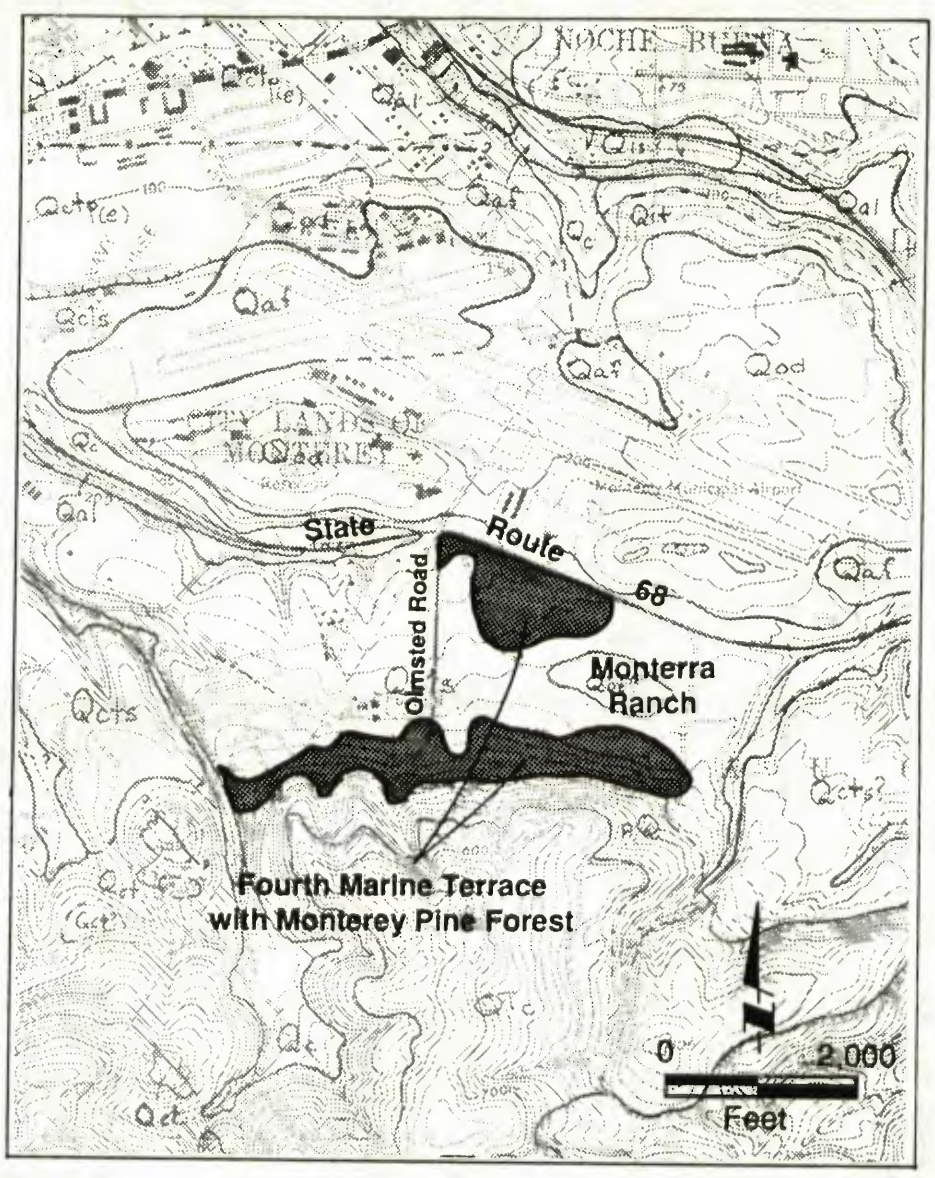
Hickman's Cinquefoil

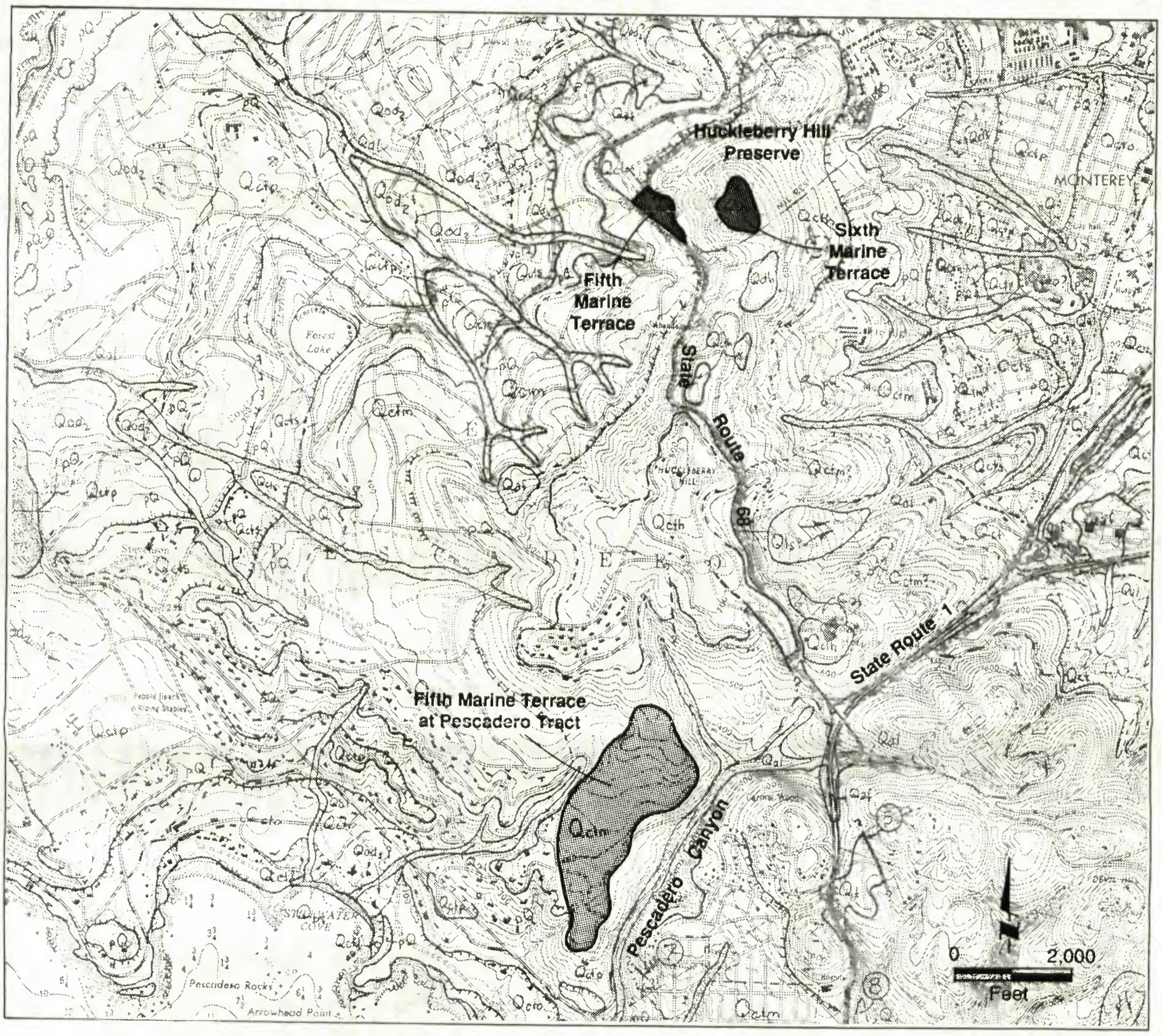
Description and Taxonomy

Hickman's cinquefoil is a perennial herb in the rose family (Rosaceae). Stems are prostrate to decumbent and more or less glabrous. The leaves form a rosette from a thick, woody taproot. The leaves are pinnately compound and 4-30 cm long, with four to seven pairs of leaflets. Leaflets are palmately cleft. Inflorescences generally have fewer than 10 flowers. Petals are yellow and are 6-10 mm long. The hypanthium is usually 3-6 mm wide. Achenes are 2 mm long and glabrous. (Hickman 1993, California Native Plant Society 1987.)

Distinguishing characteristics of Hickman's cinquefoil include slender styles 2-3 mm long that are attached near the tip of the ovary; four to seven pairs of leaflets, each divided midway to the base; and subglabrous herbage.







Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 12
Potential Sites for Establishing New Populations of Monterey Clover

Listing Status

Hickman's cinquefoil was proposed for federal listing as endangered under the Endangered Species Act in August 1995 (60 FR 148:39326-39337, August 2, 1995). It was listed as endangered under the California Native Plant Protection Act in September 1979 and is also protected as an endangered species under the California Endangered Species Act. CNPS considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

Distribution

Hickman's cinquefoil is known from two occurrences, the Indian Village site (Site 13) on the Monterey Peninsula (Figure 13) and an occurrence recently discovered by the California Department of Transportation (Caltrans) on a Caltrans study corridor near Devil's Slide in San Mateo County (Vonarb and Ertter pers. comms.). The Indian Village occurrence supported approximately 14 plants in 1995; however, another survey by University of California, Berkeley, botanists identified 21 plants at the Indian Village site in 1995 (Morosco pers. comm.). A May 1992 survey of this site found 24 plants present (Ferreira 1995).

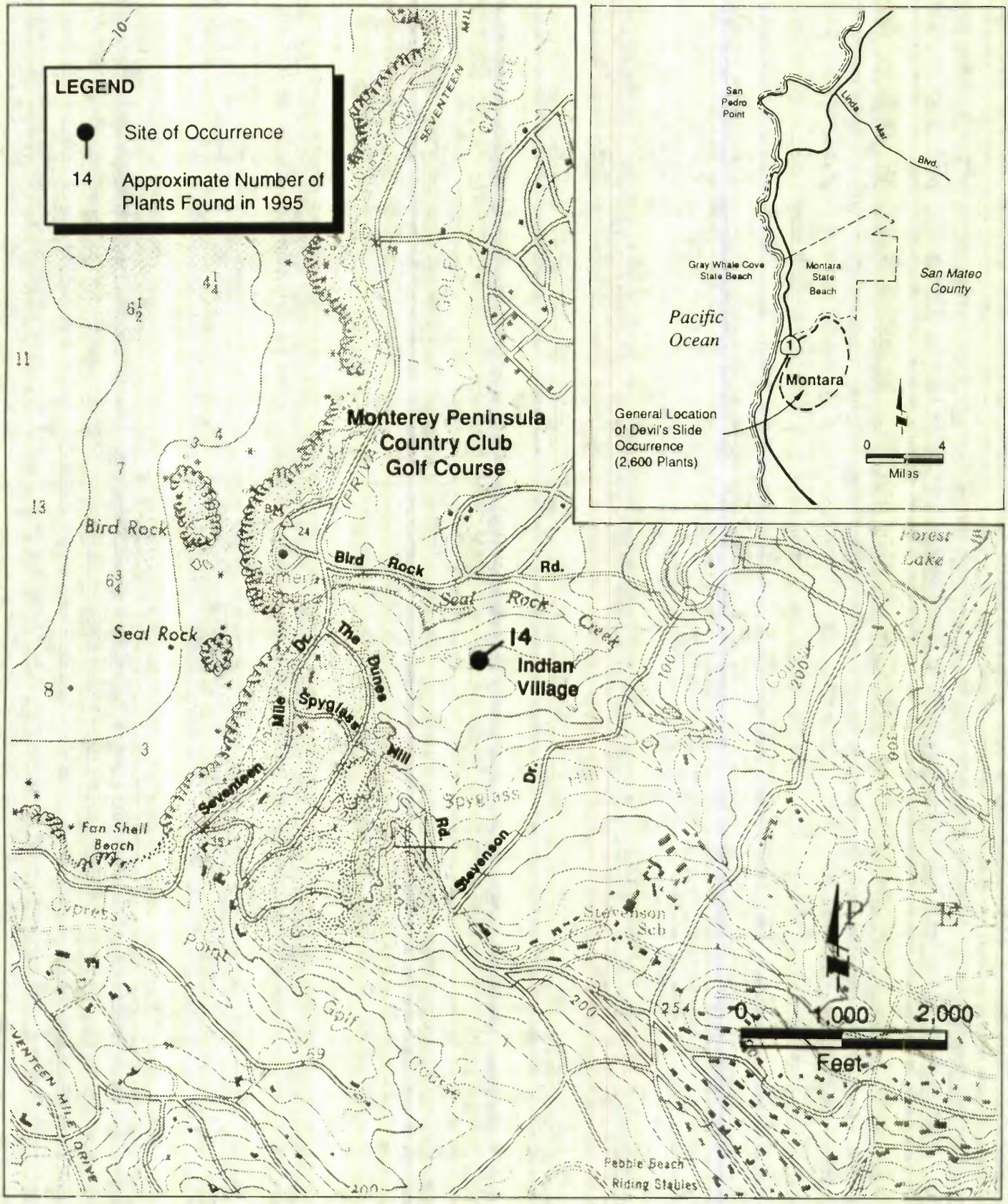
The number of plants at the Devil's Slide site was estimated to be 2,600 divided among three subpopulations (Vonarb pers. comm.). This recent discovery near Devil's Slide opens up the possibility that other populations of Hickman's cinquefoil may be found along the central California coast (Ertter pers. comm.).

An occurrence of Hickman's cinquefoil, was reported by Suttliffe in 1933 from a flat overlooking the ocean 0.7 mile south of Montara Point near Moss Beach in San Mateo County (Natural Diversity Data Base 1995) and this occurrence could be the one found in 1995 by Caltrans. An occurrence reported by Crum in 1932 from Pacific Grove near the reservoir has also been extirpated by development (Ferreira 1995).

Ecology and Habitat Requirements

At Indian Village, Hickman's cinquefoil occurs in a grassy opening in Monterey pine forest. Although Dupré (1990) maps this site as Pleistocene dunes covering the second marine terrace, the Indian Village site is actually an exposed portion of second terrace with Santa Ynez soils. These soils support an A horizon of sand and organic material, a leached E horizon at 5-inch depth, and a clay Bt horizon at 10-inch depth. Surrounding areas appear to contribute drainage to the site and the clay layer ponds water, resulting in wet meadow conditions where the cinquefoil grows. Adjacent habitat is closed-canopy Monterey pine forest on old dunes with deep, sandy Tangair soils that do not support Hickman's cinquefoil.

At Indian Village, 13 of the 14 Hickman's cinquefoil plants occur within a fenced exclosure, with no vegetation management. The exclosure is dominated by soft chess, slender oats (*Avena barbata*), annual fescues, and wild barley (*Hordeum murinum* ssp. *leporinum*). Other associates



Source: USGS Monterey, California 7.5-minute quadrangle photorevised 1983.

Jones & Stokes Associates, Inc.

Figure 13
Known Distribution of Hickman's Cinquefoil

include California oatgrass, coast gumplant (*Grindelia latifolia*), ripgut brome (*Bromus diandrus*), little rattlesnake grass (*Briza minor*), common geranium (*Geranium dissectum*), and curly dock (*Rumex crispus*). Hickman's cinquefoil is surviving within the dense competitive grassland inside the exclosure, but could succumb to the competition without some management of the site to reduce vegetative cover. Scattered individuals of cinquefoil occur outside the exclosure; only one was found in 1995, in the heavily used recreational areas. Hickman's cinquefoil appears less tolerant of vegetation and soil disturbance from trampling, grazing, and mowing than Pacific Grove clover, which thrives in the recreation area. In 1992, nine cinquefoil plants were found inside the exclosure and 15 were found outside the exclosure (Ferreira 1995). An intermediate level of vegetation disturbance (e.g., ground fire, grazing, or mowing) may be beneficial to Hickman's cinquefoil by reducing competition without resulting in high cinquefoil mortality.

At the Devil's Slide site, Hickman's cinquefoil occurs in level to sloping grasslands. The site has been grazed, and Hickman's cinquefoil is associated with native needlegrasses (*Nassella* spp.) and California oatgrass and non-native canary grass (*Phalaris* sp.). The cinquefoil appears to grow best with the native grasses on level to gently sloping mesic sites. (Vonarb and Ertter pers. comms.).

A single plant collected from the field at Indian Village flowered and set seed in its pot, and the seed produced viable offspring in the absence of cross pollination, indicating that the species is likely self-compatible or apomictic (Yadon pers. comm.). Hickman's cinquefoil has protogynous flowers, the stigma is receptive to pollen before the pollen-bearing anthers open within the same flower; this timing mechanism tends to reduce self-fertilization and increase the potential for outcrossing.

No pollinators were observed, but based on the open floral structure, Hickman's cinquefoil is likely pollinated by a wide variety of flies, bees, and beetles. Hickman's cinquefoil produces seed late in the season and dry years may result in low or no seed production (Yadon pers. comm.).

Reasons for Decline and Threats to Survival

Hickman's cinquefoil has declined as a result of coastal development (Ferreira 1995). The Indian Village population is threatened by proposed development of surrounding land that could adversely affect the hydrology of the Indian Village site and possibly by competition from grasses inside the exclosure. If vegetative cover within the exclosure is not reduced, the population of cinquefoil may succumb to competition from tall grasses. Mowing and heavy recreational use of areas of suitable habitat surrounding the exclosure appears to be preventing the Hickman's cinquefoil population from successfully expanding into areas outside the exclosure. Uses at the Indian Village site include parking lots, picnic areas, a volleyball court, and horseshoes courts.

At Indian Village, herbivory by deer and gophers may reduce survivorship and reproduction of Hickman's cinquefoil. Gopher activity, however, could improve habitat for the cinquefoil by removing competing vegetation (Yadon pers. comm.). Changes in local drainage at Indian Village as a result of proposed development on adjacent parcels could adversely affect the cinquefoil habitat (Matthews pers. comm.). Competition from the non-native perennial kikuyu grass (*Pennisetum*

clandestinum) may threaten the Indian Village cinquefoil population if this grass is not controlled (Yadon pers. comm.).

The population of Hickman's cinquefoil near Devil's Slide may be affected by Caltrans' proposed State Route 1 bypass and by potential development of the private land on which it occurs.

The Indian Village population of Hickman's cinquefoil is on property owned by the Del Monte Forest foundation. The population near Devil's Slide is on privately owned land next to a state park, but no plants have been found in the park (Vonarb pers. comm.).

Recommendations for Habitat and Population Recovery

Both occurrences of Hickman's cinquefoil are on private property and are threatened by the present use or potential future uses of those properties.

At Indian Village, available habitat for cinquefoil could be expanded through some or all of the recreational activities being moved to another site or consolidated to a smaller area at the Indian Village site. In summer 1995, Pebble Beach Company moved the volleyball and horseshoe courts, horse tie-up facilities, and log barriers to the west side of the Indian Village site and rocks were placed to discourage vehicle traffic (Staub pers. comm.). About five group events per month, such as volleyball games and horseshoe competitions, take place at the site. If recreational uses are controlled , grassland habitat should recover on the site and Hickman's cinquefoil would likely become established in these areas without artificial assistance. All designated cinquefoil habitat at the site should be fenced to discourage pedestrian and horse traffic. The grassland should be managed to prevent grasses from outcompeting the cinquefoil and to keep Monterey pine from establishing and creating excessive shade. An adaptive management program should be applied, with testing of light mowing or grazing as possible vegetation management techniques.

The following steps are recommended for more rapidly increasing the number of Hickman's cinquefoil plants, rather than waiting for natural population expansion, at Indian Village Site:

- Develop greenhouse techniques for amplifying seed using material from the Devil's Slide populations.
- Apply successful seed amplification methods to Indian Village material.
- Bring Hickman's cinquefoil into successful cultivation, maintaining strict records on the origin of material.
- Expand the number of plants at Indian Village by outplanting cultivated material originating from Indian Village seed source.

The University of California, Berkeley, has collected about 150 seeds from the Devil's Slide population that could be used in testing seed amplification methods (Ertter pers. comm.).

Techniques for enhancing Hickman's cinquefoil survival and reproduction should be tested. Plants presently in cultivation by the Pebble Beach Company (about 20 plants) and Vern Yadon (about 10 plants, all offspring from single parent) should be used to test these techniques.

Techniques to be tested on potted or outplanted individuals should include:

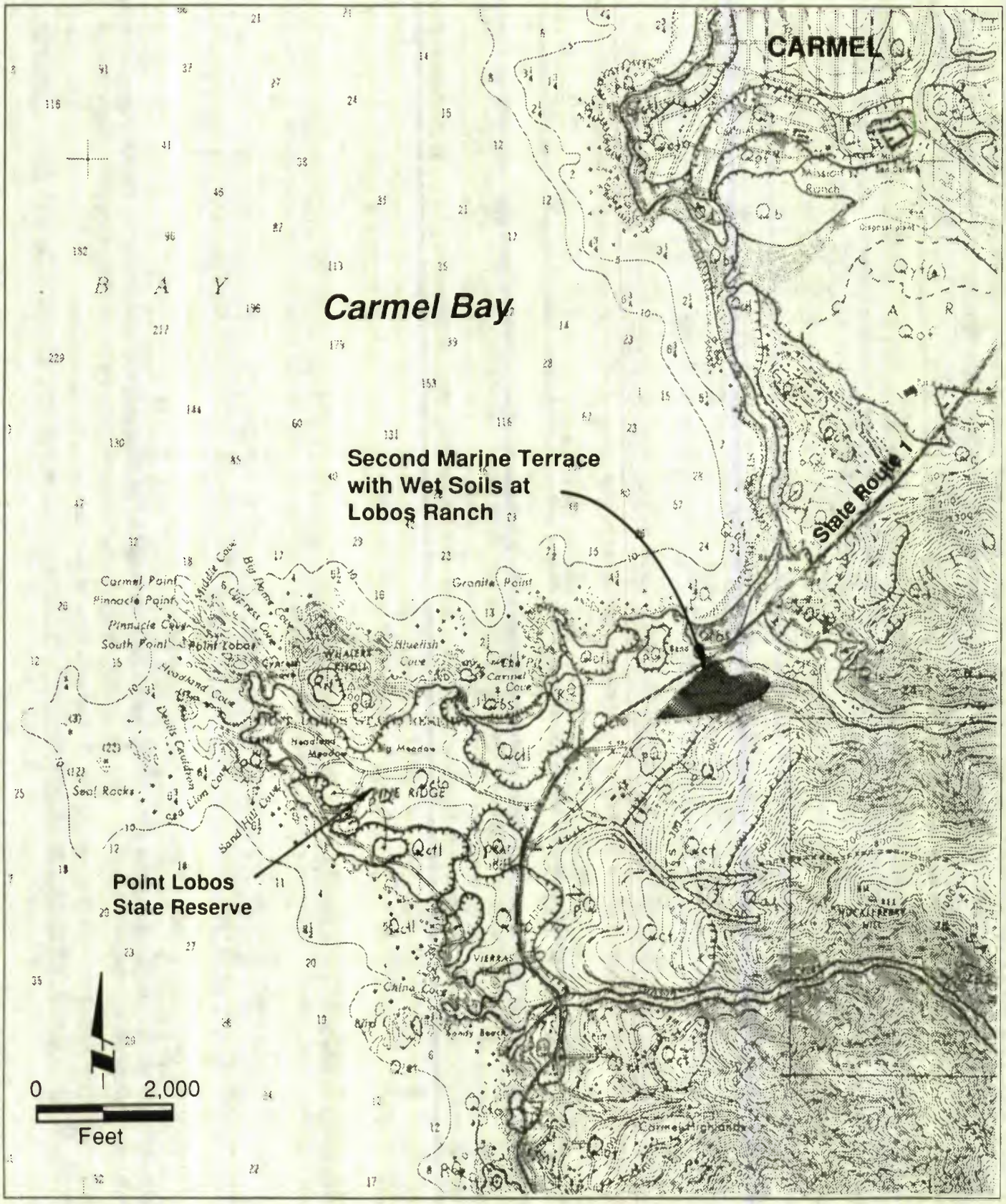
- caging to reduce herbivory,
- weeding around plants to reduce competition, and
- supplemental watering to extend fruiting period.

With landowner cooperation, the Devil's Slide occurrence should be studied to further elucidate the habitat requirements of Hickman's cinquefoil and effective population and habitat enhancement techniques. The larger, more isolated condition of this site and much larger number of plants makes it a more readily recoverable location than Indian Village for Hickman's cinquefoil. The possibility of acquiring this site, and entering into a conservation easement or other method to protect the population in perpetuity should be investigated with the landowner by DFG.

One site with potentially suitable habitat for establishment of a new population of Hickman's cinquefoil was identified in the Jones & Stokes Associates 1995 surveys. This site is at Lobos Ranch (Site 34) at the Allen Road north occurrence of Pacific Grove clover (Figure 14). Because it is on the second marine terrace and supports wet meadow habitat on Santa Ynez soils, the site is similar to Indian Village. The suitability of the site or adjacent areas for cinquefoil introduction should be investigated. This land belongs to the Big Sur Land Trust and is slated to be transferred to CDPR. Hickman's cinquefoil, originating from the Indian Village population, is being grown successfully by the Pebble Beach Company and Vern Yadon and seed from these plants could be used to propagate new populations. Additional seed from the Indian Village population also could be collected, amplified, and used to establish plants at Site 34.

, Efforts should be made to locate undiscovered occurrences of Hickman's cinquefoil. With the use of existing geology and soils maps and knowledge of the typical characteristics of Hickman's cinquefoil habitat, these surveys could be narrowly focused on targeted sites with the highest probability of cinquefoil occurrence. The discovery of new occurrences, especially if some are on public lands, would provide greater flexibility to recovery actions and a greater likelihood for recovery success.

Genetic studies of Hickman's cinquefoil are needed to better understand the relationship between the Indian Village and Devil's slide populations. It is possible that these populations are genetically distinct because of their wide geographic separation. Although the Indian Village population is small, if it is genetically distinct from the Devil's Slide population, then it is genetically important to the species. Material from the two populations should be kept separate.



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 14
Potential Site for Establishing New Hickman's Cinquefoil Populations

Yadon's Rein Orchid

Description and Taxonomy

Yadon's rein orchid is a perennial herb in the orchid family (Orchidaceae) that has been recently described as a species (Morgan and Ackerman 1990). The bulb-like caudex produces one to two basal leaves 10-15 cm long and 2-3.5 cm wide. Plants grow for several years before producing flowering stalks. The single flowering stalk can reach 80 cm tall in height. The upper sepal is green with white margins and the lower sepals are white. Lateral petals are green with white margins and the lower petal (lip) is white. The spur is white, 2.5-4 mm long, and pointed downward. The fruit is a capsule with many minute seeds. (Hickman 1993; 60 FR 148:39326-39337, August 2, 1995.)

Yadon's rein orchid is distinguished from other rein orchids (*Piperia* spp.) by its short spur, white margins on upper sepals and petals, white lower sepals and petals, and cylindric rather than one-sided inflorescence (Hickman 1993).

Listing Status

Yadon's rein orchid was proposed for federal listing as endangered under the Endangered Species Act in August 1995 (60 FR 148:39326-39337, August 2, 1995). It is not listed as threatened or endangered under the California Endangered Species Act. CNPS considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

Distribution

The known distribution of Yadon's rein orchid is shown in Figure 15. The largest number of occurrences of Yadon's rein orchid are known from the Monterey Peninsula (Figure 15). It occurs in undeveloped areas throughout the Peninsula. Inland of the Monterey Peninsula, four small occurrences are known from along Jack's Peak Road and Garden Road (Figure 15). Four occurrences are known from sites to the north at The Nature Conservancy's (TNC's) Blohm Ranch Preserve, Tucker Road, Manzanita Regional Park, and Vierra Canyon (Figure 15). Population size estimates for these four occurrences are based on flowering stalk counts and do not include plants in vegetative state; therefore, underestimates of population sizes are likely. In surveys conducted between 1990 and 1995, approximately 56,000 individuals of Yadon's rein orchid have been counted at all known occurrences with about 96% of these plants on the Monterey Peninsula (Allen pers. comm., Natural Diversity Data Base 1995, this study). Surveys for Yadon's rein orchid conducted by Pebble Beach Company in February-March 1995 before the flowering period depended on leaf characteristics to identify rein orchids and used known habitat and distribution requirements to separate Yadon's rein orchid from Michael's rein orchid (*Piperia michaelii*) (Allen pers. comm.). Because leaves of these two species cannot be readily distinguished, the amount of Yadon's rein orchid may have been overestimated through counting of Michael's rein orchid plants. The southernmost occurrence of

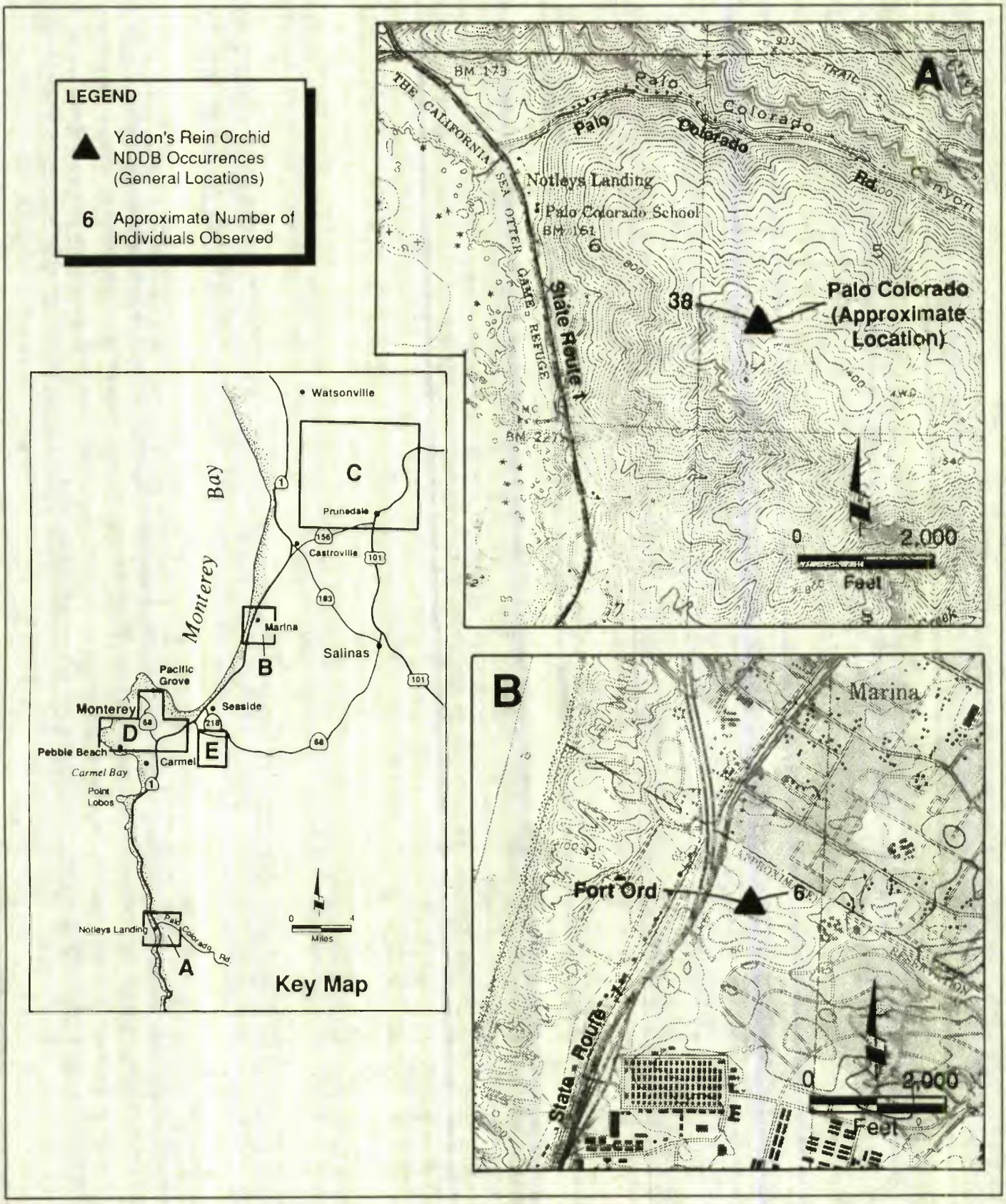


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Figure 15
Known Distribution of Yadon's Rein Orchid
(Continued on Figure 15a)

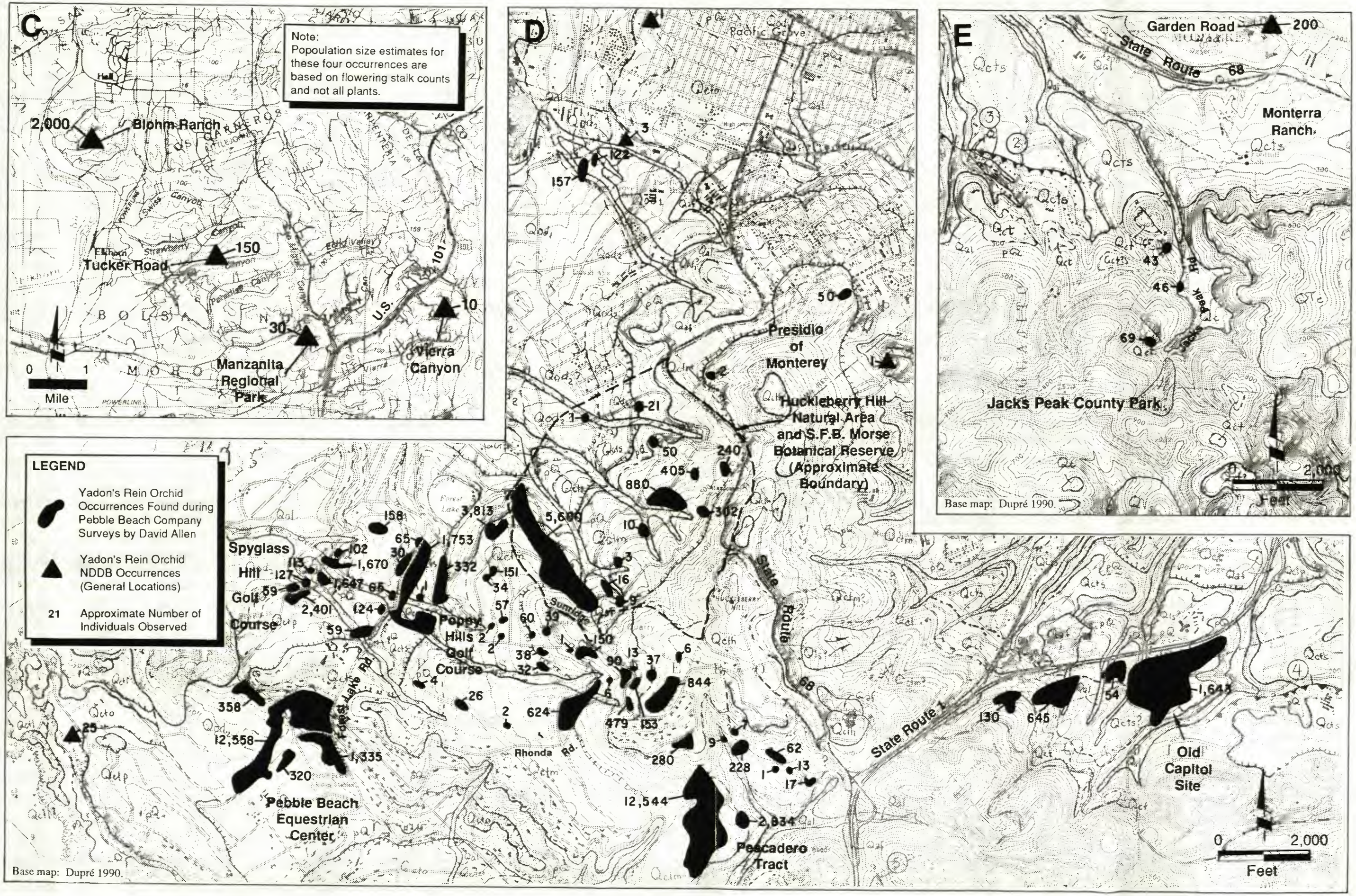


Figure 15a
Known Distribution of Yadon's Rein Orchid

Jones & Stokes Associates, Inc.

Yadon's rein orchid was found by Jeff Norman in 1995 at Palo Colorado Canyon and supported approximately 38 individuals (Figure 15) (Morgan pers. comm.).

An occurrence reported near State Route 1 at Fort Ord in 1992 (U.S. Army Corps of Engineers 1992) was not relocated during Jones & Stokes Associates' surveys in 1995. Approximately six Yadon's rein orchid individuals were found at this site in 1991, but the orchid was not found in surveys conducted in 1993 and 1994 (Morgan pers. comm.).

Ecology and Habitat Requirements

Yadon's rein orchid occurs in Monterey pine forest, maritime chaparral, and pygmy forest habitats. In Monterey pine forest, Yadon's rein orchid typically grows in openings with grassy understory cover. It does not occur where shrub cover is dense or in densely vegetated drainages (Allen pers. comm.). In maritime chaparral, the rein orchid typically occurs under low shrubs, particularly Hooker's manzanita (*Arctostaphylos hookeri* var. *hookeri*), which serves as an indicator species of rein orchid habitat (Allen pers. comm.). In early summer, the orchid's inflorescence emerges from the shrub canopy. Yadon's rein orchid appears to be of smaller stature in chaparral than in Monterey pine forest.

Yadon's rein orchid occurs on a variety of soil types and geomorphic surfaces. The largest populations occur on the third through sixth marine terraces and intervening granitic slopes, with smaller populations occurring on the second marine terrace and Pleistocene dune deposits. Most occurrences of Yadon's rein orchid appear to be on Narlon and Huckleberry soils.

The rein orchid appears to thrive in partial shade and apparently is not tolerant of sustained high soil moisture (Allen pers. comm.). Yadon's rein orchid is sometimes found invading fresh road cuts (Allen pers. comm.). Individual plants may need to reach a certain age or bulb size before they will flower and set seed. Flowering occurs from May through August. No observations of pollinators have been made. Seeds are minute and wind dispersed. Strong winds are likely to carry the millions of dust-like seeds produced by a large population over a large area. Typical of orchids, the roots of Yadon's rein orchid form a close symbiotic association with mycorrhizal fungi. This relationship is referred to as "mutualism". The orchid requires the fungus and the fungus requires the orchid.

Deer browsing on stalks and leaves of Yadon's rein orchid appears to be an important factor in mortality and reproduction. A preliminary study of caged orchid plants indicated that 2% of plants produce flowering stalks outside the cages, where they are subject to deer browsing, and approximately 80% of plants protected inside cages produce flowering stalks (Allen pers. comm.).

Reasons for Decline and Threats to Survival

Yadon's rein orchid populations have been extirpated from portions of the Monterey Peninsula; many historical collections have been made in the Pacific Grove area (60 FR 148:39326-39337, August 2, 1995). Urban and recreational development of the peninsula have resulted in a

decline in rein orchid populations, and continued urban and golf course developments threaten remaining populations. Browsing by the large population of deer on the peninsula threatens orchid reproduction. Other threats to Yadon's rein orchid include competition from non-native plants, roadside vegetation maintenance, and a proposed realignment of U.S. Route 101 near Prunedale (60 FR 148:39326-39337, August 2, 1995).

Yadon's rein orchid occurs on property owned by public and private entities including the Pebble Beach Company, Del Monte Forest Foundation, U.S. Department of Defense, County of Monterey, and TNC. The largest number of occurrences and individuals (approximately 50,000) are on Pebble Beach Company property (Allen pers. comm.). Yadon's rein orchid is afforded some protection through land use designations at the S. F. B. Morse Botanical Reserve, Huckleberry Hill Natural Area, Huckleberry Hill Preserve, George Washington Park, Crocker Cypress Grove, Veterans Memorial Park, Manzanita County Park, and the Blohm Ranch Preserve. These areas support approximately 9,600 plants, or about 17% of the total known number of individuals.

The large numbers of Yadon's rein orchid recently identified, particularly by studies conducted by the Pebble Beach Company in February-March 1995, indicate that this species is not as uncommon as previously believed. Before these studies, the total number of rein orchid individuals was thought to be fewer than 2,000 individuals (Natural Diversity Data Base 1995). As discussed above, the total known population is now estimated at 56,000 individuals. This large number of plants, however, is concentrated into small areas mostly on private property and many are at sites proposed for development projects.

Recommendations for Habitat and Population Recovery

For the purpose of this discussion, occurrences of Yadon's rein orchid were grouped into seven locations that support large numbers of plants:

- S. F. B. Morse Botanical Reserve and Huckleberry Hill Natural Area (7,600 plants, 13.5% of individuals);
- Pescadero Tract (15,700 plants, 28% of individuals);
- sites to the north of the Pebble Beach Riding Stables along Drake Road, Stevenson Drive, Forest Lake Road, and Bristol Curve (14,600 plants, 26% of individuals);
- sites along Stevenson Drive and Forest Lake Road surrounded by Spy Glass Hill and Poppy Hills Golf Courses (8,500 plants, 15% of individuals);
- sites along Spruance, Ronda, and Sunridge Roads (2,400 plants, 4% of individuals);
- Old Capitol Site (2,500 plants, 4% of individuals); and
- Blohm Ranch Preserve (2,000 plants, 3.5% of individuals).

These seven sites combined support approximately 94% of the known individuals of Yadon's rein orchid (Figure 15). In this section, population size and status are described and management recommendations provided for each of these seven sites; recommendations are provided for overall habitat and population management and recovery of the species; and locations for additional surveys are recommended.

Recommendations for Management and Recovery by Location. Yadon's rein orchid occurrences at the S. F. B. Morse Botanical Reserve and Huckleberry Hill Natural Area receive some level of protection from future development because these areas have been designated as open space by the Del Monte Forest Foundation and Pebble Beach Company. Approximately 7,600 plants, about 13.5% of the known individuals, were found in this area in 1995 (Allen pers. comm.). The populations in this area may have increased since 1987, when fire removed the pygmy forest cover of dense trees and shrubs. The recovering pygmy forest supports much more open vegetation than a mature pygmy forest and therefore more habitat for the rein orchid. Hooker's manzanita, an indicator of orchid habitat, is common in the recently burned areas but not in the mature forest. It is likely that suitable habitat for Yadon's rein orchid will decline over time as the pygmy forest recovers and matures, providing less open vegetation. Management of the forest to maintain areas of open habitat for the orchid should be conducted. The use of fire as a management tool at this site is not feasible because of the risk it poses to surrounding residential areas, and other techniques for maintaining forest openings should be studied. The rein orchid occurrences at these reserves are important to the long-term protection and recovery of the species because the sites are already in protected status, the extent of natural vegetation here is large and can be managed efficiently, and this is the only known occurrence of rein orchid in pygmy forest habitat.

Pescadero Tract is owned by the Pebble Beach Company and supports approximately 15,700 Yadon's rein orchid plants, about 28% of the known individuals. The orchids occur within a large area of natural Monterey pine forest. This site has been proposed for golf course development but if the landowner were to agree to protect this population of Yadon's rein orchid, the site could serve as a valuable location to ensure the long-term viability of the species.

North of the Pebble Beach Equestrian Center large populations of rein orchid, approximately 14,600 plants (about 26% of the known individuals), are supported along Drake Road, Stevenson Drive, Forest Lake Road, and Bristol Curve. These sites support stands of Monterey pine forest with grassy understory vegetation. All of these sites are proposed for residential development by the Pebble Beach Company. If the landowner were to agree to protect these populations, it could serve as a valuable location to ensure the long-term viability of the species.

Scattered large populations of Yadon's rein orchid occur along Stevenson Drive and Forest Lake Road surrounded by Spy Glass Hill and Poppy Hills Golf Courses and residential development on land owned by the Pebble Beach Company. Approximately 8,500 plants, about 15% of the total known individuals, occur at these sites. These sites are fragmented by existing residential and golf course development and proposed new development would add to that fragmentation. The fragmented nature of these sites makes them difficult to manage and prone to local extinctions. These sites are not recommended for long-term management or recovery of the species, but loss of plants and fragmentation of populations should be avoided or minimized if these sites are developed.

Scattered large populations of rein orchid occur along Spruance, Ronda, and Sunridge Roads in Monterey pine forest surrounded by residential development. These sites support about 2,400 plants, about 4% of the known individuals. These sites are proposed for development by the Pebble Beach Company. The loss of plants should be avoided or minimized if these sites are developed.

The Old Capitol Site is owned by the Pebble Beach Company and supports approximately 2,500 Yadon's rein orchid plants, about 4% of the known individuals. This site has been proposed for development. The loss of plants should be avoided or minimized if these sites are developed.

The Blohm Ranch Preserve is managed as a nature preserve by TNC. At this site, the rein orchid occurs at three locations with Hooker's manzanita in maritime chaparral. This occurrence is the largest of the four northern populations with about 2,000 plants, about 3.5% of the known individuals and Yadon's rein orchid is expected to persist under proper management by TNC at this site.

Recommendations for Species Management and Recovery

The focus of protection and recovery of this species should be through protection and management of existing populations because large populations remain within areas of native vegetation. Yadon's rein orchid bulbs have been successfully transplanted at the Old Capitol Site (Allen pers. comm.) but the long-term viability of these plants has not been monitored. Because of the mycorrhizal fungus-orchid mutualism, native soil with fungal spores would need to be used in any programs developed to grow or transplant the orchid. Although establishment of new orchid populations may be feasible, it is a less certain approach than working to maintain and enhance the existing natural populations. The key to maintaining suitable habitat is to manage Monterey pine forest for an open canopy and grassy understory and pygmy forest for early successional chaparral.

If ecotypic variation exists within the species, it is likely to be greatest among different habitats and at the fringes of the distribution. Populations of Yadon's rein orchid should be protected in each of the three habitats from which it is known, Monterey pine forest, pygmy forest, and maritime chaparral. Populations at the extremes of the range should also be given priority. Important populations at the fringe of the distribution are the Blohm Ranch Preserve population, the four populations along Jack's Peak Road and Garden Road, and the population at Palo Colorado Canyon (Figure 15).

Sites of large rein orchid populations with some existing protected status should be managed to maintain populations within specific size ranges. These sites are the Huckleberry Hill Natural Area, S. F. B. Morse Reserve, Blohm Ranch Preserve, and Manzanita County Park. DFG should coordinate with Del Monte Forest Foundation, TNC, and Monterey County to establish management and monitoring programs for Yadon's rein orchid on these properties. These sites support at total of approximately 9,600 plants, or about 17% of the known individuals. Population sizes are expected to fluctuate annually. Because this species can remain dormant during years with poor conditions, it may not appear every year even though bulbs are present in the ground. For example, at Blohm Ranch Preserve for example, a site that supported a population of approximately 1,000 plants in 1995

apparently did not support any plants in 1994 (Zembsch pers. comm.). Population sizes at each site should be monitored to determine whether they are stable, declining, or increasing. An adaptive management approach should be used to address declining populations.

The five large concentrations of Yadon's rein orchid on private property slated for development by the Pebble Beach Company support about 77% of the known individuals of Yadon's rein orchid. The Pescadero Tract and the site north of the Pebble Beach Equestrian Center are the largest and least fragmented of these occurrences. These two sites account for about 54% of the known individuals of Yadon's rein orchid. Efforts to protect the species should be focused on these two sites. At the other three sites, the loss of rein orchid habitat and populations should be avoided or minimized if development proceeds. The Pebble Beach Company should be approached by DFG and U.S. Fish and Wildlife Service to identify how rein orchid protection and management could be integrated into development plants for these sites.

The combined protection of Yadon's rein orchid at existing protected sites and the two largest unprotected sites would result in retention of at least 70% of the known individuals of the species within larger areas of native plant communities. Portions of other occurrences at sites planned for development could also persist with implementation of appropriate mitigation measures during development. Retention of more than 39,000 plants within four large population centers would likely be sufficient to ensure long-term survival of a perennial species such as Yadon's rein orchid.

Additional Surveys. Surveys should be conducted for new occurrences of Yadon's rein orchid at the Bureau of Land Management's (BLM's) natural resource management area at old Fort Ord. Large areas of the BLM land support Hooker's manzanita in maritime chaparral and could support Yadon's rein orchid. Surveys of these areas by Jones & Stokes Associates in 1992 did not identify Yadon's rein orchid, but Michael's rein orchid was recorded and could have been misidentified because the surveys were conducted prior to flowering of either species (U.S. Army Corps of Engineers 1992). If rein orchid populations occur at this site, management and enhancement measures could be more easily applied than for occurrences on privately owned properties in developed areas of the Monterey Peninsula.

Gowen Cypress

Description and Taxonomy

Gowen cypress is a small coniferous tree in the cypress family (Cupressaceae). This sparsely branched tree grows 15-25 feet tall with a short, broad crown. The scale-like leaves are light green to yellow-green and 1-2 mm long. Pollen-bearing cones are 3-4 mm long and 1.5-2 mm wide. The globose seed-bearing cones are 12-25 mm in diameter and are tan, aging to gray. Seeds are dark brown to black. (Hickman 1993; 60 FR 148:39326-39337, August 2, 1995; Sudworth 1967.)

Gowen cypress is distinguished from its Mendocino County conspecific pygmy cypress (*Cupressus goveniana* ssp. *pigmaea*) by its lack of a long whip-like terminal shoot, lighter colored

leaves, and occurrence in Monterey County (Hickman 1993). The Gowen cypress is a smaller tree than pygmy cypress when grown on fertile soils (Griffin and Critchfield 1972).

Listing Status

Gowen cypress was proposed for federal listing as threatened under the Endangered Species Act in August 1995 (60 FR 148:39326-39337, August 2, 1995). It is not listed as threatened or endangered under the California Endangered Species Act. CNPS considers this species to be rare and endangered in California (List 1B) (Skinner and Pavlik 1994).

Distribution

Gowen cypress is known from only two occurrences, one occurrence on Huckleberry Hill on the Monterey Peninsula and a second occurrence on the north side of Gibson Creek inland of the Point Lobos Peninsula (Figure 16). Gowen cypress is sold horticulturally and is cultivated more widely than it is naturally distributed.

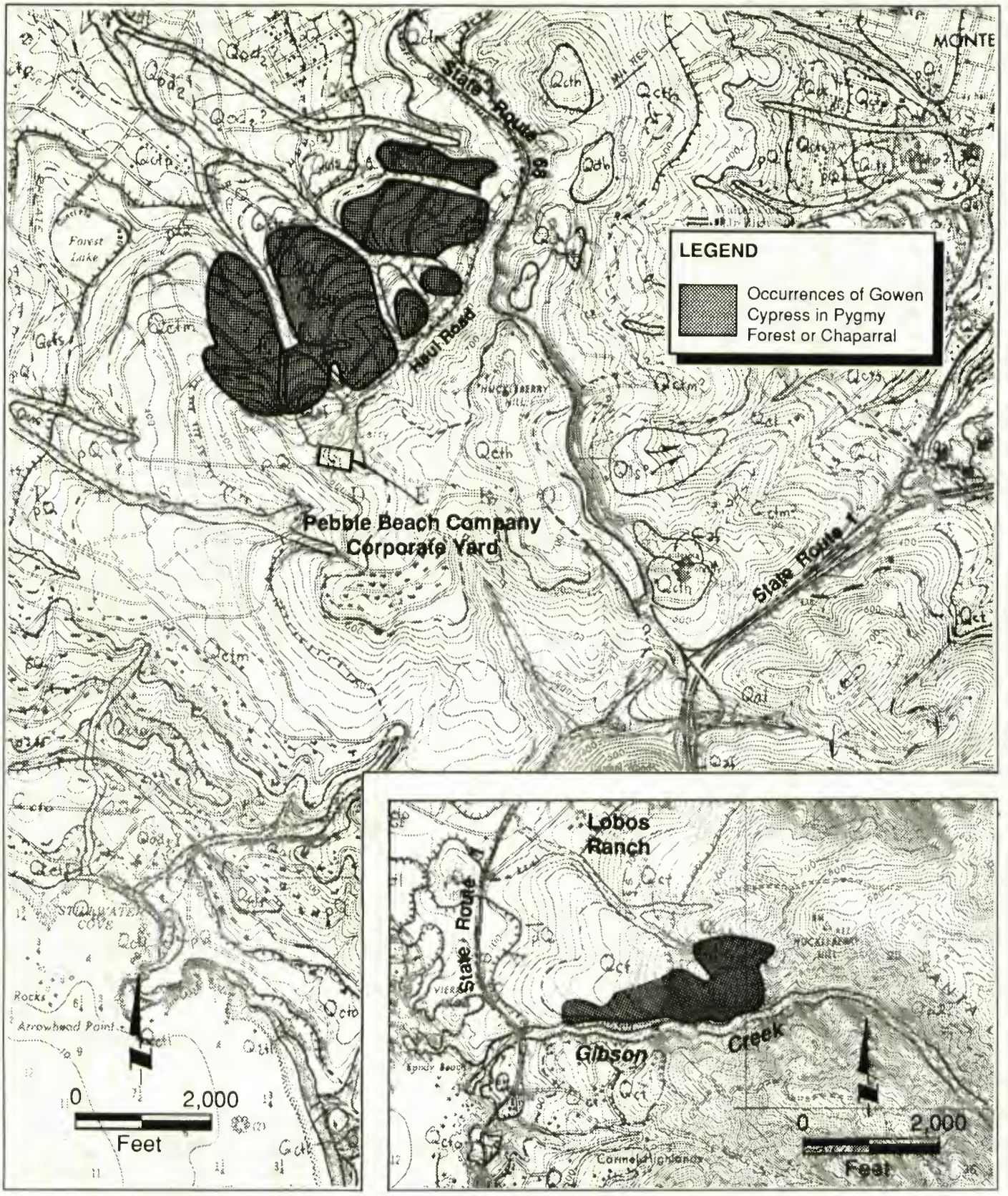
Ecology and Habitat Requirements

Gowen cypress occurs in pygmy forest and maritime chaparral habitats. In pygmy forest, Gowen cypress occurs as nearly pure stands, mixed stands with Bishop pine, and scattered individuals within Bishop pine stands. These three general types of pygmy forest are referred to here as Gowen cypress, mixed, and Bishop pine pygmy forest. Pygmy forest occurs only on the fifth marine terrace (Jones & Stokes Associates 1994a). In addition to Gowen cypress and Bishop pine, pygmy forest supports scattered, stunted Monterey pine and an understory dominated by chaparral shrubs such as shaggy-barked manzanita (*Arctostaphylos tomentosa*), huckleberry (*Vaccinium ovatum*), and Hooker's manzanita All three types of pygmy forest are found at Huckleberry Hill on the Monterey Peninsula. The Gibson Creek site supports only Gowen cypress pygmy forest.

Pygmy forest occurs on Narlon, Huckleberry, and Sunridge soils (Jones & Stokes Associates 1994). Pygmy forest occurs where the soil is shallow, acid, strongly leached, and poorly drained and has a claypan or hardpan. The three pygmy forest types may represent a sequence of soil development with the Gowen cypress type occurring on the shallowest (4 inches) and most acidic (pH = 3.9) soils, the mixed type on intermediate soils, and the Bishop pine type on the least extreme soils (20 inches deep; pH = 5.7) (Jones & Stokes Associates 1994).

Gowen cypress occurs as scattered individuals in maritime chaparral at Gibson Creek, above the site that supports Gowen cypress pygmy forest. The maritime chaparral is on Cienaba soils on the inland granitic bedrock geologic formation. Dominant species in the maritime chaparral are shaggy-barked manzanita, Hooker's manzanita, and chamise (*Adenostoma fasciculatum*).

Gowen cypress is fire adapted. The cones remain on the tree for many years and open in response to the heat of a fire. Regeneration following fire is rapid and prolific. Gowen cypress



Base map: Dupré 1990.

Jones & Stokes Associates, Inc.

Figure 16
Known Distribution of Gowen Cypress

produces cones within the first few years of life, an adaptation typically associated with a frequent fire regime. Sudworth (1967) reports that Gowen cypress bears abundant cones when only 2 to 3 feet tall. In 1994, young trees were found with large numbers of mature seed cones at the site of the 1987 Huckleberry Hill fire. Suppression of fire in Gowen cypress stands could result in an increase in diseases and pests in aging forests.

Gowen cypress is wind pollinated. Cones mature in the second season and may open without fire, typically dispersing seeds in September or October (Sudworth 1967). Seeds are wind dispersed, but are not light enough to be carried far from the parent plant (Sudworth 1967).

Reasons for Decline and Threats to Survival

Most of the historical occurrences of Gowen cypress are extant. There is some indication by Coleman (1905) that Gowen cypress may have occupied a larger area on the Monterey peninsula. A portion of the stand at Huckleberry Hill, including about 840 trees, was removed in the early 1980s for the construction of Poppy Hills Golf Course (60 FR 148:39326-39337, August 2, 1995).

The stand of Gowen cypress at Huckleberry Hill is within the Huckleberry Hill Natural Area and the S. F. B. Morse Botanical Reserve owned by Pebble Beach Company and Del Monte Forest Foundation, respectively. The stand at Gibson Creek is on Point Lobos State Reserve and property owned by the Big Sur Land Trust (Lobos Ranch) slated to be transferred to Point Lobos State Reserve.

Because Gowen cypress regenerates most prolifically following fire, fire suppression likely poses a threat to the health of the species. Existing development surrounding the Huckleberry Hill cypress occurrence likely precludes the use of fire as a management tool. Future maintenance or expansion of fire roads within the pygmy forest may also reduce the Gowen cypress population. Invasion by aggressive non-native species such as pampas grass (*Cortaderia selloana*) and French broom (*Genista monspessulana*) could threaten Gowen cypress regeneration (60 FR 148:39326-39337, August 2, 1995).

Recommendations for Habitat and Population Recovery

Both occurrences of Gowen cypress are on protected sites. The Huckleberry Hill occurrence is on privately owned land with an open space designation. The Pebble Beach Company has no immediate plans for development on the portion of this site under its ownership.

The best management of Gowen cypress habitat would include fire as a management tool. However, residential development surrounds the Huckleberry Hill occurrence and the use of fire as a management tool would need to satisfactorily address the risks to life and property. The wildfire at Huckleberry Hill in 1987 resulted in healthy stands of high-diversity, early-successional pygmy forest, including many young Gowen cypress, but also caused the loss of homes. The tolerance of Gowen cypress to extremely poor soil conditions probably keeps it from being overtaken by other trees on sites of shallow, acidic soils even in the absence of fire. However, some form of vegetation-

clearing disturbance would likely benefit Gowen cypress. For example, pygmy forest trees and shrubs could be cut and chipped and left to regenerate. This cutting and chipping method should be tested, along with other vegetation clearing methods, and the best technique incorporated into management measures. If permits and public acceptance can be obtained, the chipped material could be control burned in blocks of habitat surrounded by fire roads. Management for Gowen cypress at Huckleberry Hill should be integrated with management for Monterey clover and the pygmy forest community as a whole.

The use of fire as a management tool is more viable at the Gibson Creek Gowen cypress occurrence than at Huckleberry Hill because surrounding lands are sparsely developed. With the appropriate fire roads and blacklines (preburned fuelbreaks) established, and under the proper weather conditions, portions of the Gowen cypress forest could be control burned.

Experimental studies of the effects of various vegetation clearing techniques on Gowen cypress regeneration are needed. Because the use of fire may be precluded, the use of other management tools will be necessary to ensure the long-term health of pygmy forests supporting Gowen cypress.

CONCLUDING REMARKS

Recommended recovery measures in this report include:

- site-specific actions for the protection of existing populations,
- species-specific vegetation management techniques to expand or enhance habitat, and
- the identification of suitable unoccupied habitat on protected properties that could be used for the establishment of new populations.

Coastal dunes milkvetch is known from only one occurrence of eleven fragmented patches on private property subject to much recreational use. Improved protection of the existing population and establishment of new populations on suitable habitat at Point Lobos State Reserve should be conducted as soon as possible.

Pacific Grove clover was found at six new locations during the study, in addition to the five from which it was previously known. This clover is not as severely threatened as it was thought to be three years ago when only two occurrences were known, but the species is still in danger of extinction. Most of the clover occurrences are on privately owned properties that receive various types and levels of use. Pacific Grove clover is adapted to disturbance and does well under many of these uses. Increased protection of existing populations and establishment of new populations in suitable habitat at protected sites are recommended.

Occurrences of Monterey clover were recorded by the study for the first time since 1989. Although Monterey clover is a fire follower, the use of fire may not be feasible over most of the suitable habitat of this species. Alternative forms of vegetation management are recommended to create clover habitat, including the opportunistic use of a proposed fuelbreak in Monterey pine forest. Establishment of a new population of Monterey clover on the fifth marine terrace near Gibson Creek at Point Lobos State Reserve is recommended. Fire could be used as a management tool at this site.

Hickman's cinquefoil was thought to occur only at one small site on the Monterey Peninsula, until a much larger population was found by Caltrans' botanists in San Mateo County. Species recovery efforts should focus on protecting the San Mateo County occurrence, which is on private property. Efforts should be made to locate additional potential populations along the central coast. Improved protection of the existing Monterey Peninsula population and establishment of new populations on suitable habitat at Lobos Ranch are recommended.

Yadon's rein orchid occurs in much greater numbers than was thought before 1995. All occurrences of Yadon's rein orchid may not need to be preserved to ensure the long-term survival of the species. Several large occurrences are on protected sites. It is recommended that the two largest occurrences on private property planned for development be preserved and brought under protection.

Gowen cypress occurs at two locations on protected sites in pygmy forest and chaparral habitats. Gowen cypress is a fire-adapted species, but the use of fire may not be feasible over all of its habitat on the Monterey Peninsula. Alternative forms of vegetation management are recommended to create habitat for Gowen cypress regeneration. The use of fire as a management tool at the Gowen cypress pygmy forest near Gibson Creek at Point Lobos State Reserve is recommended.

CITATIONS

Printed References

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Appendix A. Field Notes for Rare Plant Survey Sites

Appendix A. Field Notes for Rare Plant Survey Sites

This appendix contains brief field notes taken by Jane Holte, consulting botatist under contract to Jones & Stokes Associates, during spring 1995 surveys on the Monterey Peninsula, Point Lobos State Reserve, Lobos Ranch and Monterra Ranch for Pacific Grove clover (*Trifolium polydon*), coastal dunes milkvetch (*Astragalus tener* var. *titi*), Hickman's cinquefoil (*Potentilla hickmanii*), and Monterey clover (*Trifolium trichocalyx*). Site numbers correspond to numbers shown in various figures in the text of the report.

SURVEY NOTES

Site 1 - Area is dominated by African ice plant (*Carpobrotus edule*) or unvegetated. Area is dry, rocky, and heavily trampled. No areas of suitable Pacific Grove clover or coastal dunes milkvetch habitat were found.

Site 2 - Area is dominated by African ice plant, kikuyu grass (*Pennisetum clandestinum*), or golfing green. There is a marshy area, but golf green goes right to edge of marsh. No areas of suitable rare plant habitat were found.

Site 3 - Dense pansa sedge (*Carex pansa*), coyote bush (*Baccharis pilularis*), and African ice plant dominate the area. Much of this site is private land. Public land and roadsides were thoroughly searched. Probably not suitable rare plant habitat.

Site 4 - Much of area was covered by dense pansa sedge or dune vegetation. Potential Pacific Grove clover habitat was seen in wet swale areas found on the ocean side of the road but only cow clover (*Trifolium wormskioldii*) was found.

Site 5 - A few Pacific Grove clover plants were found in old roadbed (located in sand dunes) and in grassy area near flagpole. Other roadbed and wetland sites in dunes were thoroughly searched. Grassy areas located in conference grounds immediately surrounding dunes were also searched. Many of these grassy areas were dominated by tall, non-native grasses. Several other clover species were found. Many of these clovers were going to seed and it is possible that additional Pacific Grove clover occurs here but was not seen.

Site 6 - Marshy area dominated by willow and other wetland species. Area surrounded by dune. No potential rare plant habitat seen.

Site 7 - Pacific Grove clover found by D. Allen in an old roadbed in newly constructed dune habitat. Surveyed and found population.

Site 8 - Most of area is dominated by African ice plant and turf grasses. Cow clover was found, and some areas of suitable Pacific Grove clover and coastal dunes milkvetch habitat were found along road.

Site 9 - Areas dominated by pansa sedge and African ice plant. No potential Pacific Grove clover or coastal dunes milkvetch habitat observed.

Site 10 - Most of the area on the ocean side of Seventeen Mile Drive has been disturbed and revegetated in this location. Area inland of Seventeen Mile Drive is dominated by pansa sedge and Afrcian ice plan.

Site 11 - Along ocean side of Seventeen Mile Drive, coastal dunes milkvetch found within fenced "sensitive" plant area and in a few nearby patches to south of fenced area. Pacific Grove clover was found only in fenced area where it was planted (Yadon pers. comm.). Area inland of 17 Mile Drive along horse trail contained both coastal dunes milkvetch and Pacific Grove clover.

Site 12 - Pacific Grove clover and coastal dunes milkvetch were found in several patches along the path and in the horse jumping area.

Site 13 - Indian Village site. Known location of Pacific Grove clover and Hickman's cinquefoil. While surveys were conducted, maintenance workers came and mowed and weed-whacked the site. Weeds were cut right up to the fenced area, ensuring that no errant Hickman's cinquefoil would escape the exclosure. Pacific Grove clover was mowed just as it was starting to set seed. The clover was pointed out to the workers, who were unaware of it; however, they continued to mow it.

Site 14 - Little potential Pacific Grove clover habitat seen here. South end of location very wet and dominated by reed grass (*Calamagrostis* sp.). Northern portion of location (near Stevenson School) was much dryer and no clover was seen. No potentilla species were encountered. Fairway area is solid golfing green and has no potential habitat for either Pacific Grove clover or Hickman's cinquefoil.

Site 15 - Few clover encountered. Area either fairly dry woodland or very wet (several marshes encountered). Pacific silverweed (*Potentilla anserina* ssp. *pacifica*) was found in several very wet spots.

Site 16 - Pacific Grove clover discovered in mowed parking area. After later search, D. Allen reported that Pacific Grove clover population extended into equestrian grandstand area as well.

Site 17 - Area dominated by tall grasses. This area is private land and was not thoroughly searched, but no potential habitat for target rare plant species was seen.

Site 18 - This area is a private horse pasture and is heavily disturbed (mostly unvegetated). Little of the area appears to be wet enough to support Pacific Grove clover or Hickman's cinquefoil. Area was not thoroughly searched because it is private property.

Site 19 - Most of greenbelt is dominated by African ice plant and annual grasses. No Pacfic Grove clover and coastal dunes milkvetch were found, but several small wet areas of excellent habitat were seen.

Site 20 - Excellent potential habitat for Pacific Grove clover and coastal dunes milkvetch. Many associates found, but no rare plants found.

Site 21 - Remnant dune habitat. Dominated by pansa sedge and European dune grass (*Ammophilia arenaria*). Few marshes with cow clover.

Site 22 - Horse pasture on private land. Very disturbed, no wet areas with potential for Pacific Grove clover or coastal dunes milkvetch habitat seen from street.

Site 23 - Coastal scrub with intermittent non-native grassland. Area dominated by ripgut brome (*Bromus diandrus*) and wild oats (*Avena* sp.). No clover seen.

Site 24 - Area dominated by tall annual grasses, including big rattlesnake grass (*Briza maxima*) and soft chess (*Bromus hordaceus*). Some wet drainage areas with California oatgrass (*Danthonia californica*) and rushes (*Juncus* ssp.), but no clovers or milkvetch. Vegetation may be too tall for these species.

Site 25 - Wet meadow with signs of previous disturbance. Pacific Grove clover found near trail.

Site 26 - Dramatic change in vegetation seen. Area seems to be dryer and dominated by tall annual grasses (soft chess and wild oats), mustard (*Brassica* spp.), and other weedy species. Change in vegetation seems to correspond to change in terrace shown on geology map.

Site 27 - Mostly tall grassy vegetation, including soft chess, big rattlesnake grass, and Italian ryegrass (*Lolium multiflorum*). A few wet areas with low vegetation, no clover or milkvetch seen.

Site 28 - Area with pronounced mima relief. Many annual grasses, including big rattlesnake grass and soft chess. Seems too dry for rare species. No clover seen.

Site 29 - West side of road is excellent potential habitat for Pacific Grove clover and coastal dunes milkvetch. Mima relief with many clover and milkvetch associate species found in depressions, including tufted hairgrass, coyote thistle (*Eryngium* sp.), meadow barley (*Hordeum brachyantherum*), cut-leaf plantain (*Plantago coronopis*), and common toad rush (*Juncus bufonius*).

Site 30 - Area on east side has less potential rare plant habitat. More annual grasses, especially big rattlesnake grass. Tufted hairgrass gets very thick (almost 100% cover) in many spots. Some very wet spots with reed grass. A few mima depressions with suitable habitat but the only clover found was pin-point clover.

Site 31 - Many homes, appears to be private property. Area dominated by tall annual grasses.

Site 32 - Horse pasture with several large low areas with many clover, including Pacific Grove clover and rushes.

Site 33 - Both sides of the road are private property. Unable to thoroughly search. East side of road is sloped and probably drains too fast for good clover habitat. Many houses on the west side of the road. Strip of land next to highway is excellent Pacific Grove clover and coastal dunes milkvetch habitat. Very wet, many rushes and cow clover seen. It is actively grazed by cows.

Site 34 - Pacific Grove clover was seen in low, wet area at base of slope. Dryer areas and northern section near San Jose creek dominated by annual grasses and mustard.

Site 35 - Tall grasses. Not suitable habitat for Pacific Grove clover.

Site 36 - This area is a dryer slope, dominated by tall grasses and some shrubs. Not suitable habitat for Pacific Grove clover.

Site 37 - Level, grassy area at base of slope with Pacific Grove clover found in wet depression areas.

Site 38 - Area with the greatest relief, might be considered mima relief. Appears wetter than Site 37. Vernal pools in depression areas. A few clovers found, but no Pacific Grove clover.

Site 39 - Many grassy areas would seem to be good clover habitat, but few found. Area seems very dry now. Hop clover (*Trifolium campestre*) and thimble clover (*Trifolium* (completely gone to seed) were found.

Site 40 - Many houses now on this site. Area was not thoroughly searched. Some patches of hop clover seen in open places.

Site 41 - Open areas and road in unburned Monterey pine (*Pinus radiata*) forest searched (south of fire road). No clover seen.

Site 42 - Monterey clover and thimble clover found in open grassy area in chaparral understory in previously burned Monterey pine forest.

Site 43 - Monterey pines very thick from top of the ridge west and north, down the slope. Trees about a foot apart. Several forays made into the middle of this area, no clearings seen and little understory vegetation. No apparent suitable habitat for Monterey clover.

Site 44 - Monterey clover and thimble clover found in disturbed open area long the road.

Site 45 - No clover found. Area was covered with trees and very dry chaparral. Dead snags were piled in many of the open areas. (There must have been some clearing done after the 1987 fire.)

Site 46 - Many patches of clover, including thimble clover, whitetip clover (*Trifolium variegatum*), bearded clover (*Trifolium barbigerum*), and rose clover (*Trifolium hirtum*) found. No Monterey clover found. Many of the clovers were still blooming, so it is unlikely that Monterey clover was just missed.

Site 47 - No clover found. Area is dry and open spaces were often dominated by annual grasses.

Site 48 - Area with very thick tree cover. Only edges surveyed. Few cleared areas, but they were densely shaded.

Site 49 - There were many open grassy areas in chaparral understory that seem likely Monterey clover habitat. Areas indicated by Vern Yadon as Monterey clover occurrences in 1988 were located and surveyed (Yadon pers. comm.). Only one patch of dried tomcat clover (*Trifolium willdenovii*) was found. It could be too late in season for Monterey clover.

Site 50 - Trees in pygmy forest get taller as you go toward the golf course. A dense (impenetrable) understory of huckleberry (*Vaccinium ovatum*) and salal (*Gaultheria shallon*) forms. No clover habitat seen except along roads. No clover seen in locations of Monterey clover identified by Vern Yadon in 1988 (Yadon pers. comm.).

Site 51 - Dense patches of rose clover seen along fire road near area indicated as a Monterey clover occurrence by Vern Yadon in 1988. Little other clover habitat seen. It looks like the road has been widened recently.

Site 52 - September Ranch. Pacific Grove clover found here by Bryan Mori in spring 1995 (Mori pers. comm.). Site not surveyed by Jones & Stokes Associates.

PERSONAL COMMUNICATIONS

Mori, Bryan. Botanist. May 12, 1995 - California native species survey forum for Pacific Grove clover.

Yadon, Vernal. Consulting botanist. Pacific Grove, CA. April 28, 1995 - field meeting; May 1, 1995 - telephone message; May 26, 1995 - field meeting.

Appendix B. Field Survey Forms for Coastal Dunes Milkvetch

Site 11

California Native Species Field Survey Form

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 4 (mo) - 28 (day) - 95 (year)

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Scientific Name *(no codes):* Astragalus tener tit.

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: ~3300 Subsequent visit? [ ]yes [ ]no

Compared to your last visit: [✓]more [ ]same [ ]fewer
Accord. to V. Yadon

Is this an existing NDDB occurrence? [yes] [ ] [ ]
Yes, Occ. # no unk.

Collection? If yes: _____ _____
number Museum/Herbarium

Reporter: Jane Holte

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: 10% 90% _____
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____ _____ _____
 # adults # juveniles # unknown

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*
Both sides of 17 mile drive
Between Bird Rock and Ocean Drive. In fenced sensitive plant area, surrounding disturbed areas and along horse trail.

County: Monterey Landowner/Mgr: Pebble Beach Co.

Quad Name: Monterey Elevation: < 50' UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Wet coastal prairie with slight mima relief and surrounding disturbed areas receiving drainage. Plants found in low, wet areas. One patch was found in old (decomposed granite roadbed (?). (over)

Other rare spp.? Trifolium polyodon (planted on ocean side of road)

Site Information: Current/surrounding land use: Ocean side: Fenced sensitive plant area & unfenced open space. Inland side: Horse trail

Visible disturbances, possible threats:
Human & Horse trampling, invasive exotics (Hottentot fig, Cut-leaved plantain, ripgut brome)

Overall site quality: [ ]*Excellent* [✓]*Good* [✓]*Fair* [ ]*Poor* Comments: _____

Determination: *(Check one or more, fill in the blanks)*

___ Keyed in a site reference: _____

___ Compared with specimen housed at: _____

___ Compared with photo/drawing in: _____

___ By another person (name): V. Yadon

Other:

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 11

Ocean side:

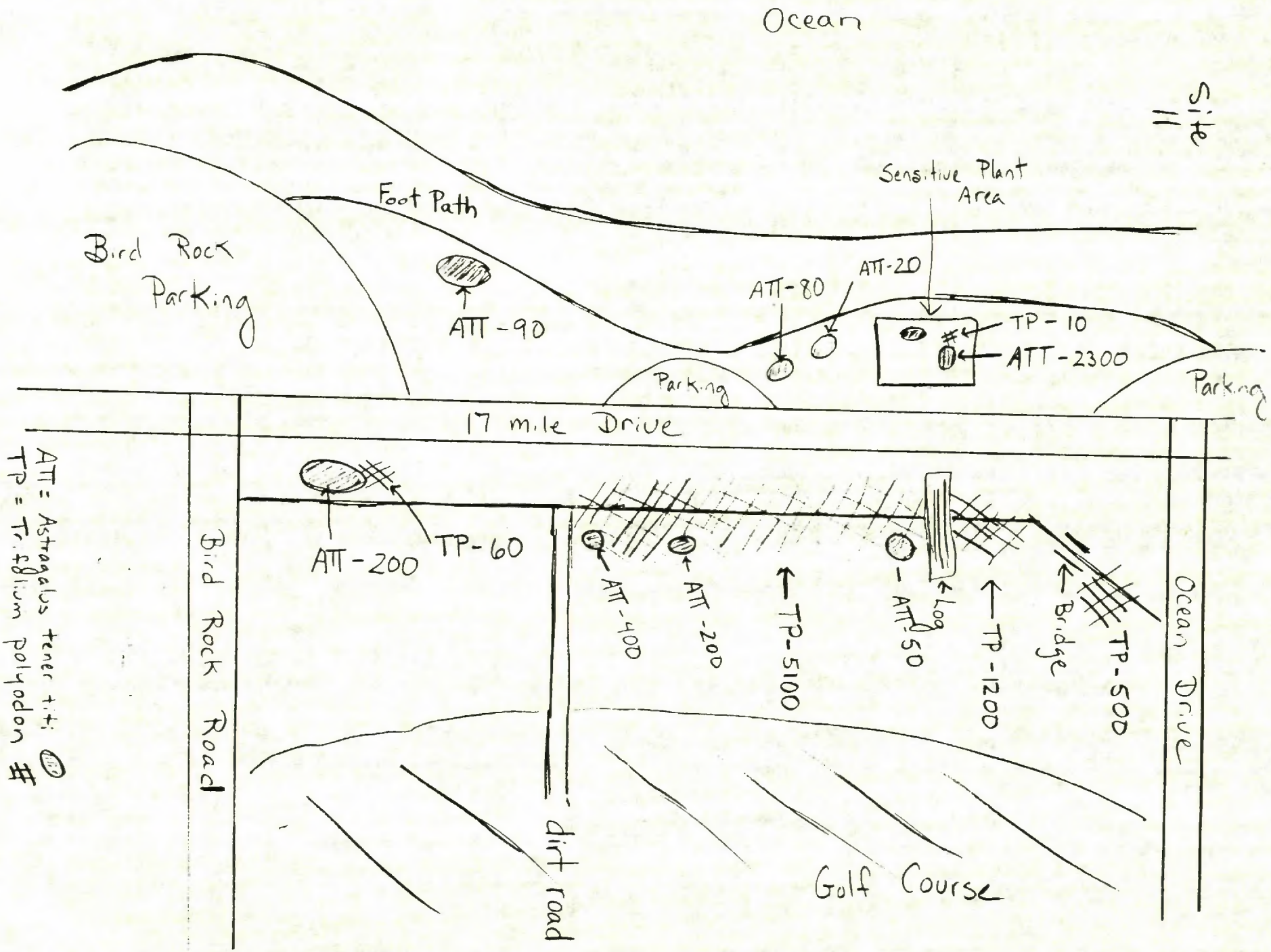
Dominants: Deschampsia caespitosa ssp. holiformis, Plantago coronopus

Associates: Lasthenia minor, Eryngium armatum, Poa unilateralis, Trifolium variegatum, T. polyodon, T. wormskjoldii, Carex pansa, Castelleja ambigua, Cotula coronopifolia, Hordeum brachyantherum.

Inland side:

Dominants: Plantago coronopus

Associates: Lasthenia minor, Eryngium armatum, Poa unilateralis, Deschampsia caespitosa ssp. holiformis, Juncus bufonius, Juncus xiphioides, Trifolium variegatum, T. polyodon, Hordeum brachyantherum.


Ocean
Site 11
Sensitive Plant Area
Foot Path
Bird Rock Parking
ATT-90
ATT-80
ATT-20
TP-10
ATT-2300
Parking
Parking
17 mile Drive
ATT-200
TP-60
ATT-400
ATT-200
TP-5100
ATT-50
Log
TP-1200
Bridge
TP-500
Ocean Drive
Bird Rock Road
dirt road
Golf Course
ATT = Astragalus tener titi
TP = Tr. fblium polyodon #

California Native Species Field Survey Form site 12

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 6 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes)*: Astragalus tener titi

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: ~680 Subsequent visit? [ ]yes [ ]no

Compared to your last visit: [ ]more [ ]same [ ]fewer

Is this an existing NDDB occurrence? [yes] [ ] [ ]
Same occurrence as Location # II *Yes, Occ. #* *no* *unk.*

Collection? If yes: _____ _____
number *Museum/Herbarium*

Reporter: Jane Holte

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: 10 *% vegetative* 90 *% flowering* _____ *% fruiting*

Animal Information:

Age Structure: _____ *# adults* _____ *# juveniles* _____ *# unknown*

Site Function: [ ] *breeding* [ ] *foraging* [ ] *wintering* [ ] *roosting* [ ] *burrow site* [ ] *other*

Location: *(Please also attach or draw map on back.)*

Greenbelt area of MPCC Golf course:
500 feet E. of 17 mile drive, between Bird Rock & Ocean Roads

County: Monterey Landowner/Mgr: Monterey Pen. Country Club

Quad Name: Monterey Elevation: <50' UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Disturbed coastal prairie, integrating with coastal scrub, In low areas receiving drainage. No apparent mima relief.
Dominants: Danthonia californica, Briza minor, Plantago coronopus
Assoc.: Deschampsia caespitosa ssp. holiformis, Juncus xiphioides, Juncus bufonius, Lasthenia minor
Other rare spp.? Trifolium polyodon

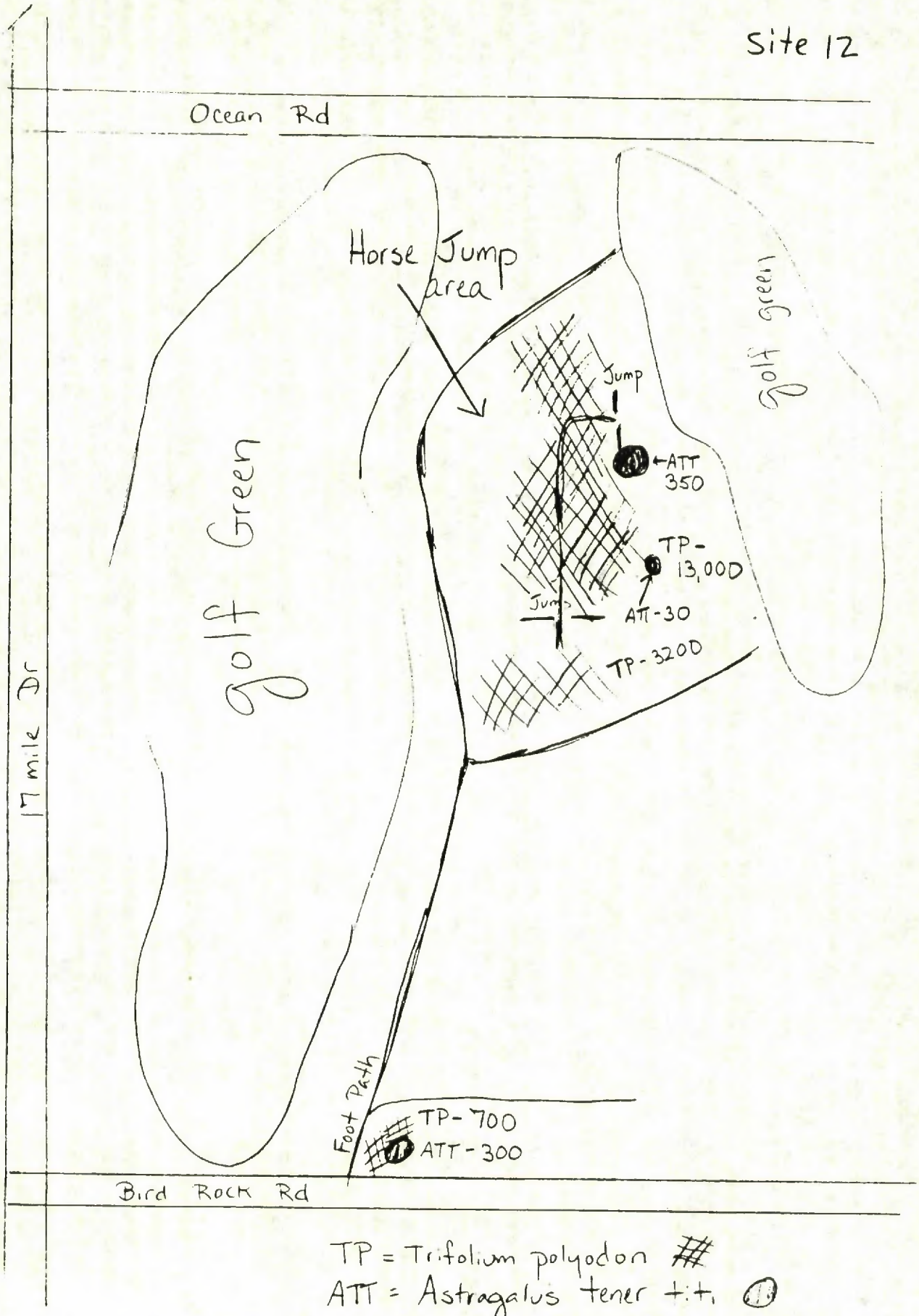
Site Information: Current/surrounding land use: Greenbelt area, used as horse trail. Several horse jumps set-up at northern end.
Visible disturbances, possible threats:
Horses, mowing in horse jumping area
Overall site quality: [ ]*Excellent* [✓]*Good* [ ]*Fair* [ ]*Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): _____
___ Other: _____

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 12



TP = Trifolium polyodon ##

ATT = Astragalus tener +:+ (1)

Location # 12

Appendix C. Field Survey Forms for Pacific Grove Clover

California Native Species Field Survey Form site 5

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 13 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium polyodon

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: ~10 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [ND] Yes, Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 50 % flowering 100 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
Asilomar State Beach, Pacific Grove. In old road bed to north of main board walk leading to Admin. building and near flagpole in lawn area by Admin. Building
County: Monterey Landowner/Mgr: Calif. State Parks
Quad Name: Monterey Elevation: <50' UTM: 595000 mE, 4053000 mN
T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) i) In old roadbed in restored dunes. Substrate was decomposed granite, area was slighty lower than surrounding dune area & apparently received drainage. Dominants: Juncus bufonius, Juncus xiphioides, Plantago coronopus Assoc.: Trifolium barbigerum, T. gracilentum, Briza maxima, Trifolium wormskjoldii (over)
Other rare spp.?

Site Information: Current/surrounding land use: Road bed is in closed dune restoration area. Grassy area includes picnic benches.
Visible disturbances, possible threats:

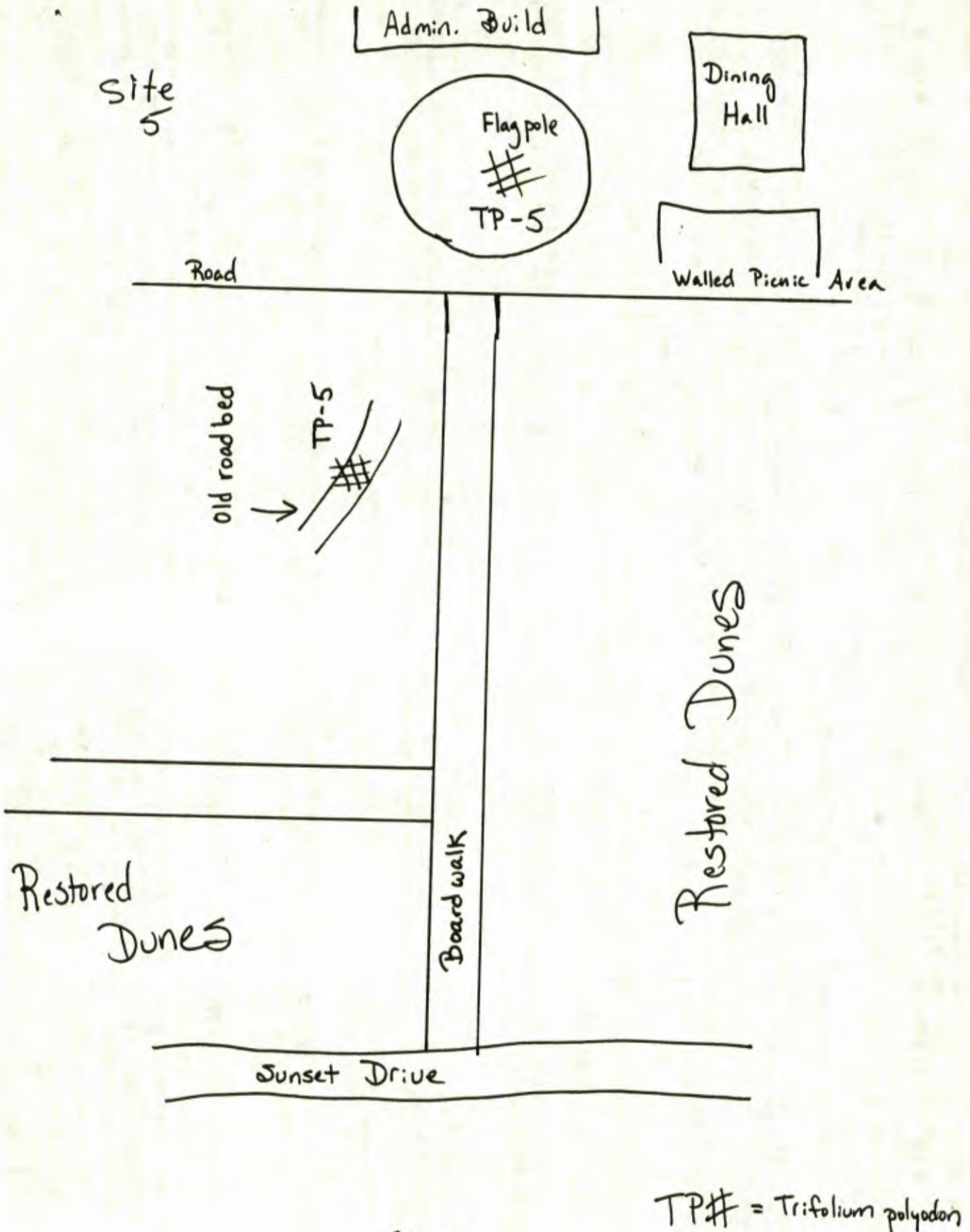
Overall site quality: [ ]Excellent [?]Good [?]Fair [ ]Poor Comments: What can you say about an old road bed? Grassy area obviously weeded

Determination: (Check one or more, fill in the blanks)
____ Keyed in a site reference: _____
____ Compared with specimen housed at: _____
____ Compared with photo/drawing in: _____
____ By another person (name): Confirmed by V. Yadon
____ Other: _____

Photographs: (Check one or more) Slide Print
Plant/animal ___ ___
Habitat ___ ___
Diagnostic Feature ___ ___
Other ___ ___
May we obtain duplicates at our expense? [ ]yes [ ]no

site 5

Habitat: 2) grassy area near flag pole. Several wet (depression areas with rushes & clovers. Associates & Dominants same except add: Trifolium dubium. Trifolium variegatum Overall cover much higher than #1.


Admin. Build
Site 5
Flagpole
TP-5
Dining Hall
Walled Picnic Area
Road
Old road bed
TP-5
Restored Dunes
Boardwalk
Restored Dunes
Sunset Drive
Ocean
TP# = Trifolium polyodon

California Native Species Field Survey Form Site 7

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 26 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium Polyodon

Species Found? [✓] [ ] _____ (yes / no / If not, why?)
Total # Individuals: ~50 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [No] [ ] [ ] (Yes, Occ. # / no / unk.)
Collection? If yes: _____ (number) _____ (Museum/Herbarium)

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ (% vegetative) 80 (% flowering) 20 (% fruiting)

Animal Information:
Age Structure: _____ (# adults) _____ (# juveniles) _____ (# unknown)
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
In old road bed located in restored dune, 100 ft. North of parking lot for Moss Beach (on Spanish Bay Road, off of 17 mile Drive).

County: Monterey Landowner/Mgr: Pebble Beach Co
Quad Name: Monterey Elevation: <50' UTM: 594 000 mE, 4052 000 mN
T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) Low lying, decomposed granite roadbed in restored dune habitat. Wet area apparently receiving drainage. Dominants: Lolium multiflorum, Juncus bufonius, Juncus xiphioides Assoc.: Trifolium barbigerum, T. wormskjoldii, Hypochoeris glabra, Trifolium variegatum, T. dubium, Bromus hordeaceus
Other rare spp.?

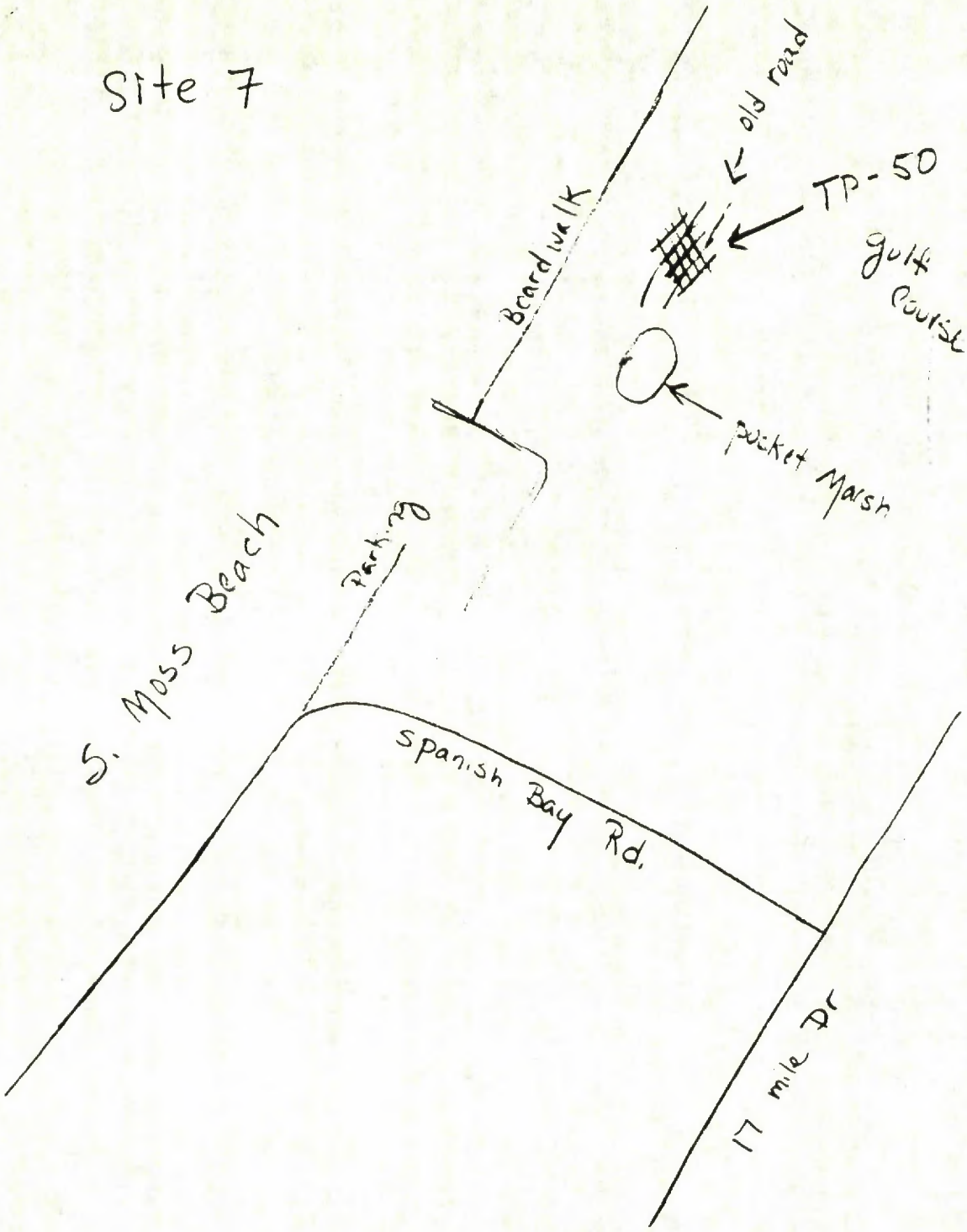
Site Information: Current/surrounding land use: Open space, restored area next to golf course.
Visible disturbances, possible threats:

Overall site quality: [ ]Excellent [✓]Good [ ]Fair [ ]Poor Comments:

Determination: (Check one or more, fill in the blanks)
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): Reported by D. Allen
___ Other: _____

Photographs: (Check one or more) Slide Print
Plant/animal ___ ___
Habitat ___ ___
Diagnostic Feature ___ ___
Other ___ ___
May we obtain duplicates at our expense? [ ]yes [ ]no

Site 7



TP = : Trifolium polyodon

California Native Species Field Survey Form Site 11

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 4 (mo) - 28 (day) - 95 (year)

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Scientific Name *(no codes):* Trifolium polyodon

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: ~6870 Subsequent visit? [ ]yes [ ]no

Compared to your last visit: [✓]more [ ]same [ ]fewer
Accord. to V. Yadon

Is this an existing NDDB occurrence? [yes] [ ] [ ]
Yes, Occ. # *no* *unk.*

Collection? If yes: _____ _____
number *Museum/Herbarium*

Reporter: Jane Holte

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: _____ 100 % _____
% vegetative *% flowering* *% fruiting*

Animal Information:

Age Structure: _____ _____ _____
 # adults *# juveniles* *# unknown*

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*

Both sides of 17 mile drive between Bird rock and ocean Drive. Most plants on inland side of 17 mile dr, only ~10 plants found on ocean side in sensitive plant area (these were planted).

County: Monterey Landowner/Mgr: Pebble Beach Co.

Quad Name: Monterey Elevation: <50' UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Disturbed, wet coastal prairie. Plants found in low areas receiving drainage.
Dominants: Plantago coronopus, Lasthenia minor
Associates: Eryngium armatum, Poa Unilateralis, Juncus bufonius, (over)

Other rare spp.? Astragalus tener titi

Site Information: Current/surrounding land use: Greenbelt/ horse trail next to golf green.

Visible disturbances, possible threats: Horse trampling, invasive exotics (hottentot fig)

Overall site quality: [ ]*Excellent* [ ]*Good* [✓]*Fair* [ ]*Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*

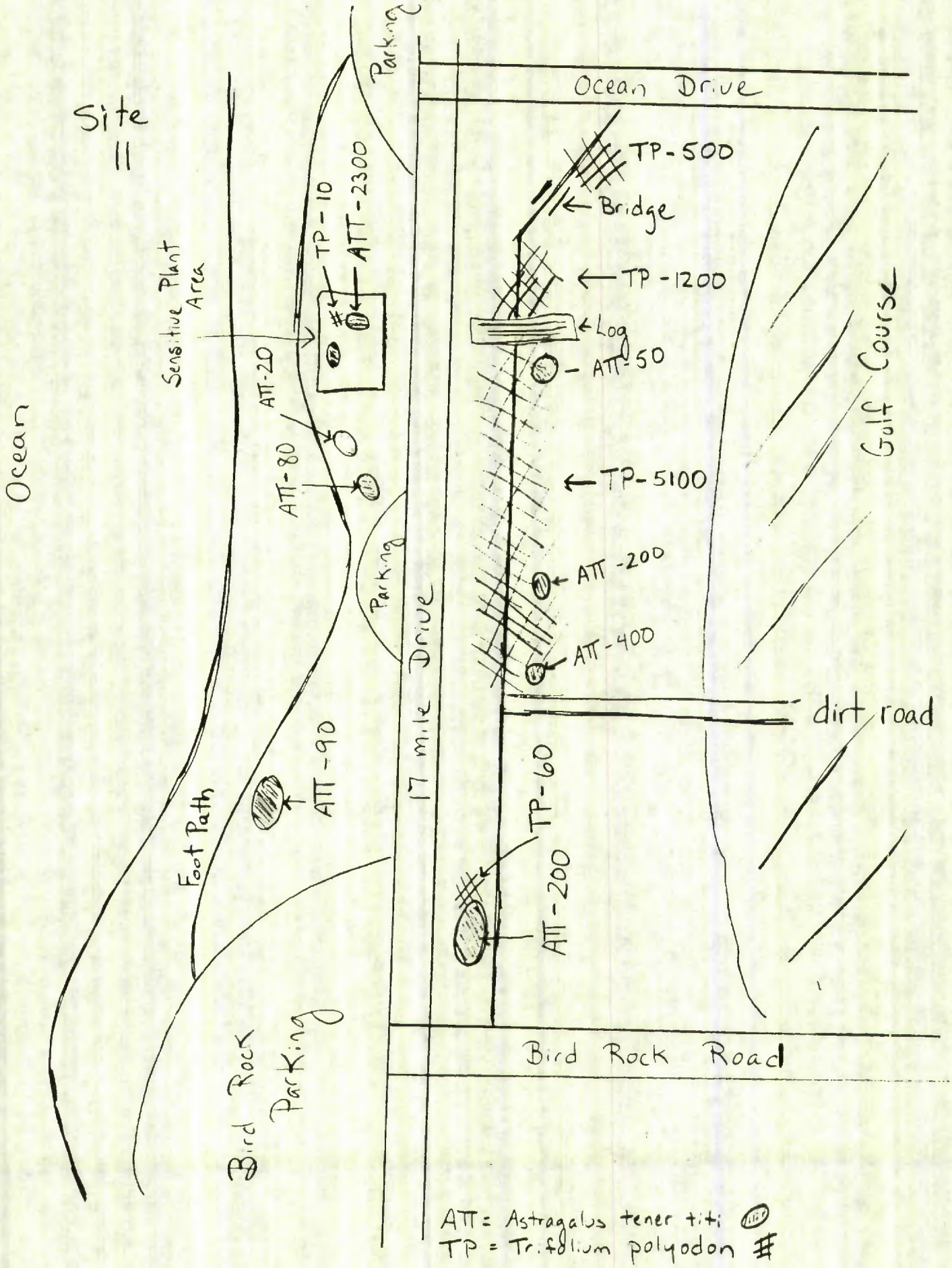
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): V. Yadon

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 11

Assoc. (cont.): Juncus xiphioides, Hordeum brachyantherum, Trifolium variegatum, T. barbigerum, T. microdon, Deschampsia caespitosa ssp. holiformis


Site
Ocean
Sensitive Plant Area
Parking
Ocean Drive
TP-500
Bridge
TP-1200
Log
ATT-50
Golf Course
TP-10
ATT-2300
ATT-20
ATT-80
Parking
17 mile Drive
TP-5100
ATT-200
ATT-400
dirt road
ATT-90
Foot Path
TP-60
ATT-200
Bird Rock Parking
Bird Rock Road
ATT = Astragalus tener titi
TP = Trifolium polyodon #

California Native Species Field Survey Form Site 12

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 6 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium Polyodon

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: ~1,000 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [yes] [ ] [ ]
Same occurrence as location # 11 Yes, Occ. # / no / unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 100 % flowering 20 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
Greenbelt area of MPCC Golf course:
500 ft. E. of 17 mile drive, Between Bird Rock and Ocean Roads

County: Monterey Landowner/Mgr: Monterey Pen. Country Club
Quad Name: Monterey Elevation: _____ UTM: _____
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) Disturbed coastal prairie, integrating with coastal scrub. In low, wet areas that have been disturbed by horses or mowing. No apparent mima relief.
Dominants: Danthonia californica, Briza minor
Assoc.: Deschampsia caespitosa ssp. holiformis, Juncus bufonius, Lasthenia minor
Other rare spp.? Astragalus tener titi (over)

Site Information: Current/surrounding land use: horse trail and jumping area, greenbelt for golf course
Visible disturbances, possible threats:
Horses, mowing in jumping area
Overall site quality: [ ]Excellent [✓]Good [ ]Fair [ ]Poor Comments:

Determination: (Check one or more, fill in the blanks)
____ Keyed in a site reference: _____
____ Compared with specimen housed at: _____
____ Compared with photo/drawing in: _____
____ By another person (name): _____
____ Other: _____

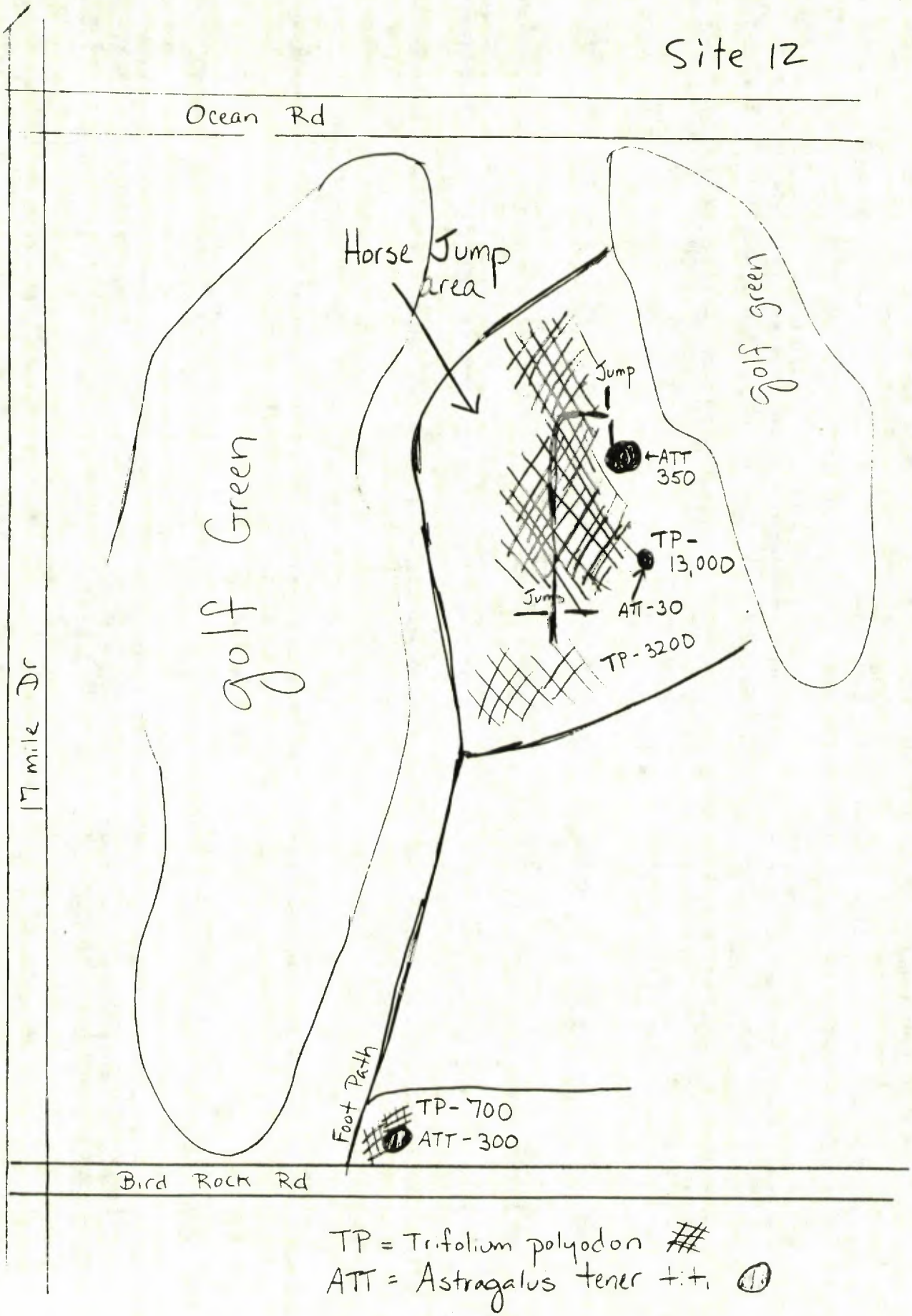
Photographs: (Check one or more)	Slide	Print
Plant/animal	—	—
Habitat	—	—
Diagnostic Feature	—	—
Other	—	—

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 12

Assoc. (continued): Sisyrinchium bellum

Site 12



TP = Trifolium polyodon ##
ATT = Astragalus tener +:+ (1)

California Native Species Field Survey Form Site 13

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 6 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes):* Trifolium polyodon

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: 4100 Subsequent visit? [ ]*yes* [ ]*no*

Compared to your last visit: [✓]*more* [ ]same [ ]fewer
According to V. Yadon

Is this an existing NDDB occurrence? [_____] [ ] [ ]
Yes, Occ. # no unk.

Collection? If yes: _____ _____
number Museum/Herbarium

Reporter: Jane Holte

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: _____ 100 30
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____ _____ _____
 # adults # juveniles # unknown

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*
"Indian Village" site, ½ mi east of "The Dunes" road (off 17 mi drive - ⅛ mi S. of Bird Rock Parking area). Plants throughout picnic area & surrounding areas.

County: Monterey Landowner/Mgr: Pebble Beach Co.

Quad Name: Monterey Elevation: _____ UTM: _____

T_____R_____ _____ 1/4 of _____1/4 Sec _____ T_____R_____ _____ 1/4 of _____1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Open meadow in Monterey Pine forest. Level areas and lower wet areas receiving drainage, many areas appearing wet at time of survey. Dominants: Plantago Coronopus, Juncus bufonius. Associates: Danthonia californica, Hordium brachyantherum, Hordium leporinum, medicago sp., Trifolium barbigerum (over)

Other rare spp.? Potentilla hickmanii near by

Site Information: Current/surrounding land use: Picnic & volley ball area. Area frequently mowed

Visible disturbances, possible threats: mowing at inappropriate times - see notes

Overall site quality: [ ]*Excellent* [✓]*Good* [ ]*Fair* [ ]*Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): _____
___ Other: _____

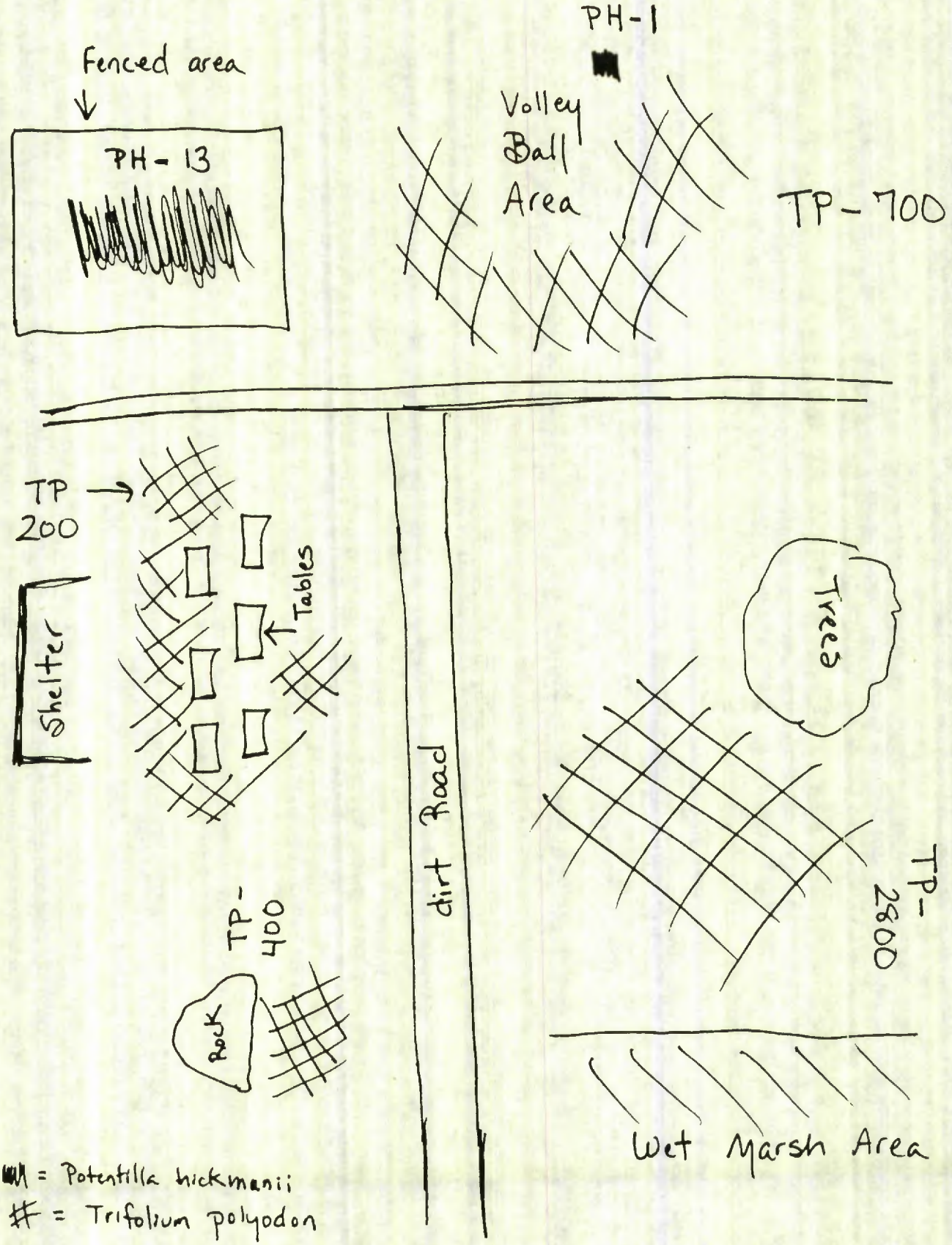
Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 13

Assoc. (cont): T. variegatum, T. microdon, Juncus xiphioides

Site 13



PH ▮ = Potentilla hickmanii
TP # = Trifolium polyodon

California Native Species Field Survey Form Site 16

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 12 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium polyodon

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: ~10,000 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [No] [ ] [ ] Yes, Occ. # / no / unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: _____
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 60 % flowering 50 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
Employee parking area near equistrian center between Drake Rd, Stevenson Rd and Portola Rd. Approx ½ mi NW of Pebble Beach.

County: Monterey Landowner/Mgr: Pebble Beach Co
Quad Name: Monterey Elevation: 150' UTM: 593000 mE, 4048000 N
T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) Mowed wet meadow used as parking area & equestrian center grandstands.
Dominants: Plantago coronopus Assoc.: Bromus hordeaceus, Erodium sp., medicago sp, Juncus bufonius, Lolium multiflorum, Trifolium barbigerum, T. variegatum, T. dubium, Spergularia rubra
Other rare spp.?

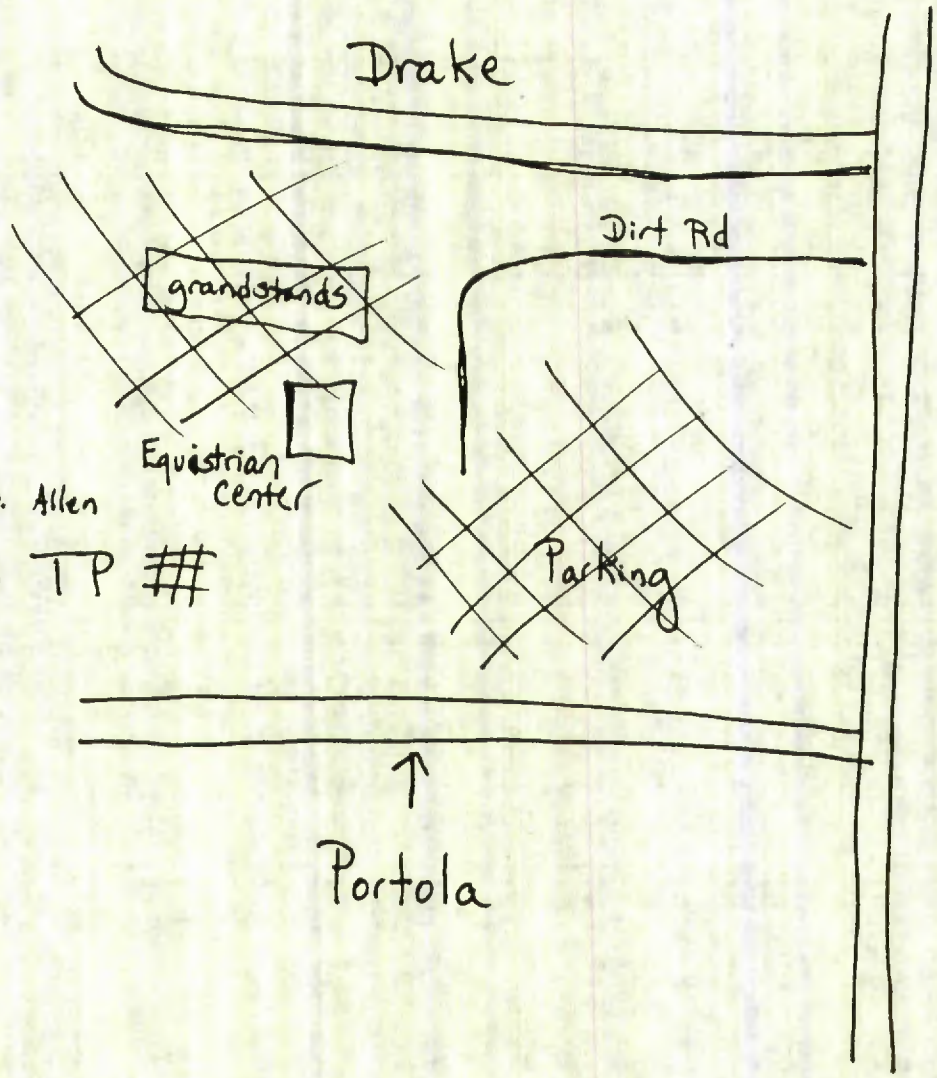
Site Information: Current/surrounding land use: Parking and grandstand area
Visible disturbances, possible threats: Parking in wet weather?
Overall site quality: [ ]Excellent [ ]Good [✓]Fair [ ]Poor Comments: Very disturbed, but T. polydon like it!

Determination: (Check one or more, fill in the blanks)
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): Verified by D. Allen, M. Zander
___ Other: _____

Photographs: (Check one or more)	Slide	Print
Plant/animal	—	—
Habitat	—	—
Diagnostic Feature	—	—
Other	—	—

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 16



Estimate by D. Allen

~ 10,000 TP #

California Native Species Field Survey Form Site 25

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 19 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes)*: Trifolium polyodon

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: ~2000 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [No] Yes, Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 100 % flowering 50 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*
Pt. Lobos - Along Moss Cove Trail
¼ mi South west of reserve boundry. Found on both sides of trail

County: Monterey Landowner/Mgr: Calif. State Parks
Quad Name: Monterey Elevation: <50' UTM: 595000 mE, 4042000 mN
T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Previously disturbed wet coastal prairie. Level area with some topigraphical relief. Plants found in low, wet areas. See notes for Loc. 25 & 26. Dominants: Plantago coronopus, Juncus bufonius, Juncus xiphioides Assoc.: Hordeum brachyantherum, Danthonia californica, Eryngium armatum, Trifolium variegatum
Other rare spp? (over)

Site Information: Current/surrounding land use: Preserve

Visible disturbances, possible threats: Exotic grasses & mustard surround area

Overall site quality: [ ]Excellent [✓]Good [ ]Fair [ ]Poor Comments: Distinct vegetation changes in surrounding area corresponding to soil changes? See notes for 26

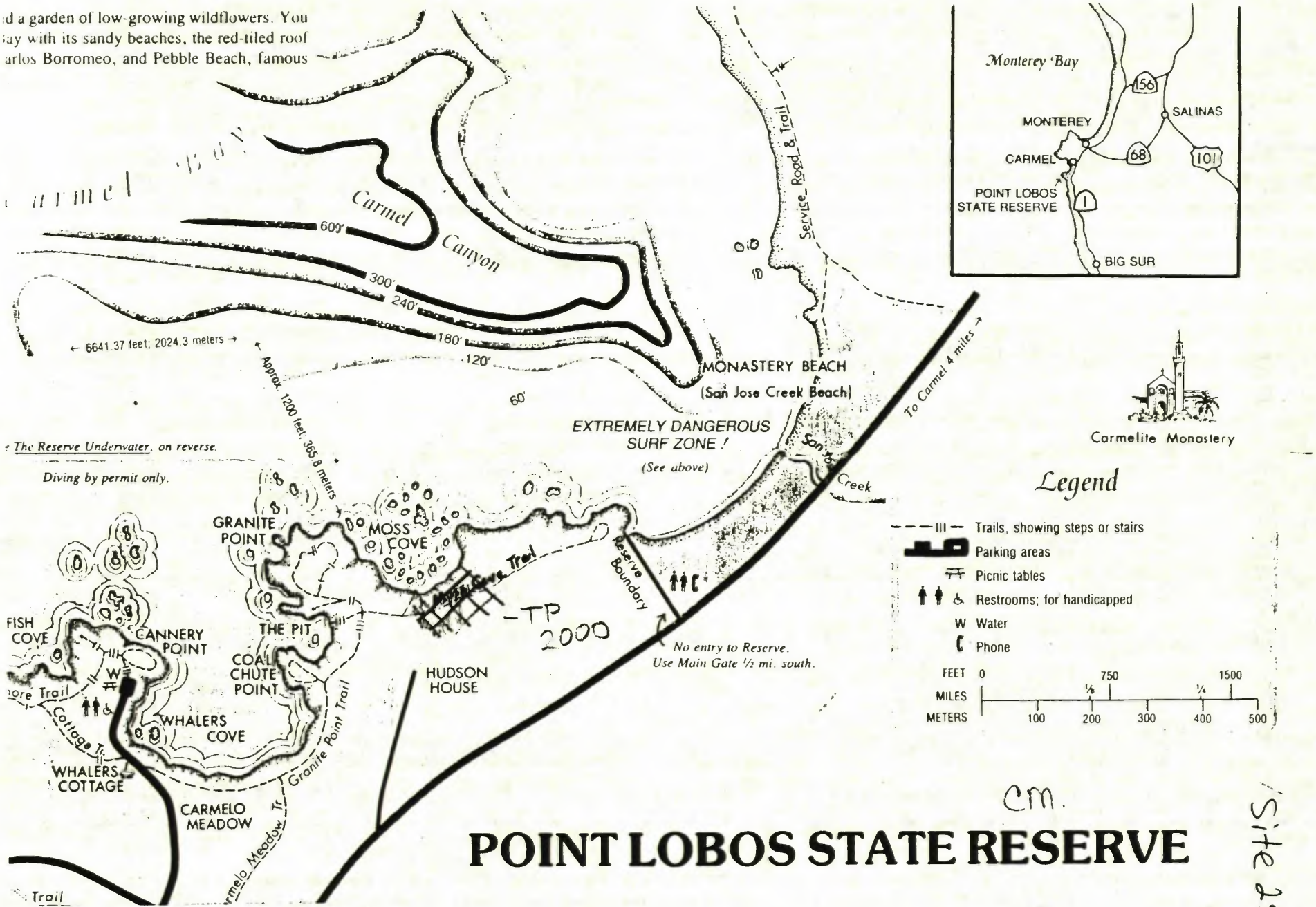
Determination: *(Check one or more, fill in the blanks)*
___ Keyed in a site reference: _____
✓ Compared with specimen housed at: living specimens at
___ Compared with photo/drawing in: found along 17 mi drive
___ By another person (name): _____
___ Other: _____

Photographs: *(Check one or more)* Slide Print
Plant/animal ___ ___
Habitat ___ ___
Diagnostic Feature ___ ___
Other ___ ___
May we obtain duplicates at our expense? [ ]yes [ ]no

Site 25

Assoc. (cont.): T. wormskjoldii, T. barbigerum

d a garden of low-growing wildflowers. You
ay with its sandy beaches, the red-tiled roof
arlos Borromeo, and Pebble Beach, famous



POINT LOBOS STATE RESERVE

cm.

Site 25

California Native Species Field Survey Form Site 32

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 19 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium polyodon

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: 1500 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [No] [ ] [ ] Yes, Occ. # / no / unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 80 % flowering 60 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*
In horse pasture used by CHAPS, SE of Allen Road. 1/8 mi directly east of entrance road to Pt. Lobos State Reserve

County: Monterey Landowner/Mgr: Big Sur Land Trust? CHAPS (?)
Quad Name: Monterey Elevation: 80' UTM: 595000 mE, 4041000 N
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Wet grassland/pasture with some relief. Plants found in wet depressions (mima relief?) at Southern edge of pasture. Dominants: Plantago coronopus, Juncus bufonius - higher areas, non-native grasses: Bromus hordaceus, Lolium multiflorum, Hordium leporinum Assoc: Trifolium barbigerum (over)
Other rare spp.?

Site Information: Current/surrounding land use: horse pasture - very well grazed

Visible disturbances, possible threats:

Overall site quality: [ ]Excellent [ ]Good [✓]Fair [ ]Poor Comments: Many exotics

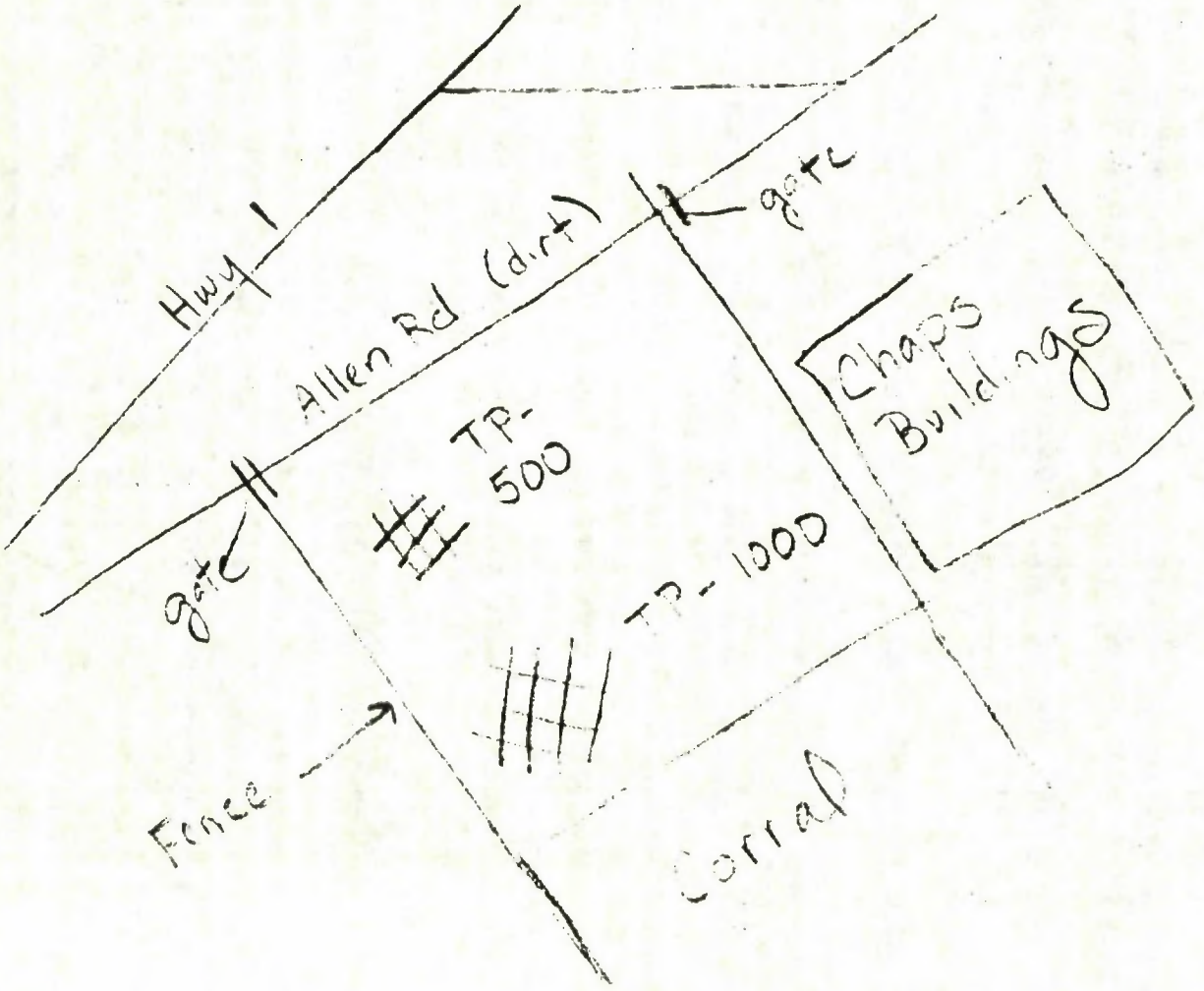
Determination: *(Check one or more, fill in the blanks)*
___ Keyed in a site reference: _____
✓ Compared with specimen housed at: living specimens
___ Compared with photo/drawing in: found along 17 mi Dr.
___ By another person (name): _____
___ Other: _____

Photographs: *(Check one or more)*	Slide	Print
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 32

Assoc (cont.): T. variegatum, T. gracilentum, T. dubium, T. subterraneum, Briza minor



California Native Species Field Survey Form Site 34

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 19 (day) - 95 (year)

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Scientific Name *(no codes)*: Trifolium polyodon

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: ~~10,000~~ Subsequent visit? [ ]*yes* [ ]*no*

Compared to your last visit: [ ]*more* [ ]same [ ]fewer

Is this an existing NDDB occurrence? [No] [ ] [ ]
Yes, Occ. # *no* *unk.*

Collection? If yes: _____ _____
number *Museum/Herbarium*

Reporter: Jane Holte

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: _____ 90 20
% vegetative *% flowering* *% fruiting*

Animal Information:

Age Structure: _____ _____ _____
 # adults *# juveniles* *# unknown*

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*

On Lobos Ranch property - east of Pt. Lobos. In grassy area east of Allen Rd, ~½ mi SW of San Jose Rd.

County: Monterey Landowner/Mgr: Big Sur land trust (?)

Quad Name: Monterey Elevation: 70' UTM: 596000 mE, 4042000 N

T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____ R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* In wet coastal prairie. Area was formerly a heavily grazed horse pasture up to about 5 yrs ago. Clover were found in slight depressions in level area at base of slope. This level area supported lots of native ~~grassland~~ species & seems to have recovered nicely. All vegetation was

Other rare spp.?

Site Information: Current/surrounding land use: I believe this will be part of Pt. Lobos Preserve

Visible disturbances, possible threats: Exotics in higher, dryer areas

Overall site quality: [ ]*Excellent* [✓]*Good* [ ]*Fair* [ ]*Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*

- ___ Keyed in a site reference: _____
- ✓ Compared with specimen housed at: Plants along 17 mi drive
- ___ Compared with photo/drawing in: _____
- ___ By another person (name): _____
- ___ Other: _____

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

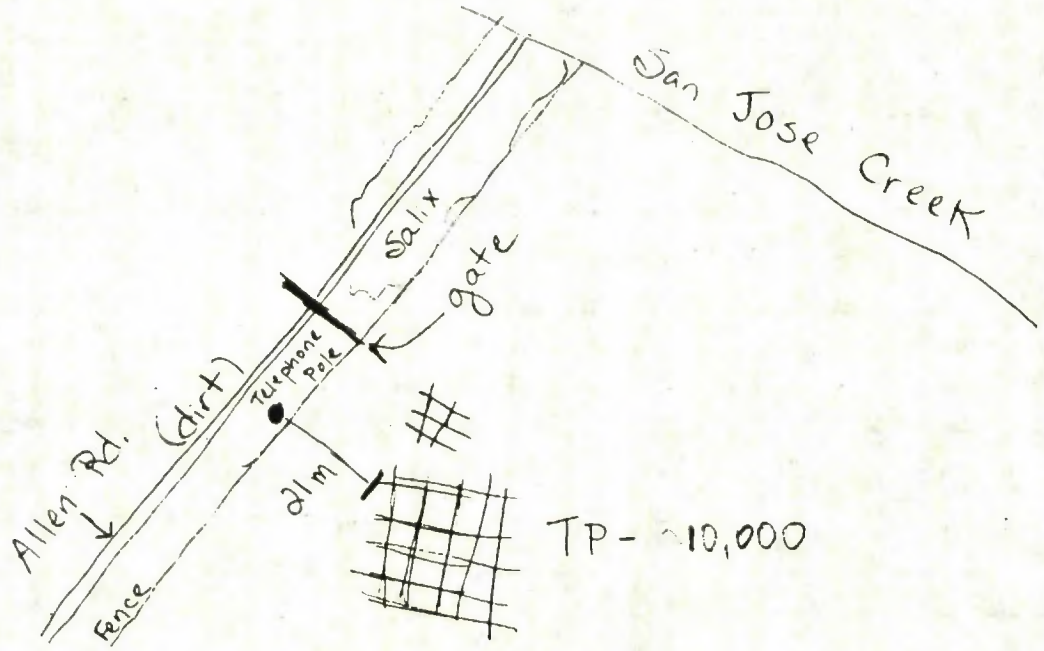
May we obtain duplicates at our expense? [ ]yes [ ]no

Site 34

Habitat Description: tall, including clover (which were about 2' tall).

Dominants: Hordium brachyanterum, Lolium multiflorum Juncus bufonius, Juncus xiphioides

Assoc: Trifolium variegatum, Plantago coronopus, Trifolium wormskjoldii, Rumex crispus, Briza minor, Cyperus eragrostis



California Native Species Field Survey Form Site 37

Mail to:
Natural Diversity Data Base
Califomia Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 26 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes):* Trifolium polyodon

Species Found? [✓] [ ] _____
yes no If not, why?

Total # Individuals: ~10,000 Subsequent visit? [✓]yes [ ]no

Compared to your last visit: [✓]more [ ]same [ ]fewer
Accord. to V. Yadon

Is this an existing NDDB occurrence? [yes] [ ] [ ]
Yes, Occ. # no unk.

Collection? If yes: _____ _____
number Museum/Herbarium

Reporter: _____

Address: _____

Phone: ( ) _____

Other knowledgeable individuals (name/address/phone):

Plant Information:

Phenology: _____ 20 90
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____ _____ _____
 # adults # juveniles # unknown

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*
Monterra Ranch - ~½ mi east of Olmstead Road, ~¼ mi South of Hwy 68 - Along old roadbed and patches in fenced 'work area'

County: Monterey Landowner/Mgr: Monterra Ranch/Russell McQuity (Mgr.)

Quad Name: Seaside Elevation: 250' UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Disturbed coastal prairie/pasture. Is currently being grazed by cows. In low, wet depressions ~~at base of~~ on level area at base of slope. Area has some relief. Dominants: Avena sp., Bromus hordaceus, Briza ssp., Vulpia sp. Assoc.: Danthonia californica, Hordium brachyantherum

Other rare spp.? (over)

Site Information: Current/surrounding land use: Cow pasture

Visible disturbances, possible threats:
Many exotics

Overall site quality: [ ]*Excellent* [ ]*Good* [✓]*Fair* [ ]*Poor* Comments:

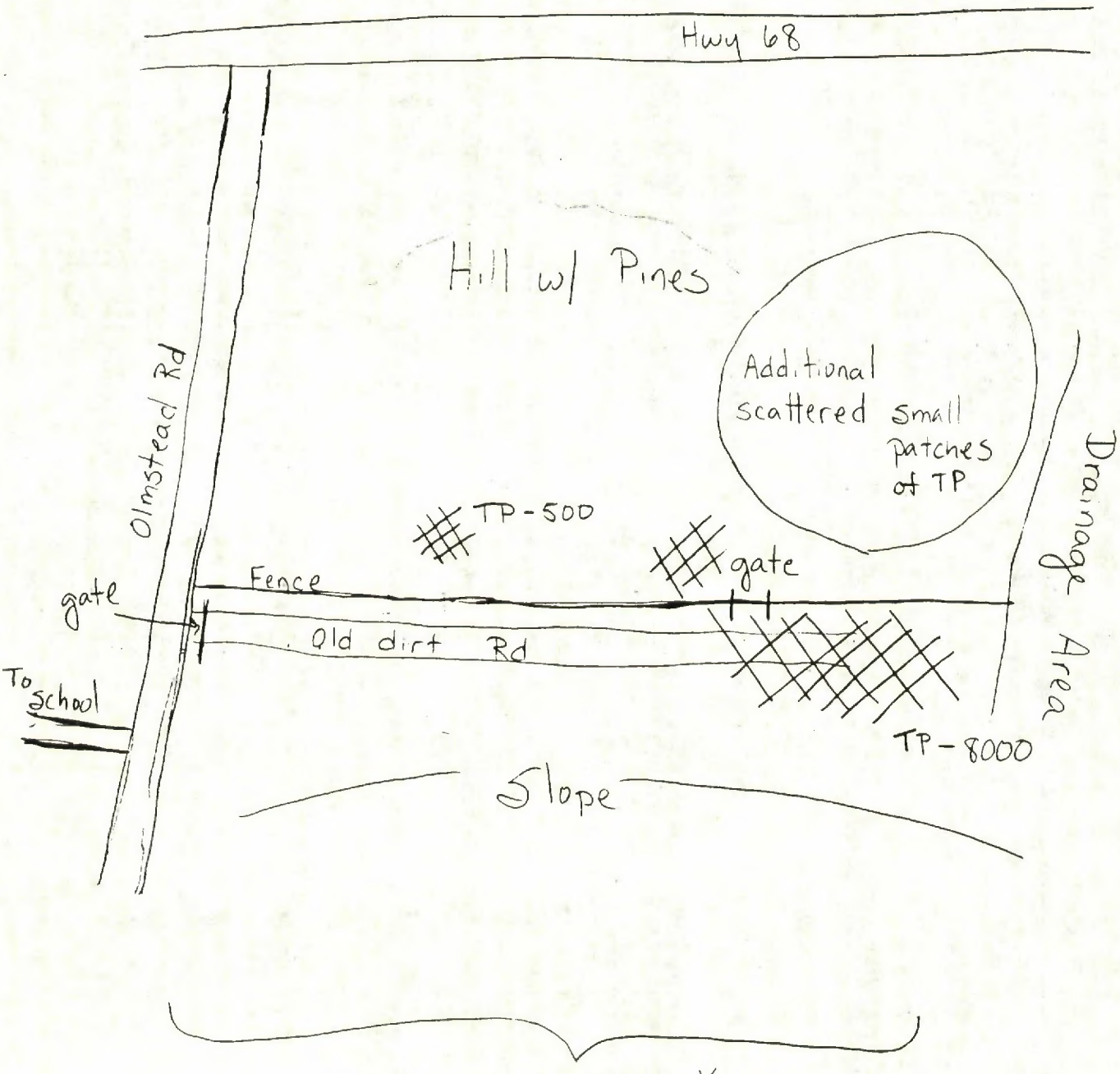
Determination: *(Check one or more, fill in the blanks)*
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
✓ By another person (name): ID. by V. Yadon
___ Other: _____

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Site 37

Assoc. (cont): Juncus bufonius, Juncus sp., Trifolium variegatum, T. barbigerum



California Native Species Field Survey Form Site 52.

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 12 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium polyodon

Species Found? [X] yes [ ] no _____ If not, why?
Total # Individuals: _____ Subsequent visit? [ ] yes [X] no
Compared to your last visit: [ ] more [ ] same [ ] fewer
Is this an existing NDDB occurrence? [NO] Yes, Occ. # [X] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Bryan Mori
Address: 1016 Brewington Ave.
Phone: (408) 728-1043
Other knowledgeable individuals (name/address/phone):
Randall Morgan
(408) 475 2212

Plant Information:
Phenology: _____ % vegetative 25 % flowering 75 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back)
September Ranch. North of Carmel Valley Road, east of Roach Canyon, so. of Jacks Peak County Park, and west of Cañada de la Segunda.
County: Monterey Co. Landowner/Mgr: Jim Morgens / September Ranch
Quad Name: Seaside Quad Elevation: 390 UTM: 40 45 '02 - '03
T ? R 1E _____ 1/4 of _____ 1/4 Sec _____ T _____ R _____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)
Perennial/Annual Grassland. Areas dominated by native species consisted of purple needlegrass, small-flowered needlegrass, California oatgrass, western rush, suncups, Ca. buttercups, blue-eyed grass, Brodeaia spp., Trifolium spp., ...

Other rare spp? Pinus radiata, Lomatium parvifolium, Ophioglossum californicum; others?

Site Information: Current/surrounding land use: Cattle grazing and horse ranch; low density housing in adjacent areas.
Visible disturbances, possible threats: Proposed for development
Overall site quality: [ ] Excellent [X] Good [ ] Fair [ ] Poor Comments: Native species diversity and abundance contribute to quality of grasslands, although areal extent is limited.

Determination (Check one or more, fill in the blanks)
[ ] Keyed in a site reference: _____
[ ] Compared with specimen housed at _____
[ ] Compared with photo/drawing in _____
[X] By another person (name) specimen id by Randall Morgan

Photographs: (Check one or more) Slide Print
Plant/animal — —
Habitat — —
Diagnostic Feature — —
Other — —
May we obtain duplicates at our expense? [ ] yes [ ] no

Appendix D. Field Survey Forms for Monterey Clover

California Native Species Field Survey Form Site 42

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 27 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes):* Trifolium trichocalyx

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: 9 Subsequent visit? [ ] yes [ ] no
Compared to your last visit: [ ] more [ ] same [✓] fewer than reported by V. Yadon
Is this an existing NDDB occurrence? [Yes] Yes, Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 20 % flowering 80 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*
Along fireroad in 1987 'burn area'
West of Castanilla Way (between Sunridge 3 Los Altos drive).
located 50 yds down road, 50 ft' north of road in previously burned Monterey pine forest.
County: Monterey Landowner/Mgr: Pebble Beach Co.
Quad Name: Monterey Elevation: 700' UTM: 596000 mE, 4049000 mN
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)* Previously burned Monterey Pine forest with chaparral understory. In open grassy area. On a slight slope (<5%) with east aspect.
Dominants: Chaparral shrubs: Actostaphylos hookeri, A. tomentosa, Pinus radiata, Baccharis pilularis Associates: Juncus falcatus, (over)
Other rare spp.? A. hookeri

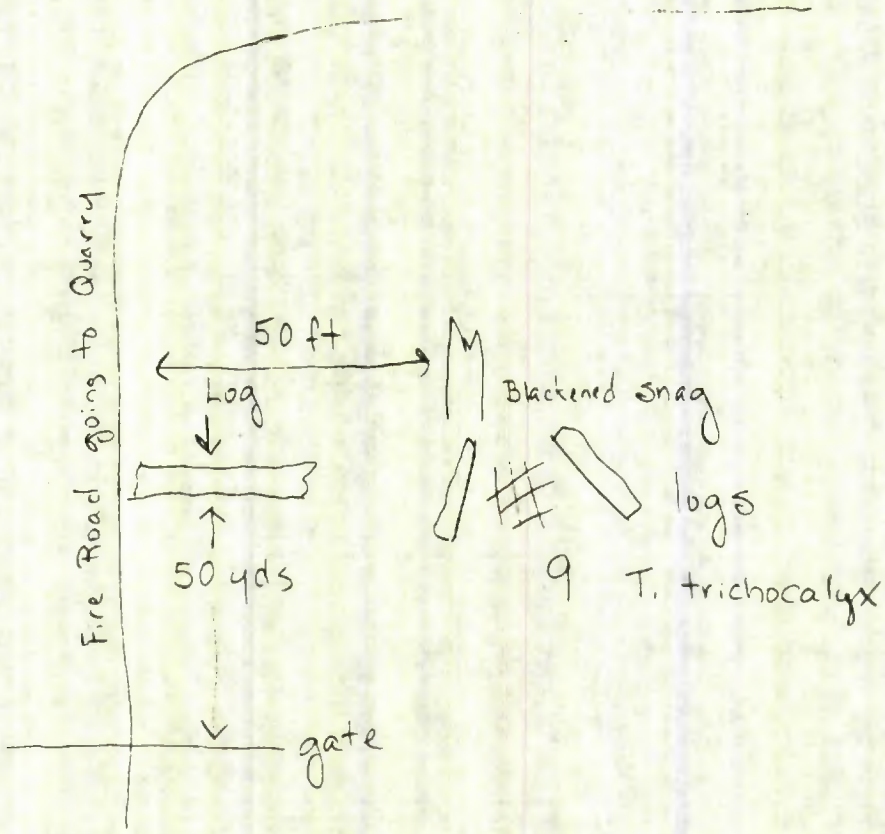
Site Information: Current/surrounding land use: Open space
Visible disturbances, possible threats: Exotics
Overall site quality: [ ] *Excellent* [✓] *Good* [ ] *Fair* [ ] *Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*
[✓] Keyed in a site reference: Jepson's
[ ] Compared with specimen housed at: _____
[ ] Compared with photo/drawing in: _____
[ ] By another person (name): _____
[ ] Other: _____

Photographs: *(Check one or more)* *Slide* *Print*
Plant/animal — —
Habitat — —
Diagnostic Feature — —
Other — —
May we obtain duplicates at our expense? [ ] yes [ ] no

Site 42

Assoc. (cont.): Aira carophyllea, Trifolium microdon, Erechtites arguta
Sisyrinchium bellum, Cytisus monspessulanus



California Native Species Field Survey Form Site 44

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 27 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Trifolium trichocalyx

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: 13 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [✓]fewer
Is this an existing NDDB occurrence? Accord. to V. Yadon [_____] Yes, Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 80 % flowering 100 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
Along Costonilla way, 100' S. of Los Altos Dr., 50' West of road in 1987 Burn area.

County: Monterey Landowner/Mgr: _____
Quad Name: Monterey Elevation: 700' UTM: 596,000 mE, 4049,000 mN
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

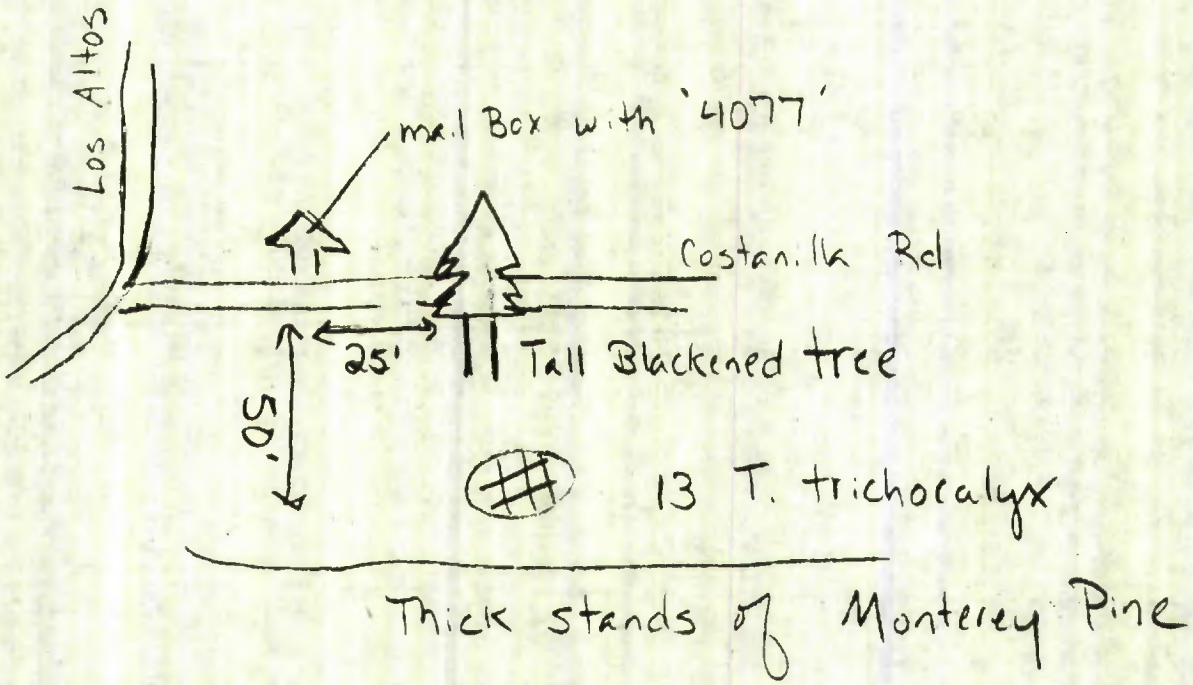
Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) Disturbed roadside in previously burned Monterey Pine forest. In level grassy area. Dominants: Pinus radiata, Vaccinium ovatum, Vulpia sp. Avena sp., Assoc. T. microdon, Erechtites argula, Cytisus monspessulanus,
Other rare spp.? Hypochoeris glabra

Site Information: Current/surrounding land use: Open space, currently being cleared for fire break
Visible disturbances, possible threats: Trampling during clearing (although most of the work appears done & it survived. Invasive exotics
Overall site quality: [ ]Excellent [ ]Good [ ]Fair [✓]Poor Comments:

Determination: (Check one or more, fill in the blanks)
[✓] Keyed in a site reference: Jepson's
[ ] Compared with specimen housed at: _____
[ ] Compared with photo/drawing in: _____
[ ] By another person (name): _____
[ ] Other: _____

Photographs: (Check one or more) Slide Print
Plant/animal [ ] [ ]
Habitat [ ] [ ]
Diagnostic Feature [ ] [ ]
Other [ ] [ ]
May we obtain duplicates at our expense? [ ]yes [ ]no

Site 44


Los Altos
mail Box with '4077'
Costanilla Rd
25'
50'
Tall Blackened tree
13 T. trichocalyx
Thick stands of Monterey Pine

Appendix E. Field Survey Forms for Hickman's Potentilla

California Native Species Field Survey Form

Site 13

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 5 (mo) - 6 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name (no codes): Potentilla hickmanii

Species Found? [✓] yes [ ] no _____ If not, why?
Total # Individuals: 14 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [Yes] Yes, Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: Jane Holte
Address: _____
Phone: ( ) _____
Other knowledgeable individuals (name/address/phone):

Plant Information:
Phenology: _____ % vegetative 90 % flowering 20 % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: (Please also attach or draw map on back.)
"Indian Village" site, ½ mi east of end of ~~dune~~ "The dunes" road (off 17 mi Dr - ⅛ mi S. of Bird Rock Parking area). Most plants inside of fenced area located near picnic area.
County: Monterey Landowner/Mgr: Pebble Beach Co
Quad Name: Monterey Elevation: 80' UTM: _____
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope) Open ~~wet~~ meadow in Monterey pine forest. Level area with underlying wet soil, but not appearing wet on surface at time of survey.
Dominants: Bromus hordeaceus, Avena barbata, Vulpia sp., Hordeum leporinum. Assoc.: Danthonia californica, Grindelia ~~latifolia~~, Bromus diandrus (over)
Other rare spp.? Trifolium polyodon near by

Site Information: Current/surrounding land use: Picnic & volley ball area. Area frequently mowed (except fenced area)
Visible disturbances, possible threats:
Little chance of plants spreading beyond fenced area as all surrounding areas are heavily mowed & weed wacked. Many exotics w/in fenced area
Overall site quality: [ ]Excellent [✓]Good [ ]Fair [ ]Poor Comments:
Timing of mowing & weeding may be important - see notes

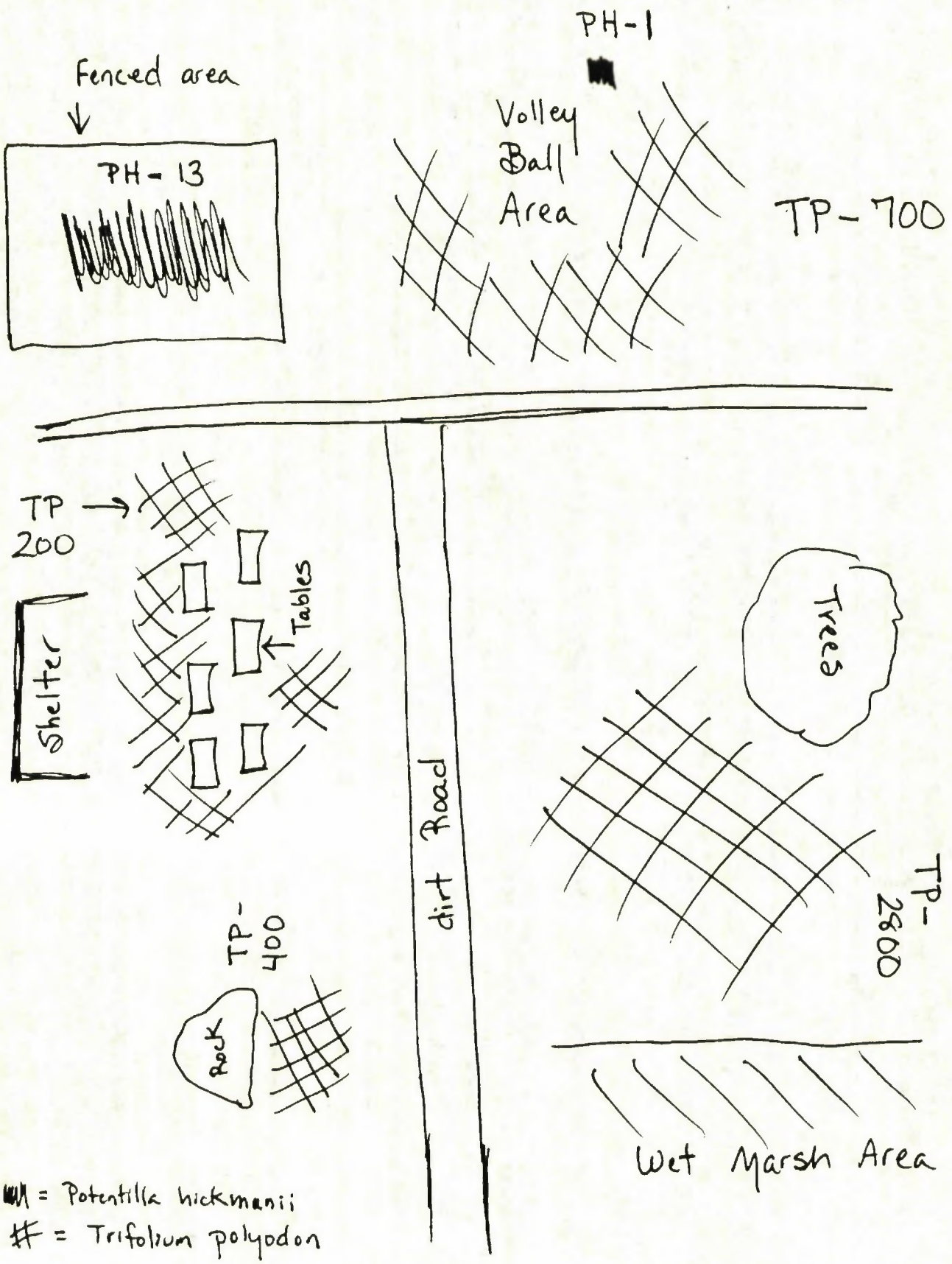
Determination: (Check one or more, fill in the blanks)
___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): Vern Yadon
___ Other: _____

Photographs: (Check one or more) Slide Print
Plant/animal ___ ___
Habitat ___ ___
Diagnostic Feature ___ ___
Other ___ ___
May we obtain duplicates at our expense? [ ]yes [ ]no

Site 13

Assoc. (Cont.): Briza minor, Geranium dissectum, Rumex crispus

Site 13



PH ▮ = Potentilla hickmanii
TP # = Trifolium polyodon

Appendix F. Field Survey Forms for Yadon's Piperia

California Native Species Field Survey Form Blohm Ranch

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 6 (mo) - 27 (day) - 95 (year)

For office use only
Source Code _____ Quad Code _____
Elm Code _____ Occ # _____
Copy to _____ Map Index # _____

Scientific Name *(no codes):* PIPERIA YADONII

Species Found? [X] yes [ ] no _____ If not, why?
Total # Individuals: 1000 Subsequent visit? [ ]yes [ ]no
Compared to your last visit: [ ]more [ ]same [ ]fewer
Is this an existing NDDB occurrence? [12] (Yes) Occ. # [ ] no [ ] unk.
Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: VICKI LAKE
Address: JONES & STOKES ASSOCIATES
Phone: (916) 737-3000
Other knowledgeable individuals (name/address/phone):
STEVE ZOMLSEN (408) 726-1499

Plant Information:
Phenology: _____ % vegetative 100% % flowering _____ % fruiting

Animal Information:
Age Structure: _____ # adults _____ # juveniles _____ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*
BLOHM RANCH, ON CHAPARRAL-DOMINATED SANDY BLUFF OF THE AROMAS FORMATION. AT LEAST 2 OTHER POPULATIONS ALSO OCCUR ON THE PRESERVE (ZENSCH PERS. COMM.)

County: MONTEREY Landowner/Mgr: THE NATURE CONSERVANCY
Quad Name: _____ Elevation: _____ UTM: _____
T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)*
PIPERIA YADONII GROWING WITHIN LOW ARCTOSTAPHYLOS HOOKERI MOUNDS. OTHER COMMON SPECIES INCLUDE MIMULUS ARMANTICUS, TRITELIA IXIOIDES, LOTUS SCOPARIUS, ERICAMERIA SPP., AND ADENOSTOMA FASCICULATUM. LAST YEAR [redacted] NO PIPERIA YADONII WERE IDENTIFIED AT THIS PARTICULAR SITE ON THE PRESERVE. ABUNDANT RAINS PROMOTED IT'S GROWTH. (ZENSCH PERS. COMM.)
Other rare spp.? ARCTOSTAPHYLOS HOOKERI, CEANOTHUS CUNEATUS SSP. RIGIDUS, ARCTOSTAPHYLOS PAJAROENSIS

Site Information: Current/surrounding land use:

Visible disturbances, possible threats:

Overall site quality: [X] *Excellent* [ ] *Good* [ ] *Fair* [ ] *Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*
X (Keyed) in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
X By another person (name): RANDY MORGAN IDENTIFIED IN 1994 IN THIS PRESERVE
___ Other: _____

Photographs: (Check one or more)	Slide	Print
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

California Native Species Field Survey Form Fort Ord

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 6 - 27 - 95 (mo day year)

For office use only
Source Code ______ Quad Code ______
Elm Code ______ Occ # ______
Copy to ______ Map Index # ______

Scientific Name *(no codes)*: PREVIOUSLY RECORDED SITE OF 6+ PIPERIA YADONII PLANTS

Species Found? [ ] yes [X] no SURVEY BY A CNPS BOTANIST LAST YEAR
If not, why? DID NOT SUCCESSFULLY RELOCATE SPECIES EITHER (MORGAN PERS COMM)
Total # Individuals: 0 Subsequent visit? [ ] yes [ ] no
Compared to your last visit: [ ] more [ ] same [ ] fewer
Is this an existing NDDB occurrence? [______] Yes, Occ. # [X] no [ ] unk.
Collection? If yes: ______ number ______ Museum/Herbarium

Reporter: VICKI LAKE
Address: JONES & STOKES ASSOCIATES
Phone: (916) 737-3000
Other knowledgeable individuals (name/address/phone):
PAUL GYLINDER

Plant Information:
Phenology: ______ % vegetative ______ % flowering ______ % fruiting

Animal Information:
Age Structure: ______ # adults ______ # juveniles ______ # unknown
Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*

FORT ORD MILITARY RESERVATION - NEAR HWY 1 & CITY OF MARINA.

County: MONTEREY Landowner/Mgr: ______
Quad Name: ______ Elevation: ______ UTM: ______
T____ R____ ____ 1/4 of ____ 1/4 Sec ____ T____ R____ ____ 1/4 of ____ 1/4 Sec ____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)*

~~SHRUB~~ COASTAL SCRUB HABITAT DOMINATED BY LOW MOUNDED ADENOSTOMA FASCICULATA, ARCTOSTAPHYLOS PUMILA, CARPOBROTUS EDULIS, AND DUDLEYA SP.
PIPERIA ~~YADONII~~ MICHELII GROWING IN DEAD FIRE SCARRED MOUND OF CARPOBROTUS EDULIS, WITH LOTUS SCOPARIUS ENCROACHING & UNDER ADENOSTOMA FASCICULATA. APPROXIMATELY 10 PIPERIA MICHELII OBSERVED.

Other rare spp.?

Site Information: Current/surrounding land use:

Visible disturbances, possible threats:

Overall site quality: [ ] *Excellent* [X] *Good* [ ] *Fair* [ ] *Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*
____ Keyed in a site reference: ______
____ Compared with specimen housed at: ______
____ Compared with photo/drawing in: ______
____ By another person (name): ______
____ Other: ______

Photographs: *(Check one or more)*

	Slide	Print
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ] yes [ ] no

California Native Species Field Survey Form

Presidio of Monterey

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 6 (mo) - 27 (day) - 95 (year)

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Scientific Name *(no codes):* PIPERIA YADONII

Species Found? [X] yes [ ] no _____ If not, why?

Total # Individuals: 50 Subsequent visit? [ ]yes [ ]no

Compared to your last visit: [ ]more [ ]same [ ]fewer

Is this an existing NDDB occurrence? [_____] Yes, Occ. # [X] no [ ] unk.

Collection? If yes: _____ number _____ Museum/Herbarium

Reporter: VICKI LANCE

Address: JONES & STOKES ASSOCIATES

Phone: (916) 737-3000

Other knowledgeable individuals (name/address/phone):
PAUL CYLINDER
JONES & STOKES ASSOCIATES

Plant Information:

Phenology: _____ % vegetative 100 % flowering _____ % fruiting

Animal Information:

Age Structure: _____ # adults _____ # juveniles _____ # unknown

Site Function: [ ] breeding [ ] foraging [ ] wintering [ ] roosting [ ] burrow site [ ] other

Location: *(Please also attach or draw map on back.)*

PRESIDIO OF MONTEREY, IN MONTEREY PINE FOREST STAND NEAR DORMS & CEMETARY

County: MONTEREY Landowner/Mgr: Department of Defense

Quad Name: _____ Elevation: _____ UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)*

WIDELY SCATTERED IN MONTEREY PINE FOREST WITH GRASSY UNDERSTORY. ASSOCIATED SPECIES INCLUDE BRIZA MAJOR, GALIUM, PLANTAGO MAJOR, TOXICODENDRON DIVERSILOBUM, ELYMUS GLAUCUS. OCCURS UNDER MONTEREY PINE CANOPY IN DENSE NEEDLE LAYER.

Other rare spp.? ARCTOSTAPHYLOS HOOKERI, PINUS MONTEREYENSIS

Site Information: Current/surrounding land use:

Visible disturbances, possible threats: TRAILS THROUGHOUT THIS SMALL PATCH OF NATURAL HABITAT

Overall site quality: [ ]Excellent [X]Good [ ]Fair [ ]Poor Comments:

Determination: *(Check one or more, fill in the blanks)*

____ Keyed in a site reference: _____

____ Compared with specimen housed at: _____

____ Compared with photo/drawing in: _____

____ By another person (name): _____

____ Other: _____

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

California Native Species Field Survey Form

Presidio of Monterey

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Date of field work: 6 (mo) - 28 (day) - 95 (year)

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Scientific Name *(no codes)*: PIPERIA YADONII

Species Found? [X] [ ] _____
yes no *If not, why?*

Total # Individuals: 2 Subsequent visit? [ ]*yes* [ ]*no*

Compared to your last visit: [ ]*more* [ ]same [ ]fewer

Is this an existing NDDB occurrence? [_____] [X] [ ]
Yes, Occ. # *no* *unk.*

Collection? If yes: _____ _____
number *Museum/Herbarium*

Reporter: VICKI LAKE

Address: JONES & STOKES ASSOCIATES

Phone: (96) 737-3000

Other knowledgeable individuals (name/address/phone):

PAUL CYLINDER
JONES & STOKES ASSOCIATES

Plant Information:

Phenology: _____ 100 _____
% vegetative *% flowering* *% fruiting*

Animal Information:

Age Structure: _____ _____ _____
 # adults *# juveniles* *# unknown*

Site Function: [ ] [ ] [ ] [ ] [ ] [ ]
breeding foraging wintering roosting burrow site other

Location: *(Please also attach or draw map on back.)*

PRESIDIO OF MONTEREY HUCKLEBERRY HILL PRESERVE

County: MONTEREY Landowner/Mgr: Department of Defense

Quad Name: _____ Elevation: _____ UTM: _____

T_____R_____ _____ 1/4 of _____ 1/4 Sec _____ T_____R_____ _____ 1/4 of _____ 1/4 Sec _____

Habitat Description: *(Plant communities, dominants, associates, substrate/soils, aspect/slope)*

NEXT TO LOW GROWING ARCTOSTAPHYLOS HOOKERI SHRUBS ARISING FROM NEEDLE LAYER ON GROUND. GRASSES ALSO PRESENT. THIS OPENING SURROUNDED BY EVERGREEN HUCKLEBERRY & MIMULUS AURANTIACUS, WITH AN OVERSTORY CANOPY OF MONTEREY PINE. SECOND INDIVIDUAL GROWING IN YOUNG BROOM STAND.

Other rare spp.? ARCTOSTAPHYLOS HOOKERI, PINUS MONTEREYENSIS

Site Information: Current/surrounding land use:

Visible disturbances, possible threats:

Overall site quality: [ ]*Excellent* [X]*Good* [ ]*Fair* [ ]*Poor* Comments:

Determination: *(Check one or more, fill in the blanks)*

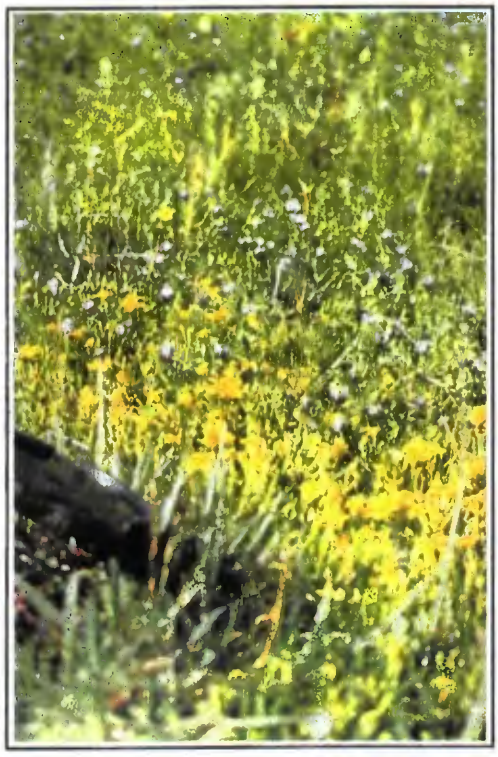
____ Keyed in a site reference: _____
____ Compared with specimen housed at: _____
____ Compared with photo/drawing in: _____
____ By another person (name): _____
____ Other: _____

Photographs: *(Check one or more)*	*Slide*	*Print*
Plant/animal	___	___
Habitat	___	___
Diagnostic Feature	___	___
Other	___	___

May we obtain duplicates at our expense? [ ]yes [ ]no

Appendix G. Photographs of Plants and Habitats

A.
Coastal dunes milkvetch (purple flowers) with goldfields (yellow flowers) at Seventeen Mile Drive site (Site 11) within the fenced exclosure. April 28, 1995.

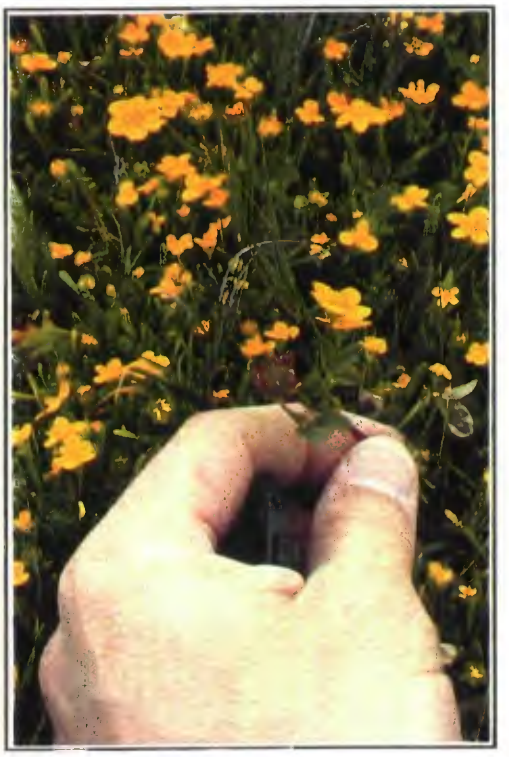


B.
Coastal dunes milkvetch in fruit, growing in dense patch of cutleaf plantain at Seventeen Mile Drive site (Site 11) within the fenced exclosure. April 28, 1995.

C.
Coastal dunes milkvetch habitat inside fenced exclosure at Seventeen Mile Drive site (Site 11). Mima mound relief can be seen here, with the mounds having taller, more dense vegetation than the wetter intermounds. Depression at center is an intermound that supports milkvetch. April 28, 1995.

Figure G-1.
Coastal Dunes Milk Vetch

A.
Pacific Grove clover growing with goldfields (yellow flowers) at Seventeen Mile Drive site (Site 11) next to horse trail. April 28, 1995.



B.
Flower heads of Pacific Grove clover (left) and whitetip clover (right) shown side by side for comparison. At Seventeen Mile Drive site (Site 11) next to horse trail. April 28, 1995.

C.
Pacific Grove clover and coastal dunes milkvetch habitat along horse/pedestrian trail at Seventeen Mile Drive site (Site 11). The trail parallels Seventeen Mile Drive, with Seventeen Mile Drive to the west (right) and the Monterey Peninsula Country Club Golf Course to the east (left). April 28, 1995.

Figure G-2.
Pacific Grove Clover

A.
Monterey clover flower head. At Site 42 next to a fire road off Costanilla Way. June 12, 1995.

B.
Monterey clover showing long, hairy calyx and well-developed, deeply cleft involucre. At Site 42 next to a fire road off Costanilla Way. June 12, 1995.

C.
Monterey clover habitat at Site 44 in grassy open habitat on Los Altos Drive. Approximately 13 plants occurred at this site in 1995. Dense Monterey pine forest in background is recovering from 1987 fire and does not support clover. June 12, 1995.

Figure G-3.
Monterey Clover

A.
Hickman's cinquefoil at Indian Village (Site 13). April 28, 1995.

B.
Fenced exclosure at Indian Village (Site 13) constructed to protect Hickman's cinquefoil. Most of the Hickman's cinquefoil plants observed are within the exclosure. Note tall grass inside the exclosure and short, managed and disturbed vegetation outside the exclosure. Posts at left center are the ends of two horseshoes courts. Disturbed ground in foreground is part of the volleyball court. April 28, 1995.

A.
Yadon's rein orchid in flower in Monterey pine forest with grassy understory near the Pebble Beach Equestrian Center. Ruler is 6 inches long. June 12, 1995.

B.
Yadon's rein orchid in leaf under Hooker's manzanita plant in pygmy forest recovering from 1987 fire at S.F.B. Morse Botanical Reserve. Apil 28, 1995.

C.
Yadon's rein orchid habitat in open Monterey pine forest with grassy understory near the Pebble Beach Equestrian Center. June 12, 1995.

Figure G-5.
Yadon's Rein Orchid

A.
Gowen cypress about 8 feet tall at S.F.B. Morse Botanical Reserve. April 28, 1995.

B.
Gowen cypress cones on tree at S.F.B. Morse Botanical Reserve. April 28, 1995.

Figure G-6.
Gowen Cypress