

Final Administrative Draft

Habitat Management and Monitoring Plan
for the
Crestridge Ecological Reserve

Prepared for

State of California
The Resources Agency
Department of Fish and Game

Prepared by

Conservation Biology Institute
Endangered Habitats Conservancy

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1.0 INTRODUCTION

1.1 Purpose of Management and Monitoring Plan

The Crestridge Ecological Reserve is an approximately 2,638-acre Ecological Reserve as designated by the California Fish and Game Commission and a unit of the Multiple Species Conservation Program (MSCP) in San Diego County. The property is subject to a Conservation Bank Agreement with the California Department of Fish and Game (CDFG). Designation as an ecological reserve has protected Crestridge from the threat of development.

The goals of the MSCP are consistent with the goals of an Ecological Reserve. The MSCP provides special protection for the irreplaceable resources in San Diego County and guides development outside of biological resource core areas. Protection of these irreplaceable resources is vital to the general welfare of all residents. Central to the MSCP is the maintenance of ecosystems and vegetation communities that support sensitive species and fragile, regionally declining resources. The MSCP's goal is to prevent future endangerment of the plants and animals that are dependent on these habitats.

The CDFG and MSCP both require the preparation of a habitat management and monitoring plan for the reserve that includes area-specific directives for the land and the species it supports, including species listed as *covered* under the take authorizations of the MSCP. Implementation protocols of the plan are intended to encourage the maintenance or improvement of the habitat quality of the reserve, while remaining adaptable to changing conditions on the reserve. The plan addresses the interface between adjacent developed lands and habitats in the reserve, appropriate land uses within the reserve, and enforcement standards for those uses that are compatible with the short- and long-term maintenance goals of the reserve.

A draft of this plan was initially developed in February 2002 for an approximately 2,377-acre reserve area. Since that time, there have been major changes on the reserve:

- Approximately 261 acres formerly conserved as mitigation by the San Diego County Water Authority have been added to the western end of the reserve.
- Approximately 1,900 acres of the reserve burned in the 2003 Cedar fire, and EHC and the California Department of Forestry and Fire Protection (CalFire) have reevaluated fire management strategies for the reserve.
- A cultural resource management plan was prepared for a portion of the reserve and is included in this updated plan.
- Several biological management and monitoring projects have been initiated; these are summarized in Section 8.1 of this plan.
- The Earth Discovery Institute has been established, and educational programs have been implemented through a series of grants (Section 8.1).

- An interpretive kiosk has been built at the entrance of the reserve, as a symbol of the legacy and significance of the land to the surrounding residential community.

Thus, this draft plan is to incorporate these changes and update the management and monitoring needs for the reserve. This management and monitoring plan is intended to cover current and future land additions to the reserve, with specific management and monitoring needs to be developed in accordance with this plan as lands are added.

In accordance with CDFG guidelines, a public meeting will be held for the local community to provide comments on and input to the draft management and monitoring plan and associated environmental document. Following public comment, the plan and/or environmental document will be revised as necessary. The final environmental document will be adopted in accordance with the California Environmental Quality Act (CEQA) and the plan approved by the CDFG, as the lead agency.

The CDFG and Endangered Habitats Conservancy (EHC) have agreed to work together to implement the Habitat Management and Monitoring Plan. In accordance with the plan, EHC and CDFG will coordinate stewardship efforts for land management, monitoring, and maintenance. EHC will also develop and implement volunteer and environmental education programs and encourage appropriate use of the land by the general public and the local community.

1.2 Property Location, History of Use, and Regional Ecological Significance

Location

The Crestridge Ecological Reserve is located in San Diego County, approximately 3 miles east of the City of El Cajon and due north of the community of Crest (Figure 1-1). The reserve is bounded on the north by Interstate-8 (I-8), on the east by Harbison Canyon, on the south by Mountain View and La Cresta roads, and on the southwest by La Cresta Road.

History of Use

The Crestridge property, also known locally as *Oakridge*, was part of a Mexican land grant known as *El Cajon de San Diego*, or *Rancho El Cajon*. The name—*the box*—referred to the pass between two hills. The original land grant consisted of approximately 48,800 acres, the third largest land grant in San Diego County, and ultimately became the site of El Cajon, Lakeside, Santee, Bostonia, and Flinn Springs. The original boundaries of the rancho, roughly, were La Mesa on the west, Mt. Helix on the south, Camp Elliott on the north, and El Monte Park on the east (Moyer and Pourade 1969). The land was granted in September 1845 by Governor Pio Pico to Maria Antonia Estudillo de Pedrorena as repayment for \$500 owed to her husband, Miguel Telesforo de Pedrorena, by the Mexican government (Aviña 1976). Señora Pedrorena and her family built houses and corrals for their livestock and harvested large crops from the land (Pourade 1963).



Save for Figure 1-1



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Miguel Pedrorena was one of 48 delegates appointed to develop a Constitution for the California territory in 1849. He died in 1850 and was buried in Old Town San Diego. His heirs began to dispose of their land during the Civil War (Moyer and Pourade 1969). In 1868, they sold most of the rancho to Isaac Lankershim, who paid less than \$1 per acre.

In the early 20th century the Cornelius family owned much of the Rancho south of existing I-8 and raised beef and milk cows there, mostly on the area that is now an avocado grove and not part of the reserve. Mrs. Cornelius purchased the original water system for Crest from the army camp at Campo. The Corneliuses named the oak grove area *Nancy Jane Park*, in memory of their daughter who died as a child. Sometime before World War II, Colonel Ed Fletcher bought the *S Tract* of Rancho El Cajon from the Cornelius family. Fletcher used the property as a retreat for his family (Fletcher 1952). During World War II, the area was used by the Searchlight Battalion of soldiers. Officers' quarters and a recreation hall were built in the vicinity of the oak grove. Some of these structures remain today.

Mr. Buck Rickles worked for the Ed Fletcher Company, Inc. from 1963 to 1976 and raised his family on the property. Mr. Rickles supplied much of the information for this history of the property. He and Mr. Waller, who was the handyman for the Ed Fletcher Company, had cows, horses, and various other livestock, mostly in the area of the avocado grove. Mr. Waller cleared the area that is now the annual grassland north of the oak grove on the reserve, erected fences, and used it to raise quarter horses. None of the rest of the property has been cleared.

During the late 1970s and 1980s, plans were approved for a residential development of more than 1,350 homes on the site. In 1989, the land was owned by Lawrence Malenfant, who planned an extensive community encompassing 2,000 homes, a golf course, lake, and sewer plant. He eventually went bankrupt. In the 1990s, Gatlin Development (Gatlin) planned to build 92 homes on about 450 acres and to designate about 1,500 acres as open space. This plan was approved by the County of San Diego.

In response to the development proposals, the citizens of Crest formed the Crest Open Space Supporters and worked with the Back Country Land Trust (BCLT) to advocate for conservation of the property as open space and incorporation into the MSCP preserve system. The Endangered Habitats League (EHL) also had a major role in assuring conservation of the property.

In 1995, Gatlin established the Crestridge Conservation Bank on the property. At the urging of the EHL, the BCLT, other environmental groups, and the CDFG, The Nature Conservancy (TNC) purchased the entire property, and in 1999 the Wildlife Conservation Board purchased the property from TNC. In 2002, the County Water Authority transferred approximately 261 acres to the CDFG on the western end of the reserve. These properties now comprise the Crestridge Ecological Reserve. J. Whalen Associates, Inc. sells mitigation credits, with the proceeds going toward additional acquisitions and an endowment for habitat management on the reserve (Section 1.4).



Regional Ecological Significance

The Crestridge Ecological Reserve is a large island of habitat almost entirely surrounded by residential development. It is centrally located at the eastern edge of urban development between MSCP lands to the north of I-8 and MSCP lands to the south of I-8 and thus may function as a habitat linkage. Despite its proximity to urbanization, much of Crestridge shows relatively few signs of disturbance. Crestridge supports mature riparian woodlands and Engelmann oak woodlands, surrounded by coastal sage scrub and chaparral. These habitats provide nesting and foraging habitat for raptor species, including the black-shouldered kite (*Elanus leucurus*) and Cooper's hawk (*Accipiter cooperi*). The reserve supports a wide diversity of native butterflies and native plant species, including bunch grasses and sensitive herbaceous species. Crestridge supports the largest known populations of Lakeside ceanothus (*Ceanothus cyaneus*) and, before the 2003 fires, Hermes copper butterfly (*Lycaena hermes*). The coastal sage scrub habitat on the west end of the reserve may function as one of the *stepping stones* for coastal sage scrub birds, including the California gnatcatcher (*Polioptila californica californica*), in the Lakeside archipelago of coastal sage scrub.

The reserve is valued as open space by the surrounding community of Crest. Crestridge was also valued in prehistoric times, as evidenced by the existence of archeological sites on the reserve, including an ancient village.

1.3 MSCP Responsibilities

Under the MSCP Plan, each conservation area must be managed to maintain and enhance habitat for covered species and other natural communities within the MSCP preserve system. The MSCP goal is to *manage* the reserve by allowing natural ecological processes to continue with minimal impact from humans. This responsibility bears with it the obligation to know the locations and condition of various resources on the reserve at all times, from season to season and year to year. Management entails careful observation and documentation to record how the natural communities respond to different levels and types of land uses, as much as it entails taking action. This plan and its implementation must evolve with our understanding of the resources and their responses to various environmental and man-induced conditions. For this reason, the management and monitoring plan provides management options that may or may not be implemented, depending on the status of resources and the potential impacts of human management and adjacent land uses at any point in time.

This Habitat Management and Monitoring Plan for the Crestridge Ecological Reserve has been prepared to comply with the MSCP Guidelines for Preserve Management Activities (Section 6.3 of the Final MSCP Plan, Ogden 1998):

Area-specific management directives will be prepared by federal, state, and local agencies responsible for managing lands conserved as part of the preserve. Area-specific management directives will be developed using generally accepted practices and procedures for management of biological preserves. These directives will be developed



and implemented to address species and habitat management needs in a phased manner for logical and discrete areas, once conserved as part of the preserve, including any species-specific management required as conditions of the take authorizations.

Both framework plans (generally) and area-specific management directives (specifically) will address the following management actions, as appropriate:

Preserve-level actions	Species-level actions
<ul style="list-style-type: none">• Fire management• Public access control• Fencing and gates• Ranger patrol• Trail maintenance• Visitor/interpretive services• Volunteer services• Hydrological management• Signage and lighting• Trash and litter removal• Access road maintenance• Enforcement of property requirements	<ul style="list-style-type: none">• Removal of invasive species• Nonnative predator control• Species monitoring• Habitat restoration• Management for diverse age classes• Use of herbicides and rodenticides• Biological surveys• Species management conditions

This plan acknowledges that regional management and monitoring guidelines are being updated, and it is our intent that management and monitoring at Crestridge will comply with or exceed the requirements specified by the wildlife agencies.

1.4 Conservation Bank

The *Crestridge Conservation Bank* is a County-approved mitigation bank approved for use within the MSCP area, except the immediate coast. Pursuant to Agreements with CDFG, the U.S. Fish and Wildlife Service (USFWS), the California Wildlife Foundation, and EHL, 2,377 acres of the Crestridge Ecological Reserve are enrolled as a Conservation Bank. Mitigation credits are sold from the bank by a licensed broker, with the proceeds going to build an endowment administered by the California Wildlife Foundation. Approximately 1,600 credits of various habitat types—including coast live oak woodland, coast live oak riparian woodland, coastal sage scrub, southern mixed chaparral, scrub oak chaparral, and annual grassland—remain available within the bank (<http://www.jwhalen.net/mbindex.html>).

The principal funds in the endowment held by the California Wildlife Foundation are valued at approximately \$4 million. The endowment's principal is conservatively invested in money market instruments earning an annual rate of return of approximately 5%. Thus, the Crestridge endowment is expected to generate \$200,000 to \$250,000 per annum. EHC intends to supplement these revenues with private-sector fundraising to manage an annual operating budget for the reserve of approximately \$350,000 to \$400,000.



Proceeds from the mitigation bank are intended to support stewardship activities on the Reserve, including: (1) habitat restoration, management and monitoring, (2) security and community relations, (3) environmental education/habitat restoration programs, (4) fencing and signage, (5) planning activities for capital improvement projects, and (6) trail maintenance. In addition, portions of the bank's proceeds are intended to support future acquisitions designed to expand the reserve's boundaries.

2.0 PROPERTY DESCRIPTION

2.1 Geographical Setting

The Crestridge Ecological Reserve is situated in southwestern San Diego County, approximately 3 miles east of the City of El Cajon and due north of the community of Crest. The reserve is bounded on the north by I-8, on the east by Harbison Canyon, on the south by Mountain View and La Cresta roads, and on the southwest by La Cresta Road.

Elevation ranges from 2,258 ft above mean sea level (msl) in the southeastern portion of the reserve to approximately 1,000 ft msl on lower slopes above Rios Canyon in the central portion of the property. Overall, rugged topography and steep slopes characterize the majority of the site. Relatively level terrain occurs primarily along the southern property boundary, just northeast of the end of Horsemill Road (Figures 2-1, 2-2).

A number of blueline streams occur on Crestridge (Figure 2-1). Rios Canyon Creek and two unnamed drainages on either side of Ceanothus Slope flow north to Los Coches Creek. Two smaller, unnamed blueline streams drain into Rios Canyon from the south. A small portion of a blueline stream in the southeast portion of the reserve is a tributary to the larger drainage in Harbison Canyon. In addition to blueline streams, a natural spring occurs at about 1,700 ft elevation in the eastern portion of the reserve. This spring was not visited during the 2000 surveys (due to topography and dense vegetation) but appears from aerial photographs to support an oak woodland community.

According to the nearest weather station in El Cajon, administered by the Western Regional Climate Center (2007), monthly average temperatures range from 52 to 78 degrees Fahrenheit, with an average minimum temperature of 41 degrees Fahrenheit in December and an average maximum temperature of 89 degrees Fahrenheit in August (for the period 11/01/1979–06/30/2007). Average annual rainfall for the period 1979-2007 is 12.07 inches at the El Cajon station, with minimum annual rainfall of 1.51 inches and maximum annual rainfall of 23.15 inches during this period.

2.2 Adjacent Land Use

The Crestridge Ecological Reserve is largely an island of natural communities surrounded by urban and agricultural communities and demarcated by roads. The long southern boundary is mostly bordered by residential development, as is the western end. The easternmost end of the property adjoins a patch of vacant land between the reserve and Harbison Canyon, but this adjacent property is currently planned for residential development (Crestlake) and has a development plan approved by the County of San Diego. There is still an effort to acquire this property for conservation as part of Crestridge. Except for a small ravine, which may function as a corridor between Crestridge and Harbison Canyon, most of this land is very steep and effectively



isolates Crestridge from Harbison Canyon. Interstate-8, Olde Highway 80, Flinn Springs County Park, and a few houses border the northern boundary of the reserve. Avocado groves and residential development along Rios Canyon Road largely separate the western and eastern portions of the reserve.

Aside from being isolated by roads and development, the primary threats from adjacent development are use of the site by offroad vehicles, landscaping (as point sources for exotic species introductions), and runoff from irrigation and wash water from horse corrals. Runoff may facilitate invasion by Argentine ants (*Iridomyrmex humilis*) as well as cause erosion, affect the composition of plant communities onsite, and contribute to water quality problems.

2.3 Geology and Soils

Eight soil series or formations are present on Crestridge (Figure 2-2). These include the Bosanko, Cieneba (including Cieneba-Fallbrook soils), Fallbrook (including Fallbrook-Vista soils), Greenfield, Las Posas, Visalia, and Vista series, and acid igneous rock land. Soil series are described below with respect to general structure and qualities, parental material, and location onsite.

Bosanko Series (Btc)

This series consists of well-drained, moderately deep clays that formed in material derived from acid igneous rock. Bosanko soils onsite occur in moderately sloping areas (5-9% slopes) and are characterized by a stony surface layer. Bosanko stony clays are typically <1 m deep over decomposed rock. Soil fertility is medium to high, runoff is slow to medium, and the erosion potential is slight to moderate (USDA-SCS 1973). Bosanko soils occur at the southeastern corner of the site.

Cieneba Series (ClG2, CmrG, CnE2, CnG2)

Cieneba soils include excessively drained, shallow coarse sandy loams. These soils formed in material weathered in place from granitic rock and occur in gently sloping to steep upland areas. Onsite, Cieneba soils occur in areas of 30-75% slopes. These soils are characterized by low fertility, rapid permeability, medium to rapid runoff, and high to very high soil erosion. Sheet and gully erosion may be evident. Cieneba very rocky coarse sandy loams (CmrG) are further characterized by very thin soils, rock outcrops over about 20% of the soil surface, and very large granodioritic boulders on about 30% of the surface (USDA-SCS 1973). Cieneba very rocky coarse sandy loams (CmrG) are one of the dominant soil types in the eastern portion of the site, occurring primarily on steep, north-facing slopes south and east of Flinn Springs County Park. Smaller pockets of this soil type occur in the central and western portions of the site. Cieneba coarse sandy loams (ClG2) are more restricted in distribution and occur primarily along the southern property boundary, east of the oak grove at the end of Horsemill Road. Cieneba-Fallbrook rocky sandy loams (CnE2, CnG2) are included in the Cieneba series, but contain about 55% Cieneba coarse sandy loams and 40% Fallbrook sandy loams.



Reserve for Figure 2-1



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Reserve for Figure 2-2



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Rock outcrops account for 5-10% of the soil surface, and large boulders cover 10% of the soil surface. These soils occur on slopes ranging from 9-65%. The Cieneba soil component consists of a 25 cm soil layer over weathered granitic rock. These soils have low fertility, moderately rapid permeability, medium to very rapid runoff, and moderate to very high erosion potential. The Fallbrook soil component consists of a thin surface layer of sandy loam and a subsoil of sandy clay loam. These soils have medium fertility, slow to moderately slow permeability in the subsoil, medium to very rapid runoff, and moderate to very high erosion potential (USDA-SCS 1973). Cieneba-Fallbrook soils are important in the western part of the site. Cieneba-Fallbrook rocky sandy loams (CnE2) are also found in the east-central and eastern corners of the site, where they typically occur adjacent to and on lower slopes than Cieneba soils and acid igneous rock.

Fallbrook Series (FaC, FaC2, FaD2, FaE2, FeE, FeE2, FvE)

Fallbrook soils consist of well-drained, moderately deep to deep sandy loams that formed in material weathered in place from granodiorite. These soils occur in upland areas onsite with slopes ranging from 5-30% and are typically 50-150 cm deep over rock. Fallbrook rocky sandy loams (FeE, FeE2) are further characterized by large boulders over 10-25% of the soil surface and rock outcrops over 10% of the soil surface. Soil fertility is low to medium, runoff is slow to rapid, and the erosion potential is slight to high. Fallbrook-Vista sandy loams (FvE) are about 50% Fallbrook sandy loams and 40% Vista sandy loams (USDA-SCS 1973). Fallbrook soils occur in localized patches in the western and west-central portions of the site. They are found in the grassland habitat just east of the oak grove at the end of Horsemill Road and on slopes north and northwest of this grove.

Greenfield Series (GrB)

Greenfield soils occur at the westernmost end of the reserve, on a small area of land formerly administered by the County Water Authority. The Greenfield series consists of well-drained, very deep sandy loams derived from granitic alluvium, with slopes of 0 to 15%.

Las Posas Series (LrG, LpE2, LpD2)

The Las Posas series includes well-drained, moderately deep stony fine sandy loams with a clay subsoil. These soils occur in upland areas and form in material weathered from basic igneous rocks. The substratum of Las Posas soils is deeply weathered gabbro. Las Posas stony fine sandy loams (LrG) occur on steep slopes (30-65%) and are characterized by medium soil fertility, moderately slow subsoil permeability, rapid to very rapid runoff, and high to very high erosion potential. Las Posas fine sandy loams (LpE2) are not stony, occur on moderately steep slopes (15-30%), and are characterized by medium to rapid erosion and moderate to high erosion potential (USDA-SCS 1973). Las Posas soils are found only on south and west-facing slopes above Rios Canyon. In this location, Las Posas stony fine sandy loams (LrG) occur on upper slopes, while Las Posas fine sandy loams (LpE2) are restricted to lower slopes. This soil type is particularly significant as it is often associated with sensitive plant species.

Visalia Series (VaB, VaC)

The Visalia series includes moderately well-drained, very deep sandy loams derived from granitic alluvium. These soils occur on gently to moderately sloping portions of alluvial fans and floodplains. Visalia sandy loams onsite occur in areas of 2-9% slopes. Soil fertility is high, permeability is moderately rapid, runoff is slow to medium, and the erosion potential is slight to moderate, depending on the slope (USDA-SCS 1973). Visalia soils are restricted in distribution onsite, being found only in the oak grove at the end of Horsemill Road (VaB) and in a small patch in the western part of the site (VaC).

Vista Series (VsE, VvE, VvG)

The Vista series includes well-drained, moderately deep and deep coarse sandy loams derived from granodiorite or quartz diorite. These soils occur in upland areas with slopes ranging from 15-65%. Medium soil fertility, moderately rapid permeability, medium to rapid runoff, and a moderate to high erosion hazard potential characterize Vista coarse sandy loams (VsE). Vista rocky coarse sandy loams (VvG) are also characterized by medium soil fertility and moderately rapid permeability. In addition, these soils have rock outcrops over 10% of the soil surface and large boulders over 10-20% of the soil surface. These rocky coarse sandy loams, which occur on steeper slopes than the coarse sandy loams, are also characterized by rapid to very rapid runoff and high to very high erosion potential (USDA-SCS). Vista soils occur in relatively small patches in the western and west-central portions of the site.

Acid Igneous Rock Land (AcG)

Acid igneous rock land is a fast-draining formation that occurs on low hills and in areas of steep topography. Large boulders and rock outcrops cover 50-90% of the surface and are comprised of a variety of materials, including gabbro, basalt, or gabbro diorite. The soil layer is typically shallow and infertile and occurs over decomposed granite or basic igneous rock. Pockets of deeper soil can occur between the rocks. Runoff is rapid to very rapid, and the erosion potential is considered moderate to very high (USDA-SCS 1973). Acid igneous rock is prominent in the eastern part of the site, where it forms the steep, west-facing slopes above the former racetrack. In this location, the distribution of acid igneous rock correlates strongly with the distribution of the sensitive chaparral shrub species, Lakeside ceanothus (*Ceanothus cyaneus*). Another large outcropping of acid igneous rock occurs on south-facing slopes above Rios Canyon. Acid igneous rock also occurs on southwest-facing slopes above La Cresta Road, in the southwest portion of the site.

2.4 Fire History

Crestridge has been subjected to repeated burning in recent times, and the frequency and interval between fires are likely reflected in the current vegetation onsite. Burn data for this site were obtained through the CalFire burn history database (CalFire 2007) and cover the period from 1940 to 2007 (Figure 2-3a). It is possible that additional fires occurred on the reserve during this time period but were not recorded. The burn history data provide boundaries of individual fire events

and the year of the event. These data do not provide information on fire intensity or season; both factors can influence post-fire vegetation recovery.

Eleven fire events have been recorded at Crestridge (Table 2-1). In general, fire frequency has been lowest in the east, highest in the west, and intermediate between the two in the central portion of the reserve. The fire interval, or years since the last fire, is presented in Figure 2-3b. The most recent burn in 2003 (Cedar fire) covered the majority of the reserve, with the exception of the central eastern part of the reserve. The approximate acreages of these fires and their relative locations onsite are presented in Table 2-1.

Table 2-1
Recorded Fire Events on Crestridge

Date of Fire	Approximate Acres Burned Onsite	General Area of Reserve
1940	1,300	Central and eastern
1950	950	Central and western
1953	650	Western
1958	350	Western corner
1965	650	Western, excluding north-facing slope along north boundary
1970	1,550	Central and western (Laguna fire)
1973	<50	Northeast corner
1978	50	Near northeast corner
1986	750	East-central
1987	80	North-central
2003	1,900	Western, central, and far eastern (Cedar fire)

Source: Fire history data (CalFire 2007).

The following examples demonstrate some of the effects of fire on vegetation on Crestridge:

- The northeast portion of the reserve (e.g., north-facing slopes south of I-8) has only one recorded burn event (1940) and has experienced a fire-free interval of more than 65 years. Vegetation on these slopes consists of dense stands of southern mixed chaparral and well-developed oak woodlands.



- Lakeside ceanothus in adjacent parts of the eastern reserve burned 4, 21, and 67 years ago. Densities and sizes of individual plants differ in these three areas, but quantitative comparisons have not been made. This is an excellent opportunity for studying the effects of fire and fire frequencies on Lakeside ceanothus. Current pollinator studies in this area will contribute to our understanding of the ecology of this community.
- South and west-facing slopes above Rios Canyon have experienced three or four burns in the recorded time period, with the last burn occurring 4 years ago. Areas with more frequent fires (shorter fire intervals) consist of coastal sage scrub with a high percentage of nonnative grasses. Conversely, slopes that have been subjected to less frequent fires and longer fire intervals consist of relatively intact sage scrub, except where they have been subjected to other disturbance factors (e.g., roads, trails, fuel breaks).
- The highest fire frequency occurs in the western portion of the reserve, where five to nine fire events have been recorded, with 4 years since the last fire. The dominant vegetation association in these areas is chaparral. Timing and intensity of burns, in addition to fire frequency, have likely influenced the current shrub composition in this area. This area supports one of the highest concentrations onsite of the crown-sprouting species, scrub oak (*Quercus berberidifolia*).

2.5 Cultural Features

Protection and preservation of cultural resources must comply with all applicable state and federal laws. A partial survey of the property was conducted in 2002 and a management plan for the cultural resources in this area of the reserve is included as Appendix I of this plan.

Three prehistoric archaeological sites were identified on the central and western parts of the reserve (1,173 acres) surveyed during the 1980s as part of a California Environmental Quality Act requirement when a portion of the reserve was originally proposed for development. One site (SDM-W-1121) is a village-like site consisting of extensive numbers of grinding features with interspersed midden and artifacts. The milling components include slicks, basins, and mortars, scattered over numerous large outcrops of bedrock. This site represents a rare association of bedrock milling and midden.

Site SDM-W-1122 consists of a series of milling areas with no definable midden or artifacts in association. Site SDM-W-1123 consists of a single bedrock outcrop with two milling components, including one mortar and one slick.



Reserve for Figure 2-3a



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Reserve for Figure 2-3b



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During World War II, the area was used by the Searchlight Battalion of soldiers. Officers' quarters and a recreation hall were built in the vicinity of the oak grove. These structures have been removed for security and safety purposes.

The remainder of the property that has not been surveyed will be evaluated for archaeological and historical resources. Prior to any ground-disturbing activities, specific management directives will be developed for any significant cultural resources discovered on the reserve and will be considered part of this management plan.

2.6 Existing Facilities

Some abandoned structures originally on the site have been removed. The only existing facilities are within the Core Public Use Area (Figure 2-4) and these include:

- Straw-bale Kiosk
- Greenhouse
- Entrance Gate with Sign
- Reserve Office, Research Work Area, and Caretaker Facility

Earth Discovery Institute (EDI), working in association with EHC, will contract with a landscape architect/design firm to assist in developing a site plan for the Core Public Use Area, which will integrate interpretive elements and structures such as the Kiosk, Field Station/Caretaker Residence, greenhouse, restroom and trash facilities, public gathering spaces, and student field activity sites. EHC staff will design and construct a new maintenance sign for Crestridge at the Horsemill Road entrance. The sign will provide maps, interpretive displays, and warnings.

The Straw-bale Kiosk is currently used for small meetings. The Greenhouse is used for growing native plants that will be used in restoration efforts.

EDI and EHC are developing plans for the Reserve Office, Research Work Area, and Caretaker Facility that focus on security, maintenance, improvements, and educational uses. Currently this facility is being used for meetings and storage of supplies and equipment.

The existing infrastructure of gates and roads serves to control public access and allow fire suppression response. There are currently 15 gates that control access to the reserve, including 8 gates on Crestridge property and 7 gates on immediately adjacent properties that have direct bearing on access to the reserve. Existing gates are found at the following locations (Figure 2-5):

- Horsemill Road
- Lakeview Lane
- Kent Road to water tank
- La Cresta Heights at Cross Timbers Truck Trail
- Valley View Truck Trail near the Oak Grove



- Lower Rios Canyon
- Upper Rios Canyon
- Montana Serena
- Vista de Montemar (gate not on reserve property)
- Valley View Truck Trail near Walmart/Von's (gate not on reserve property)
- Valley View Truck Trail on Laurel Ridge (gate not on reserve property)
- East County Drive (gate not on reserve property)
- Lower Rios at reserve boundary and at Krug property (gate not on reserve property)
- Montana Serena, in residential development (gate not on reserve property)
- Gibson, near eastern corner of reserve (gate not on reserve property)

In addition, two new gates are needed onsite to control access at the reserve boundary. Proposed gate locations include:

- Coyote Ridge, in the western portion of the reserve
- Valley View Truck Trail, also in the western portion of the reserve



Reserve for Figure 2-4



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Reserve for Figure 2-5



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3.0 HABITATS AND SENSITIVE SPECIES

3.1 Vegetation Communities

A generalized vegetation map of Crestridge was prepared in 1992 as part of the regional vegetation mapping for the MSCP. That map was generated from interpretation of 1990 aerial photographs (scale: 1" = 2000') and limited field verification. In spring 2000, vegetation was mapped in the field to refine the earlier map, update vegetation changes due to fire or other disturbances, and provide a baseline for long-term monitoring comparisons. Vegetation communities on the new properties at the western end of the reserve have not yet been verified in the field.

Patricia Gordon-Reedy of the Conservation Biology Institute (CBI) and Fred Sproul, an independent biological consultant, conducted the spring 2000 surveys using high resolution digital multispectral imagery captured by the Airborne Data Acquisition and Registration (ADAR) system (scale: approximately 1" = 328'). San Diego State University (SDSU) prepared the ADAR base maps used in vegetation mapping. Topography was overlain on these maps at a later date to assist in refining vegetation boundaries. Vegetation was mapped according to the modified Holland system of classification (Oberbauer 1996), which is consistent with SANDAG's regional vegetation database.

Future vegetation mapping will be conducted using the classification based on A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), which is consistent with the National Vegetation Classification System (FGDC 1997). As the CDFG encourages the use of this updated system, the Holland vegetation categories have been preliminarily cross-walked to the Sawyer-Keeler-Wolf vegetation classification, to the extent feasible.

Vegetation mapping was conducted primarily by direct observations and from vantage points using binoculars. A few areas in the eastern portion of the site were inaccessible and were mapped from the imagery alone. County of San Diego GIS staff digitized the vegetation boundaries, calculated acreages (Table 3-1), and produced a map of vegetation communities (Figure 3-1). These communities are described in Appendix A.1. Dominant species composition was recorded for nearly half of the vegetation polygons (Appendix A.4). A list of plant species was developed for the reserve (Appendix A.2). Dr. Jon Rebman of the San Diego Natural History Museum (SDNHM) added to this list based on voucher specimens collected for the museum in spring of 2003, 2004, and 2005.

Table 3-1
Acreage by Vegetation Community and Classification

Holland 1996	Sawyer-Keeler-Wolf 1995	Acres
Coastal Sage Scrub	California sagebrush California sagebrush - California buckwheat Laurel sumac Mixed sage	660
Southern Mixed Chaparral Scrub Oak Chaparral	Chamise Chaparral - whitethorn Chamise - white sage Chamise - bigberry manzanita scrub oak Holly-leaf cherry Mixed scrub oak Scrub oak chamise Scrub oak – chaparral whitethorn Sugarbush	1,800
Nonnative (Annual) Grassland	California annual grassland Introduced perennial grassland Red brome Ripgut brome – soft chess Slender oats - filaree	20
Freshwater Seep	Sedge Spikerush	0.5
Coast Live Oak Riparian Woodland	Coast live oak	12
Coast Live Oak Woodland	Coast live oak Engelmann oak	125
Eucalyptus Woodland	Eucalyptus	0.1
Disturbed Areas	none	20
Total		2,638

3.2 Sensitive Plant Species

Patricia Gordon-Reedy of CBI and Fred Sproul, an independent biological consultant, conducted surveys for sensitive plant species in spring 2000 (see Table 3-2). Sensitive plant surveys also had been conducted on or near the Crestridge site as part of focused biological surveys for proposed development projects (e.g., RECON 1993, 1994; Sweetwater Environmental Biologists, Inc. 1994). Sensitive species surveys conducted in 2000 focused on establishing baseline conditions for management and monitoring of sensitive plant populations onsite. Toward this end, this effort documented or verified locational information, estimated population size(s) for selected species, delineated population boundaries, surveyed selected areas for sensitive species, and assessed threats to extant populations. Voucher specimens were not collected as part of this effort. Sensitive species collected by the SDNHM were added to this list; voucher specimens of these species were collected for curation at the museum.



Reserve for Figure 3-1



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Table 3-2
Vegetation Mapping and Sensitive Plant Survey Schedule

Survey Personnel	Survey Date	Survey Type	Survey Location
Patricia Gordon-Reedy Fred Sproul	4/17/00	Vegetation mapping	Central (vicinity of Padre Dam water tower)
Patricia Gordon-Reedy Fred Sproul	4/19/00	Vegetation mapping/ Sensitive plants	Eastern (north-facing slopes south of I-8); central (vicinity of Horsemill Rd, slopes to east)
Patricia Gordon-Reedy Fred Sproul	4/25/00	Vegetation mapping/ Sensitive plants	Central and western (from water tower west to Wal-Mart overlook)
Patricia Gordon-Reedy Fred Sproul	4/26/00	Vegetation mapping/ Sensitive plants	Central and eastern (vicinity of Horsemill Rd and slopes to east, vicinity of 'racetrack'); western (slopes along La Cresta Drive, Las Coches Road, and east of Wal-Mart)
Patricia Gordon-Reedy Fred Sproul	4/28/00	Vegetation mapping/ Sensitive plants	Eastern (north-facing slopes south of I-8); central (slopes east of Rios Canyon Rd)
Fred Sproul	4/30/00	Vegetation mapping/ Sensitive plants	Eastern (from Dunbar Lane along southeast boundary to 'racetrack' overlook)
Patricia Gordon-Reedy Fred Sproul	5/8/00	Vegetation mapping/ Sensitive plants	Central (near oak grove); eastern (north of 'racetrack')
Patricia Gordon-Reedy Fred Sproul	5/9/00	Vegetation mapping/ Sensitive plants	Central (slopes east of Rios Canyon Rd)
Patricia Gordon-Reedy Fred Sproul	5/10/00	Vegetation mapping/ Sensitive plants	Central (slopes east of Rios Canyon Rd); western (rechecked selected areas west of the water tower)
Patricia Gordon-Reedy Fred Sproul	5/19/00	Sensitive plants	Eastern (from Dunbar Lane to slopes overlooking I-8 to the north and 'racetrack' to the west)



Sensitive plant surveys focused on locating, mapping, and estimating population size (where feasible) for MSCP covered species, i.e., those species for which special conservation and management measures are required by the MSCP take authorizations. Mapping was conducted on the ADAR imagery used for vegetation mapping. Population size was counted directly or estimated by visual observation. Other sensitive plant species were noted where observed but were not specifically surveyed for or mapped in this effort. Due to time limitations, focused sensitive plant surveys were conducted primarily in areas with a high potential to support endemic or otherwise restricted species (e.g., clay or gabbro soils; steep, rocky canyons).

Sensitive plant species detected on Crestridge are briefly described in Appendix A.3. Figure 3-2 presents locations of sensitive species mapped during the 2000 surveys as well as during the 1994 surveys of the former County Water Authority property on the west end of the reserve.

MSCP Covered Species

Two MSCP covered plant species were detected on Crestridge during the 2000 surveys: San Diego thornmint (*Acanthomintha ilicifolia*), which is listed as federally endangered, and Lakeside ceanothus (*Ceanothus cyaneus*). Cleveland's goldenstar (*Muilla clevelandii*) was detected just offsite to the east. Slender-pod jewelflower (*Caulanthus stenocarpus*) was also detected in one location on Crestridge. This species has undergone a taxonomic revision since originally being placed on the MSCP covered species list and is now considered a synonym of a more widespread, common taxon (*C. heterophyllus* var. *heterophyllus*). Therefore, this taxon was not mapped or recorded as a sensitive species.

The SDNHM collected Mission Canyon bluecup (*Githopsis diffusa* spp. *filicaulis*) east of the old race track. This species was a target species for MSCP planning but it was not identified as covered by the MSCP Plan because too little was known about its distribution relative to the level of conservation proposed by the plan. The EDI continues to gather new information on species and their distributions, and species lists and management needs will be updated accordingly.



Reserve for Figure 3-2



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3.3 Animal Species

Klein-Edwards Professional Services performed general and focused wildlife species surveys in and immediately adjacent to the Crestridge Ecological Reserve in 2000 and 2001. The purpose of these surveys was to identify invertebrate and vertebrate wildlife species that occur and utilize the reserve, whether as occasional visitors, as regular seasonal migrants, or as permanent residents. Observations and notes were taken on their activities onsite, including records of breeding or nesting success. These include federally and state listed wildlife species, as well as MSCP covered species, i.e., those species for which special conservation and management measures are required by the MSCP take authorizations. Repeated censuses of birds were initiated and performed along three specific routes within the reserve in an attempt to identify species diversity and determine relative abundance (Appendix F.5). The locations of certain sensitive and otherwise noteworthy wildlife species were mapped, and, in some cases, the species themselves were photographed. Wildlife species were identified in the field by sight, calls, tracks, scat, or other signs (Appendix B.1 and B.2). In addition, the San Diego Tracking Team conducts two transects quarterly at Crestridge (Figure 3-3). Mammal signs are recorded on these surveys, and these species are included in the list in Appendix B.3.

Sensitive wildlife species observed and recorded within the boundaries of the Crestridge Ecological Reserve are briefly described in Appendix B.3. Figure 3-3 presents locations of sensitive species recorded onsite during these survey efforts. Field notes are included in Appendix B.4.

3.4 Habitat Linkages to the Crestridge Ecological Reserve

Habitat linkages between the Crestridge Ecological Reserve and other conserved open space are essential to maintain the biological diversity and condition of Crestridge. Existing linkages could be irretrievably compromised by development projects in the next few years. The biological integrity of the MSCP conserved open space will be jeopardized if these linkages are lost. A relatively modest investment in connective habitats can ensure the integrity of Crestridge and other conserved areas.

CBI used field reconnaissance along the Crestridge boundaries and 2000 color-infrared aerial imagery to identify habitat linkages to Crestridge that may still remain viable for wildlife movement. The existing habitat linkages adjacent to Crestridge cross one or more major roadways, thereby potentially reducing the long-term viability of the linkages. CBI did not conduct surveys to document presence of wildlife in the area or to determine the relative importance of the linkages for wildlife movement. The focus of the study was evaluating linkages as potential wildlife movement corridors for large mammals (deer, coyotes, bobcats, and mountain lions); however, these habitat linkages are equally important to maintaining connectivity for other biological resources as well.



Background

The MSCP preserve was designed to maintain connections between core habitat areas, including linkages between coastal lagoons and more inland habitats, and linkages between different watersheds. In addition to allowing for demographic and genetic exchange by all species between core preserve areas, linkages are intended to allow larger predators (mountain lions, coyotes, and bobcats) to move among conserved habitat blocks. These top predators are particularly vulnerable to extirpation from fragmented habitats (Soulé et al. 1992, Noss 1983), which can precipitate further detrimental changes to ecological communities. Dominant carnivores can suppress smaller carnivores through both competition and predation. Consequently, the decline of top predators in fragmented areas may lead to increased populations of smaller predators (*mesopredators*), such as gray foxes, raccoons, striped skunks, opossums, and house cats (i.e., mesopredator release, Soulé et al. 1988, Crooks 2000). Thus, dominant carnivores such as bobcats and coyotes may be fundamental in maintaining the ecological integrity of the coastal sage scrub and chaparral systems.

For purposes of this study, habitat linkages are defined as habitat areas that provide connectivity between habitat patches as well as year-round foraging, reproduction, and dispersal habitat for resident plants and animals (MSCP 1995). A wildlife corridor is a landscape feature, usually relatively narrow, that allows animal movement between two patches of habitat or between habitat and geographically discrete resources (Ogden 1996). Wildlife corridors must have species-specific characteristics to be functional for a given target species (e.g., Soulé 1991, Beier and Loe 1992).

Importance of Crestridge

The Crestridge Ecological Reserve is a natural habitat island almost entirely surrounded by residential development. It is centrally located at the eastern edge of urban development between MSCP lands to the north of I-8 and MSCP lands to the south of I-8 and thus may function as a habitat linkage for some species between these conserved areas. The coastal sage scrub habitat on the west end of the reserve may function as one of the *stepping stones* for dispersing coastal sage scrub birds, including the California gnatcatcher, in the Lakeside archipelago of coastal sage scrub.

Deer, bobcats, coyotes, and even a mountain lion are reported to use the habitats in the reserve. These animals may use the Crestridge reserve as part of their territory or home range or as part of a movement corridor; or they may use it seasonally (e.g., seasonal deer migrations); or Crestridge may provide habitat for inter-generational movement over longer periods of time. However, these large mammals risk being isolated from surrounding habitats or lost from Crestridge entirely if residential housing continues to shrink the availability of nearby natural open space. The rugged topography, dense vegetation, and increasing presence of roads and humans in the area further constrain wildlife movement between Crestridge and other habitat areas.



Reserve for Figure 3-3



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Potential Habitat Linkages to Crestridge

Following is a description of the boundaries and potential habitat linkages to Crestridge. Figure 3-4 provides the general context for these descriptions.

Western boundary—stepping-stone linkage

Residential housing and the County Water Authority (CWA) mitigation bank lie immediately west of Crestridge, and some additional undeveloped land occurs on the northwest boundary of Crestridge. The CWA mitigation bank ultimately will be annexed to the Crestridge Ecological Reserve. Residential housing borders the CWA mitigation bank to the west. The coastal sage scrub at the western end of Crestridge and the CWA mitigation bank provide core habitat in the middle of an archipelago of coastal sage scrub islands north and south of I-8, thus potentially allowing for bird and insect movement through this stepping-stone linkage (the Lakeside linkage). Such movement may be impacted by recent Caltrans activities in the I-8 median, where natural habitat in the median has been removed.

Northern boundary—stepping-stone linkage

Steep, rocky slopes preclude most movement opportunities by large mammals along the northern boundary of the reserve, with the exception of Rios Canyon and a couple of smaller drainages to Los Coches Creek. These canyons are developed or heavily roaded at the mouths of the canyons, and future development is proposed for the avocado grove. Olde Highway 80 and I-8 border the fringe of development areas north of Crestridge. There may be a route for wildlife movement from the northeast end of the reserve, down the north slope and east through the junk yard around the toe of the slope along Alpine Boulevard to the Peutz Valley Road habitat along Chocolate Canyon Creek (Figure 3-4). However, after field inspection, this area is not considered a habitat linkage, but there may be infrequent at-grade wildlife movement along Peutz Valley Road under I-8.

The southeast end of Chocolate Canyon Creek terminates in a residential area of Alpine. Movement north along the creek to undeveloped habitat around El Capitan Reservoir is impeded by the intersection of Alpine Boulevard and Peutz Valley Road, which crosses under I-8. The culvert under Alpine Boulevard and Peutz Valley Road is about 15 ft in diameter and has good vegetative cover, but there was no evidence that it is used for wildlife movement. The culvert itself is probably 650 ft long, and light at the northern end of the culvert is not visible from the southern end. Movement to the south from the Peutz Valley Road intersection is impeded by Harbison Road and dense residential housing in the Galloway Valley. Thus, this northeastern area of the property is not considered a habitat linkage for mammals, although there may be infrequent wildlife movement in these areas. Certainly this area of the reserve supports a stepping-stone linkage to the open space around El Capitan Reservoir.



Eastern boundary—linkage to Harbison Canyon

The old McClain Ranch and Bullard Lane, currently a dirt road, border Crestridge to the east, along the old Rancho El Cajon boundary. This property (Crestlake) has been approved for development but has not yet been built. The westernmost portion of the Crestlake property, adjacent to Crestridge, is a fairly flat mesa and currently serves as an extension of the Crestridge habitat (primarily chaparral). A pond drains to a gently sloping, oak-riparian canyon leading down into Galloway Valley, which is densely populated. Bullard Lane, a paved road, is at the mouth of this canyon and supports a substantial residential community in Galloway Valley, at the northern end of Harbison Canyon. The creek through Harbison Canyon is densely vegetated and winds through small residential lots. However, the narrow grassland and scrub areas at the toe of the slopes (between the residential lots and the steep slopes of the canyon) may provide for wildlife movement, as evidenced by trails, south to Dehesa and the Sweetwater Valley. Harbison Canyon, including portions of the slopes on either side, is designated as a Pre-approved Mitigation Area by the County of San Diego. Figure 3-5 shows the remaining undeveloped natural land that could serve as a habitat linkage between Crestridge and Harbison Canyon.

From the Crestlake canyon, there may be some wildlife movement north through Galloway Valley, although it is a circuitous route around and through housing developments. As discussed above for the northern boundary of Crestridge, this route is highly fragmented and heavily impeded by roads and is not considered a viable habitat linkage for mammals to open space north of I-8. However, it probably supports a stepping-stone linkage to other habitat off the reserve.

Southern boundary—linkage to Sweetwater River Valley

Steep, rocky slopes also preclude most movement opportunities by large mammals along the southern Crestridge boundary, with the exception of a few smaller canyons draining to Forrester Creek, just south of La Cresta Road. Large-lot housing fills the flatter areas along these small canyons at the western end of Crestridge. Where the southern boundary of Crestridge is closest to La Cresta Road (southwestern edge of property), the topography slopes gently south toward the road, potentially accommodating animals crossing the road at-grade, although more housing and steep topography south of La Cresta Road also create barriers to movement in many areas along the road.

The area south of La Cresta Road and north of Dehesa Road lies within the County of San Diego Pre-Approved Mitigation Area and the USFWS Acquisition Area for the Otay-Sweetwater National Wildlife Refuge. Approximately 80 acres of this area are presently conserved under USFWS ownership, 150 acres by CDFG, and 350 acres under EHC ownership. EHC is in the process of acquiring additional acreage in the immediate area. It appears that the northern boundary of the refuge acquisition area is along an east-west ridge that separates the Forrester Creek valley from the Sweetwater River valley. A north-south powerline easement transects this ridge and then runs east-west on the south side of the ridge. This easement could serve as a pathway for wildlife movement, and the Endangered Habitats Conservancy has purchased land that will facilitate movement along this corridor. According to Buck Rickles, who worked for the Ed



Reserve for Figure 3-4



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Reserve for Figure 3-5



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Fletcher Company and lived on the Crestridge property between 1963 and 1976, a small deer herd used this general area to move between Crestridge and Sloan Canyon on the Sweetwater River.

Dehesa Road and residential development planned by the Sycuan Tribe could create another set of barriers for wildlife movement. There appears to be a chokepoint for wildlife movement across Dehesa Road between Sloan Valley Road and Dehesa Valley. Specifically, there is a potential at-grade crossing of Dehesa Road just west of the elementary school and another one east of the school, at the bend in Dehesa Road. Figure 3-6 shows the remaining undeveloped natural land that could serve as a habitat linkage and potential wildlife movement corridor between Crestridge and the Sweetwater River Valley.

Conclusions

The Crestridge Ecological Reserve is becoming increasingly isolated due to urbanization and roads. Based on the results of field reconnaissance and review of recent aerial imagery, there currently appear to be two primary habitat linkages to future MSCP conservation areas, in addition to the Lakeside archipelago stepping-stone corridor. These two linkages connect Crestridge south to the Sweetwater River Valley and east to the Galloway Valley and Harbison Canyon and are currently under threat by residential development projects. Both of these habitat linkages are tenuous and fragmented because of steep slopes, increasing development, and major roads. However, we assume these habitat areas are being used by smaller mammals, herpetofauna, birds, and invertebrates and thus are important habitat connections to Crestridge for these species. Any new development proposals in these areas and proposals for road improvements (La Cresta Road, Harbison Canyon Road, and Dehesa Road) should be evaluated for their potential impacts to these habitat linkages.





Reserve for Figure 3-6



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4.0 CONSERVATION MANAGEMENT GOALS AND OBJECTIVES

4.1 Conservation Issues

The Crestridge Ecological Reserve is a large island of habitat almost entirely surrounded by residential development. It is located at the eastern edge of urban development between conserved MSCP lands to the north of I-8 and conserved MSCP lands to the south of I-8 and may function as a habitat linkage between these lands and conserved open space to the east (Section 3.4). Thus, the primary challenge for management will be to maintain the current biodiversity of the reserve by containing edge effects from surrounding development and ensuring that the land remains as a viable habitat linkage.

Table 4-1 identifies the primary threats to habitats and sensitive species at Crestridge and the impacts that are expected to result from these threats. The most significant threats currently are caused by unauthorized offroad vehicles, resulting in trampling of habitat and soils, increased erosion, habitat loss, alteration of hydrology, air and water pollution, and roadkill. Over the long term, an altered fire regime, either through increased fire frequency or fire suppression, may reduce seral stages of vegetation communities, reduce species richness and biodiversity, and reduce the numbers and species of native pollinators. In addition, adjacent residences serve as point sources for exotic species introductions and are the source of irrigation runoff and altered hydrology. Roads and human activity in the area may ultimately result in displacement of corridors for wildlife.

This management plan is designed to address these threats and minimize potential impacts. Implementation of the management plan should maintain or enhance ecological *functions* of individual areas of the reserve and the reserve as a whole. While some of the biological goals are ecosystem or habitat-based, many of the objectives are specific to rare and endangered species to satisfy MSCP species-specific conditions. The MSCP covered species, as well as some other sensitive species onsite, are recommended for long-term monitoring to evaluate the effectiveness of management actions.

The following goals and objectives are intended to guide all management decisions on the Crestridge Ecological Reserve. They are derived from Table 3-5 of the MSCP Plan (Ogden 1998) as well as the Biological Goals, Standards, and Guidelines in the MSCP Resource Document (Ogden 1995). These goals and objectives are divided into Biological, Public Use, and Facility Maintenance Elements and form the basis for the management and monitoring actions described in Section 5. A biological goal is the statement of intended long-range results of management based on the feasibility of maintaining, enhancing, or restoring species populations and habitat. A public use goal is the statement of the desired type and level of public use compatible with the biological goals. Objectives are statements of the intended results of management actions that promote the



biological, public use, or facility goals on the reserve. The management actions (Section 5) are intended to implement the objectives (CDFG 2001).

Table 4-1
Analysis of Threats

Threats	Impacts
1. Public Use <ul style="list-style-type: none"> • Offroad vehicles* • Noise from offroad vehicles* • Equestrian use • Hiking • Mountain biking* • Rock climbing 	<ul style="list-style-type: none"> • Habitat fragmentation (e.g., illegal trails)* • Habitat loss* • Trampling of habitat and soils* • Increased erosion and pollution* • Roadkill (e.g., lizards in trails)* • Reduction in disturbance-sensitive species • Exotic species dispersal • Littering and trash dumping • Reduction in native species richness and diversity • Reduction in numbers and species richness of native pollinators
2. Urban Edge <ul style="list-style-type: none"> • Fuelbreaks* • Landscaping* • Irrigation runoff • Noise • Lighting • Pets and children • Herbicides and pesticides • Dumping 	<ul style="list-style-type: none"> • Altered soil moisture • Increased erosion • Point sources for exotic species introductions* • Reduction in disturbance-sensitive species • Increased exotic ant species and altered predator prey relationships • Littering and trash dumping* • Reduction in native species richness and biodiversity • Reduction in numbers and species richness of native pollinators
3. Habitat Fragmentation <ul style="list-style-type: none"> • Roads (onsite and offsite)* • Housing 	<ul style="list-style-type: none"> • Loss of habitat* • Displacement of wildlife corridors* • Reduction in area-dependent species • Altered predator prey relationships
4. Altered Fire Regime <ul style="list-style-type: none"> • Fire suppression* • Increased fire frequency 	<ul style="list-style-type: none"> • Reduced seral stage associates* • Reduction in native species richness and diversity, habitat conversion • Reduction in numbers and species richness of native pollinators

*Most significant threats and impacts on Crestridge Ecological Reserve.

4.2 Biological Elements

Goal 1: Maintain populations of MSCP covered species and other sensitive resources.

Objective 1—Protect and maintain populations of MSCP-covered plants and other sensitive plants (Lakeside ceanothus, San Diego thornmint, Cleveland's goldenstar, Engelmann oak).

The primary threats to the conservation of sensitive plant species on Crestridge are invasive weed species and trampling and erosion caused by offroad vehicles. An altered fire regime, either through fire suppression or increased fire frequency, is a potential threat without appropriate fire management. For example, prescribed fire could be used to manage for a diverse age structure of Lakeside ceanothus to ensure reproduction and persistence of this species. In addition, under a regime of fire suppression, coastal sage scrub and chaparral habitats will become dense and closed and may reduce habitat for species such as thornmint.

Eliminating these threats will allow plant populations to complete their life cycles and will facilitate the persistence of these populations in the reserve. Monitoring the abundance of nonnative plants, followed by appropriate control methods, will be required, especially in areas where populations of MSCP-covered plant species occur. In addition to eliminating threats, San Diego thornmint and Lakeside ceanothus populations should be augmented through seed collection and restoration to ensure that the genetic diversity of the onsite populations is not lost as a result of fire or other catastrophic events.

Objective 2—Protect and maintain habitat (including host plants and nectar plants) for the Hermes copper, Harbison's dun skipper, and Quino checkerspot butterfly and pollinators of covered plant species.

Many of the stressors that affect sensitive plants are also a threat to rare butterflies and other pollinators, particularly habitat loss (e.g., due to offroad vehicles) and an altered fire regime (i.e., either too frequent fires or fire suppression). It is unclear whether nonnative annual plant species may reduce habitat quality for the Quino checkerspot, e.g., by crowding out areas of *Plantago erecta*. Because the majority of the reserve burned in 2003, there may be little suitable habitat remaining onsite for Hermes copper, which requires mature redberry (*Rhamnus crocea*) bushes as its host plant.

Objective 3—Protect and maintain coastal sage scrub breeding habitat for the California gnatcatcher and other sage scrub species (e.g., San Diego horned lizard, orange-throated whiptail, rufous-crowned sparrow).

All coastal sage scrub habitat on Crestridge was burned in 2003. Before that, the scrub on most of the property, except for the far westernmost end, was mature and dense and did not support habitat suitable for California gnatcatchers. The western end of the reserve, formerly owned by the County Water Authority, supported gnatcatchers in the 1990s (PSBS 1994). As gnatcatchers have been reported to use sage scrub that is at least 3-4 years old for nesting (Atwood et al. 2002,



Minnich and Dezzani 1998, O'Connell and Erickson 1998), the 2003 fires may have created more suitable nesting conditions on Crestridge. The western patches of coastal sage scrub on the reserve are part of the Lakeside archipelago, a regional linkage comprised of patches of coastal sage scrub north and south of I-8. Maintenance of this coastal sage scrub and that in the interior of the reserve will help to facilitate multi-generational dispersal of gnatcatchers and rufous-crowned sparrows between the El Capitan coastal sage scrub north of Crestridge and scrub in the MSCP area south of Crestridge. Moreover, eliminating noise and habitat loss from offroad vehicles will further enhance habitat for sage scrub species.

Objective 4—Protect and maintain nesting and foraging habitat for MSCP-covered raptors and other raptor species.

The oak woodlands on the northern and southern boundaries of the reserve and in Rios Canyon provide good nesting habitat for Cooper's hawks, red-shouldered hawks, black-shouldered kites, and other raptors. Nest disturbance during the breeding season is the primary threat to raptors at Crestridge. Seasonal closure of trails in areas with active raptor nests would enhance raptor nesting success in the area.

Goal 2: Enhance and restore degraded habitats in the reserve.

Objective 1—Implement habitat enhancement and restoration projects.

Habitat degradation as a result of human activity and invasion by exotic species is a threat to habitat value for a variety of plant and animal species. Various habitat enhancement and restoration projects could be conducted on the reserve. As appropriate, develop specific enhancement or restoration plans for review and approval by the wildlife agencies. The wet meadow near the former racetrack area is a good candidate for enhancement once the offroad vehicle use is eliminated. There may also be opportunity to enhance habitat for San Diego thornmint by reseeding areas where exotic plants have been removed. Recently burned areas could be reseeded with host and nectar plants for Quino checkerspot, if Crestridge is selected as a potential reintroduction site for the species.

Objective 2—Abandon unnecessary trails and roads through the reserve to allow rehabilitation.

Trails and other areas disturbed by offroad vehicle activity may promote increased runoff and soil erosion and may provide substrate for establishment of exotic species. These areas also provide access to otherwise undisturbed areas. Closing these areas to further human disturbance, along with actions to facilitate restoration, would improve the quality of the habitat for wildlife.

Objective 3—Investigate the use of fire to enhance the quality of degraded vegetation communities, maintain a diverse age structure, and maintain and restore biotic and abiotic processes.

Although the 2003 Cedar fire burned the majority of the reserve, some areas did not burn (e.g., the Lakeside ceanothus above the racetrack). Fire suppression for extended periods can lead to inappropriate age structure of the vegetation community. The fire management strategy at



Crestridge should include reducing unplanned fire events through the use of maintained fire breaks, especially in areas where the fire frequency has been greatest. In the future, strategic prescribed burns could be used in specific areas as part of a restoration process in currently degraded sage scrub and grassland habitats.

Objective 4—Monitor the presence and extent of exotic species in the reserve and responses to management actions.

Locations of exotic plants and animals should be checked at least annually to evaluate population size and potential threats to nearby resources and to gauge the effectiveness of management actions. Populations should be prioritized for management actions to maximize cost-effectiveness.

Goal 3: Document the status of MSCP-covered species and other sensitive resources in the reserve to help prioritize management actions and to assess the effectiveness of management actions.

Objective 1—Monitor the populations of MSCP-covered species and other sensitive species in the reserve and responses to management actions.

Locations of MSCP-covered species and other sensitive resources should be checked at least annually to document their continued conservation, track population status, identify potential threats, develop management recommendations, and gauge the effectiveness of management actions.

Goal 4: Monitor habitats and ecological processes to aid in identifying threats to ecosystem integrity or health and to guide adaptive management of the reserve.

Objective 1—Monitor habitats to evaluate the physical condition of the habitat and any changes resulting from management measures and other factors.

Reserve managers should be familiar with the structure and age classes of vegetation communities, and look for signs of senescence, disease, and pest infestations and lack of recruitment or reproduction. Managers should also evaluate recovery of the habitats after fire, fuel management, exotic plant control, and recreational uses.

Objective 2—Monitor key ecological processes to provide an appropriate context for interpreting biological changes and responses to management measures.

The extent, intensity, and periodicity of burns affects the structure and age classes of vegetation communities and can provide some insights into the need for fire management. A fire management plan should identify fire management units to facilitate maintenance of public safety and ecological function. Similarly, temperature and rainfall amounts and timing often have dramatic effects on species reproduction. The reserve manager should use these data to interpret trends in species' population status. Stream hydrology data may also be used to evaluate the relationship between vegetation structure, species use, and flow patterns.



Objective 3—Evaluate offsite areas as connection routes to Crestridge for various taxa, and ensure there are no constraints to animal movement within the reserve.

The Crestridge Ecological Reserve is almost a habitat island that is nearly surrounded by roads and residential development. To maintain the integrity of the reserve, it is critical that it is connected to other habitat areas and that adjacent or new development does not interfere with wildlife movement in the area of the reserve.

Objective 4—Monitor the indirect effects of adjacent land uses.

Habitats on the edges of the reserve are susceptible to indirect impacts from nonnative landscaping that may invade the reserve, as well as impacts from nonnative animal species such as house rats, house mice, and Argentine ants, and domestic pets that may prey on or compete with native species. The reserve edge also may be impacted by lights directed into the reserve or by persistent loud noises. The boundary of the reserve should be checked periodically for intrusive impacts and to identify and implement potential remedial actions. Fuel breaks may also serve as a substrate for invasive plants and should be monitored for new invasions.

Objective 5—Monitor urban runoff within the reserve.

Irrigation runoff from residential areas bordering the reserve may result in increased erosion and deposition of new substrates for colonization by weedy species (Hobbs and Atkins 1988, Saunders et al. 1991). Increased surface flows may also facilitate the invasion of exotic species, such as Argentine ants (Holway 1998). Increased surface moisture or underground seepage that results in increased soil moisture may also promote exotic plant establishment, facilitate invasion by Argentine ants, alter seed bank characteristics, and modify habitat for ground-dwelling fauna (Alberts et al. 1993, Amor and Stevens 1976, McIntyre and Lavorel 1994, Saunders et al. 1991, Suarez et al. 1998). Depending on the timing of any increased water supply, urban runoff may result in conditions that promote nonnative, exotic plant species (e.g., tamarisk) at the expense of native riparian tree species and may promote downcutting of streambeds. Runoff may also include pesticides that may be harmful to riparian resources.

Goal 5: Implement research projects to address management issues.

Objective 1—Facilitate the implementation of focused research projects.

Effective management will ultimately be hindered by a lack of understanding of the basic biology of the resources and their responses to stressors and potential management actions. Implement focused monitoring and research projects that provide management-related information. Encourage and facilitate university-level research to address fundamental biological questions and identified unknowns specific to management of Crestridge Ecological Reserve.



Goal 6: Develop and coordinate a centralized data management system.

Objective 1—Develop a centralized data management system for use in reserve management efforts.

Effective management of the reserve will require a data management system that allows managers to store and query information collected over time. The data management system must support both spatial data and numerical data collected as part of management and monitoring efforts. This data management system should be used to track the responses of resources to management actions, provide summary reports to the wildlife agencies, and evaluate trends in population status of various species. Where possible, the data management system will be closely aligned with that used by the wildlife agencies.

Objective 2—Coordinate land management and resource allocations with other conserved areas.

Effective management of the Crestridge Ecological Reserve will require an understanding of resource status and management needs in all parts of the MSCP preserve system. The centralized data management system must allow comparison of resource status and management activities among various portions of the MSCP preserve.

4.3 Public Use Elements

Goal 1: Ensure appropriate public use consistent with biological objectives of the ecological reserve.

Objective 1—Identify appropriate passive uses of the reserve, and prohibit inappropriate recreational uses.

Encourage uses that take advantage of the natural and scenic beauty of the reserve and that facilitate enjoyment of a wilderness experience. The California Fish and Game Commission identifies appropriate uses and restrictions for Ecological Reserves (California Code of Regulations (CCR) Title 14, Chapter 11, Section 630). These include the following:

- Protection of resources.
- No commercial fishing, except by permit; limited to angling from shore.
- No collecting, except by permit.
- No motor vehicles, except on designated access roads and parking areas.
- No swimming or wading, except by permit.
- No boating, except by permit.
- Hiking and riding on designated trails only.
- No firearms, except by law enforcement personnel.
- Ejection for violation of regulations.

- Public entry can be restricted at the discretion of the CDFG.
- No release or introduction of species, unless authorized by the commission.
- No feeding of wildlife.
- No pesticides, unless authorized by the commission.
- No littering, including plastic or synthetic projectiles.
- No grazing.
- No falconry.
- No aircraft, except by permit.
- No pets, unless retained on a leash of less than 10 ft (3 m).
- No fireworks or fires, except for management purposes.
- No camping.
- No vandalism.
- No paint ball or other projectile devices.

Goal 2: Enhance public appreciation of the value of the Crestridge reserve and conservation issues in general, consistent with biological objectives of the ecological reserve.

Objective 1—Provide clearly marked public access points to the reserve and prohibit access at other locations.

Public access should be managed such that biological functions can be maintained throughout the reserve and public use impacts can be contained and monitored.

Objective 2—Provide clearly identified trails for public use and safety.

Identifying the locations of allowable public use will assist in maintaining quality habitat for wildlife. Hikers, bicycles, and horses inadvertently disperse weed seeds, and areas of bare dirt provide substrate for establishment of exotic species. By defining travel routes, exotic species dispersal and human-wildlife interactions will be minimized.

Objective 3—Identify cultural resources in the reserve and incorporate these resources into management objectives for biological resources.

Cultural resources will be protected on site. Periodic site visits will be conducted to ensure no damage is occurring to these sites. Continued work will emphasize research and protection of the cultural history of the reserve. Cultural resources may provide educational value, if consistent with their protection.



Goal 3: Develop a public outreach and education program.

Objective 1—Strengthen partnerships with other environmental and educational organizations to develop a public relations plan and public outreach and education program.

Identify public agencies, nonprofit organizations, and educational groups that could work together to develop regional and local programs for public education.

Objective 2—Encourage community involvement.

Educating and involving the local residents surrounding the reserve will enhance the public's appreciation of conservation goals while facilitating appropriate public uses.

Objective 3—Develop an education curriculum and stewardship program for elementary, middle, high school, and college students.

Developing a sense of stewardship in young people through natural history education is critical to the success and persistence of the Crestridge Ecological Reserve and other MSCP preserves.

4.4 Facility Maintenance Elements

Goal 1: Maintain facilities on the reserve to ensure that biological resource values are protected and management activities are facilitated.

Objective 1—Maintain existing facilities and infrastructure on the reserve, and reduce public hazards.

The existing infrastructure of gates and roads serves to control public access and allow fire suppression response (Figure 2-5). Maintenance of gates, fences, and roads will allow these functions to continue. Abandoned structures previously on the reserve have already been removed to discourage use by trespassers and to enhance the aesthetic values of the reserve.

Objective 2—Determine where extra surveillance and new gates and fencing are needed to prevent vandalism and to encourage appropriate public use.

A survey of the reserve boundary will help illuminate areas of unauthorized public access for determining where new gates and fencing should be established. Signs at these locations will also help direct the public to authorized entrance points. Property owners at these locations can help enforce appropriate public uses and protect conservation values.



Goal 2: Establish facilities to maintain, enhance the appreciation of, and encourage research on the natural resources of the reserve.

Objective 1—Develop a facility to serve as both a field station and caretaker residence.

The existing house on Horned Lizard Bypass can be renovated to accommodate public educational activities as well as space for administration and research. This space could also be used as an educational laboratory to provide hands-on learning opportunities and a forum for community stewardship.

This house can also serve as a residence for a full-time caretaker to provide round-the-clock surveillance of the reserve and a resource for public emergencies.

Objective 2—Provide public gathering spaces and facilities, bulletins and maps, opportunities for community participation, and interpretive information.

Develop a plan for the Core Public Use Area that directs the public to interpretive and educational resources and that identifies hiking, biking, and equestrian activities on the reserve, as well as to resting areas and restroom facilities. A formal entrance with signs and trails maps, as well as enhanced use of the straw-bale kiosk will facilitate public learning and involvement.

Objective 3—Provide facilities to facilitate implementation of restoration projects on the reserve.

Enhance the greenhouse as necessary to grow plants for restoration projects and to facilitate participation by school children and the public.

Goal 3: Remove litter and trash that may attract nonnative animals and reduce the aesthetic values of the reserve.

Objective 1—Establish responsibilities for removing trash from the site and for regular garbage collection at specific locations.

The existing garbage and recycling bins at the Horsemill Road entrance have greatly diminished littering on the reserve. Additional locations in the Core Public Use Area for garbage and recycling cans, and a regular system for pickup, will further encourage public stewardship.

5.0 MANAGEMENT AND MONITORING RECOMMENDATIONS

Recommended management and monitoring actions to achieve the goals and objectives in Section 4.0 are listed below. These are summarized in Appendix H. Current activities and future priorities for management and monitoring are listed in Section 6.0. CDFG and EHC intend to implement these recommendations through a partnership agreement. It is envisioned that EHC and its partner, EDI will take the lead for implementation of the following actions.

5.1 Management

Goal 1: Maintain populations of MSCP covered species and other sensitive resources.

Exotic Plant Control

The following exotic plant species are of primary concern for control or eradication. Some locations were mapped during the year 2000 surveys (Figure 5-1). Other exotic plant species observed onsite, but not mapped, are included in Appendix C.1. Particularly, after the Cedar fire of 2003, African fountain grass (*Pennisetum setaceum*) has been observed coming in along some of the roads. The primary objective in exotic plant control at Crestridge should be to monitor and control the abundance of invasive plant species, particularly around populations of sensitive plants and in riparian areas, using mechanical or chemical methods or prescribed burns. Appendix C provides details of the biology, threats, and management options for selected exotic plant species.

Continued monitoring of exotic species populations, abundance, and locations will assist in determining which management options are most appropriate. CDFG and EHC will develop detailed measures for physical, biological, and chemical control; such measures are described further in *Invasive Plants of California's Wildlands* (Bossard et al. 2000). EHC will coordinate with the CDFG's Pesticide Investigations Unit in exotics removal.

1. **On an annual basis, map stands of exotic species and prioritize them for treatment.** See Appendix C.1 for a list of exotic species observed at Crestridge. Many of these are included on the California Exotic Pest Plant Council list as exotic pest plants of greatest ecological concern in California (CalEPPC 2008).
2. **Eradicate tamarisk (*Tamarix* sp.) from Rios Canyon and other drainages.** The current infestation on the reserve is small and occurs within primarily native habitat. For these reasons, either digging or pulling plants or cutting the stem(s) and applying herbicide will best accomplish tamarisk control on Crestridge. Re-treat any resprouts within 4 to 12 months of the initial treatment (Carpenter 1998). Large mechanized equipment that may disturb native habitat should not be used.



3. **Eradicate pampas grass (*Cortaderia selloana*) from the reserve.** During the 2000 surveys, pampas grass was noted in only one location in the eastern portion of the Crestridge reserve, adjacent to a trail. This small infestation consisted of only a few plants. This species also occurs offsite, where it has been planted as a landscaping ornamental in adjacent residential developments. Although the small stand of pampas grass at Crestridge does not currently pose a major threat to native vegetation or sensitive plant species, it has the potential to expand its distribution due to its seed dispersal mechanism, presence of a seed propagule source in the vicinity, and the network of roads, trails, and other bare soil areas on the reserve. Pampas grass has been effectively controlled through both physical and chemical methods (see Appendix C). Flowering stalks should be bagged prior to removal to prevent seed dispersal. The residential community surrounding the reserve should be educated about the issues with using this invasive species for landscaping because of the huge numbers of seeds that it disperses.
4. **Remove young eucalyptus (*Eucalyptus* sp.) trees from the drainages.** Large, mature eucalyptus trees are not recommended for removal at this time because they appear to provide perches for red-shouldered hawks and other raptors. However, evidence of recruitment from these trees should be monitored, and the young saplings or suckers should be removed. Eucalyptus trees can be removed through either physical or chemical methods or a combination of both (Appendix C). Burned eucalyptus trees that pose a danger in public use areas should be tagged for removal. As eucalyptus trees provide a good fuel source, they should be removed as time and budget allow.
5. **Eradicate African fountaingrass (*Pennisetum setaceum*) on the slopes above Rios Canyon and along roads within the reserve.** Small stands of African fountaingrass may be a threat to populations of sensitive plant species (e.g., San Diego thornmint, small-flowered morning-glory, Palmer's grappling hook). African fountaingrass also occurs offsite, with extensive stands observed on southwest-facing slopes above La Cresta Road and along La Cresta Boulevard. Hand removal would be an appropriate management tool for most stands of fountaingrass on Crestridge and would likely need to be used in conjunction with native plant revegetation to reduce subsequent colonization opportunities for the fountaingrass. Because of the potential for seed longevity in the soil and the offsite propagule sources in proximity to the reserve, long-term monitoring of the Crestridge reserve will be required to ensure that new infestations are controlled at an early stage. See Appendix C for a discussion of the large stand of fountaingrass above Flinn Springs County Park.
6. **Manage tocalote (*Centaurea melitensis*) at levels that do not threaten sensitive species and their habitat, especially on the south and west-facing slopes above Rios Canyon (Thornmint Hill) and along the fuelbreak at the bottom of the slope.** Tocalote is best controlled through monitoring and spot eradication of plants in critical areas prior to widespread infestations. The use of herbicides (e.g., RoundUp Pro) has been highly effective in these cases, especially along trails. Chemical control would be more efficient than mechanical control in this area, and there will usually be less resprouting using herbicide than with mechanical cutting. Where chemical control is not possible (e.g., using volunteers who are not trained in the safe use of herbicides), weed whips, brush cutters,



Reserve for Figure 5-1



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loppers, hoes, etc. can be used to cut the weed as close to the ground as possible. As some plants will resprout from the below-ground root and many of these plants have seeds that germinate over a long period of time, control efforts should be done on a weekly to every other week basis until they show signs of forming buds. During the blooming season, weekly visits are important to prevent any plants from setting seed.

Mowing is probably more appropriate along the base of the west-facing slope adjacent to Rios Elementary School. Plants should be cut below the lowest branches, and cutting should occur when the population has just started to bloom. If plants are mowed too early, regrowth, flowering, and seed production may occur.

7. **Manage purple falsebrome (*Brachypodium distachyon*) on the upper west and southwest-facing slopes above Rios Canyon at levels that do not threaten San Diego thornmint.** At this time, mowing along the base of the slope adjacent to Rios Elementary School and spot-treating with herbicide along the trail leading up to the thornmint population should be management priorities. Little information is available on control of purple falsebrome in wildland areas. Use of Fusillade, a grass-selective herbicide, should be tried (T. Smith pers. comm.), although this species has shown some resistance to herbicides in Mediterranean regions (Heap 2000). A fire management plan that reduces fire frequency in this area and allows for shrub regeneration may also be effective for controlling purple falsebrome. The spread of this exotic plant may be suppressing the population of thornmint and other native species.
8. **Remove individual horehound (*Marrubium vulgare*) plants and restore and manage habitat conditions to minimize the potential for new infestations.** Horehound was noted in only one location during the 2000 surveys: along an east-west oriented trail leading from the Padre Dam water tower to the western portion of the site. Its presence is indicative of localized, degraded conditions, and it appears to have spread since the 2003 Cedar fire. Horehound can be controlled through both mechanical and chemical methods (Appendix C).
9. **Remove individual plants of Natal grass (*Rhynchelytrum repens*) along the southeast property boundary to prevent the spread of this species further into the reserve.** Natal grass occurs on a flat rock outcrop adjacent to a northwest-oriented trail. Vegetative material and flowering stalks should be removed from the reserve. If plants are in bloom during the removal process, flowering stalks should be bagged prior to removal, as described for pampas grass.
10. **Remove star thistle (*Centaurea solstitialis*) and small or immature exotic tree species in the vicinity of the proposed nature center.** These include palm trees, pepper trees, and eucalyptus trees. While removal of star thistle should be a high priority, mature specimens of the exotic tree species are not a high priority for removal; rather, the goal should be to keep them from spreading.
11. **Control the exotic species in the annual grassland in the center of the reserve through a fire management and restoration program.** The 2003 Cedar fire and subsequent restoration efforts have begun to transform this area that was previously dominated by



nonnative annual grasses. Monitoring and control of these grasses must be continued as part of the restoration program.

12. **Remove *Emex* plants from along the north side of Cross Timbers Truck Trail (near La Cresta Heights Road) and the cleared area bordering homes southeast of Rios Elementary School.**

Exotic Animal Control

13. **Manage borer beetles infesting Engelmann oaks.** Tag Engelmann oaks that are infested with borer beetles, and monitor the beetles and health of trees. Serious infestation can damage or kill the trees. Work with the state Food and Agriculture Department and the U.S. Department of Agriculture to determine possible methods of biological control for the beetles. Some of the oaks are likely more susceptible to the beetles after the 2003 fire.
14. **Note locations of Argentine ants and fire ants with respect to position in the reserve and adjacent land uses.** The Argentine ant and fire ant are exotic pests in Southern California and have been shown to have detrimental effects on terrestrial communities. The exotic ants tend to follow drainages or areas of moist soils. Fire ants have been observed on Crestridge near the Rios Elementary School and in the oak grove near the center of the reserve. The ants have the potential to invade the reserve from adjacent urban areas. By mapping locations of Argentine ants and fire ants, evaluate whether runoff into the preserve from adjacent lands or other adjacent land uses may be contributing to exotic ant invasions. See monitoring recommendations.
15. **Control pets in the reserve.** Dogs and cats and other domesticated animals living adjacent to the reserve are a potential predation threat to native species. Educate homeowners about keeping pets indoors at night and keeping pet food indoors or in a secured location that does not attract animals from the reserve. When walking dogs in the reserve, owners must keep their dogs on a leash of less than 10 ft, stay on the trails, and pick up after them (CDFG CCR Title 14, Ch.11.630).
16. **Control bullfrogs, cowbirds, starlings, and other nonnative species that compete with or consume native species in the reserve.** Methods may include capture and removal, poison, or other direct lethal means with appropriate permits or approvals.
17. **Restrict the use of pesticides in the reserve.** Pesticides may be useful in controlling fire ants and exotic rodents, if they are found in the reserve. EHC will coordinate with CDFG's Pesticide Investigations Unit.

Fire Management

The community of Crest is particularly vulnerable to wildfire, with miles of perimeter interface between the natural lands on the reserve and residences. A Framework Fire Management Plan is included as Appendix D. This document establishes a framework for working with CalFire on wildland fire suppression, pre-fire treatment and vegetation management, and post-fire rehabilitation at Crestridge.



The primary goals of fire management at Crestridge are to (1) ensure the safety of the surrounding residential community, which shares miles of interface along the perimeter of the reserve, and (2) prevent repeated fires at intervals that are more frequent than a natural fire regime. CalFire strives to suppress all fires that threaten public safety. Pre-fire treatment of the land, in the form of fire breaks and fuel management, as well as enforcement of allowable land uses will help to prevent catastrophic wildland fires at Crestridge. Although fire is an integral part of the ecosystem processes on Crestridge, overly frequent fires may result in shifts in native species composition, a loss of certain native species, or habitat type conversions that favor nonnative species.

18. The framework fire management plan for Crestridge addresses the following:

- Prevention and suppression tactics, including road repair and maintenance and clearing of a defensible space around structures
- Post-fire rehabilitation activities
- Sensitive resource areas to be avoided (both biological and cultural resources)
- Fire management objectives and general guidelines
- Staging areas for trucks and equipment

19. Inform landowners about maintaining their own defensible space. Landowners adjacent to the reserve are responsible for having an appropriate defensible space around their homes and other structures and a noncombustible roof, per the Bates Bill (Assembly Bill No. 337), which was approved in September 1992. The East County Fire Prevention/Protection District, Lakeside Fire District and El Cajon Fire District all have responsibilities for communicating this information to landowners who surround the Reserve. EHC and EDI staff will evaluate areas along the boundary where vegetation management is needed based on aerial maps and site visits. Vegetation management will consist of:

- Work with CalFire to establish a process for use of clearing crews available through McCain Camp.
- Target removal/thinning on prioritized segments of the reserve's perimeter to remove all nonnative plants within 100 ft of the property line and to thin 50% of the native cover within 100 ft of the nearest occupied structure. Removal will be by hand and herbicide application.
- Present materials to neighbors about invasive plants and their effect on native habitat as well as fire safety.

20. Improve the following internal dirt roads and access points, in order of priority, to facilitate future brush management activities on the reserve as well as wildfire management and emergency response. In many cases, the existing internal dirt roads are degraded to the point of impassibility for fire management access. Improvements include grading, where necessary, vegetation removal, recontouring for erosion control, stormwater management, and culvert rehabilitation (see Figure 5-2).

- Rios Canyon Road to Montaña Serena
- WalMart access and Valley View Truck Trail to Horsemill Road

- Horsemill Road to Horned Lizard Bypass (passes the former warden house)
 - Horned Lizard Bypass to Rios Canyon Road
 - Lakeview Road to Valley View Truck Trail
21. **Designate a Crestridge representative to the Crest Fire Safe Council.** The Facilitator for the Crest Fire Disaster Recovery Center is located in El Cajon, and can be reached at 619-328-0900 or crestrecovery@yahoo.com.

Erosion Control

Offroad vehicle traffic and, to a lesser extent, equestrian activities, have resulted in excessive erosion and formation of gullies along trails and in habitat associated with and below eroded trails. Runoff from offsite land uses can contribute to erosion problems, and badly eroded trails can be a public safety issue. Erosion may also expose or deposit new substrates for weed colonization (Hobbs and Atkins 1988).

22. **Restrict or prohibit equestrian and mountain bike activity** and non-essential management and monitoring activities *in areas where erosion is a problem*. Restrict equestrian and mountain bike activity to roads that are maintained by CalFire. Close roads to equestrians and mountain bikes for 3 days following rainfall events greater than 1 inch.
23. **Correct erosion problems adjacent to sensitive plant populations.** In the eastern part of the site, erosion may be impacting Ramona horkelia. Also, Las Posas (gabbro-derived) soils, which support San Diego thornmint and Palmer's grapplinghook on Thornmint Hill, are characterized by high to very high erosion potential. Identify erosion problems that have the potential to impact these populations, and install reinforcements to slow erosion.
24. **Install checkdams in eroded drainages to catch debris and slow erosion, and install water bars across dirt roads to control erosion.** Identify locations. In some areas, a Streambed Alteration Agreement from CDFG may be required for this action.
25. **Control water sources and urban runoff within the reserve.** The only feasible means of controlling residential runoff may be an educational program that informs residents of the



Reserve for Figure 5-2



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detrimental effects of certain types of landscaping plants and watering regimes on adjacent biological resources and offers literature on alternatives such as xerophytic plantings and drip irrigation. Additional recommendations may be appropriate for new developments, such as requiring the use of French drains to minimize seepage on slopes, diverting runoff away from the reserve, and restricting irrigation and certain types of plantings adjacent to the reserve. Meet with residents to explain the impacts of urban runoff in the reserve. Especially investigate horse manure runoff into the drainage along Horsemill Road. Monitor sources of water adjacent to the reserve. However, ensure that water flow is not impeded upstream from San Diego sedge (*Carex spissa*) locations. San Diego sedge is the host plant for the Harbison's dun skipper.

Seed Collection and Storage

26. **Develop a seed collection program for Lakeside ceanothus and San Diego thornmint to ensure that the genetic diversity of the onsite populations is not lost as a result of fire, habitat degradation, or other catastrophic events.** Collect seed in conjunction with other management measures to maintain or improve habitat quality and in a manner that does not impact existing populations. Collected seed should represent the entire Crestridge population of the species. For Lakeside ceanothus, focus initially on seed collection within the area that has burned most recently (2003) and that is most susceptible to adverse impacts from fire. Seed collection for Ramona horkelia is currently a lower priority than for Lakeside ceanothus and San Diego thornmint. A take authorization will be necessary for the collection of seeds of San Diego thornmint. See Appendix E for protocols for seed collection, storage, and propagation (from McMillan and CBI 2002). A Rare, Threatened, and Endangered Collecting permit must be obtained from CDFG.
27. **Store collected seed in a recognized seed collection facility.** For Lakeside ceanothus, seed from recently burned areas should be stored separately from seed from areas with the longer fire-free interval (67 years). Seed should be available for post-burn seeding, enhancement, or reintroduction efforts, as determined necessary. Seed should not be stored for longer than 3 years. See Appendix E.
28. **Collect soil samples that may harbor seeds of San Diego thornmint.** Take a number of soil samples from the core thornmint area, and identify the seed bank present, if possible, especially for thornmint and Palmer's grappling-hook seed. These soil samples could be planted, watered, and grown to see what germinates. This approach, recommended by Mike Kelly of Kelly & Associates, could help determine whether thornmint seed is still present in the seed bank. Germinating and growing the samples could show what plants predominate and contribute to understanding competitive interactions. A Rare, Threatened, and Endangered Collecting permit must be obtained from CDFG.

5.2 Habitat Enhancement and Restoration

Goal 2: Enhance and restore degraded habitats in the reserve.

29. **Restore the wet meadow near the former racetrack.** The former racetrack area on the east end of the reserve currently supports wetland species but has been degraded by offroad vehicle use that has altered the topography and likely promoted invasion of the wetland habitat by nonnative species. Recontour this area to remove offroad vehicle ruts and *jumps*, and ensure that water drains to the north. Native wetland species are already present in this area, so revegetation (i.e., introduction of native plant materials) may not be necessary. However, some weed control is necessary to reduce the cover of nonnative wetland species. Avoid genetic contamination by prohibiting the introduction of cultivars or native species from different geographic regions. Erect temporary signs to indicate habitat restoration.

Recontour other areas that contain offroad vehicle ruts and *jumps*, specifically at two areas on the west end of the reserve, off of Cross Timbers Trail. Engelmann and live oak trees should be protected during the recontouring. Enforcement action should continue to be taken to preclude the construction of *jumps*, destruction of habitat, and illegal use of offroad vehicles.

30. **Enhance the oak grove at the Crestridge entrance (between Horsemill Road and Lakeview Lane).** This approximately 10-acre site is dominated by coast live oaks and Engelmann oaks. Several oaks in this area have died or lost very large limbs in the last few years. A San Diego County plant pathologist examined trees in February 2008 and determined that no disease is present. However, years of drought and stress from the Cedar Fire have made them susceptible to bark beetles, which seem to be primarily responsible for the losses. There is no known control for the beetles, but healthy trees often survive infestation. One major goal will be to help the trees recover from decades of soil compaction which impedes their root systems, limits their access to water and nutrients, and interferes with their ability to fight off beetle infestations. The oak grove could be enhanced by taking the following steps:

- Rip the soil in the areas of old foundations to address soil compaction and removal of nonnative plants.
- Remove nonnative species in the oak grove area, including Vinca, Indian fig cactus, and Mexican bird-of-paradise. Also, remove St. Augustine grass along the creek, downslope and north of the oak grove.
- Close off roads underneath the oaks to prevent soil compaction and damage to tree roots, and remove relic blacktop. Place signs that redirect activity and explain the purpose of limiting access.
- Allow the duff to remain in the oak grove, and prevent recreational users from raking away the duff. Apply mulch (straw, recycled cardboard, and purchased mulch) to speed the natural decompaction process.
- Allow dead trunks and branches of dead tree material to remain standing or on the



- ground as habitat.
- Replant bare areas where horses have crossed the creek. Replant these areas with native species, such as meadow rue (*Thalictrum polycarpum*), California fuchsia (*Epilobium canum*), and sticky monkeyflower (*Mimulus aurantiacus*). Remove nonnative plants by hand.
 - Map Engelmann oak locations for future monitoring.
 - If an active oak regeneration program is deemed necessary, this would include acorn collection and seedling production for outplanting, soil preparation (e.g., augering planting holes, adding fertilizer), predator control (including protective devices for both vegetative growth and roots of seedlings), weed control, and reestablishment of a native understory (McCreary 1990; Pavlik et al. 1991).
 - Create and install interpretive signage that explains oak ecology and the restoration and monitoring process.
31. **Continue restoration activities for the annual grassland in the center of the reserve.** The 2003 Cedar fire cleared this area of annual grasses (though not the seed bank) and allowed EDI and EHC staff to conduct soil testing followed by active seeding and plantings of native grasses and forbs in the central, flatter area, with a transition to coastal sage scrub and chaparral on the surrounding slopes. This approximately 10-acre area within the Core Public Use Area will continue to require management to control the mustard, erodium, and annual grasses and prevent them from outcompeting the new plantings. Because the area to be restored is one of the most heavily used, it presents excellent opportunities to offer interpretive information to students and recreational users.
32. **Restore the ecological values that have been damaged by neighborhood trespassing, creation of unnecessary trails, and degradation of reserve lands.**
33. **Maintain a small nursery of native plants.** The shade house near the Horsemill Road entrance will continue to be used for native plant propagation for onsite restoration programs.

5.3 Monitoring

Goal 3: Document the status of MSCP covered species and other sensitive resources in the reserve to help prioritize management actions and to assess the effectiveness of management actions.

Sensitive Species Monitoring

The MSCP Plan (Ogden 1998) and Biological Monitoring Plan (Ogden 1996) require monitoring of the habitats and species conserved in the MSCP. The wildlife agencies are in the process of revising these plans, and the monitoring at Crestridge will be consistent with the final plans. The following guidelines will serve as a baseline for monitoring at Crestridge; these may be added to with adoption of the revised regional plans. Table 5-1 summarizes the biological monitoring



requirements for the Crestridge Ecological Reserve. Figure 5-3 shows locations of monitoring efforts already begun.

Table 5-1
Priority Species and Resources Recommended for
Long-term Monitoring and Management

Scientific Name	Common Name	Annual Monitoring
Plants		
<i>Artemisia palmeri</i>	San Diego sagewort	Presence/absence
<i>Harpagonella palmeri</i>	Palmer's grappling hook	Presence/absence, pollinators
<i>Quercus engelmannii</i>	Engelmann oak	Recruitment, insect host and infestations (borer beetles, gall wasps)
<i>Acanthomintha ilicifolia</i> Federal/State Endangered	San Diego thornmint	Population trends, seed collection, weed control, pollinators
<i>Ceanothus cyaneus</i>	Lakeside ceanothus	Population trends, age structure, seed collection, pollinators
<i>Horkelia truncata</i>	Ramona horkelia	Presence/absence, seed collection, pollinators
<i>Muilla clevelandii</i>	Cleveland's golden star	Population trends, reproductive strategies, pollinators
Animals		
<i>Lycaena hermes</i>	Hermes copper butterfly	Host and nectar plants, patch use, and population trends
<i>Euphyes vestris harbisoni</i>	Harbison's dun skipper	Host and nectar plants, patch use, and population trends
<i>Euphydryas editha quino</i> Federal Endangered	Quino checkerspot butterfly	Habitat potential
<i>Elanus leucurus</i>	Black-shouldered kite	Presence/absence relative to habitat structure and area of reserve
<i>Accipiter cooperi</i>	Cooper's hawk	Nesting location relative to habitat structure and area of reserve
<i>Aquila chrysaetos</i> Federal Protected	Golden eagle	Foraging locations relative to habitat structure and area of reserve
<i>Poliioptila californica californica</i> Federal Threatened	California gnatcatcher	Banding and dispersal studies, population trends and location relative to fire, habitat structure, and area of reserve
<i>Aimophila ruficeps</i>	Rufous-crowned sparrow	Presence/absence and location relative to habitat structure/area of reserve
<i>Amphispiza belli belli</i>	Bell's sage sparrow	Presence/absence, location relative to habitat structure/area of reserve



Scientific Name	Common Name	Annual Monitoring
<i>Phrynosoma coronatum blainvillei</i>	San Diego horned lizard	Presence/absence, location relative to habitat structure and area of reserve
<i>Cnemidophorus hyperythrus beldingi</i>	Orange-throated whiptail	Presence/absence, location relative to habitat structure and area of reserve
<i>Thamnophis couchi hammondi</i>	Two-striped garter snake	Presence/absence, location relative to habitat structure and area of reserve
<i>Crotalus ruber ruber</i>	Red diamond rattlesnake	Presence/absence, location relative to habitat structure and area of reserve
	Large and medium-sized mammals	Tracking -- access to the reserve
Vegetation Communities		
Native grassland		Location, extent, and weed control
Coastal sage scrub and chaparral		Age structure and density for fuel modification or prescribed burning
Oak woodlands		Recruitment
Wet meadow		Restoration, weed control

Monitoring will include presence/absence surveys, estimates of relative abundance, assessments of habitat quality and habitat use, and mapping of species distributions to determine population trends and identify threats, using the data forms in Appendix F. In addition, data should be submitted to the California Natural Diversity Data Base and the CDFG BIOS database, as appropriate.

Monitoring should focus initially on those biological and ecological factors that appear to be most important to species persistence and that may be influenced by management measures. Demographic monitoring of some species may be warranted if populations indicate a decline. Monitoring results should be evaluated in conjunction with climate and fire history data, as appropriate. Monitoring of federally and state listed species will require the appropriate permits and memoranda of understanding.

34. **Annually conduct presence/absence surveys for San Diego sagewort along drainages, and map locations (July - September).** Add to database in Figure 3-2.
35. **Annually conduct presence/absence surveys for Palmer's grappling hook at Thornmint Hill (March - April).** Note insect pollinators when monitoring. Note the abundance of Palmer's grappling hook relative to the San Diego thornmint population on Thornmint Hill, as the grappling hook may be outcompeting the thornmint in this area. Add to database in Figure 3-2.
36. **Annually survey Engelmann oaks for insect pest infestations and evidence of oak seedling recruitment.** Map locations of individual Engelmann oaks.



37. **Annually monitor the San Diego thornmint population at Thornmint Hill (April - June).** Estimate population density or relative abundance. Note insect pollinators when monitoring. Review and map the population boundaries relative to previous years. Note the site conditions, and identify potential threats or stressors (see Appendix F.2). Add to database in Figure 3-2.
38. **Annually monitor the Lakeside ceanothus population on Ceanothus Slope (April - June).** Review population boundaries relative to previous years, and note age structure. Note insect pollinators when monitoring. Note the site conditions, and identify potential threats. Add to database in Figure 3-2.
39. **Annually conduct presence/absence surveys for Ramona horkelia in the eastern part of the reserve (May - June).** Note insect pollinators. Map site locations, note site conditions, and identify potential threats. Add to database in Figure 3-2.
40. **Re-survey selected areas for San Diego goldenstar (May).** San Diego goldenstar occurs in clay soils just beyond the easternmost Crestridge property boundary, where it was observed in relatively low numbers during the 2000 survey period. This species is an herbaceous perennial from a corm. In below-average rainfall years, many corms fail to produce vegetative and/or flowering material. Re-survey areas of appropriate soils in the eastern part of the property during years of average or above-average rainfall to determine whether San Diego goldenstar occurs on the Crestridge reserve. Note the site conditions, and identify potential threats. Add to database in Figure 3-2.
41. **Annually census dwarf plantain (*Plantago erecta*), the host plant for the Quino checkerspot butterfly, for the butterfly in the northern section of the reserve near Rios Canyon Road and Rios Elementary School (Thornmint Hill).** The plantago population exceeds 1,000 plants situated within a flat open ridgetop, appropriate conditions for Quino adults and larvae. Monitor patches for post-diapause larvae of Quino checkerspot once per week from about the last week of January to the end of February. Monitor adjacent hilltops or ridgetops once per week for adults from March through mid-May. Add to database in Figure 3-2.
42. **Continue to map areas of suitable habitat for Quino checkerspot butterfly, especially in areas dominated by coastal sage scrub on the western end of the property (west and northwest of the water tank and west to the western reserve boundary).** While there is suitable habitat on Thornmint Hill, its proximity to I-8 makes this site susceptible to nitrogen deposition and thus problematic for Quino (USFWS 2003). Because of its geographic location between observed Quino checkerspot butterflies to the north and south, Crestridge may be a potential site for re-introducing this endangered butterfly.
43. **Annually monitor and census eggs and larvae of Hermes copper in May.** Monitor and census adults in June. Note inter-colony movement and relative abundance. Note and map host and nectar plants. See data form in Appendix F.3. Add to database in Figure 3-3.
44. **Annually monitor San Diego sedge for evidence of overwintering larvae of Harbison's dun skipper.** Monitor adult Harbison's dun skippers in June for potential nectary plants in .

Reserve for Figure 5-3



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the current known locations. Note inter-colony movement and relative abundance. See data form in Appendix F.3

45. **Annually note nesting and foraging areas for black-shouldered kites, Cooper's hawks, and golden eagles on the reserve, and record nest trees and locations on a map.** Record the period of time the birds are in the nest, and restrict access (within 100 m) during this period.
46. **Annually conduct presence/absence surveys for California gnatcatchers in coastal sage scrub (January-March).** Determine nesting and monitor productivity (April-July). Cooperate with the County of San Diego in banding and dispersal studies.
47. **Annually conduct bird point count surveys, using the forms and methods in Appendix F.5.**
48. **Monitor raptor populations at Crestridge, pending recommendations on protocols from the wildlife agencies.**
49. **Continue monitoring herpetofauna, consistent with recommendations from U.S. Geological Survey (USGS) biologists.** Monitor status and trends in the populations every 5 years, based on USGS efforts on the west slope of Thornmint Hill (see Appendix F.4).
50. **Note the locations, relative to habitat structure and area of the reserve, of other sensitive species.** As part of field efforts, map locations and note habitat use by rufous-crowned sparrow, Bell's sage sparrow, San Diego horned lizard, orange-throated whiptail, coastal rosy boa, two-striped garter snake, and red diamond rattlesnake.
51. **Annually map presence and extent of exotic plant species, and evaluate responses to management actions.** Monitoring will address trends in species presence and abundance and evaluate the effectiveness of management actions to control invasions and removal.
52. **Monitor Argentine ants, fire ants, and Africanized bees.** Monitoring will address whether and where these species are in the reserve and whether their presence correlates with identifiable edge effects and declines in covered species presence or relative abundance. Monitoring will track the distribution of exotic species over time and the effectiveness of specific management actions in controlling invasions.
53. **Monitor population levels and distribution of mule deer on the reserve.** Assess ratios of does, bucks, and fawns.

Goal 4: Monitor habitats and ecological process to aid in identifying threats to ecosystem integrity or health and to guide adaptive management of the reserve.

Habitats and Ecological Processes Monitoring

54. **Prepare an update of the vegetation map every 5 years, using current color-infrared aerial photography (i.e., 2010, 2015, etc.).** Use fire history maps to help in the update. The new vegetation map will be developed using the Sawyer-Keeler-Wolf classification.



Identify potential threats by vegetation polygon. For each polygon, note the general level of disturbance (e.g., percent composition of invasive species, percent of bare ground caused by trails or offroad vehicles, etc.), and responses to management actions. Incorporate these attribute data into the GIS for each vegetation polygon. Establish permanent photo points, and use photos to help document and record changes in communities. Potential photo vantage point locations include the water tower, warden's house, slope above the former racetrack, Rios Elementary School parking lot, Thornmint Hill, and locations along roads and trails in the reserve. Automated change detection analyses using digital imagery may be helpful in updating vegetation maps and monitoring habitat changes. The Geography Department at San Diego State University has developed a change detection data set by integrating multi-temporal (2000 and 2001) IKONOS image data obtained through a NASA grant and vegetation mapping data developed by CBI. The SDSU Geography Department would be a good partner for vegetation mapping and monitoring.

55. **Track fires (extent, intensity, and periodicity of burns) on the reserve using CDF fire history data, and monitor the structure and age classes of vegetation communities to assess recovery following fire.**
56. **Monitor habitats for signs of senescence, lack of recruitment or reproduction, disease, and pest infestations.**
57. **Annually monitor the indirect effects of adjacent land uses.** Note the presence of harmful lighting directed into the reserve, house mice and rats, Argentine ants, and domestic pets off-leash. Check the boundary periodically for intrusive impacts.
58. **Identify sources of urban runoff adjacent to the reserve, and propose containment options to landowners.** Check the reserve boundary periodically for inappropriate runoff. Especially check runoff of horse manure into the drainage along Horsemill Road.
59. **Monitor wildlife movement to and from the reserve.** The San Diego Tracking Team is monitoring transects within the reserve. We recommend that these transects be moved or that new transects be added to monitor movement:
 - across La Cresta Road, between Crestridge and South Crest
 - on the eastern boundary of Crestridge, between the reserve and Harbison Canyon

Identify the most frequently used movement corridors for large mammals, and remove any impediments. Install fences to direct movement and revegetate areas, if needed, to encourage use.

60. **Install a meteorological station on the reserve to monitor temperature, humidity, wind speed and direction, and rainfall.**
61. **Monitor stream flow and water quality in Rios Canyon Creek.** Install staff gages in Rios Canyon Creek, and work with the San Diego Stream Team to monitor water quality. Note presence/absence of water in other drainages onsite relative to time of year and rainfall amount.

Goal 5: Implement research projects to address management issues.

Research Needs

Scientific research is an important component of adaptive management. The Crestridge Ecological Reserve provides many opportunities for research projects that would inform management decisions. EHC and EDI should encourage partnerships with academic institutions to conduct applied research at Crestridge.

62. Research projects could include but are not limited to the following:

- Response of vegetation communities to changes in fire regimes.
- Recovery of vegetation communities after fire.
- Response of vegetation communities to restoration efforts.
- Response of target species populations to changes in fire regimes.
- MSCP covered species population dynamics.
- Effectiveness of measures to control nonnative plant species.
- Fire management techniques and strategies.
- Population genetics studies of species on the reserve (e.g., rare plants, butterflies).
- Effectiveness of measures to control exotic grasses through use of prescribed fire.
- Recovery of native species after prescribed fire.
- Why is the Hermes copper butterfly restricted to selected areas in San Diego County? What are the conditions at Crestridge that favor such a large population? For example, what are the soil conditions (chemical composition and mineral components) where the populations occur?
- Ecology of various pollinators important to endemic plant species.
- Oak regeneration studies.
- Use of Crestridge for California gnatcatcher dispersal, using marked birds.
- Large mammal (deer, mountain lion, bobcat, coyote, fox) use of Crestridge for dispersal, foraging, and reproduction.
- Use of Crestridge by bats—where do they roost/forage? Research the potential and value for roost creation.
- Research the value of establishing a coastal cactus scrub community to support coastal cactus wren recovery efforts.

5.4 Data Management and Reporting

Goal 6: Develop and coordinate a centralized data management system.

Data Management

63. **Develop a data management system to incorporate baseline data collected for the preparation of this management and monitoring plan.** The data management system should be compatible with the subregional database structure and should include the baseline GIS data for annual updating. The base map used for this management plan can serve as the base map for updating spatial biological data.
64. **Incorporate monitoring data collected to track the responses of resources to initial management actions.**
65. **Evaluate the suitability of the data management system for management purposes, and refine the system as necessary.**
66. **Maintain a record of habitat management and monitoring activities.** This record will assist in evaluating changes in resource status and responses to management actions. The record will also assist in updating the habitat management and monitoring plan, as needed. See Appendix F.6.

Reporting

67. **Annually review resource status for the next year's reserve management activities.** Develop management and monitoring priorities and a budget for a 2-5 year period. Review these priorities annually, and develop a list of proposed management actions, prioritized by resource. Prioritize funding for next year's reserve management activities, and prepare a budget for the prioritized management and monitoring actions for each year.
68. **Coordinate with managers in other parts of the MSCP preserve to compare monitoring and management results.** Review the resource status and management and monitoring results at other preserves in the MSCP for perspective in evaluating management and monitoring needs at Crestridge.
69. **Provide an annual summary of management and monitoring activities at Crestridge.** Prepare a summary of management and monitoring activities to provide to the County of San Diego Department of Planning and Land Use for use in their annual MSCP report, which is submitted to CDFG and USFWS (see Appendix F.6). Also post this summary on the Crestridge Ecological Reserve website.
70. **Submit a report to the wildlife agencies every 3 years.** Summarize management activities, management priorities, restoration activities, and the ability to meet resource management goals, based on current funding status, every 3 years for submittal to the wildlife agencies. The report should also describe necessary updates to the habitat management and monitoring plan.



6.0 PUBLIC USE RECOMMENDATIONS

6.1 Security

Goal 1: Ensure appropriate public use consistent with biological objectives of the ecological reserve.

1. **Develop a neighborhood security strategy.** Unauthorized use of the reserve, particularly offroad vehicle use, is currently the severest threat to natural resources. Unauthorized motor vehicles are prohibited in ecological reserves (CCR, Title 14, Section 630 (a)(4)). Thus, staff of EHC and EDI are collaborating to develop and support a security strategy that will identify a set of community leaders who live in strategic points around the reserve as well as a group of volunteer trail patrol members. Each resident leader will serve as point persons for reserve management activities in his/her neighborhood and will coordinate management and reporting activities for actions that damage the reserve's unique ecological and community values. Neighborhood groups can serve as effective *eyes on the ground* in their immediate neighborhoods. These volunteer neighborhood groups will also monitor trails, report incidents and emergencies, share reserve policies with visitors, and provide general reserve information to the public. Individuals will be asked to enjoy at least one, 4-hour patrol per month for a minimum of 1 year.
2. **Collaborate with the County Sheriff's Office to halt damage to the reserve through offroad vehicle activities, trespassing, grading encroachment, and dumping, and consider options for remediation on the part of the responsible party.** EHC will collaborate with County code enforcement, the Sheriff, CDFG, and Padre Dam to discuss code enforcement options and an effective strategy for policing the reserve to ensure no violations of code, trespassing, or damage to the reserve. CDFG can issue citations for abusers of regulations.
3. **Survey and fence the reserve's perimeter.** Using Wildlife Conservation Board and County of San Diego parcel records, develop a list of property owners and addresses, and contact property owners about Crestridge security issues and ecological goals of the reserve. Provide phone numbers for CDFG, fire, sheriff, and the Managing Entity to all property owners on the reserve boundary.
4. **Control public access points, and identify, map, and close off (at least) 15 other points of possible vehicular access by the public, using appropriate fencing and signs.** Provide primary public access to the reserve at four locations: Lakeview Lane, Horsemill Road, and Rios Canyon east and west. The Management Agreement between EHC and CDFG will address responsibility for controlling public access and enforcement authority. The following entities will have keys to the gates at Lakeview Lane and Horsemill Road: CDFG, EHC, CDF, East County Fire Prevention/Protection District, San Diego County Sheriff, Padre Dam Municipal Water District (MWD), San Diego Gas and Electric (SDG&E), and selected researchers as authorized by CDFG and EHC.

6.2 Trails

Goal 2: Enhance public appreciation of the value of the Crestridge reserve and conservation issues in general, consistent with biological objectives of the ecological reserve.

5. **Design and install a public information display at the Horsemill entrance.**
6. **Refine the roads and trails map (Figure 5-2), as necessary. Use signs to identify trails that are available for specific user groups—equestrians, mountain bikers, and hikers, and close off trails that are redundant, near sensitive biological areas, and trails along the reserve boundary.** Trail improvements and maintenance will begin in the Core Public Use Area (Figure 2-4). Do not allow any new roads or trails to be created beyond those trails shown on Figure 5-2. Short bypass links may be necessary to avoid dangerous, poorly designed trail segments, which may need to be retired and restored. Certain trails will be limited to hikers only. Existing roads will remain for fire access and multiple user groups. The roads cut for soil percolation testing (as part of the original proposed development project in the western portion of the reserve) should be closed off to allow for natural revegetation. The progress of revegetation should be monitored to determine if soil ripping or active restoration efforts are needed to facilitate recovery. Some of these roads are heavily eroded and will need soil remediation work. Trails near sensitive biological resources may result in soil disturbance and promote habitat invasion by nonnative species. These may include the following:
 - Close the trail to the San Diego thornmint area, except for monitoring and docent-led tours.
 - Minimize access in areas known to support the Hermes copper butterfly.
 - Minimize access within 30 m of Harbison's dun skipper locations (*Carex spissa* plants in the riparian areas).
 - Restrict public access to areas with active raptor nests during the breeding season.
 - Prohibit bikes and horses in riparian areas.
7. **Repair damaged sections of trails and roads to ensure public safety and prevent erosion (Figure 5-2).** EHC and EDI are responsible for ensuring the safety of visitors by maintaining trails and strictly enforcing access and land use. Local stakeholders and volunteers will assist in trail maintenance and land use patrol on a routine schedule. Mulch trail surfaces to minimize erosion. Do not use materials for trail mulch that are a source of seed of invasive exotic species. Use native brush that has been cleared along dirt roads and chipped onsite. Install water bars where necessary to divert water off the trail. Water bars can be made from native rock obtained onsite, native logs, or 4x6 redwood timber. Set the water bar at a 60° angle across the trail, and extend it such that water is carried completely off the trail. Provide rock at the downslope end of the water bar to dissipate the flowing water.



Normal trail use will result in a berm along the edge (outslope) of the trail. This berm will prevent water from flowing off the trail and cause gulying down the center of the trail. Maintain the outslope (the berm at the edge of the trail) by pulling the berm back into the trail tread.

Do not allow trails to widen more than 4 ft. If trails continue to widen as a result of inappropriate use, they should be closed for restoration.

Only roads (Figure 5-2) will be used for fire access; trails will not be used.

8. **Establish and maintain interpretive signs and trails markers.** Develop a map of trails and their designated uses and distances, and make it available for visitor use. Install markers and signs with public information.
9. **Identify a trailhead and staging area for visitor parking.** The primary parking location for the public is the cul-de-sac at Horsemill Road. Additional public parking (for scheduled events) can include the area west of the Horsemill entrance, near the straw bale kiosk. Minimal parking for staff and researchers, as well as parking for the disabled, will be allowed near the straw bale kiosk.
10. **Promote use of weed-free hay for feeding horses in the community by creating a demand for suppliers of weed-free hay.** There are currently two sources of horse feed in the community. They should be encouraged to find and use a source of weed-free hay for users of Crestridge.

6.3 Community Relations

Goal 3: Develop a public outreach and education program.

Volunteer Management

11. **Establish a volunteer program.** EDI is working with various community groups and media contacts to publicize the need and recruit volunteers for Crestridge. Volunteers are needed for assistance with security, education, and restoration programs at Crestridge.
 - Neighborhood patrol. EDI staff will continue to coordinate a neighborhood patrol in which community volunteers provide feedback about and propose solutions to security, wildlife, trails, visitation, fire hazard, and a variety of other reserve issues and concerns. Community members also meet on a regular monthly basis with EDI and EHC staff. EDI staff will continue to manage an incident reporting system, offering an efficient feedback loop between EHC/EDI, CDFG, and users of the reserve.
 - Trail patrol. Establish partnerships with (for example) the San Diego Mountain Bike Association to regularly patrol trails and identify trail maintenance needs.
 - Volunteer activities. EDI holds volunteer work days to assist with restoration and maintenance of the reserve as well as environmental education. Volunteers help maintain the native plant demonstration garden and participate in native plant propagation. Volunteers will also participate in trails repair and trails patrols. EDI will



schedule community activities to educate the local community and general public about compatible reserve uses, restoration, and habitat issues at community forums, docent-led walks, native plant sales, and creation of interpretive signs.

- Education docents. EDI has created a docent training program that includes a written manual of grade level-specific, standards-based education curriculum and student field visit procedures. Docents receive at least 6 hours of hands-on field training before beginning to work independently with students. Docents receive annual training updates regarding the program.
- Restoration assistants. EDI is working with technical specialists to coordinate volunteer training workshops. This ensures a qualified work force to address management and monitoring issues. Following is a list of current and planned training workshops and recommendations for various technical specialists to conduct volunteer training on topics including but not limited to:
 - Nonnative invasive plant identification and removal, including restricted use of herbicides
 - Native mammals/wildlife tracking
 - Water quality and ecology
 - Native bird identification and monitoring
 - Native invertebrate identification and monitoring
 - Sustainable building
 - Fire ecology
 - Native plants
 - Oak ecology
 - Reptiles
 - GIS

Community Education/Communication

12. **Publish a regular newsletter and website about reserve stewardship activities and issues.** EDI distributes a monthly newsletter to 500 recipients including reserve neighbors, educators, elected officials, financial contributors, partners, and others. EDI will also manage and maintain the EDI/CER website (www.earthdiscovery.org), which includes interactive features for providing feedback about the reserve. The website will also include the mission of EDI, the reserve's management plan, information about EDI's educational and volunteer programs, photos documenting Crestridge's natural resources, and educational materials for school and the community.
13. **Support environmental education and related habitat restoration activities.** Since 1999, EDI has operated an environmental education initiative at Crestridge, which today serves over 3,000 students per year from local elementary and middle schools. The majority of the direct costs associated with this initiative are borne by grant funding provided to the participating school districts. However, EDI is responsible for securing funds to pay staff expenses and administrative costs associated with curriculum design, program administration, evaluation, and habitat restoration planning. Some of the



- Crestridge-related funds at the California Wildlife Foundation will support portions of the educational program involving habitat restoration activities near the entrance of the reserve, including planting and caring for native plants and weeding nonnatives.
14. **Partner with other San Diego County environmental/wildlife organizations** (e.g., San Diego Natural History Museum, resources agencies, San Diego State University, other land trusts) for cross promotion, education, interpretation, and docent training.
 15. **Develop a habitat-based curriculum project.** Granite Hills High School (GHHS) is partnering with the Crestridge Ecological Reserve to develop a habitat-based, cross-disciplinary experiential curriculum and service learning program that meets state content standards, complies with district service learning requirements, and supports regional conservation goals. The program fosters civic responsibility through student involvement in the community. Students learn first-hand about the natural and cultural resources of Crestridge and the relationship of these resources to their own community and quality of life.
 16. **Develop a site plan for the Horsemill Road entrance area.** EDI will contract with a landscape architect/design firm to develop a site plan which integrates interpretive elements and structures such as the field station, greenhouse, restroom and trash facilities, public gathering spaces, and student field activity sites. EHC will also design and construct a new main entrance sign at the Horsemill Road entrance that will provide a map of the reserve displaying major landmarks and approved equestrian and hiking trails. Interpretive displays will highlight and explain the regional NCCP and MSCP context as well as the biological resources on the reserve. Warning displays will define non-permitted activities on the reserve, such as offroad vehicle use and walking dogs without a leash, and point out safety issues such as rattlesnakes and wildfire risks.
 17. **Implement the recommendations in the cultural resources management plan for Crestridge.** Dr. Susan Hector has prepared a cultural resources management plan for Crestridge that addresses use of the site by the Kumeyaay Indians and the relationship of San Diego's historic families to the land. Recommendations for continued protection of these resources are contained in Appendix I. These include:
 - Conservation and protection of SDI-4664.
 - Monitoring fence construction and sign posting in the vicinity of the following sites, which are near the edge of the reserve: SDI-6020, SDI-6022, SDI-14,958, SDI-14,963, SDI-14,965, and SDI-15,548.
 - Evaluation of the remains of historic ranching activities before they are removed.
 - Involvement of the Native American community.
 - Interpretive displays and programs.
 - Stewardship
 18. **Prohibit feeding of wildlife (CCR Title 14, Ch.11. 630).**
 19. **Prohibit unauthorized collection and introduction of plants and wildlife (CCR Title 14, Ch.11. 630).**



20. **Prohibit firearms, paintball and other projectile devices, pesticides, fireworks, and fire, except where authorized (CCR Title 14, Ch.11. 630).**
21. **Prohibit camping and vandalism (CCR Title 14, Ch.11. 630).**

Public Use Enforcement

22. **Patrol public use of the reserve to ensure compliance with the rules and biological goals of the reserve and to assess level of use by area of the reserve.** Track trail use, and determine which trails are used more frequently than others. On an annual basis, inspect all of the trails to monitor and mitigate for impacts. This may include restoring the outslope of the trail, installing waterbars, and pruning along the edge of the trail.
23. **Monitor presence and location of domestic animals in the reserve.** This task could be performed by volunteers.
24. **Issue tickets/citations to persons that violate reserve regulations (CDFG warden or County sheriff).**

7.0 FACILITY MAINTENANCE RECOMMENDATIONS

7.1 Fencing and Boundary Enforcement

Goal 1: Maintain facilities on the reserve to ensure that biological resource values are protected and management activities are facilitated.

1. **Contract with a land surveyor to officially map the reserve boundary.** The goal of this task is to determine where gates, fencing, and signs are needed to secure the reserve perimeter. Mark the boundary and inform neighbors of the legal boundary line of the reserve. Take corrective action for boundary violations. The first portion to be surveyed will be in the western portion of the reserve in the area of Valley View Truck Trail and Vista de Montemar.
2. **Identify portions of the reserve boundary where fencing and additional gates are needed.** Fencing should probably be installed or reinforced in areas adjacent to residential lots, roads, and other level areas. Fencing along steep, rocky areas (e.g., along the southeastern boundary) is probably not necessary. Fencing should be maintained as needed and should be checked at least annually. Two new gates are needed onsite to control access at the reserve boundary. Proposed gate locations include:
 - Coyote Ridge, in the western portion of the reserve
 - Valley View Truck Trail, also in the western portion of the reserve
3. **Establish property signs along the reserve boundary (3 signs every linear mile) and at each access point, identifying the area as an ecological reserve and providing directions for access and contact information.**
4. **Maintain all existing fences and locked gates, and establish a list of persons with keys to the reserve** (CDFG staff, EHC, EDI, CalFire, East County Fire Prevention/Protection District, SDG&E, Padre Dam MWD, Sheriff, selected researchers). EDI has evaluated and developed a chart of the 15 gates on or adjacent to the reserve (Figure 5-2) with notes about official access and security needs. EDI has also identified two additional onsite areas where gates are needed. These locations, both in the western part of the reserve, are on Coyote Ridge and the Valley View Truck Trail, where it enters the property. EDI will develop a plan of action for each gate that addresses maintenance and access issues. In addition, EDI will continue to coordinate with neighboring property owners regarding offsite gates that affect access to the reserve.
5. **Purchase equipment for management, maintenance, and monitoring.**

7.2 Core Public Use Area

Goal 2: Establish facilities to maintain, enhance the appreciation of, and encourage research on the natural resources of the reserve.

6. **Remodel the former warden's house on Horned Lizard Bypass to support a field station, offices for EHC/EDI, and caretaker facility.** This facility would be used by the EDI educational programs for hands-on environmental and cultural education and community service opportunities and to maintain the Core Public Use area.
7. **Establish the *Bridge to Nature*.** Designed by James Hubbell, this contemplative space will be located near the oak grove.
8. **Develop a plan for the Core Public Use Area that will maximize effective community participation and education.** A site plan will help integrate interpretive elements and structures such as the field station/caretaker residence, greenhouse, restroom and trash facilities, public gathering spaces, and student field activity sites.
9. **Design interpretive displays for the Core Public Use Area.** These should include a map of the reserve displaying major landmarks and approved equestrian, biking, and hiking trails, explanations of the unique wildlife and plants, warnings about unauthorized uses and hazards, and announcements of special events.

Goal 3: Remove litter and trash that may attract nonnative animals and reduce the aesthetic values of the reserve.

10. **Remove unused ranching equipment and facilities.** For example, remove the fence in the annual grassland, fence west of the oak grove, fences along and across the drainages, pipes and metal debris adjacent to Horsemill Road, and old axle, irrigation tubing, and sign posts in the proposed *Bridge to Nature* area. Evaluate the need to retain the old farm equipment and barn storage areas east of the warden's house. Remove the pens east of the warden's house. Remove all relict barbed wire fencing on the reserve.
11. **Remove litter at periodic intervals, and arrange for regular garbage pickup.** Place closed garbage cans and recycle bins at public entry points (Horsemill Road and Lakeview Lane). Remove trash from drainages, especially Rios Canyon. Prohibit dumping of trash, dirt, and garden refuse (CCR Title 14, Ch.11. 630).
12. **Evaluate the need for powerline remediation.** Based on recommendations from the Wildlife Research Institute, the existing powerline across Crestridge may need remediation to mitigate for potential bird strikes.



8.0 CURRENT ACTIVITIES AND FUTURE PRIORITIES

8.1 Current Outreach, Stewardship, and Monitoring Activities

Implementation of the management recommendations has already begun through cooperative efforts among the CDFG, Endangered Habitats League (EHL), Endangered Habitats Conservancy (EHC), Earth Discovery Institute (EDI), San Diego Urban Corps, Conservation Biology Institute (CBI), and CalFire. These are described briefly in this section, on a special section of EDI's website (<http://www.earthdiscovery.org/crestridge-ecological-reserve>), and in a regular newsletter distributed by EDI.

After creation of the Crestridge Ecological Reserve in 1995, EHL and a network of community volunteers immediately began work to steward the property and to make it a center of environmental education and learning. As *on-the-ground* stewards of Crestridge, EHL staff and volunteers have conducted community outreach, planned and constructed capital improvement projects on the reserve, particularly near the reserve's entrance on Horsemill Road, and implemented a number of habitat restoration projects. EHL was responsible for the funding and implementing the major rehabilitation of the buildings that formerly housed the CDFG warden, and the demolition of four dangerously dilapidated buildings on the reserve. EHL is currently working with the County of San Diego to determine the status of planning efforts with the goal of maintaining a habitat linkage between Crestridge and Harbison Canyon.

Community Outreach

Volunteers have repaired fences, posted signage, and helped to educate community members about appropriate and inappropriate uses of the reserve. In particular, local residents have been discouraged from conducting equestrian activities in inappropriate locations, walking dogs without a leash, and riding offroad vehicles on the reserve. EHL has also conducted proactive community outreach to encourage local residents to use the reserve for passive recreational and outdoor-oriented activities and has facilitated making the reserve a focal point for outdoors-oriented community life. For example, an annual native plant sale is organized by EHL and local volunteers at Crestridge.

In addition, EHL has used Crestridge as an asset for forging partnerships with other outstanding nonprofit organizations in the San Diego region. For example, as part of a long-standing partnership, EHL has collaborated with the San Diego Urban Corps to engage its help in constructing trails and building interpretive and educational facilities on the reserve. The San Diego Urban Corps is a locally-based nonprofit organization that provides education and jobs to young adults aged 18-25. The majority of youth employed at Urban Corps are high school dropouts who have little or no job training. At Urban Corps they learn new skills while contributing to the overall quality of life in the San Diego area.



Earth Discovery Institute

The Earth Discovery Institute (EDI) is a project of the Endangered Habitats League which develops and manages the community education, volunteer training, and environmental education and research programs on the Crestridge Ecological Reserve. Dozens of training/activity sessions have been conducted serving adults and young people. Topics have included native plants, wildflowers, birds, insects, reptiles, mammals, tracking, sustainable building, composting, and erosion control. All sessions include either hands-on work related to the topic or observational walks through the reserve.

Environmental education and research programs are developed for students at all levels—elementary through college. EDI's program is the first on-site educational program of its kind in San Diego. As a resource to teachers and students, EDI staff work with faculty to develop standards-based natural resource, as well as interdisciplinary programs combining science, technology, art, history, and language arts. Curricula have been developed for elementary, middle, and high school students through partnerships with the Cajon Valley Union School District (17,000 students), Grossmont Union High School District (24,000 students), and the Poway Unified School District (52,000 students). Approximately 3,000 students are involved in educational programs on the reserve each year. The work of EDI was highlighted in the nationally-lauded book *Last Child in the Woods*, by San Diego author Richard Louv, which discusses the need to reconnect children in our society with the natural world.

EHL created plans for three capital projects that would support its environmental and community education programs of the EDI. The first of these projects—a straw bale information kiosk—was designed by renowned artist and architect James Hubbell and constructed in collaboration with the San Diego Urban Corps and community members. The kiosk was destroyed in the 2003 Cedar fire but has since been almost completely rebuilt by EHL and community volunteers. The kiosk is used by EDI as a facility for student lectures and training.

The second project—*The Bridge to Nature*—has been designed by James Hubbell to function as a quiet, contemplative space for visitors to the Crestridge Ecological Reserve and as a learning theater for educational projects and programs implemented on the reserve by EDI. A third and final capital project will be a reserve office and caretaker facility and research work area for schools and other institutions working in partnership with EDI.

In 2008 EDI incorporated as a separate 501c3 nonprofit organization. As a distinct nonprofit, EDI will continue to operate environmental education programs at Crestridge and will also manage day-to-day stewardship activities on the reserve.

Stewardship

The Crestridge Ecological Reserve strategically advances EHL's mission to preserve the biodiversity of the Southern California ecoregion by setting rigorous standards for regional conservation programs such as the MSCP. EHC is a regional land trust organization, which is



structured as a sister organization to the Endangered Habitats League. EHC intends to assume responsibility for implementation of all aspects of the management of Crestridge, including a reserve-wide biological monitoring program, habitat restoration and other adaptive management activities, trail improvements and maintenance, fire risk mitigation, security, building a volunteer corps comprised of local community members, and expanded environmental education and youth service programs. EHC is assuming these management responsibilities, working with funding from the Crestridge endowment at the California Wildlife Foundation, in conjunction with final approval and adoption of the management plan.

Future management and stewardship of Crestridge will be supported by interest earnings proceeds from the endowment for the reserve being administered by the California Wildlife Foundation, as well as by private sector fundraising. EHC intends to *spend down* the interest that has accumulated at the California Wildlife Foundation over a 2 to 2.5-year period, while also funding its work plan through current interest earnings that will be generated by the endowment each year. Significant private sector fundraising by EHC, for both program operations and capital projects, will also support the reserve's annual operations. The staff members of EHC have an extensive history and track record of successful private sector fundraising, and it is expected that private grants and donations will play a significant role in supporting future stewardship activities on the reserve.

EHC is committed to managing the Crestridge Ecological Reserve to meet the highest possible standards of land stewardship, as a means for *raising the bar* for NCCP-conserved lands in California that are managed by public sector or nonprofit entities. EHC is a member of the Land Trust Alliance (LTA) and will be drawing from documented best-practices certified by the LTA as part of its management of Crestridge. CBI remains involved as a critical advisor and provider of technical expertise in ongoing management of the reserve.

Monitoring

Michael Klein and Claude Edwards of Klein-Edwards Professional Services have been conducting monitoring on Crestridge since 2000, and they continue to conduct studies and work with school programs at Crestridge. Michael Klein has developed a list of invertebrate species on the reserve, and he conducted the original surveys that documented Hermes copper butterfly and Harbison's dun skipper locations on the reserve. Although the majority of the host plants (*Rhamnus crocea*) for Hermes copper were burned in the 2003 Cedar fire, Michael is monitoring the hoped-for recovery of the species' use of the reserve by monitoring host plant locations on and adjacent to the reserve. He is also monitoring the host plant (*Carex spissa*) for Harbison's dun skipper on the reserve, and is studying the specialized pollination regime for Lakeside ceanothus on Crestridge as part of a Section 6 Endangered Species Act grant. Better understanding this plant's ecology will contribute to the stabilization and enhancement of this MSCP covered species' population.

Claude Edwards developed a list of vertebrate species on the reserve, and established and conducted bird point-count surveys along two routes through the reserve. As part of a long-term monitoring program, he will continue these surveys and annual surveys of coastal sage scrub birds on the western end of the reserve, those areas that function as part of the Lakeside archipelago.



8.2 Future Management and Monitoring Priorities

Section 5 identified management and monitoring tasks for the Crestridge Ecological Reserve, including the new acquisition areas on the west end. All of these tasks are summarized in Appendix H. The table below identifies the primary management and monitoring priorities for the next 2-3 years and the primary responsible party. To facilitate reference, tasks are organized and numbered to correspond to tasks in Section 5.

	1 st priorities		2nd priorities		3rd priorities
Task					Responsible
Exotic Plant Control					
1	Map locations of exotic plants throughout the reserve, using the year 2000 locations as a baseline, and prioritize locations for treatment.				CBI
Fire Management					
18	Work with CalFire to prepare a phased fire management plan.				CBI, EHC, CalFire
19	Work with landowners to maintain their own defensible space.				EDI
20	Begin process to improve internal dirt roads and access points, with initial focus on Rios Canyon.				EHC, CalFire
21	Designate a Crestridge representative to the Crest Fire Safe Council.				EHC
Habitat Enhancement and Restoration					
30	Continue enhancement of the oak grove near the Crestridge entrance.				EDI
31	Continue restoration activities for the annual grassland in the center of the reserve.				EDI
32	Continue restoring the ecological values that have been damaged by neighborhood trespassing and degradation of reserve lands.				EHC, EDI
Sensitive Species Mapping and Monitoring					
37	Survey and map the thornmint population on Thornmint Hill.				CBI
42	Map the plantago population on Thornmint Hill.				CBI
46	Conduct presence/absence surveys for California gnatcatchers.				CBI
Habitats and Ecological Processes Monitoring					
54	Prepare an update of the vegetation map.				CBI
59	Monitor wildlife movement to and from the Reserve.				SDTT



Task		Responsible
Public Use		
1	Develop a neighborhood security strategy.	EHC
2	Halt damage to the reserve by illegal ORV activities, trespassing, grading encroachment, and dumping, including liability and remediation options for the responsible party.	Sheriff, CDFG
3	Begin surveying and fencing the reserve's perimeter, beginning with the property boundary identified above (#35).	EHC
4	Continue controlling public access points.	EHC
5	Design and install a public information display at the Horsemill entrance.	EHC, EDI
8	Establish and maintain interpretive signs and trails markers.	EHC
11	Continue the volunteer program.	EDI
13	Continue to support environmental education and related habitat restoration activities.	EDI
14	Continue partnerships with other nongovernmental and community organizations.	EDI
15	Continue supporting a habitat-based curriculum project.	EDI

8.3 Staffing and Budget

Staff from EHC and EDI will oversee and implement management activities on the reserve. EHC, under the direction of its President, will have responsibility for implementing all NCCP-related management activities. Staff from EDI will oversee and implement community relations, security, capital improvement projects, wildfire response strategies, trail maintenance, and environmental education, and they will support NCCP-related biological management and monitoring activities. Selected consultants will be employed to assist with specific biological management and monitoring projects. CBI, in coordination with CDFG staff, will assist EHC and EDI on an annual basis in reviewing management priorities for the reserve and help to set priorities for management and monitoring during the upcoming year.

Management activities on the Crestridge Ecological Reserve will be funded via an annual operating budget, running on a January-to-December fiscal year. The budget will be formulated in the fourth quarter of the prior year and will be adopted by the EHC Board of Directors as part of its own budgeting process. Budgeted expenses will be funded through revenues derived from the management endowment for the reserve, which is held by the California Wildlife Foundation, and through other grants and donations. Between 2008/2009 and 2012, the annual operating budgeting for routine Crestridge management activities is expected to be approximately \$325,000 per year. Special projects, such as large-scale habitat restoration initiatives or capital improvements, will be



supported through additional special project funds (secured primarily as grants). In addition, a separate budget will be developed and managed by EDI for environmental education programs to be conducted on the reserve. These activities will be supported through the EHL/EDI Crestridge Fund at the California Wildlife Foundation, as well as through other grants and donations.

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