Chapter 2.

Minimum Conservation Area and Corridor System

Sand Gilia

Chapter 2. Minimum Conservation Area and Corridor System

INTRODUCTION

Modifications to the 1994 Habitat Management Plan (1994 HMP) incorporated into this HMP have little or no effect on the methods and results of the minimum conservation area and corridor system development process. Information has been revised to reflect changes such as modifications to a species-listing status.

SPECIES AND COMMUNITY BIOLOGICAL DATA

Tables 2-1 and 2-2 present ecological characteristics of HMP wildlife and plant species that are pertinent to development of conservation areas and corridors. Additional information on species distributions and endangerment status is in the Flora and Fauna Baseline Study of Fort Ord, California (U.S. Army Corps of Engineers, Sacramento District 1992a) and the supplement to the draft Biological Assessment (BA) (U.S. Army Corps of Engineers, Sacramento District 1993b). Distribution maps for HMP species at former Fort Ord (from these documents) are included in Appendix B of this HMP.

HABITAT MANAGEMENT PLAN HABITATS

The following sections describe the community ecology of maritime chaparral and coastal dunes that is pertinent to development of conservation areas and corridors.

Maritime Chaparral

Maritime chaparral is a coastal form of chaparral associated with specific soil conditions. Two forms are recognized at former Fort Ord based on the substrate that supports them: sand hill maritime chaparral occurs on relict dunes of the late Pleistocene Epoch and Aromas formation maritime chaparral occurs on weakly consolidated red sandstone that is a relict of mid-Pleistocene dunes. The occurrence of maritime chaparral may be limited to the summer fog zone. (Griffin 1976.)

Periodic disturbance or removal of vegetation caused by unstable substrate and fire are important factors in maintaining and rejuvenating the maritime chaparral community.

Important shrubs in maritime chaparral are shaggy-barked manzanita, chamise, Toro manzanita, sandmat manzanita, Hooker's manzanita, Monterey ceanothus, toyon, black sage, bush monkeyflower, coyote bush, Eastwood's ericameria, poison-oak, dwarf ceanothus, coast silk tassel, rush rose, California sagebrush, blue-blossom ceanothus, and mock heather. HMP species occurring in maritime chaparral are black legless lizard, Toro manzanita, sandmat manzanita, Hooker's manzanita, Monterey ceanothus, Eastwood's ericameria, Seaside bird's-beak, sand gilia, Monterey spineflower, coast wallflower, and Yadon's piperia.

Table 2-1 Ecological Characteristics of HMP Wildlife

Species	Life Cycle	Dispersal Migration	Reproduction	Mating Behavior	Breeding Period	Habitat Requirement
Smith's blue butterfly (*Euphilotes enoptes smithi*)	1-year life span, egg laying, five larval instars and adult stage are associated with peak blooming period of coastal and seacliff buckwheat, pupal stage is dormant stage during nonflowering periods	Limited flight dispersal; migration unknown	Emergence from pupae and mating associated with peak flowering period of coastal buckwheat species	Mate location, copulation, and oviposition occur on flowerheads of buckwheat species	Breeding occurs June-September tied to peak flowering periods of coast and seacliff buckwheat	Coastal sand dunes and ravines associated with coast and seacliff buckwheat, completely dependent on buckwheat during all lifestages
Western snowy plover (Coastal populations) (*Charadrius alexandrinus nivosus*)	Young are precocial, fledge in 27-47 days	Migrate north and south, from Washington to Baja California	Nest on sandy, open ground; both adults incubate eggs; multiple clutches per year; 2-6 eggs per clutch	Colonial nesting; monogamous by clutch	Breeding and nesting occurs mid-March through mid-September	Flat sandy beach above the high tide level; highly sensitive to human disturbance; may abandon nests if disturbed
California linderiella (*Linderiella occidentalis*)	1-year life cycle; egg stage is dormant in soil during dry season; larvae and adult develop during winter rains	Possible dispersal of eggs borne in mud adhered to feet of animals; wind may also disperse eggs during dry season	Breed in winter when pools and ponds are full; lay eggs as ponds dry in spring	Male grasps female with specially elongated antennae	Adult linderiella observed from mid-October to May	Vernal pools, ponds, and swales
California black-legless lizard (*Anniella pulchra nigra*)	Young born live, adults and young remain near soil surface in spring; burrow to unknown depths during rest of year	Presume all habitat requirements are found in activity areas; no migration patterns known, regional dispersal highly restricted, may disperse short distances between suitable habitat areas	1-4 born live	Unknown	Unknown	Various plant communities where loose sandy soils and abundant invertebrate populations are available
Monterey ornate shrew (*Sorex ornatus salarius*)	Most do not live beyond 1 year	No dispersal patterns known, probably highly restricted; no migration patterns known	Up to 6 born in a litter, multiple litters produced per year	Unknown	Believed to be February to October	Found in a variety of riparian, woodland, and upland communities where there is thick duff or downed logs
California red-legged frog (*Rana aurora draytoni*)	Egg and tadpole stages aquatic; adult amphibians	Travel overland during rains	Female lays egg masses; after fertilization, eggs are left unprotected	Copulate in breeding ponds	Eggs laid from December to early April	Cold water ponds or river pools with emergent and submergent vegetation with riparian vegetation along the edges
California tiger salamander (*Ambystoma tigrinum californiense*)	Eggs and larval stages occur in temporary pools; adults are subterranean, except during breeding	Travels overland; may migrate up to 1 mile from burrow to breeding ponds	Females lay numerous clutches of eggs in temporary pools and ponds on submerged and emergent vegetation	Unknown	Breeding occurs from December to February, mainly in vernal pools	Open woodlands and grasslands; requires water to breed and uses burrows or cracks in soil at upland sites up to 1 mile from breeding ponds during summer

Table 2-2. Ecological Characteristics of HMP Plants

Sensitive Plant Species	Life Cycle/Habit	Seed or Fruit Dispersal Mechanism	Regeneration Mechanism	Pollination Biology	Response to Disturbance	Habitat Requirements
Sand gilia (*Gilia tenuiflora* ssp. *arenaria*)	Annual herb; flowers in spring	Small seeds dropped or shaken by wind from capsule; may disperse with blowing sand	Annual seed production; seed bank in soil	Insect pollinated; bee flies may be important	Colonizes open sand	Coastal sand dunes below 30 meters elevation; fog belt area;some inland areas, such as the former Fritzsche Army Airfield area at former Fort Ord; Monterey Bay; needs open, sandy sites for establishment; Baywood sands and coastal dunes
Monterey spineflower (*Chorizanthe pungens* var. *pungens*)	Annual herb; flowers in summer	Small seeds dropped or shaken by wind from capsule; spiny fruits may be carried by fur-bearing animals or may disperse with blowing sand	Annual seed production; seed bank in soil	Insect pollinated; self-pollination likely common	Colonizes open sand; invades roadsides and firebreaks	Coastal strand, coastal scrub, maritime chaparral, and disturbed sites in grassland; below 450 meters elevation; fog belt area; sandy soils (Baywood sands, Oceano, Arnold, coastal dunes)
Robust spineflower (*Chorizanthe robusta* var. *robusta*)	Annual herb; flowers in summer	Small seeds dropped or shaken by wind from capsule; spiny fruits may be carried by fur-bearing animals or may disperse with blowing sand	Annual seed production; seed bank in soil	Insect pollinated; self-pollination likely common	Colonizes open sand	Coastal strand, coastal scrub areas below 300 meters elevation
Seaside bird's-beak (*Cordylanthus rigidus* var. *littoralis*)	Annual herb; flowers in summer; hemiparasitic	Small seeds dropped or shaken by wind from capsule	Annual seed production; seed bank in soil; must attach roots to host plant	Insect pollinated	Does not tolerate disturbance	Coastal dunes, coastal scrub, and maritime chaparral, below 200 meters elevation; must have host plant in vicinity
Toro manzanita (*Arctostaphylos montereyensis*)	Shrub, flowers in late winter-early spring	Fruits with large seeds eaten and dispersed by mammals and birds	Annual seeds produced; need fire to crack seed coat	Insect pollinated; bees, flies, moths	Seedlings colonize areas after fire and open eroded sandstone	Chaparral in sandy soils below 350 meters elevation, especially on Aromas formation sandstone

Table 2-2. Continued.

Sensitive Plant Species	Life Cycle/Habit	Seed or Fruit Dispersal Mechanism	Regeneration Mechanism	Pollination Biology	Response to Disturbance	Habitat Requirements
Sandmat manzanita (*Arctostapohylos pumila*)	Shrub, mat and mound forming; flowers in late winter-early spring	Fruits with large seeds eaten and dispersed by mammals and birds	Annual seeds produced; need fire to crack seed coat	Insect pollinated; bees, flies, moths	Seedlings colonize areas after fire	Sandy soils, hills, chaparral, woodland, coniferous forest below 200 meters elevation
Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri*)	Shrub, mat and mound forming; flowers in late winter-early spring	Fruits with large seeds eaten and dispersed by mammals and birds	Annual seeds produced; need fire to crack seed coat	Insect pollinated; bees, flies, moths	Seedlings colonize areas after fire	Sandy soils, sandy shales, sandstone outcrops, chaparral, below 300 meters elevation
Monterey ceanothus (*Ceanothus rigidus* = *C. cuneatus* var. *ridigus*)	Shrub, flowers in early spring	Seeds ejected mechanically from capsule as fruit drys in summer sun	Annual seeds produced; need fire to crack seed coat	Insect pollinated	Seedlings colonize areas after fire	Sandy hills, flats, chaparral, close-cone-pine forests below 200 meters elevation
Eastwood's ericameria or golden bush (*Ericameria fasciculata*)	Shrub, flowers in late spring-early summer	Seeds dispersed by wind	Annual seed production; seed bank in soil	Insect pollinated; beetles, butterflies, bees, flies, etc.	Likely colonizes after fire	Dunes, coastal chaparral, closed-cone-pine forest below 100 meters elevation
Coast wallflower (*Erysimum ammophilum*)	Annual or biennial herb; flowers in spring	Seeds dropped or shaken by wind from fruit	Annual seed production; seed bank in soil	Insect pollinated; likely bees and butterflies	Colonizes open (stabilized) sand	Coastal dunes below 50 meters elevation
Yadon's piperia (*Piperia yadoni*)	Perennial herb from corm; flowers in spring	Tiny seeds dropped from capsule	Annual seed production; seed bank in soil	Insect pollinated	Resprouts from roots after fire	Generally sandy soil or sandstone, coastal shrubland, Monterey pine forest and maritime chaparral, below 150 meters elevation

Windblown sand in the sand hill and water erosion in the Aromas formation create open substrate where herbaceous species and a high diversity of shrubs make up the vegetative cover. Without disturbance in sand hill maritime chaparral, shaggy-barked manzanita and chamise tend to dominate the shrub cover and form a closed canopy that excludes herbaceous species. Without disturbance in Aromas formation maritime chaparral, chamise or Toro manzanita tend to form nearly monotypic stands and a closed canopy that excludes herbaceous species. After a fire, shaggy-barked manzanita and chamise resprout from their base while other shrubs and herbs recolonize from seed. Early successional sites appear to support the highest diversity of shrubs, including the largest number of HMP shrub species. On some sites, coast live oak may form a canopy over maritime chaparral if the site has not burned in a long time.

Healthy maritime chaparral occurs as a patchwork of stands that have burned at different times and that support vegetation of various ages and structures. This habitat mosaic allows for high species and habitat diversity and provides sources of propagules for dispersal between patches.

Successful conservation of maritime chaparral is dependent on proper management of the habitat by using fire as a management tool and allowing or encouraging some forms of substrate disturbance. The goal of management is to achieve high species and habitat diversity through a program of controlled burning that creates and maintains a mosaic pattern of maritime chaparral of various aged stands. However, sand gilia, Monterey spineflower, and coast wallflower may be dependent on open habitat created by blowing sand rather than by fire. Destabilized sand from firebreaks and roads in maritime chaparral apparently creates habitat for these species. Promoting a dynamic system of moving sand by selective vegetation removal may encourage the formation of habitat for the above-mentioned HMP species.

Coastal Dunes

Coastal strand and dune scrub habitats of the coastal dunes are dynamic plant communities that respond to a moving sand substrate and changing dune configuration. Blowing sand undermines and buries plants, but most dune plants are adapted to shallow burial and blasting by sand. Large areas of destabilized sand, called "blowouts," result in large-scale removal of vegetation and change in dune structure. As plants reinvade the bare sand they stabilize the dune. Dune structure creates a variety of habitats. The foredune is more exposed to wind and salt spray than the rear dune. Dune crests are subject to high winds and substrate removal, while interdune valleys are protected from wind, have higher soil moisture, and experience sand deposition. North-facing dune slopes are usually moister and cooler than south-facing dune slopes.

The highest diversity of dune habitat and species is best maintained in dunes with conditions ranging from active to stabilized and a variety of topography with foredunes and rear dunes, dune crests, interdune valleys, and north- and south-facing slopes.

Native plants likely to be found in healthy coastal strand habitat on Monterey Bay include coastal sand verbena, pink sand verbena, beach sagewort, beach bursage, beach evening primrose, beach morning-glory, live-forever, woolly paintbrush, coastal paintbrush, sea rocket, Douglas' bluegrass, mock heather, sea thrift, wild buckwheat, seacliff buckwheat, and cudweed aster. Healthy dune scrub at former Fort Ord is dominated by mock heather, bush lupine, Chamisso bush lupine, poison-oak, coyote bush, bracken fern, and deer weed.

HMP species occurring in coastal strand and dune scrub are Smith's blue butterfly, sand gilia, Monterey spineflower, robust spineflower, black legless lizard, and coast wallflower. Yadon's piperia may occur in these habitats.

ECOLOGICAL CONCEPTS FOR CONSERVATION AREA AND CORRIDOR SYSTEM DESIGN

Habitat loss and resultant habitat fragmentation are considered the primary causes of the loss of biodiversity in many regions (Norton 1988, Noss 1991). Conservation of many species of plants and animals is now dependent on proper management of the remaining fragmented habitat patches or habitat islands. Management of these fragmented habitats must consider several factors, including the size and shape of the patch, location of the patch in relation to other patches, species present, and the connectivity of the patch to adjacent patches (Doak et al. 1992, Pulliam and Danielsen 1991). The following sections describe ecological concepts used to design conservation area and corridor systems.

Conservation Area Size

Isolated habitat patches will generally contain fewer species than will large, continuous tracts of the same habitat. Additionally, the populations present in habitat patches are more vulnerable to extinction than populations present in continuous tracts: vulnerability to extinction is area dependent (Terbough and Winter 1980, Soulé 1987). Small populations are highly susceptible to random changes in their environment and in their recruitment rates. Small, isolated populations are also vulnerable to inbreeding and to "genetic drift", the random loss of genetic diversity (Gilpin and Soulé 1986). For long-term conservation, minimal viable population sizes must be maintained to provide for sufficient genetic diversity to overcome genetic drift and allow the species to continue naturally to evolve and adapt.

The effective area of a habitat patch is smaller than the total area of the patch for many species (Soulé 1987). The edges of habitat patches are vulnerable to invasion by new species of plants and animals and to changes in biotic structure or composition due to edge effects such as windthrow or desiccation. Many species of plants and animals are considered "interior species" because of their susceptibility to edge effects (Jensen et al. 1990).

Small, isolated habitats do not allow the populations contained within them to escape changing environmental conditions. Seasonal fluctuations in the environment, such as changes in temperature, water regime, or vegetation, may require seasonal changes in the distribution of a population over a region. Catastrophic natural or humanmade disturbances may require major spatial shifts by populations or individuals for survival. The inability to escape temporally occurring events will result in high extinction rates for the populations confined to small habitat patches.

Natural communities are a complex of small populations that vary in structure or composition. This variability provides stability in the face of environmental stochasticity (random events) or catastrophes (Jensen et al. 1990). Small habitat patches cannot maintain the natural variability inherent in larger systems, nor can they maintain adequate amounts of microhabitats to provide for long-term viability for species or populations dependent on specific microhabitats.

Conservation Area Shape

The shape of a habitat patch influences the effective size of the habitat. A long, thin strip of habitat is smaller in effective size than a more geometric-shaped habitat because of the high edge-to-interior ratio in long, thin shapes. As mentioned above, the habitat at the edge of a patch is often substantially different in structure and composition than that found in the interior. This edge habitat is unsuitable for many species of plants and animals that may require interior habitats. Edge habitat is vulnerable to environmental effects from wind pruning, desiccation, invasions by weed and pest species, and disturbances associated with human activities. The type and intensity of effects from human activity on habitat and species depend on the kind of activity or development that occurs adjacent to conserved habitat. Increased susceptibility to invasions by disease, competitors, and predators also occurs in habitat patches that have a high edge-to-interior ratio. The theoretical optimal shape for a preserve would be circular, thus having minimal edge habitat (Temple 1983, Samson et al. 1991).

Conservation Area Location

The location of a habitat patch is important at several levels. At the landscape level, the location in relation to other habitat patches and populations is critical for the long-term viability of the populations. Because a population at the extreme edge of its species' distribution is as vulnerable to extinction as is a small population (Weaver 1993), a conservation area located in the center of a species' range may have higher potential for maintenance of viable populations. At the population level, the location of a conservation area in an area of high habitat suitability for healthy populations would be advantageous. Preservation of large tracts of marginal habitats may have only minimal benefits for a species. Marginal habitats often do not support viable populations because recruitment rates are below mortality or dispersal rates. Individual species present in marginal or disturbed habitats are more likely to be only temporary residents or to have reduced reproductive success (Doak et al. 1992). However, marginal habitats may be critical to long-term viability of a regional population by providing for corridors of dispersal or areas of temporary residency during catastrophes or times of high-population levels (Leftkovich and Fahrig 1985, Pulliam and Danielsen 1991). Marginal habitats may also function as areas where pressures from natural selection may be more intense or differ from high-quality habitat areas. These increased or varying selection pressures may assist in maintaining the long-term genetic variability of a population and allow for establishment of new traits that contribute to the species' overall genetic variability.

Conservation Area Connectivity

Small populations in habitat patches are highly susceptible to extinction because of environmental and demographic stochasticity. This susceptibility is greatly reduced if the population is not isolated from other populations. Connections or corridors between populations can effectively create a dynamic regional population, often called a metapopulation. The exchange of individuals between populations lessens the effect of natural fluctuations on small populations, allows for recolonization of habitats when local extinction occurs, and maintains genetic diversity. The ability of the metapopulation to function dynamically is related to the proximity of the individual habitat patches and the dispersal capabilities of the species (Pulliam and Danielsen 1991, Doak et al. 1992). If the habitat patches are small and widely dispersed, the rate of successful immigration will probably be low. More individuals will be lost or will settle in the unsuitable habitats surrounding each patch, and will not be available or productive members of the metapopulation.

The loss of individuals to unsuccessful dispersal is lessened when habitats patches are connected by corridors of suitable habitat. Corridors are not necessarily optimal habitats, but do provide the dispersing individuals with minimal life requirements. Corridor habitats also may play a critical role in population viability during catastrophes by providing escape routes, as well as temporary refuge habitat (Pulliam and Danielsen 1991).

Different species have different dispersal capabilities and habitat requirements. Generally, a species' survival rate will be higher if the species disperses through habitats similar to its preferred habitat. Species differ in their habitat requirements and flexibility, and a corridor for one species will be a barrier to dispersal to another (i.e., a forest species may not be able to cross grassland successfully). To optimize survival, a conservation area should have a network of adjacent corridor habitats of various types within which many species could disperse. To connect habitat patches, a single corridor may have to provide the only route of movement for the populations. Corridors of poor-quality habitats may result in high-dispersal mortality rates and reduced effectiveness of the regional dynamics to stabilize the metapopulation.

Management Considerations for Conservation Areas and Corridors

Active management practices are often required to maintain the ecological integrity of habitats within conservation areas and corridors. Controlled burns in chaparral and scrub may be necessary to provide a mosaic of successional stages and maintain high species diversity. Active management may also entail limiting public access or controlling various uses in the conservation area to prevent habitat degradation.

Management requirements may be constrained or aggravated by land uses adjacent to a conservation area. Urban or residential uses close to conservation areas or corridors may limit fire management capabilities; result in the need for added law enforcement to prevent unauthorized use; and require control of introduced species, pets, and pest species tolerant of human disturbance.

To minimize potential conflicts between adjacent land use and management activities within conservation areas and corridors, conservation areas should be established where adjacent land uses are compatible with management actions necessary within the conservation area. Also, management requirements within a conservation area should be considered before development is planned near the conservation area.

Potential conflicts between management and adjacent land uses may also be minimized by limiting the edge-to-interior ratio of the conservation area and reducing the amount of edge in contact with incompatible land uses.

METHODS USED TO DEVELOP A MINIMUM CONSERVATION AREA AND CORRIDOR SYSTEM

The distributions of several HMP resources were analyzed to develop a minimum conservation area and corridor system. This system was used as a stepping stone toward development of the final conservation area and corridor system described in Chapter 4. Existing and potential land uses, opportunities for habitat restoration, and habitat enhancement were not factored into this preliminary analysis.

The analysis of HMP species distributions resulted in selection of four conservation areas and three corridors. The four conservation areas were created by combining the distributions of the following resources:

- sites supporting high or medium densities of known populations of sand gilia and Monterey spineflower,
- sites supporting high- and medium-quality habitat (as defined by the density of buckwheat) or known occurrences of Smith's blue butterfly,
- sites supporting potential or known coastal nesting habitat for western snowy plover, and
- study polygons supporting the highest richness of HMP species (seven or more species or suitable habitat occurrences).

The analysis was based on data included in the Flora and Fauna Baseline Study of Fort Ord, California (U.S. Army Corps of Engineers, Sacramento District 1992a).

Habitat Management Plan Species Richness Study

The distribution and abundance of botanical resources at former Fort Ord were initially identified in 1992 through surveys of a series of irregularly shaped and sized polygons (survey polygons) of uniform habitat (U.S. Army Corps of Engineers, Sacramento District 1992a). To conduct an appropriate analysis of richness patterns of HMP species at former Fort Ord, land units of similar size had to be used. Because the size of the survey polygons varied greatly, these smaller survey polygons were aggregated into larger land units (richness study polygons) with a smaller variance in size. Richness study polygons were created to contain approximately 300–400 acres and to incorporate blocks of similar habitats where possible. The total number of HMP species that occurred in each study polygon was then calculated. Of 18 HMP species, the number in any polygon ranged from one to nine.

Mapping the Minimum Conservation Area

A map was produced of high- and medium-density habitat for Smith's blue butterfly, high- and medium-density occurrences of sand gilia and Monterey spineflower, known and potential nesting habitat for Western snowy plover and richness study polygons that support seven or more HMP species (Figures 2-1 and 2-2). The California red-legged frog was not included in the map because it has not been observed at former Fort Ord. (However, the potential habitat was considered and included in designation of habitat reserve areas. See the "Impacts on Listed and Proposed HMP Species" section of Chapter 4.) The selection of a threshold of seven species was arbitrary. Mapping the resources in this manner resulted in identification of four discrete areas of former Fort Ord that would protect the most HMP species with the least amount of habitat (Figure 2-3). The conceptual conservation areas (Figure 2-3) were used with information from reuse plans to determine habitat reserve and corridor areas that meet the overall goals of this HMP. The reserve and corridor areas are shown on Figure 4-1. These areas were then connected with potential habitat corridors to ensure that genetic migration could be maintained between the conservation areas (Figure 2-3). The conservation areas and corridors are described below.

DESCRIPTIONS OF MINIMUM CONSERVATION AREAS AND CORRIDORS

Inter-Garrison - Former Fritzsche Field Conservation Area

The Inter-Garrison - Former Fritzsche Field conservation area is a roughly triangular area approximately bounded by Inter-Garrison Road on the south, Highway 1 and the City of Marina on the west, and former Fritzsche Army Airfield and Reservation Road on the north (Figure 2-3). Dominant habitats are coast live oak woodland, coastal scrub, maritime chaparral, and annual grassland. Housing and other developments also exist in the conservation area. The area provides important habitats for the black legless lizard, sand gilia, and Monterey spineflower. The highest densities of sand gilia at former Fort Ord exist in this conservation area. Areas of high species richness occur along Inter-Garrison Road and Reservation Road and between former Fritzsche Army Airfield and the City of Marina.

Figure 2-1

High- and Medium-Density Occurrences of Federally Listed HMP Species

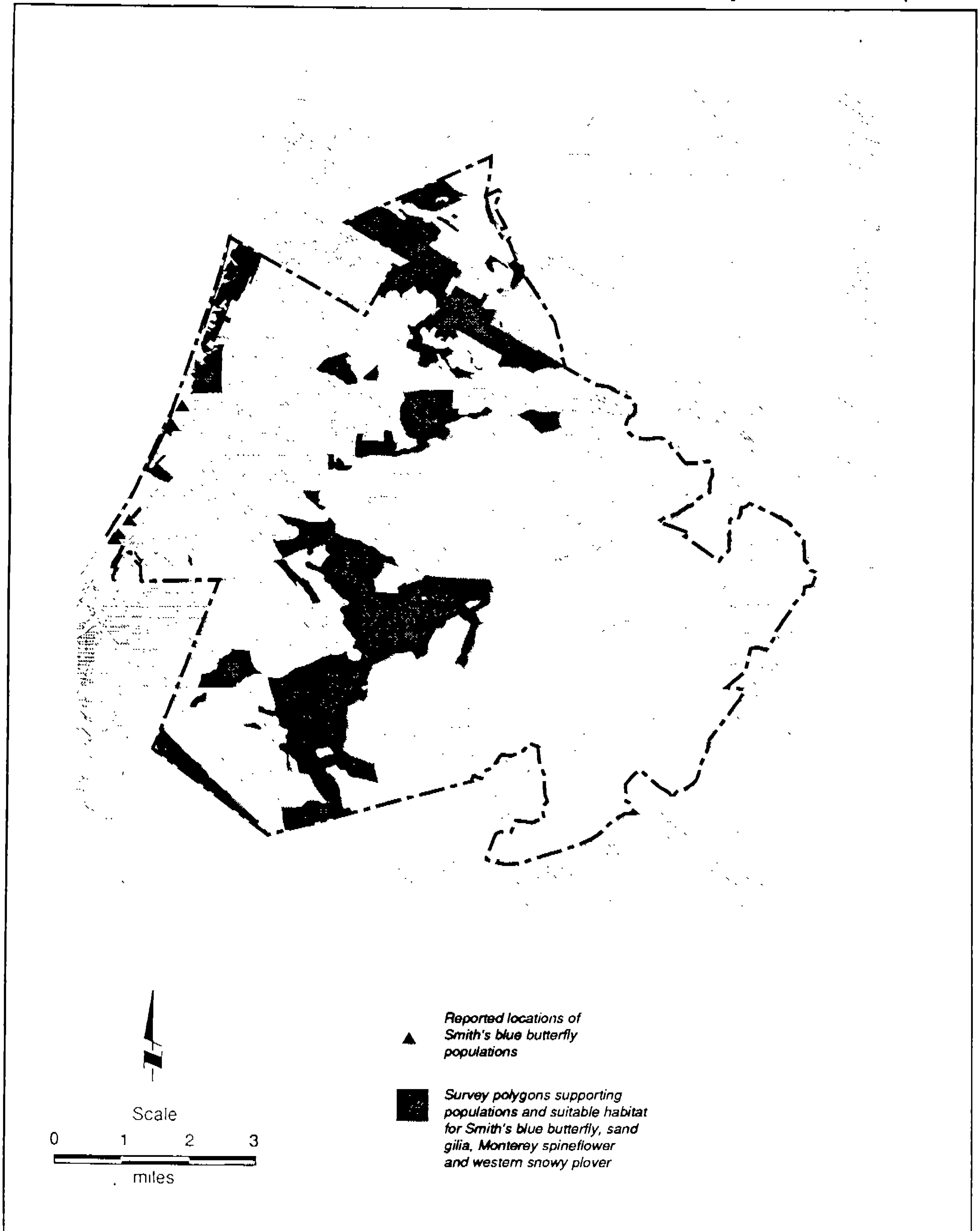


Figure 2-2
HMP Species High Richness Sites

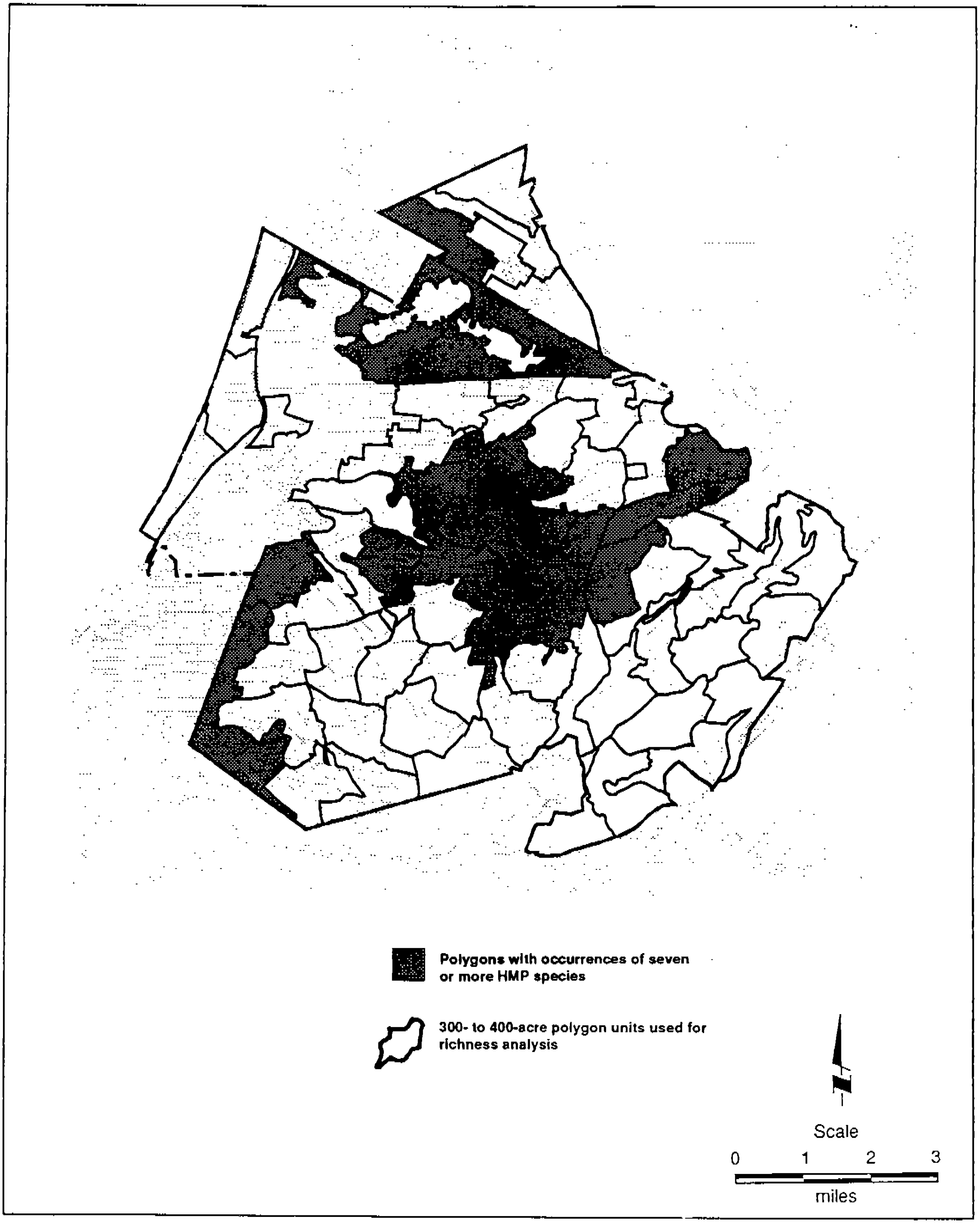
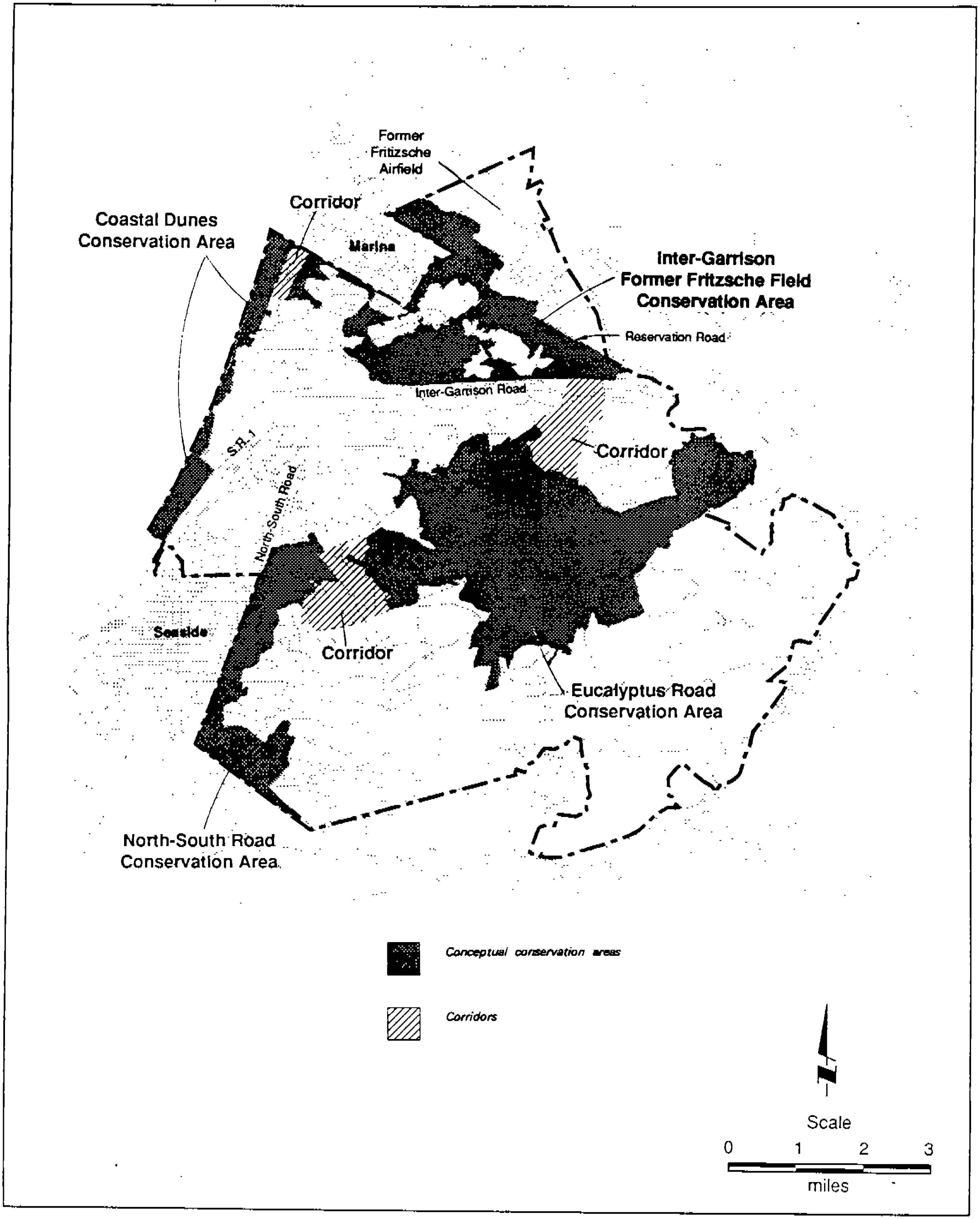


Figure 2-3

Conceptual Conservation Areas and Corridors



Coastal Dunes Conservation Area

The Coastal Dunes conservation area occupies the western half of the dunes west of Highway 1 (Figure 2-3). The Coastal Dunes conservation area provides important habitat for Smith's blue butterfly, western snowy plover, black legless lizard, Monterey spineflower, and several small populations of sand gilia.

Eucalyptus Road Conservation Area

The Eucalyptus Road conservation area is a large conservation area located in the central portion of the installation surrounding Eucalyptus Road (Figure 2-3). Dominant habitats are maritime chaparral and coast live oak woodlands and savannas, with inclusions of grasslands. The area generally supports listed and proposed species at low densities, but supports a high richness of HMP species, particularly plants that characterize the sand hill and Aromas maritime chaparral subtypes. Vernal pools providing habitat for California linderiella and California tiger salamander are also present in the conservation area.

North-South Road Conservation Area

The North-South Road conservation area is located along the east side of North-South Road south of the Presidio of Monterey Annex (Figure 2-3). The dominant habitat is maritime chaparral, which supports sand gilia and Monterey spineflower at low densities and a high richness of HMP species, particularly plants that characterize the sand hill maritime chaparral subtype.

Corridors

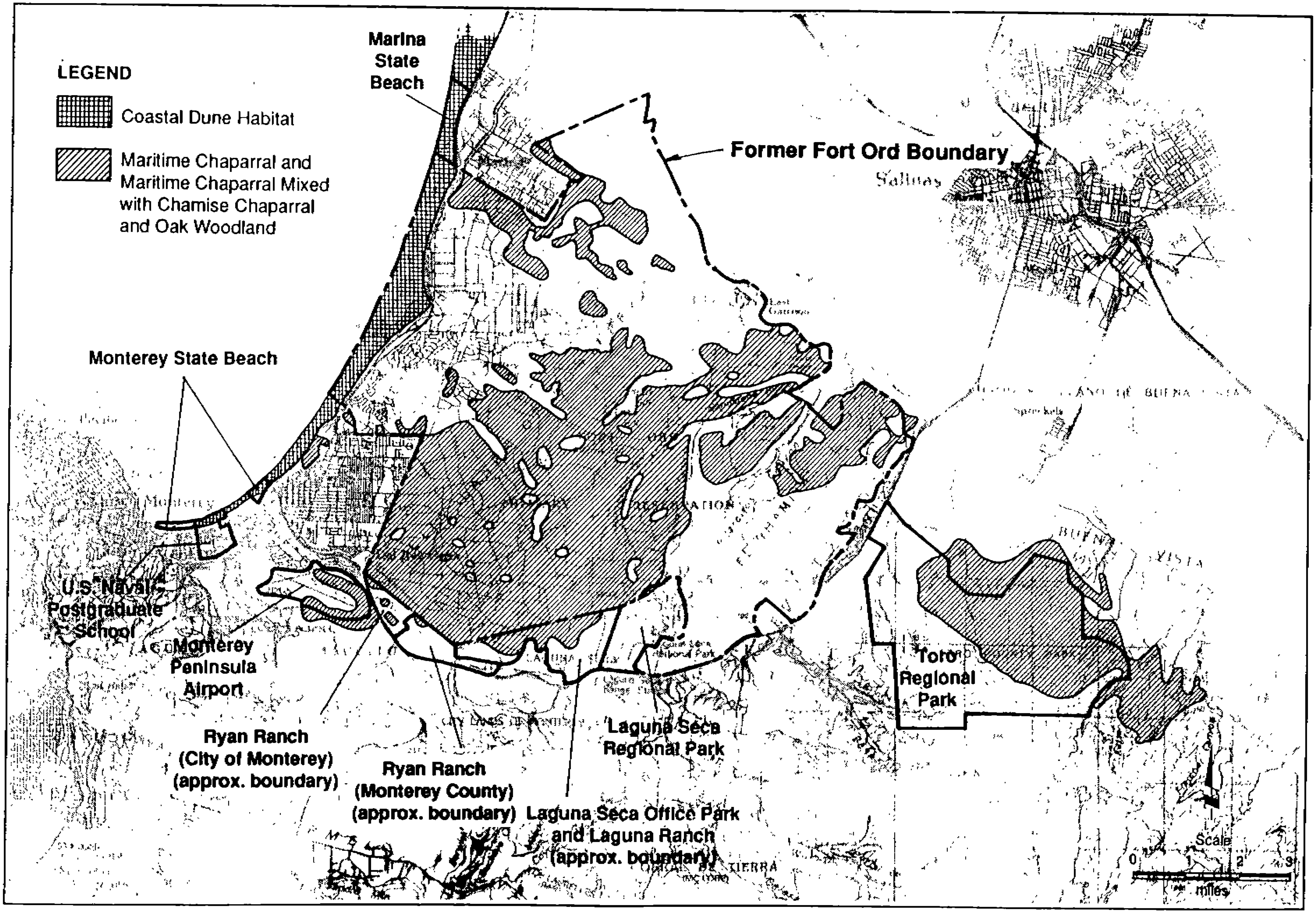
Habitat corridors were developed to provide avenues for wildlife and plant dispersal and genetic interchange among the larger habitat blocks of the conservation areas (Figure 2-3). One corridor would link the North-South Road conservation area with the Eucalyptus Road conservation area and another would link the Eucalyptus Road conservation area with the Inter-Garrison - Former Fritzsche Field conservation area.

An additional corridor could link plant populations of the Inter-Garrison - Former Fritzsche Field and Coastal Dunes conservation areas. The link would have to be provided by habitat on the roadside and center median of Highway 1. Sand gilia and Monterey spineflower occur on both sides of Highway 1 where this corridor is located.

RELATIONSHIP OF FORMER FORT ORD TO OTHER MARITIME CHAPARRAL AND DUNE HABITATS

Former Fort Ord is mostly surrounded by developed and agricultural land, but protected and unprotected land supporting maritime chaparral and coastal dune habitats and HMP species occurs nearby (Figure 2-4).

Figure 2-4
Maritime Chaparral and Coastal Dune Habitats in the Vicinity of Former Fort Ord



Coastal Dune Habitat

Coastal dune habitat on private and public lands along the coast north and south of former Fort Ord is known to support or have potential to support Smith's blue butterfly, sand gilia, Monterey spineflower, robust spineflower, coast wallflower, black legless lizard, and western snowy plover (Figure 2-4).

Marina State Beach

Marina State Beach is contiguous with the north end of the coastal dunes of former Fort Ord. The coastal strand habitat at Marina State Beach is known to support Smith's blue butterfly, sand gilia, Monterey spineflower, robust spineflower, coast wallflower, and black legless lizard. Beaches support western snowy plover nesting habitat.

Sand City, Seaside, and Monterey

Dune habitats in Sand City, Seaside, and Monterey are contiguous with the south end of the coastal dunes at former Fort Ord (Figure 2-4). These dune habitats are heavily disturbed and fragmented by water treatment plants, hotel and residential development, sand mining operations, and roads. However, sand gilia, Monterey spineflower, and black legless lizard are known to occur in specific locations in this area, and various dune restoration efforts have been undertaken.

Monterey State Beach

Monterey State Beach is divided into two parcels within the City of Monterey (Figure 2-4). The north parcel supports degraded dune habitat. The south parcel supports a narrow strip of beach with only a small amount of degraded coastal strand habitat between the beach and developed sites. Dune restoration efforts have been undertaken at portions of Monterey State Beach.

U.S. Naval Postgraduate School

The U.S. Naval Postgraduate School supports coastal dune habitats, including degraded and native coastal strand. These dunes are known to support many sand gilia.

Maritime Chaparral

Maritime chaparral habitat occurs on private and public lands to the east and south of former Fort Ord and is known to support or could potentially support sand gilia, Monterey spineflower, California linderiella, Seaside bird's-beak, Yadon's piperia, black legless lizard, Toro manzanita, sandmat manzanita, Monterey ceanothus, Eastwood's ericameria, coast wallflower, and Hooker's manzanita (Figure 2-4).

Toro Regional Park and Adjacent Private Land

Toro Regional Park supports stands of Aromas formation maritime chaparral disjunct from that on former Fort Ord. The park is known to support Toro manzanita, Monterey ceanothus, and Eastwood's ericameria. Urban development, State Route (SR) 68, oak woodland, and grassland separate the maritime chaparral at Toro Regional Park from that at former Fort Ord.

Monterey Peninsula Airport and Adjacent Private Land

Southwest of former Fort Ord, Monterey Peninsula Airport and adjacent private property support maritime chaparral. These sites are known to support Seaside bird's-beak, Toro manzanita, sandmat manzanita, and Eastwood's ericameria. The maritime chaparral at the airport is separated from former Fort Ord by SR 68 and a narrow strip of oak woodland.

Ryan Ranch

Ryan Ranch (a portion of which is within the City of Monterey and a portion is in county lands) borders former Fort Ord on the south and supports small patches of maritime chaparral. Some of these maritime chaparral patches are contiguous with former Fort Ord maritime chaparral and others are separated by areas of grassland. Maritime chaparral at the west end of the city portion of Ryan Ranch forms a partial corridor between former Fort Ord and the Monterey Peninsula Airport. Development already exists on both Ryan Ranch properties and additional development is proposed for these sites.

Laguna Seca Park

Small patches of maritime chaparral occur at the north edge of Laguna Seca Park contiguous with the maritime chaparral at the southwest corner of former Fort Ord.

Laguna Seca Office Park and Laguna Ranch

Laguna Seca Office Park and Laguna Ranch support large areas of maritime chaparral contiguous with the south boundary of former Fort Ord. This site likely supports sandmat manzanita, Monterey ceanothus, and Hooker's manzanita, based on occurrences of these species abutting the former Fort Ord side of the boundary. Low-density residential development occurs within the maritime chaparral habitat at Laguna Ranch.

Sand City

Approximately 60 acres of sand hill maritime chaparral occurs in Sand City between Highway 1 and Del Monte Boulevard. This site supports transitional habitat between sand hill maritime chaparral on Baywood sands and coastal strand habitat on coastal dunes. Large populations of sand gilia are known to occur at this site.