UNIVERSITY OF CALIFORNIA

Santa Barbara

Interim Management Plan for Arroyo Hondo Preserve

A Project for the Land Trust for Santa Barbara County

A Group Project submitted in partial satisfaction of the requirements for the degree of Master's in Environmental Science and Management

for the

Donald Bren School of Environmental Science and Management

By

Pete Choi

Paola Gomez-Priego

William Sears

Alex Tuttle

Committee in charge:

Professor John Melack

Sandy Andelman

April 2002

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Pete Choi

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Paola Gomez-Priego

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William Sears

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Alex Tuttle

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Professor John Melack

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Sandy Andelman, Ph.D.

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Photos: W. Sears

Alex Tuttle, Pete Choi, William Sears, Paola Gomez-Priego
Bren School of Environmental Science and Management
University of California, Santa Barbara

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ABSTRACT

The 316-hectare (782-acre) Arroyo Hondo Preserve is located along the Gaviota Coast, 48 kilometers (30 miles) west of Santa Barbara, California. Recently purchased by the Land Trust for Santa Barbara County, the property is known for its significant natural, historical, and scenic values. The acquisition offers a unique opportunity to protect an entire coastal watershed, as it provides a link between the coast and Los Padres National Forest, which occupies the upper half of the Arroyo Hondo watershed. Arroyo Hondo Creek and its associated riparian woodland and coastal lagoon provide habitat for several threatened and endangered species including southern steelhead trout, California red-legged frog, and tidewater goby. The Preserve has a rich human history, and contains the remnants of Native American, Spanish, Mexican, and early American occupation, including a buried Chumash village and an historic adobe home built in 1842.

The Preserve will be managed for the protection of natural and cultural resources, while providing opportunities for compatible public use, including outdoor education, recreation, and scientific research. To provide an initial framework for stewardship of the Preserve, an Interim Management Plan has been drafted that will be utilized for 3 to 5 years, during which time the Land Trust will continue to develop and refine long-term management goals and strategies. The plan identifies immediate and long-term management challenges, and provides strategies that work to protect the unique resources of the Preserve. Sensitive species management, exotic species control, habitat restoration, fire and vegetation management, historical preservation, public use, and infrastructure maintenance and planning are key topics discussed in the plan. The plan also identifies additional information that will be crucial in making informed management decisions in the future.

Photo: W. Sears

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1. INTRODUCTION

On October 16, 2001, the Land Trust for Santa Barbara (hereafter "Land Trust") acquired fee title to the 316-hectare (782-acre) Rancho Arroyo Hondo (APNs 81-090-08, 81-150-02, and 81-150-10), with funding from private and public sources (Appendix A). The property, now known as the Arroyo Hondo Preserve (hereafter "Preserve"), is situated within the Arroyo Hondo watershed along the Gaviota Coast, a scenic and predominately rural region of coastal watersheds draining the southern slopes of the Santa Ynez Mountains in southern Santa Barbara County, California (Map 1). The Preserve occupies approximately one-third of the 1,132-hectare (2,797-acre) watershed; the remaining portion is part of the Los Padres National Forest, with a small, privately owned 32-hectare (80-acre) inholding located on the Preserve's northern boundary. Santa Barbara County-owned Tajiguas landfill borders the Preserve to the east, and two private ranches lie to the west (Map 2).

Photo: W. Sears

The Ortega Adobe and westside orchards of Arroyo Hondo Preserve.

According to a study by the Conception Coast Project (2001), the Arroyo Hondo watershed ranked as one of the more important watersheds along the Gaviota Coast in terms of habitat quality and ecological importance. The establishment of the Preserve within the watershed will help protect regionally important habitats that support several endangered, threatened, and special concern species including southern steelhead trout (*Oncorhynchus mykiss irideus*), California red-legged frog (*Rana aurora draytonii*), tidewater goby (*Eucyclogobius newberryi*), southwestern pond turtle (*Clemmys marmorata pallida*) and two-striped garter snake (*Thamnophis hammondii*) (Storrer 2001).

In addition to its ecological importance, Arroyo Hondo Preserve contains significant cultural and historical resources – the result of a rich history of Native American, Spanish, Mexican, and American settlements. These resources, combined with opportunities for outdoor education, recreation, and scientific research, made the property a priority for protection.

1.1. PURPOSE OF THE MANAGEMENT PLAN

The development of this Interim Management Plan was undertaken to assemble existing information regarding the resources of the Preserve and provide the Land Trust

with management and stewardship guidance. As directed by the Land Trust's Board of Trustees in the Arroyo Hondo Preserve Guiding Principles (Appendix B), the focus of this effort is:

> "*…to develop a preserve stewardship plan that has as its foremost goal preservation of the extraordinary historical, cultural, natural and scenic resources of Arroyo Hondo, and to implement management practices that conserve its value as habitat for a diversity of native wildlife...*"

The pages that follow offer interim management strategies and long-term recommendations that will guide the protection of resources, while providing for compatible outdoor education, passive recreation, and research opportunities. The management strategies are designed to address the goals of the Land Trust as well as conform to the requirements set forth in the Grant Deed Restriction for the Preserve (Appendix C). The plan identifies immediate and long-term management challenges, and provides strategies that address conflicts and ensure that the unique resources of the Preserve are protected.

The Land Trust intends to utilize this Interim Management Plan for the first 3 to 5 years of ownership, and will continue to develop and refine long-term strategies and policies that incorporate many of the issues identified in this initial planning effort. The specific programs and actions recommended in this Plan were developed by the Bren School project team (hereafter "project team"), based on research and input from Land Trust staff, various professional advisors, and review of similar management plans from other natural preserves. This Interim Management Plan does not constitute a commitment by the Land Trust to act on any specific measure recommended herein. Implementation of specific actions or programs at Arroyo Hondo will depend on approval of the Land Trust Board of Trustees, based on factors such as financial feasibility and priority, permit considerations and additional information to be developed over time.

While the Land Trust has already begun implementing several of the actions presented here, the financial and human resources of the Land Trust are limited. The ability to carry out many of the actions and recommendations is contingent upon receiving additional funds or developing partnerships with public agencies or other private groups; volunteers will also be vital to their implementation.

1.2. APPROACH TO THE PLAN

The essential first step in developing the management plan involved working with the Land Trust to identify goals and objectives for the Preserve (Section 4). This task assisted the project team in determining the scope of the plan and specific issues to be addressed. It is important to mention that there are many influences on the Preserve for which there is no management or control. This plan focuses only on those stressors that can be mitigated or avoided with management actions.

Photo: W. Sears

The eastside orchard and foothills of Arroyo Hondo Preserve.

The second step involved collecting and synthesizing existing information regarding physical and biological characteristics, land use history, and cultural resources (see Section 2). Personal observations by members of the project team during multiple site visits were used to supplement this information. Information was incorporated into a geographic information system (GIS) to provide a visualization tool for management planning and as a tool for resource monitoring efforts. A review of the current conservation planning literature was performed to provide relevant guidance in species and habitat conservation. Management plans written for similar preserves were reviewed to evaluate potential management strategies and mitigation measures.

The project team developed a framework to help define the requirements for meeting the dual goals of resource protection and passive public access. This framework consisted of eight stages:

1. Identification of current and potential future stressors on resources and public access at the Preserve;
2. Assessment of the impacts of stressors;
3. Development of management strategies to help mitigate or avoid impacts (see Appendix D for conceptual models of stages 1 through 3);
4. Development of management actions to facilitate the goals for compatible public use of the Preserve;
5. Prioritization of management actions based on their contribution to the achievement of goals and objectives;

6. Analysis implemention feasibility for management actions including costs, regulatory considerations, enforcement, and potential coordination and partnerships required;
7. Identification of limitations and challenges to implementing management strategies;
8. Identification of information and monitoring needs.

The project team worked to distinguish between management actions that are essential to achieving the goals and objectives established by the Land Trust and those that would be beneficial but not essential in the successful management of the Preserve. Appendix E summarizes these actions and establishes their importance in terms of fulfilling the goals and objectives for the Preserve.

The project team utilized a threats-based approach to developing the management plan. While some management action support the development of public access, most of the actions discussed in this plan were developed in order to mitigate or avoid the impacts of stressors on the Preserve. Many of the actions are based on the precautionary principle, which dictates a "protection first" approach to management. To protect the resources of the Preserve, a lack of information, scientific uncertainty, or lack of scientific consensus should not delay management actions that protect habitats and species.

Management of the Preserve will be adaptive in nature, recognizing that current knowledge about many of the resources and how they are affected by public use is incomplete, and allowing for management strategies to be reevaluated and modified as new information becomes available. In practical terms, the adaptive management concept is essentially common sense; however, the ability to evaluate the success of management strategies depends on effective monitoring of resources and human-nature interactions, and the development of specific criteria that define the success of management actions (The Nature Conservancy 2000). The lack of quantitative information regarding resources at the Preserve precludes the establishment of meaningful criteria in this interim plan. Appendix F provides guidance for how such monitoring and success criteria should be established. Benchmarks for success will likely be identified in the future as management techniques are refined and new data collected (Mulder et al. 1999).

The approaches and analyses discussed above were integrated into the development of this interim management plan. Information collected was compiled into three deliverables: (1) GIS with available spatial information, (2) bibliographic database with relevant literature, and (3) contact information.

1.3. ABOUT THE LAND TRUST FOR SANTA SARBARA COUNTY

The Land Trust for Santa Barbara County is a non-profit organization established in 1985 that works with willing landowners, public and private grant agencies, and other community organizations to protect natural and agricultural lands in Santa Barbara County through negotiated conservation transactions. Governed by a volunteer board of trustees, the Land Trust recommends conservation planning options and incentives to landowners and promotes responsible stewardship of the land. The organization is committed to educating the community about land conservation and sponsoring educational programs in natural history, geology, and agriculture. To date, Land Trust activities have resulted in the permanent protection of over 11,000 acres of land in the county.

1.4. CAMPAIGN TO RAISE ACQUISITION FUNDS

In the fall of 2000, after over a year of negotiations with J.J. Hollister and representatives of the remaining 16 owners of the Arroyo Hondo Ranch, the Land Trust for Santa Barbara County secured an option to purchase the property for $6,176,000. The terms of the option agreement required that the Land Trust raise half of the purchase price by January 2001, and the remainder by October of that year.

The Land Trust established a fundraising campaign goal that included an operating endowment, project and campaign administrative costs, start-up funds for the first year of operation, and real estate transaction fees: a total of $7,300,000. Through grant writing, property tours, events, media announcements, direct mail appeals and individual donor solicitation, the Land Trust was able to meet the payment schedule imposed by the option agreement and raise the total campaign goal. A total of $7,316,000 was raised in one year with an overhead administrative cost of only 1.7%. The trust closed escrow on October 16, 2001, one day after the date targeted in the option agreement.

As outlined in the *Fundraising Campaign Summary* (Appendix A), the principal source of funds was government agencies and programs including: the California Coastal Conservancy, Wildlife Conservation Board, the Environmental Enhancement and Mitigation Program (operated jointly by the Resources Agency and the California Transportation Commission), and the County of Santa Barbara Coastal Resources Enhancement Fund). Grants from foundations brought in over $500,000 and included funds from the David and Lucille Packard Foundation, John S. Kiewit Foundation, the Santa Barbara Foundation, and the Goleta Valley Land Trust. Finally, 412 individuals donated to the campaign, amounting to another $572,000.

2. BACKGROUND

2.1. REGIONAL SETTING

The Gaviota Coast region has been described as a "crossroads" in California – a transitional area where ecological systems and natural features change, from the orientation of the coastline, to the geology, flora and fauna, ocean currents, and climate (Chesnut 1993). While descriptions of the geographic extent of the region vary, most agree on an area of coastal watersheds along approximately 56 kilometers (35 miles) of coastline, from the western boundary of urban Goleta to the eastern boundary of Vandenberg Air Force Base (Map 1) (Santa Barbara County 1999, Santa Barbara County 2001a, Gaviota Coast Conservancy 2002).

The east-west trending Santa Ynez Mountains form the backbone of the region and are unique among California's primarily north-south traversing mountain ranges. Part of the Western Transverse Range, the Santa Ynez Mountains are the result of over 6 million years of plate tectonic activity (Dibblee 2001). Initially formed by subduction at the boundary between the northbound Pacific oceanic plate and the North American continental plate, the Transverse Range has rotated by more than 90 degrees over time (Atwater 2002). Continuous uplifting and erosion of the Santa Ynez Mountains have combined over the last several million years to form the many valleys and canyons of the region (Dibblee 2001).

The diverse landscape of the area supports approximately 1,400 plant and animal species, including 140 endemics, 13 threatened and endangered species, and 54 species of concern (Burns 2002, National Park Service 2002). An important ecological transition zone, the region contains a diverse intermingling of northern and southern plant and animal species (Caughman and Ginsberg 1987, Conception Coast Project 2001). Four ecoregions, as defined by the USDA Forest Service ECOMAP framework, converge in Santa Barbara County, further supporting the notion that the region surrounding Arroyo Hondo is ecologically rich (Miles and Goudey 1998). The Gaviota Coast represents an important transition zone in the marine environment as well, where the cool waters of the southerly-bound California current mix with the warmer waters of the Southern California counter-current in the Santa Barbara Channel to create an extremely rich and diverse marine ecosystem (Conception Coast Project 2001, National Park Service 2002).

The region is also rich in cultural and historical resources as demonstrated by the presence of numerous Chumash archeological sites. Adobe homes built by Spanish and Mexican settlers during the 18th and 19th centuries still stand in several of the larger canyons (Santoro et al. 1993, National Park Service 2002).

2.2. REGIONAL LAND USE TRENDS

The Gaviota Coast region represents one of the few remaining rural coastlines in Southern California. Historically, cattle and sheep grazing were the dominant land uses in the region; agriculture is still a prevalent land use, but many properties have shifted to more profitable avocado and citrus operations. Beginning in the 1960s, crude oil and natural gas processing facilities were developed in a number of locations along the coast to accommodate offshore production (Santa Barbara County 1999). Tajiguas Canyon, just east of Arroyo Hondo Preserve, was developed as a landfill site in the late 1960s to accommodate waste from the surrounding communities and unincorporated areas of the county; it is still operating today (Santa Barbara County Public Works 2002). Low-density residential development has taken place in areas such as Dos Pueblos, Hollister Ranch, Arroyo Quemado, and Tajiguas.

Current county land use plans and zoning designations for the region call for agricultural, public recreation, and coastal-related industrial uses. A lack of public service infrastructure (sewer, roads, schools and domestic water) in the region makes large-scale, high-density residential development unlikely (Santa Barbara County 1999).

In recent years, however, population and economic growth in southern Santa Barbara County has begun to exert increasing development pressure on natural and agricultural lands in the region (Santa Barbara County 2001a). Strong demand for housing has dramatically increased land valuations in the area, especially along the expanding western frontier of Goleta, where some landowners are reportedly failing to renew agricultural preserve (Williamson Act) contracts; presumably to allow for future residential development (U.S. Environmental Protection Agency 2001). At least two large land holdings are currently on the market (Brinkman and Bixby ranches, Map 2), adding to concerns that these lands may be subdivided and developed in the near future (U.S. Environmental Protection Agency 2001).

2.3. STATUS OF REGIONAL NATURAL LANDS PROTECTION

In recent years, protecting the Gaviota Coast has become a topic of concern at both the national and regional levels. The unique natural and cultural resources of the Gaviota Coast draw attention to the importance of conservation along this portion of California's coast. Throughout this region there is a mosaic of federal, state, and private land with varying types of land-use. Different perspectives regarding the conservation of the region's natural resources creates a challenge that requires cooperation between various landowners and stakeholders if conservation objectives are to be met. The level of interest in protecting this section of California's coast is illustrated by the variety of resource studies and conservation strategies being developed at the federal, state, and local level, and by non-profit organizations.

Initially, land conservation planning and resource protection in this region was limited to the establishment of Los Padres National Forest in 1898 by President William McKinley (USDA Forest Service 2002a). The national forest is crucial to the protection of this portion of the coast since it manages the headwaters of approximately half of the coastal watersheds. The two popular state beaches in this region, El Capitan and Refugio State Beach, contribute to the management and protection of coastal resources; Gaviota State Park provides further protection by creating a protected links between the coast and the Santa Ynez Mountains.

The integration of a cooperative approach to conservation planning plays a major role in regional land management and protection. Strategies for protection primarily include the use of conservation easements or fee title acquisitions of properties of interest. Furthermore, volunteer land conservation strategies by individual landowners through various types of easements and the use transferable development rights or other land-use planning approaches can help achieve the goal of conserving regional resources for future generations. The following sections discuss the regional studies and local conservation endeavors to protect the Gaviota Coast and details the Preserve's contribution to the regional land conservation objective.

2.3.1. GAVIOTA COAST NATIONAL SEASHORE FEASIBILITY STUDY

The Gaviota Coast National Seashore Feasibility Study, currently being conducted by the National Park Service (NPS), is evaluating a range of strategies for protection of the Gaviota Coast's resources, including the potential establishment of a National Park unit. Congresswoman Lois Capps and other officials requested congressional approval for the feasibility study, due to increasing community concern over the protection of the coast. The study area includes approximately 80,938 hectares (200,000 acres) of coastal lands, from Coal Oil Point in Isla Vista to Point Sal, at the northern boundary of Vandenberg Air Force Base (National Park Service 2000). NPS is currently conducting public scoping meetings to assess local concerns and needs; a draft of the study will be available during the summer of 2002 (National Park Service 2002).

2.3.2. GAVIOTA COAST RESOURCE STUDY – SANTA BARBARA COUNTY

The County of Santa Barbara is currently conducting its own conservation planning assessment of the coastal region. Called the Gaviota Coast Resource Study, the study area covers 42,086 hectares (104,000 acres) and 56 kilometers (35 miles) of the Gaviota Coast. The goal of the study is to identify alternatives for conservation through an inventory of resources and planning information along the coast. The potential for conservation success upon implementation of the various options is also incorporated into this study (Santa Barbara County 2001a).

2.3.3. NON-PROFIT ORGANIZATIONS

In California and nationwide, non-profit organizations and other private groups play an important role in complementing conservation efforts by governmental land management agencies. The budgets and priorities of public agencies such as city and county governments, the USDA Forest Service, and the National Park Service are often closely tied to changes in administration. Therefore, non-profit and private participation in protecting and managing natural areas can help fill in the gaps left by these agencies. These collaborative measures are necessary for the long-term stability and sustainability of resource protection.

This coastal region of California garners the support of many non-profit organizations. A major promoter of the protection of regional resources is the Gaviota Coast Conservancy. The objective of the conservancy is the permanent protection of the Gaviota Coast's unique resources (Gaviota Coast Conservancy 2002). The Land Trust for Santa Barbara County has played a significant role in land conservation throughout the county and is supported by federal and state agencies, along with the help of private funding, to accomplish its endeavors. The Trust for Public Land (TPL), a national land conservation organization, has been active in this region and continues to work with the state and county to protect key areas of Santa Barbara County. The Nature Conservancy is another national organization that has played a notable role for conservation along coastal Santa Barbara County.

Some significant fee title acquisitions and conservation easements along the Gaviota Coast other than the Arroyo Hondo Preserve are being achieved through efforts by these organizations mentioned above. The El Capitan Ranch acquisition by TPL that is still being negotiated will protect 1,011 hectares (2,500 acres) of a coastal watershed that was previously in private ownership (The Trust for Public Land 2001). TPL plans to turn the El Capitan acquisition over to the state park system for management.

The Land Trust's past and current projects have been fundamental for the regional conservation efforts throughout the coast and county. A current negotiation of a permanent conservation easement on the 569-hectare (1,406-acre) Rancho Dos Vistas will add to the regional network of conserved lands. Rancho Dos Vistas is at the top of Refugio Canyon and should contribute to the wildlife habitat of the Arroyo Hondo Preserve through a habitat connection and proper management (Map 2).

Another Land Trust project that is currently underway is a strategic agricultural easement on the 304-hectare (750-acre) La Paloma Ranch in Venadito Canyon. This easement will protect the property from any further subdivision in perpetuity by restricting the property to agricultural use only and the potential development of three residential sites. La Paloma Ranch connects to the Freeman Ranch, which already has an agricultural easement and was the first ranch on the Gaviota Coast that the Land Trust made an easement agreement on.

These conservation efforts, along with the Preserve, create a sound foundation for the Gaviota Coast's protection. The Land Trust considers Arroyo Hondo as representative of the character of the Gaviota Coast and important to the regional conservation along this stretch of southern California. While this unique property offers a valuable opportunity for the Land Trust to take on a resource management role, the preference for the Land Trust remains in the purchase of easements and not fee title acquisition.

The Preserve provides a natural and historical landmark for the county and its protection will benefit the public community and flora and fauna alike. The management of the Preserve supplements the protection of the watershed by the Los Padres National Forest. This parcel is one of the larger tracks of land other than Gaviota State Park that is set aside for public access and conservation. Having this large property as a natural reserve allows the public to enjoy and learn about the natural and historical features of the Gaviota Coast.

2.4. HISTORY OF ARROYO HONDO PRESERVE

Photo: W. Sears

The Ortega Adobe.

Arroyo Hondo Preserve has a long history of human settlement. Humans established permanent residence in the Santa Barbara area approximately 10,000 years ago (Caughman and Ginsberg 1987). One of the largest California Native American groups was the local Chumash – it is estimated that over 13,000 were living in the region by the time Spanish colonizers landed on the California coast. The Chumash in this area were mostly hunters and gatherers and their economy was heavily reliant on ocean resources, mainly fish and marine mammals (Chesnut 1993).

The Spanish arrived in this area in 1542 and several missions were subsequently built along the coast (Chesnut 1993). While converting the Chumash to Catholicism, Spanish settlers introduced cattle ranching, agricultural skills and the conventions and trades of Western civilization. The Gaviota Coast was located along the coastal route, known as El Camino Real connecting missionary settlements (Chesnut 1993, Santoro et al. 1993).

In 1782, Santa Barbara became the last Spanish community established to fill the gap between Monterey and San Diego, and Captain Jose Francisco Ortega was appointed the first commandant of the Santa Barbara Presidio (the highest ranking Spanish officer after the governor of California) (Chesnut 1993, Santoro et al. 1993). Upon his retirement in 1786, Jose Francisco Ortega was granted 10,700 hectares (26,530 acres) along the Gaviota Coast (Chesnut 1993, Santoro et al. 1993). This estate, known as Rancho Nuestra Senora del Refugio (hereafter "Refugio Ranch"), was the only land concession given by Spain in what is now Santa Barbara County. The property was designated as a grazing area, becoming home to the Ortega family, foremen, vaqueros and Indian servants (Chesnut 1993, Hvolboll 1978).

Mexico became an independent nation in 1810. It was only after the first Mexican Constitution was promulgated in 1824, however, that Spain officially lost its control over the Gaviota Coast (Chesnut 1993). Secularization began in 1836 and cattle ranching became the most important activity in the area, followed by whaling (Chesnut 1993).

The City of Santa Barbara was established in 1850 under the jurisdiction of the United States (Chesnut 1993). Refugio Ranch was one of the only titles kept by native-

born owners after California was admitted into the United States (Santoro 1993, Hvolboll 1978). Antonio Maria Ortega (Jose Maria's son, Jose Francisco's grandson) and Magdalena Cota-Ortega (wife of Jose Francisco Maria, Jose Francisco's other son) kept the property rights to the land (Hvolboll 1978).

Refugio Ranch was divided into parcels in 1856 (Hvolboll 1978). Antonio Maria received the eastern section, where Arroyo Hondo Preserve is located. In 1842, prior to the first division of Refugio Lands, Jose Vicente, Antonio Maria's brother, built Arroyo Hondo's adobe (hereafter "Adobe") that still stands today and was used as a lodge and restaurant for travelers (Cappon 1993, Hvolboll 2001). For nearly 60 years, Arroyo Hondo was mainly used as a stagecoach stop and as a route for cattle transportation. A schoolhouse for local children was built across the creek from the Adobe and was later used as a chicken house and tool shed (Hvolboll 2001).

One month before his death in 1856, Antonio Maria sold the Preserve to Diego Olivera who returned the property as a gift to Maria Luisa Gonzaga-Ortega a year and a half later. Maria Luisa and Pedro Ortega (Jose Vicente's son and Maria Luisa's husband) sold the property to E. Cordero in 1889 (Hvolboll 1978). In 1908, Jennie Hollister purchased the property as a picnic site for family gatherings from Cordero and it remained in the Hollister family for 3 generations (Hvolboll 1978, Cappon 1993).

3. PHYSICAL SETTING

3.1. PHYSICAL CHARACTERISTICS OF THE PRESERVE

3.1.1. WATERSHED

The Preserve is located within the lower reaches of the Arroyo Hondo watershed (Map 3). The watershed is located on the southern slope of the Santa Ynez Mountains, and drains approximately 1,131 hectares (2,797 acres). Arroyo Hondo Creek has continuous yearlong flow that runs southward down the canyon and through a cement culvert channel beneath Highway 101 before emptying into the Pacific Ocean (34º 28' 426" N Latitude; 120º 80' 470" W Longitude). The Preserve elevation varies from 0 to 430 meters (0 to 1,400 feet) above sea level.

3.1.2. GEOLOGY AND SOILS

The bedrock of the Preserve consists largely of sedimentary rocks including marine Monterey shale, Rincon shale, Vaqueros sandstone, siltstone, claystone, and mudstone from the middle Miocene period in the lower canyon, gradually shifting to the Eocene period northward up the canyon (Padre Associates 2001). The nearest fault is the Santa Ynez, located approximately 5 kilometers (3 miles) north of the property. The soil layer in the lower canyon is made up mostly of moderately compact clays and sandy loam, with inclusions of cobbles and shale. The native soil layers in the canyon bottom range from 0.6 to 1.0 meter (2.0 to 3.3 feet) in thickness (Santoro et al. 1993). The hillsides are comprised of landslide deposits and clays, and the upper canyon consists largely of sandy loam and rock outcrops. The soils and underlying bedrock of the property generally present a moderate to very high erosion potential, combined with a medium to very rapid rate of surface runoff (Padre Associates 2001.)

3.1.3. CLIMATE

The Gaviota Coast region is characterized by a classic Mediterranean summer-dry climate (U.S. Army Corps of Engineers 1985). Tempered by the relatively warm southern California eddy in the Santa Barbara Channel and the southerly exposure of the Santa Ynez Mountains, the region experiences mild conditions throughout the year, with average coastal air temperatures of approximately 12°C (53° F) in the winter and 19°C (66°F) in the summer. Summers are relatively dry, with frequent incursions of moist marine air in the spring and early summer, forming dense fog along the coast. Summer thunderstorms in the region are rare and of low intensity with relatively light rainfall, but carry the potential to spark wildfires in the dry chaparral of the Santa Ynez Mountains. Occasionally, tropical air masses will carry moist, warm air to the region, resulting in short and heavy rain showers.

The majority (90%) of the precipitation in the region falls from November to April, generated by large frontal storm systems originating in the North Pacific (U.S. Army Corps of Engineers 1985). While precipitation amounts can vary dramatically from year to year, the region typically experiences an average of 413 millimeters (16 inches) of rain, with an occasional light dusting of snow along the crest of the Santa Ynez Mountains (Table 1).

Table 1. Average monthly rainfall patterns in the Santa Barbara region (1961-1990)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mm	81.5	91.6	72.1	26.9	4.0	1.0	0.5	2.7	11.4	13.2	51.5	55.8	412.7
Inches	3.2	3.6	2.8	1.1	0.2	0.0	0.0	0.1	0.4	0.5	2.0	2.2	16.2

Source: http://www.worldclimate.com/worldclimate/cgi-bin/data.pl?ref=N34W119+2300+047905C

3.2. BIOLOGICAL CHARACTERISTICS

3.2.1. PLANT COMMUNITIES

Six plant community types have been identified on the property by John Storrer using the Natural Diversity Database classification scheme (Holland 1986). These include non-native annual grassland, Venturan coastal sage scrub, chaparral, coast live oak woodland, three types of riparian woodland and a remnant stand of coastal brackish marsh located in the lagoon (Map 4) (Storrer 2001). In addition to the natural communities present, two orchard areas exist in the front country and ornamental landscaping surrounds the Adobe.

3.2.1.1. Non-native Annual Grassland

Non-native annual grasslands are the dominant vegetation cover on the hillsides and canyon floor of the front country (with the exception of the east-side orchard and riparian corridor) and the Hollister Meadow area of the backcountry (Map 5) (Storrer 2001). Soils supporting this plant community are typically composed of poor-draining, fine-textured clays, saturated with water during the rainy season and dry during the summer (Storrer 2001, Holland 1986). Many wildlife species use annual grasslands for foraging, but typically require nearby habitat features such as cliffs, caves, ponds or habitats with woody plants for breeding, nesting, resting and cover (Mayer and Laudenslayer 1988).

The annual grasslands of the Preserve are dominated by a variety of European grasses, including brome (*Bromus* sp.), wild oats (*Avena* sp.), barley (*Hordeum* sp.), and rye (*Lolium* sp.). Introduced forbs include bur clover (*Medicago polymorpha*), filaree (*Erodium* sp.), and sweet clover (*Melilotus*). Ruderal species, including black mustard (*Brassica nigra*) and wild radish (*Raphanus sativa*) occupy expansive areas of former native grassland, often

in areas of active slumping or other soil disturbance. Native perennial grasses, including purple needlegrass (*Nassella pulchra*) and foothill needlegrass (*Nassella* lepida), occur in small, fragmented patches sometimes associated with areas of coastal sage scrub (Storrer 2001).

3.2.1.2. Venturan Coastal Sage Scrub

Venturan coastal sage scrub is characterized by contiguous soft woody shrub patches of 0.5 to 2.0 meters (1.5 to 6.5 feet) in height, with bare ground understory (Holland 1986). It is typical of areas with steep, south facing slopes, and mudstone or shale soils. At Arroyo Hondo Preserve, this plant community exists in scattered patches on both the southern and northern slopes of the east and west hillsides of the front country. It is also found as a layer of vegetation underlying a small patch of live oak woodland on the eastern ridge beyond Hollister Meadow (Storrer 2001). Dominant shrub species include California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), and sawtooth goldenbush (*Hazardia squarrosa*). Giant rye (*Leymus condensatus*) is the commonly associated grass species in this community. Secondary components of this community include: lemonade berry (*Rhus integrifolia*), coffee berry (*Rhamnus californica*), redberry (*Rhamnus crocea*), elderberry (*Sambucus mexicana*), black sage (*Salvia mellifera*), deerweed (*Lotus scoparius*), and mountain mahogany (*Cercocarpus betuloides*). Coastal sage scrub productivity is generally lower than in adjacent chaparral habitats (Mayer and Laudenslayer 1988).

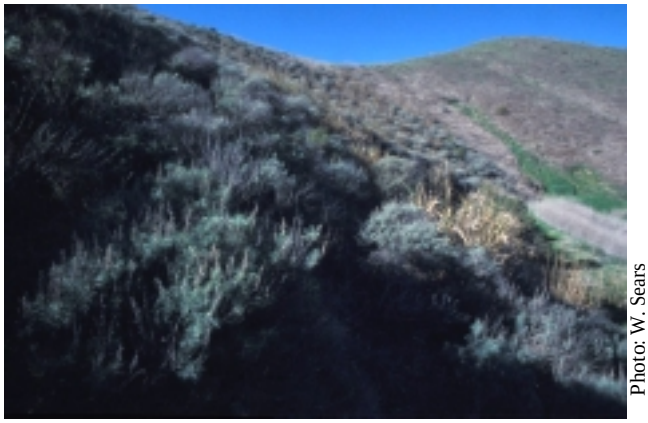

Photo: W. Sears

Coastal sage scrub on the western ridge of Arroyo Hondo Preserve.

3.2.1.3. Chaparral

Chaparral is the most extensive vegetation community found at Arroyo Hondo. In general, chaparral consists of evergreen woody shrubs adapted to cycles of drought and fire distributed typically at low elevations (Hanes 1988). Holland (1986) found that bigpod ceanothus (*Ceanothus megacarpus*) is often the dominant species of chaparral in the Santa Ynez Mountains, and as a consequence classified this plant community as *Ceanothus megacarpus* chaparral. Greenbark ceanothus (C. *megacarpus*), toyon (*Heteromeles arbutifolia*), laurel sumac (*Malosma laurina*), sugar bush (*Rhus ovata*), mountain mahogany, black sage, chamise (*Adenostoma fasciculatum*), prickly phlox (*Leptodactylon californicum*), poison oak (*Toxicodendron diversilobum*), sticky monkeyflower (*Mimulus aurantiacus*),

California buckwheat (*Eriogonum fasciculatum*), and holly-leaved cherry (*Prunus ilicifolia*) are also among the most commonly found shrub species at the Preserve. Vertical bedrock walls in the upper canyon allow growth of rock lettuce populations (*Dudleya lanceolata*), chaparral yucca (*Yucca whipplei*), prickly phlox, Indian paintbrush (*Castilleja* sp.), and several wildflower species.

3.2.1.4. Coast Live Oak Woodland

Coast Live Oak woodland generally occurs on the lower, shady exposures of the canyon, becoming denser in proximity to the creek and forming more of an open woodland in drier areas (Storrer 2001). The average canopy height is 10 to 25 meters (32 to 82 feet), consisting primarily of coast live oak (*Quercus agrifolia*). It is also found throughout the property in association with the riparian corridor and mixed together with coastal sage and chaparral communities (Storrer 2001, Mayer and Laudenslayer 1988). As mentioned in previous sections, the oak woodland understory incorporates species associated with annual grassland and coastal sage scrub communities (Storrer 2001). Representative species include poison oak, mugwort (*Artemisia douglasii*), hummingbird sage (*Salvia spathacea*), canyon sunflower (*Venegasia carpesioides*), snowberry (*Symphoricarpos mollis*), wild cucumber (*Mara macrocarpa*), fiesta flower (*Pholistoma auritum*), fuchsia-flowered gooseberry (*Ribes speciosum*), and bitter gooseberry (*R. amarum*).

Photo: W. Sears

California prickly phlox (*Leptodactylon californicum*), found in the coastal sage scrub and chaparral of Arroyo Hondo Preserve.

This woodland community supplies habitat for many wildlife species. There are at least 60 species of mammals associated with coastal oak woodland habitat; over 100 bird species have been documented within this habitat type during the breeding season in California (Verner and Boss 1980, Mayer and Laudenslayer 1988).

3.2.1.5. Riparian Communities

The riparian corridor of Arroyo Hondo is a relatively intact riparian ecosystem, sustaining a healthy aquatic environment and providing critical support for a number of riparian-dependent species (Storrer 2001). Four riparian communities are associated with Arroyo Hondo Creek: Southern Coast Live Oak Riparian Forest, Central Coast Cottonwood-Sycamore Riparian Forest, Southern Willow Scrub, and Estuarine (Storrer

2001, Holland 1986). California laurel (*Umbellularia californica*) is a primary component of the riparian overstory and is especially prominent in uniform stands in the middle reaches of the creek (Storrer 2001).

Riparian communities are generally linked to slow flows, gravelly or rocky soils and well-aerated substrata (Mayer and Laudenslayer 1988). Large specimens of sycamores and alders grow alongside the stream providing three attributes to the community: (1) bank stabilization with their roots; (2) refuge for resident aquatic and semi-aquatic fauna by providing habitat and cover; and (3) food, water, migration, and dispersal corridors for a wide variety of species, including nesting and migratory birds (Storrer 2001, Mayer and Laudenslayer 1988).

Southern Coast Live Oak Riparian Forest

According to Storrer (2001) the Southern Coast Live Oak Riparian Forest is the dominant riparian community along the mid and lower sections of Arroyo Hondo Creek. The understory of this type of community appears to be rich in poison oak, mugwort, wild blackberry (*Rubus ursinus*), snowberry, wood mint (*Stachys bullata*), and horsetail (*Equisetum* sp.). The overstory is dominated by coast live oak, western sycamore (*Platanus racemosa*), red willow (*Salix laevigata*), and California bay (*Umbellularia californica*). Plant species of regional interest that occur in this community at Arroyo Hondo include the giant stream orchid (*Epipactis gigantea*), usually found at small hillside seeps, and the tiger lily (*Lilium humboldtii*), scattered in shaded areas beside the creek.

Photo: W. Sears

Riparian woodland associated with Arroyo Hondo Creek.

Central Coast Cottonwood-Sycamore Riparian Forest

Central Coast Cottonwood-Sycamore Riparian Forest is a moderately dense forest comprised of deciduous trees such as black cottonwood (*Populus balsamifera*), bigleaf maple (*Acer macrophyllum*), western sycamore, and white alder (*Alnus rhombifolia*), in addition to the common coast live oak, willow, and California bay species (Storrer 2001). This community is well defined on the mid and upper portions of Arroyo Hondo Creek. In other stretches of the creek it is difficult to distinguish from the Southern Coast Live Oak Riparian Forest, because of the similarities in understory species.

Southern Willow Scrub

The signature species of the Southern Willow Scrub community is arroyo willow (*Salix lasiolepis*) (Storrer 2001). This species needs saturated sandy or gravelly soils, and the community is relatively homogenous with a poorly developed understory (Storrer 2001, Holland 1986). Stands of this community type are found along the lower reaches of the creek.

Estuarine

At the mouth of the creek exists a permanent lagoon of approximately 114 square meters (1,220 square feet) in area (TENERA Environmental 2001). The bottom substrate includes boulders, cobble, gravel and sand. The biota present at the pool includes a small cattail population (*Typha* sp.) and arroyo willow (Storrer 2001). Despite the modification of the lagoon, it still retains significant habitat value, evidenced by the presence of several sensitive aquatic species.

3.2.1.6. Native Fauna

The following discussion is based on preliminary surveys described by Storrer (2001) and observations of longtime resident J.J. Hollister. Future field studies will likely reveal many additional species residing at the Preserve. Species lists for each taxonomic group are provided in Appendix 7.

Mammals

The Preserve provides habitat for many native mammal species, including the two largest predators in the region: black bear (*Ursus americanus*) and mountain lion (*Felis concolor)*. Both species have been occasionally observed on the property. The main large prey item for the mountain lion, the mule deer (*Odocoileus hemionus*), is infrequently observed at the Preserve. Coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*) and bobcat (*Felis rufus*) are abundant in the watershed. Western gray squirrels (*Sciurus griseus*) have been documented in the riparian corridor and California ground squirrels (*Spermophilus beecheyi*) are conspicuous residents of the hillsides west of adobe orchard area. Striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*) and badger (*Taxidea taxus*) are also common residents of the property. The California myotis (*Myotis californicus*) is the only bat species that has been recorded at the Preserve; several other bat species are likely to occur there however, including the pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*).

Birds

Approximately 112 birds species utilize habitats on the Preserve; only a few are highlighted here. In 1999, three red-tailed hawk (*Buteo jamaicensis*) nests were observed in

the spring; adult peregrine falcons (*Falco peregrinus*) were reported in the upper reaches of the drainage in both the spring and summer. In the fall of 2000, two sightings of a juvenile golden eagle (*Aquila chrysaetos*) were documented. Nesting species include Cooper's hawks (*Accipiter cooperii*), two regionally important species of riparian-dependent songbirds, the warbling vireo (*Vireo gilvus*) and yellow warbler (*Dendroica petechia*), and five woodpeckers: the northern flicker (*Colaptes auratus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), downy woodpecker (*Picoides pubescens*) and hairy woodpecker (*Picoides villosus*). White-tailed kites (*Elanus leucurus*) and Northern harriers (*Circus cyaneus*) have been sighted during the fall and winter months. American kestrels (*Falco sparverius*) and red-shouldered hawks (*Buteo lineatus*) are known to be resident breeders, and four species of owls: barn (*Tyto alba*), great-horned (*Bubo virginianus*), screech (*Otus asio*), and northern pygmy (*Glaucidium californicum*) are permanent residents of the canyon. Nearshore waters off Arroyo Hondo are used by the California brown pelican (*Pelecanus occidentalis*), several species of gulls and other seabirds.

Reptiles and Amphibians

Arroyo Hondo Preserve supports a diverse assemblage of reptiles and amphibians. The southwestern pond turtle (*Clemmys marmorata pallida)* inhabits Arroyo Hondo Creek and lagoon, and nearby upland areas. Known snake species include the two-striped garter snake (*Thamnophis hammondii)*, elegant garter snake (*Thamnophis elegans elegans*), Southern Pacific rattlesnake (*Crotalus viridis helleri*), the California kingsnake (*Lampropeltis getulus californiae*) and the San Diego gopher snake (*Pituophis melanoleucus annectens*). Lizard species include the western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*) and coast horned lizard (*Phrynosoma coronatum*). Amphibian species include the federally listed red-legged frog (*Rana aurora draytonii*), as well as the Pacific chorus frog (*Pseudacris regilla*) and Canyon chorus frog (*Pseudacris cadaverina*). The Coast Range newt (*Taricha torosa torosa*), arboreal salamander (*Aneides lugubris*), ensatina (*Ensatina eschscholtzii*) and black-bellied slender salamander (*Batrachoseps nigriventris*) are residents of the canyon bottom and riparian areas of the Preserve.

Photo: Pete Choi

The Coast range newt (*Taricha torosa torosa*), breeds in the pools of Arroyo Hondo Creek in spring.

Fish

Only two fish species are known to occur within the creek and lagoon of Arroyo Hondo Preserve – both are federally listed endangered species. Juvenile southern steelhead trout (*Oncorhynchus mykiss irideus)* are present in the creek throughout the year. As many as 100 smolts have been sighted in the lagoon in the late summer months, and adults have been documented in the lagoon in both the fall and spring. Tidewater gobies (*Eucyclogobius newberryi)* were re-discovered in the lagoon in the winter of 2001 after a long absence (D. Dugan pers. comm.). It is likely that the local population was re-colonized by populations from creeks in nearby watersheds (Storrer 2001).

Several other fish species are likely to occur within the lagoon and creek at the Preserve. Prickly sculpin (*Cottus asper*) and top smelt (*Fundulus parvipinnis*) are two species likely to occur within the small remnant estuary at the mouth of Arroyo Hondo Creek. Other species potentially occuring within the freshwater reaches of the creek include pacific lamprey (*Lampetra tridentata*), arroyo chub (*Gila orcutti*) and staghorn sculpin (*Leptocottus armatas*) (Capelli pers. comm.).

3.2.1.7. Non-native Species

Several non-native invasive plant and animal species occur in the Preserve. Section 5.3 describes the impacts and extent of these species at Arroyo Hondo, and discusses current and future efforts to eradicate or control these populations.

3.3. PHYSICAL IMPROVEMENTS, PREVIOUS ENCANHEMENT AND MANAGEMENT

There is a long history of land management and physical improvements at Arroyo Hondo. This section identifies past improvements and management activities on the Preserve that are either impacting the property today or are of notable historical interest.

3.3.1. INFRASTRUCTURE AND PHYSICAL IMPROVEMENTS

3.3.1.1. Structures

The ranch house at the Preserve is a 608-square meter (2,000-square foot), three bedroom historic adobe built by Jose Ortega in 1842 (Hvolboll 1978). The Adobe has walls that are 0.6 meters (2 feet) thick with an insulated attic, designed to keep the indoor temperatures moderate throughout the year. Two bathrooms, one on either side of the house, have been added to the original structure (Hollister 1999). The walls inside the Adobe were renovated in 1955, after damage was caused to the plaster by a large flood. It was renovated again after it was damaged from the October 1978 earthquake (Hvolboll 2001).

Other structures built on the property include: a wooden barn with adjacent corrals; a small picnic area with several large picnic tables, a sink, propane grill, adjacent tent platforms, two outhouses and a shower; minimal ranch fencing; and approximately 6 hectares (15 acres) of avocado and citrus orchards (Hollister 1999).

There is a backcountry cabin up in the canyon. The original cabin burnt down and was rebuilt by Vicente Ortega in 1948 (Hvolboll 2001). It is currently in rather poor condition and in fact is outside the boundary of ownership of the Land Trust. Remnants of a foundation across the trail from the picnic area is another structure of historical significance. It is believed to be an old storage shed, possibly used to store grain. There were several structures once present on the Preserve that are of historical interest but have little effect on the current and future management of the property. An old schoolhouse, located in the east side orchard near the barn, burned down in the 1955 Refugio fire (Hvolboll 2001). No evidence of it remains today. Information on these will be gathered for historical records and for the purposes of an historical interpretive program to be later developed for the Preserve.

3.3.1.2. Utilities

Utilities on the property include: three wells capable of producing a total of approximately 340 liters (90 gallons) per minute; a septic tank and leach field located next to the Adobe; and electricity servicing the Adobe, barn, and picnic area (Hollister 1999). The primary water well now serving the Adobe was drilled in 1994 in the Vaqueros Sandstone formation to a depth of approximately 182 meters (600 feet). Map 5 shows the locations of the wells in reference to the Adobe and other points of interest. This well produces 170 liters (45 gallons) per minute. The second well was drilled approximately 30 years ago to a depth of 106 meters (350 feet) and is capable of producing 114 liters (30 gallons) per minute. The final water source for the Preserve is an enclosed cistern down the canyon from the Adobe. It is 9 meters (30 feet) deep and has a static water level approximately 3 meters (9 feet) below ground. It is capable of providing 76 liters (20 gallons) per minute but is generally reserved for emergency use due to poor water quality. There is a 132,489-liter (35,000-gallon) water storage tank located on the eastern slope of the canyon, just below the front ridge. Attached to it is an underground plastic pipe that carries the water by gravity down to the Adobe, surrounding buildings, and garden. Electricity on the Preserve is supplied by Southern California Edison. There are several transformers that carry electricity through much of the front country of the property (see Map 5 for demarcation of front country). There are utility easements on the property within close proximity to Highway 101 that allow for electrical and telephone lines as well as gas pipelines to pass through the Preserve (Kauttu 1999).

3.3.1.3. Roads and Trails

A road system was developed on the Preserve. It was used in the past for driving horses and carriage, and general access and maintenance purposes (Hollister 1999). The main bridge crossing the creek was built in 1996, after the original bridge was washed out in a flood (J. J. Hollister pers. comm.) Ranch roads have been developed throughout most of the front country of the Preserve (Hollister 1999). Most of these roads will become public hiking trails, but will be maintained enough to allow vehicular passage for maintenance purposes or in the case of an emergency.

Due to the Preserve's location on the coast, it is influenced by several larger traffic-related improvements. These include Highway 101 and the Southern Pacific railroad. The railroad trestle was built circa 1900 (Chestnut 1993). The highway fill over the creek was put in two stages, with the first stage starting around 1949 with the initial construction of the culvert. At this point, the old Highway 1 Bridge was still being used for southbound Highway 101 traffic. The rest of the fill was placed over the culvert in the mid-1970s, creating the 4-lane Highway 101 that is used today (J. J. Hollister pers. comm.). The abandoned Highway 1 Bridge (now used as a foot bridge) was apparently built around 1927 to replace the original county road that passed through the lower canyon of Arroyo Hondo and over the creek

3.3.2. HISTORICAL USES AND LAND MANAGEMENT

Agriculture has been a part of the landscape and culture of Arroyo Hondo Preserve, and the entire Santa Barbara region, since the Spanish settlement of California during the Mission Period (1769-1834). The padres of the Santa Ynez Mission planted a small orchard at Arroyo Hondo consisting of a few pear, olive, and cherry trees; the pear tree is still present in the east side avocado orchard, and a remnant olive tree exists along the road on the west side of Arroyo Hondo Creek (Hvolboll 2001). The remains of vineyards, thought to have been planted by early Mission padres, can be found near the west-side orchard and up-canyon (Cappon 1993).

Photo: W. Sears

The barn and stables at Arroyo Hondo Preserve.

Avocado orchards were established on the eastern side of the creek in the early-1970s and managed actively for about 25 years (J. J. Hollister pers. comm.). An irrigation

network was installed to support the avocados, but has since been nearly completely destroyed from storms and landsliding and slumping during the 1990s. The soils in the canyon are not suitable for avocados; they retain water too well and drown the roots of the trees. For these reasons, active management of the avocado orchard was relinquished in the mid-1990s. Parts of the orchard, mainly the upper areas against the hillside, still bear healthy fruit and were harvested by the past owners up until sale of the property.

There is a long history of cattle ranching in and around Arroyo Hondo. In 1875 William Hollister began a large cattle operation running from Arroyo Hondo west to Point Conception. While the Hollister family did not own Arroyo Hondo at that time, it was still used as a ranching stop for herding the cattle up and down the coast (J. J. Hollister pers. comm.). This operation continued for several decades, but Arroyo Hondo's role in it was minor. In recent history, there were 30 to 40 head of longhorn cattle kept at Arroyo Hondo for about 12 years before being removed in 1998. There remains today three domesticated animals on the property – two horses and one mule. The Land Trust has agreed to keep these animals on the Preserve until they pass. Their impact on the land is seemingly low. Nonetheless, efforts will be made to ensure they are not adversely impacting the Preserve. These efforts will be discussed in later sections of this report.

Prior to purchasing the ranch, the Land Trust contracted Padre Associates, Inc. (2001) to conduct a Phase 1 environmental site assessment to determine whether current and/or previous land use at the property caused contamination to the environment. Based on their analysis, none of the land uses on the property have resulted in notable environmental contamination. Specific results are summarized below:

- No evidence of widespread dumping or landfills was observed at the property.
- Historical agricultural operations at the ranch may have involved environmentally persistent pesticides. Generally, the presence of residual pesticides, originally applied for agricultural purposes, does not require remedial actions. No additional assessment for historical pesticide contamination is recommended.

3.4. THREATS

One of the primary purposes of developing and implementing a management plan is to control and plan for the impacts that different activities or events have on the viability of the Preserve. Threats can be damaging to the resources within the Preserve unless they are managed effectively. Threats to the maintenance of the property as a preserve include, among other things, surrounding land uses and trends, overuse by people and exotic species effects. The following sections discuss some of the threats to the integrity of the Preserve as a biological sanctuary and place of public use and enjoyment. The conceptual models (Appendix D) discussed later in this management plan provide additional information on the source of threats to the Preserve, their effects

on the resources and the public, and what management actions can be taken to address them. In addition, the conceptual models will also illustrate the relative risks of each of the threats and help to prioritize them in order to focus management actions on the more pressing issues.

3.4.1. CURRENT THREATS

3.4.1.1. Exotic Species

One of the most significant threats to biodiversity comes from the presence of exotic plant species within the Preserve. There is strong evidence to suggest that the spread of alien species is the second greatest threat to biodiversity, second only to habitat loss (Wilcove et al. 1998). The Land Trust will dedicate resources to managing this threat to mitigate its adverse impacts on the resources within the Preserve. This issue will be discussed in detail in Section 5.3 of this management plan.

3.4.1.2. Land Use

While the Preserve is somewhat insulated from external anthropogenic threats, it is bordered by a national forest to the north and the ocean to the south, there are a few issues that can potentially pose a problem for its management. The County Tajiguas landfill that lies to the east of the Preserve presents several problems to the property. A minor issue with respect to the landfill concerns the noise that emanates from the site on a regular basis. Aside from the daily operations, there are occasional explosive "booms" that resonate across the landscape. They are in fact air canons that are used to disperse seagulls from the landfill. While the effects of these blasts are short-lived, they are disturbing to wildlife and the recreating public. The Land Trust should discuss noise abatement measures with the County to minimize the adverse impacts to the Preserve.

A potentially more serious threat from the landfill results from the gulls that are attracted to the area by the trash. The lagoon has become the resting ground for a large number of gulls. There is anecdotal evidence to suggest that this high presence of birds, more than would be expected under normal conditions, is directly linked to the location of the landfill in the adjacent watershed (J. Storrer pers. comm., Peterson 2001). It has been suggested by local biologists that the lagoon is likely being used by the birds for cleaning and a source of water for drinking, because it is one of the only freshwater ponds in the vicinity (J. Storrer pers. comm.). The presence of these birds may threaten the viability of the populations of endangered species that occupy the lagoon. The potential problems include increased bacteria levels in the lagoon from the birds as well as the possible risk of predation on the tidewater gobies, California red-legged frogs, and southern steelhead trout. This will be discussed further in Section 5.1 of this document.

In addition to the possible contamination from the bird presence, the landfill also poses a potential threat of groundwater contamination. While the landfill is only for municipal waste, there is still the potential for hazardous substances that have been

documented at the site (e.g. trichloroethane, hexavalent chromium, and vinyl chloride) to percolate down into the groundwater, given the fact that the landfill is unlined and in contact at times with the underlying aquifer (GeoSolv 2001). The Draft EIR for the Tajiguas Landfill Expansion Project (TRC 2001) states that:

> *"A component of the southward groundwater flow is blocked by cross-strike (east-west trending), low permeability aquitard units. For example, water level monitoring data indicate that some groundwater flow within the Vaqueros aquifer is deflected eastward, around the Rincon Formation (aquitard), where it may discharge as base flow to the alluvium in Arroyo Quemado. This suggests that bedrock aquifers exposed in Canada de la Pila may be hydraulically connected to those in adjacent canyons and watersheds via lateral flow along contacts with aquitard units."*

There is currently not enough information, however, to accurately assess the level of threat in terms of groundwater contamination presented by the landfill.

3.4.1.3. Natural Processes

Naturally occurring processes also pose a threat to the Preserve. Winter storms along the coast have led to sizable landslides within the Preserve. Such events will most likely continue into the future regardless of any efforts taken by the Land Trust. These landslides are capable of making sections of the hiking trails impassable by the public. Thus, an impact of landslides is the deleterious effect it can have on public recreation at the Preserve.

Landslides also present a problem to Arroyo Hondo creek. Sedimentation from these slides into the creek can potentially be damaging to the health of the aquatic ecosystem. Aside from landslides, creek sedimentation can also occur from more general erosion from trails and creek banks. This will be discussed in more detail in Section 5.1 of this document.

Fire is another threat that will be a concern at the Preserve. The last significant wildfire in the area was the Refugio fire in 1955 (Chestnut 1993). Fire is a natural renewing process, and its suppression for the last several decades will likely lead to a destructive disturbance some time in the future. This threat only grows as vegetation growth increases the fuel load of the Preserve. Strategies for managing this threat will be discussed in detail in Section 5.4 of this management plan.

3.4.1.4. Environmental Hazards

There are several issues that could potentially pose environmental hazard concerns on the property. According to the Padre Associates Phase 1 survey (2001), "high radon concentrations are generally associated with the Rincon shale formation. The [Adobe] is constructed in an area of the [property] overlying [this] formation. Radon is considered to be an environmental concern for the [property]." Another potential risk associated with the Adobe and other structures is the possible presence of asbestos and lead.

According to the Phase 1 survey "based on the age of the on-site buildings, asbestos-containing materials and lead-based paint is potentially present at the on-site structures." The pole-mounted electrical transformers stationed at the Preserve may potentially contain polychlorinated biphenyls (PCBs), though unlikely given that no leakage was detected upon inspection in 2001. Finally, there is also the potential that PCBs are present in beach and nearshore sediments resulting from historical releases from the former Shell Hercules Oil and Natural Gas Processing Facility located adjacent to the property. This again is a low threat, however, given that actions were taken to remediate PCBs in the soil at the facility. The management actions in response to these environmental threats will be discussed in Sections 5.5 and 5.6 of this document.

3.4.2. FUTURE THREATS

3.4.2.1. Exotic Species

Many of the threats discussed above may continue to be present in the future. However, there are some threats that have yet to present themselves, and for which the Land Trust will have to properly plan and manage so as to minimize their future impacts on the Preserve. Aside from the spread of exotic plant species, non-native wildlife can also potentially pose a problem for the Preserve in the future. Two of the primary concerns are pigs (*Sus scrofa)* and bullfrogs (*Rana catesbeiana*). Domestic dogs (*Canis familiaris*) and cats (*Felis catus*) can also present a problem to the wildlife on the Preserve; this threat would increase if the adjacent land to the west were to be developed into additional homes. While the pigs and bullfrogs have not entered the canyon, they are present in other areas along the Gaviota coast (P. Collins and J. Storrer pers. comm.) and it is possible that they will find their way to the Preserve in the future. A more detailed discussion of invasive exotic species will be discussed in Section 5.3.

3.4.2.2. Overuse

Another potential threat to the Preserve in the future is public use. If not managed properly, use of the Preserve by the public can have significant impacts to the resources present. The public must use the site in a manner consistent with the primary objective of the Land Trust – resource protection. Important threats that must be considered regarding public use are: frequency and intensity of recreational use, public activities allowable at the Preserve; and areas accessible by visitors. Discussion of the strategies for managing the public access regime to avoid overuse and mitigating potential impacts will be detailed in Section 5.6 of this document.

3.4.2.3. Land Use

There is a proposal currently on the table by the County to expand the Tajiguas Landfill in the future to accommodate the region's growing waste disposal needs. It is unknown what impact this could have on the Preserve. The recent Draft Environmental

Impact Report (2001) produced by TRC for the Santa Barbara County Department of Public Works regarding the Tajiguas Landfill Expansion Project documented surface water quality impacts at the Arroyo Quemado lagoon and ocean outlet possibly resulting from operation of the landfill. There is a possible threat of the same impact being imposed on Arroyo Hondo. The Land Trust has submitted comments on the Draft EIR requesting that the Final EIR include a full discussion of the expansion project's impact on, and appropriate mitigation for, water quality impacts on Arroyo Hondo Creek and the groundwater source underneath the Preserve.

Development issues related to adjacent land to the west of the Preserve can potentially pose a threat in the future. Currently there are two private ranches located adjacent to the Preserve. Only the current landowners know the future plans of their properties. They currently pose no threat to the Preserve, but if they were to be subdivided and turned into smaller ranches, there would be a greater risk to the Preserve vis-à-vis increased fire danger, uncontrolled public access, and the spread of exotic plant species from livestock or ornamental landscaping. The Land Trust should open channels of communication with these landowners to discuss the future of the land Fortunately, the rugged terrain on the landscape to the west will prevent significant development of the area, so there is not a high likelihood of a serious threat to the Preserve resulting from over-development of the neighboring lands.

3.5. BASELINE DATA AND INFORMATION NEEDS

3.5.1. INFORMATION GATHERING

3.5.1.1. Natural Resources

While the Preserve was in private ownership, the Hollister family commissioned and permitted informal natural history studies and surveys on the property. The types of past investigations include cursory geologic examinations and species and habitat surveys. Of these initial information-gathering efforts, some of the most significant to the immediate management of the Preserve are the numerous species and habitat field surveys, the preliminary species occurrence mapping, and the species and habitat investigation by John Storrer, a wildlife biologist, and Paul Collins, a vertebrate zoologist for the Santa Barbara Museum of Natural History.

There are two other surveys that contribute to the baseline information for the species found at the Preserve. The bird list for the Preserve (Appendix G) is a compilation of several visits by wildlife biologists from 1999 to 2001. This list provides representation for the diversity of bird species and underscores the importance of managing for the various types of habitat that exist on the property. Another report with valuable species information and data is the "Final Report on Biological Surveys and Monitoring for the Shell/SPECO Flowline Abandonment Project." This report prepared for Padres and Associates Inc. by TENERA Environmental presents useful

data regarding the southern steelhead trout, tidewater goby, and California red-legged that reside in the lagoon at the mouth of the creek. These inventories and surveys provide the Land Trust with general background information on the species and vegetation community types that exist on the property, and also help to identify the types of additional information that will be useful and/or necessary for managing the Preserve and developing a comprehensive monitoring program.

3.5.1.2. Cultural and Historical Resources

Cultural and historical information is well documented for the Preserve and the Gaviota Coast as a whole. A significant amount of the historic information and photos are from J.J Hollister and a number of remembrances from various people that contain further details and anecdotes about the property. Additionally, the "Phase III Final Report of Archaeological Investigations" prepared by Santoro et al. of Ogden Environmental and Energy Services summarizes the culturally significant Chumash artifact findings. This report, required for the All American Pipeline Company's coastal pipeline project, was necessary to ensure the proper preservation and mitigation of cultural resources from potential impacts of the project. The report includes detailed findings of Chumash artifacts and maps the geographic extent of the Chumash presence at the Preserve as well as along the Gaviota Coast.

3.5.2. ECOLOGICAL RESEARCH

An important current research endeavor that is occurring regionally in Santa Barbara County and locally at the Preserve is the Santa Barbara Coastal Ecosystem (SBC) Project, which is part of the National Science Foundation's Long Term Ecological Research (LTER) Network. The SBC LTER is focusing on ecological systems at the land-ocean margin and Arroyo Hondo Creek has been targeted as a prime candidate since the study's inception. This LTER is focusing on monitoring the impacts of human activities on coastal watersheds and studying the linkages with stream, wetland, ocean and terrestrial habitats. More specifically, this study is researching the effects of multiple coastal watersheds in Santa Barbara County on kelp forest ecosystems in the Santa Barbara Channel (The Santa Barbara Coastal Ecosystem Project Long Term Ecological Research 2002). Monitoring at the Preserve for the SBC LTER includes measuring creek flow and sediment and nutrient loading during storm events (J. A. Melack pers. comm.). Data from this study will be made available to the Land Trust and can be used to monitor the water quality status of the creek and the habitat conditions for the sensitive aquatic species.

3.5.3. FUTURE NEEDS

Future inventory and research is essential to the interim and long-term management of the Preserve, since relatively little information exists for the current conditions of the watershed. Additional information will assist in developing a greater

understanding of processes, characteristics, and threats on the Preserve. The baseline information that currently exists will need to be supplemented by future surveys, inventories and research that will assist in the implementation of this Interim Management Plan. This information is necessary in order to evaluate the impacts of the Preserve's management on the sensitive resources present and establish specific measures of success for achieving the stated goals of the Land Trust in terms of resource protection and enhancement. Information and monitoring needs are discussed in more detail in each of the management strategies of Section 5.

4. MANAGEMENT GOALS

The designation of management goals is a critical first step in planning for the stewardship of natural lands. The overarching goals for the Preserve are derived from the Guiding Principles Statement established by the Land Trust Board of Trustees (Appendix B) and are listed below in order of priority:

Overarching Goals for the Arroyo Hondo Preserve

1. Protection and restoration (where feasible) of the natural diversity of ecological resources present on the property, including habitats, species, and processes.
2. Protection of cultural and historical resources.
3. Provide for limited public use and enjoyment of the Preserve, including educational, recreational, and research activities.

The specific ecological and programmatic goals listed below are designed to support the achievement of the overarching goals, define the general scope of anticipated activities, and provide a general framework within which management actions will take place at the Preserve.

Management goals and strategies in this plan have be designed to achieve a level of resource protection similar to that which is provided for lands managed by The Nature Conservancy, where resources are of primary concern and public use is provided as long as it does not impinge on efforts to conserve and protect species, habitats, and historical and cultural resources (The Nature Conservancy 2000). The actions discussed in this plan reflect that management philosophy. There are some activities that are clearly inconsistent with the goal of resource protection. The presence of equestrian use, mountain biking, and dogs at the Preserve, for example, may impede the Land Trust's ability to meet the overarching goals for the Preserve. If the Land Trust is intent on allowing such activities at the Preserve, then the goals of the Land Trust may presumably shift from those that fall under a natural preserve to those that are more kin to open space protection. As such, decisions regarding the types of uses that are ultimately allowed at the Preserve will need to be evaluated in that context. A significant commitment of human and financial resources to resource protection and enhancement will be required for the Land Trust to achieve its goals for the property. In order to help the Land Trust achieve its goals and facilitate this fact, the summary table of management actions (Appendix E) prioritizes actions and recommendations so that the limited resources of the Land Trust can be directed towards the most essential needs of the Preserve.

4.1. ECOLOGICAL GOALS

Species and Habitat Conservation (Section 5.1)

Goal: Protect and facilitate the recovery of endangered, threatened, and sensitive species within the Preserve.

Restoration and Enhancement (Section 5.2)

Goal: To the extent feasible, restore and enhance native plant communities, degraded landforms, aquatic habitats, and physical processes to provide for diverse, self-sustaining ecosystems within the Preserve.

Exotic Species Management (Section 5.3)

Goal: Protect the integrity of native plant communities through eradication and control of invasive non-native plants throughout the Preserve, in conjunction with Restoration and Enhancement goals and objectives (Section 5.2). Prevent the establishment of additional invasive non-native plant and animal species on the Preserve.

Fire and Vegetation Management (Section 5.4)

Goal: Manage fire risks to protect visitors, staff and infrastructure, and reduce the likelihood of large catastrophic wildfire events. Where possible, use fire and vegetation management techniques to maintain and enhance native plant communities and habitat diversity at the Preserve.

4.2. PROGRAMMATIC GOALS

Cultural and Historical Resources Management (Section 5.5)

Goal: Preserve the historical and cultural features of the Preserve and enhance the public appreciation of these resources.

Public Use (Section 5.6)

Goal: Provide opportunities for outdoor education, passive recreation, and research consistent with the protection of natural and cultural resources present on the Preserve.

Agricultural Management (Section 5.7)

Goal: Maintain small-scale agriculture at Arroyo Hondo Preserve consistent with resource protection to provide opportunities for interpretation of regional agricultural history and organic orchard management techniques.

Maintenance, Administration, and Planning (Section 5.8)

Goal: Provide the necessary infrastructure, maintenance, and planning to protect the Preserve's natural and cultural resources and support compatible public use of the Preserve.

5. MANAGEMENT STRATEGIES

Management Approach

The strategies detailed below discuss specific interim actions and long-term recommendations for the Land Trust to consider and implement in the stewardship of Arroyo Hondo Preserve. The general approach to managing the Preserve will be adaptive in nature, recognizing that strategies will likely need to be altered as new information becomes available and the threats to the goals for the Preserve change.

Conceptual Models

This management plan has taken a threats-based approach to designing management strategies, based on the assumption that the minimization or elimination of threats to resources on the Preserve will lead to the maintenance and enhancement of habitats (The Nature Conservancy 2000). Conceptual models (Appendix D) can be used as visual representations of relationships between processes that are believed to prevent or lead to a desired condition (Margoluis and Salafsky 1998). For the Interim Management Plan, conceptual models were selected among other methods because of their transparency in showing the linkages between stressors, their effects, and their mitigation through management actions. The models were used to demonstrate the thought process behind the development of the particular management actions and monitoring schemes. The predominant theme of the conceptual models was the identification of stresses that may be impeding the ability of the Land Trust to meet its goals and objectives of resource protection and passive public use for the Preserve.

The project team identified two types of stressors: existing and potential (e.g. existing fire suppression versus a potential regional fire). Existing stressors were illustrated as rectangles and potential as ovals. The likelihood that a specific stressor would trigger a specific effect was categorized into two classes: high risk and low risk (e.g. the high likelihood that a regional fire will damage infrastructure, as opposed to the low likelihood that the same stressor would harm visitors). High risk was illustrated by a solid arrow and low risk by a dashed arrow. The effects of the stressors were classified as existing or potential with rectangles and ovals respectively. The effect of a stressor, if it were to occur, was classified as either having a low impact (dashed contour line for the circle or oval) or high impact (solid contour line). Finally, a solid line with a clear arrow was used to connect management actions or monitoring schemes to the effects that they are attempting to address.

The following management strategies employ the conceptual models to systematically consider actions and recommendations that reduce or eliminate the effects of stressors, thereby enhancing species and habitat viability, historical and cultural resource protection and enhancement, and public safety and enjoyment at the Preserve.

Definitions

Each management strategy section follows the general format shown below:

Goal: General summary of the desired future state to be accomplished through management. It is intended to be visionary and brief.

Objectives: Specific statements detailing the desired future conditions designed to support the achievement of management goals once the management plan is implemented.

Interim Management Actions: Actions to be taken in the near term (within the first 5 years) that diminish the effects of stressors and support the management objectives.

Long Term Recommendations: Suggested measures to be considered in the future that will help to further enhance resource protection and public access on the Preserve, but which are not immediately required to mitigate or avoid a stressor.

Discussion: Formal description and discussion of interim management actions and long-term recommendations.

Regulatory Considerations: Regulatory issues related to the implementation of management actions.

Limitations and Challenges: Identification of the implications and constraints of implementing specific management actions.

Information and Monitoring Needs: Identification and prioritization of gaps in information and monitoring recommendations in order to effectively manage the resources and evaluate the impact of management actions on the Preserve.

Coordination and Partnerships: Identification of existing and potential cooperation and partnerships between the Land Trust and government agencies, non-governmental organizations, citizens, and scientists of the region that will support the realization of management goals and objectives.

5.1. SPECIES AND HABITAT CONSERVATION

Photo: Dan Dugan

Juvenile steelhead (*Oncorhynchus mykiss irideus*) in the lagoon at Arroyo Hondo Preserve

Arroyo Hondo Preserve harbors threatened, endangered, and special status (TES) plant and animal species (Table 2) protected under federal and state legislation (Table 3). Three resident species – southern steelhead trout (*Oncorhynchus mykiss irideus*), California red-legged frog (*Rana aurora draytonii*), and tidewater goby (*Eucyclogobius newberryi*) – are protected under the Federal Endangered Species Act of 1973 (ESA); other special status species known to occur at the Preserve are protected by the California Endangered Species Act of 1984 and/or California Fish and Game Code.

The Preserve also contains riparian and stream habitats designated as sensitive under the Local Coastal Plan (as required under the California Coastal Act) for Santa Barbara County. For the purposes of this Interim Management Plan, plant species listed by the California Native Plant Society and other species of regional concern are also considered to be priority species for protection.

Table 2. Endangered, threatened, and special status species of Arroyo Hondo Preserve

Common Name	*Scientific Name*	Regulatory Status[1]	Occurrence
Fish			
Southern steelhead	*Oncorhynchus mykiss irideus*	Federal Endangered	Resident
Tidewater goby	*Eucyclogobius newberryi*	Federal Endangered	Resident
Reptiles and Amphibians			
California red-legged frog	*Rana aurora draytonii*	Federal Threatened	Resident
Southwestern pond turtle	*Clemmys marmorata pallida*	State Species of Concern	Resident
Coast range newt	*Taricha torosa torosa*	State Species of Concern	Resident
Two-striped garter snake	*Thamnophis hammondii*	State Species of Concern	Resident
Coast horned lizard	*Phrynosoma coronatum*	State Species of Concern	Resident
Birds			
California brown pelican	*Pelecanus occidentalis*	Federal Endangered	Nearshore visitor
Peregrine falcon	*Falco peregrinus*	Federal Endangered (Delisted) State Endangered	Possibly resident
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	State Species of Concern	Resident

Common Name	*Scientific Name*	Regulatory Status[1]	Occurrence
Cooper's hawk	*Accipiter cooperii*	State Species of Concern	Probably resident
White-tailed kite	*Elanus leucurus*	State Fully Protected	Transient
Northern harrier	*Circus cyaneus*	State Species of Concern	Winter visitor
Golden eagle	*Aquila chrysaetos*	State Fully Protected	Transient
Loggerhead shrike	*Lanius ludovicianus*	State Species of Concern	Winter visitor
Yellow warbler	*Dendroica petechia*	State Species of Concern	Summer resident
Mammals			
Mountain lion	*Felis concolor*	State Specially Protected Mammal	Resident
Western gray squirrel	*Sciurus griseus*	Local concern	Resident
American badger	*Taxidea taxus*	State Species of Concern	Resident
Plants			
Catalina mariposa lily	*Calochortus catalinae*	CNPS List 4	Present
Hoffmann's nightshade	*Solanum xanti hoffmannii*	Local Endemic	Present

Federal Endangered and Federal Threatened: Species protected under the Federal Endangered Species Act
State Endangered: Species protected under the California Endangered Species Act.
State Species of Concern: Species declining at a rate that may result in listing as Endangered or Threatened.
State Fully Protected: Species protected under California Fish and Game Code.
State Specially Protected Mammal: Species protected under California Fish and Game Code 4800-4809.
CNPS List 4: Plants listed by the California Native Plant Society as having limited distribution.

Table 3. Federal and state legislation protecting biological resources present at Arroyo Hondo Preserve

Jurisdiction	Regulation Name	Administering Agency	Regulatory Objective
Federal	Endangered Species Act of 1973	U.S. Fish and Wildlife Service; National Marine Fisheries Service	Protect and manage federally listed species
State	California Fish and Game Code 3511: Fully Protected California Fish and Game Code 4800-4809: Specially Protected Mammals	California Department of Fish and Game (CDFG)	Protect the birds, mammals, fish, amphibians and reptiles of California
State	California Endangered Species Act of 1984, California Fish and Game Code 2050-2116	California Department of Fish and Game (CDFG)	Protect state-listed plants and animals
State / County	California Coastal Act (Environmentally Sensitive Habitat Area Designation)	Santa Barbara County Planning and Development Department	Protection of sensitive habitat within the Coastal Zone as designated within the Local Coastal Plan

Early recovery actions for TES species under the Federal ESA were based on a narrow, single-species view of conservation, where strategies for protecting individual species were developed without comprehensive planning for protection of critical habitats. Recent efforts to protect species have taken a broader, habitat-based approach

in response to the ever-increasing number of listed species and widespread threats to ecosystems (F. W. Davis pers. comm.). The strategies in this plan attempt to implement this broad approach to TES species conservation on a small-scale at the Preserve, with a focus on managing natural communities and habitats for the benefit of multiple species.

Management Goal

Protect and facilitate the recovery of endangered, threatened, and sensitive species within the Preserve.

Objectives

1. Protect sensitive lagoon, creek, and riparian habitats by minimizing recreational impacts.
2. Protect coastal sage scrub, chaparral, coast live oak woodland, and riparian communities.

Interim Actions

1. Prohibit recreational access in the lagoon, and in and around the creek, except at designated creek crossings and established day use sites, through the use of signs, fencing, or other barriers.
2. Perform visual inspections for California red-legged frog, southern steelhead trout and southwestern pond turtle at main creek crossing before driving a vehicle across.
3. Prohibit off-trail use in order to protect all habitats for species.
4. Work with experts to study the effects of the elevated gull population on the lagoon environment and seek mitigation if negative effects are determined.
5. Close ancillary stream crossings to reduce visitor intrusion into riparian habitat.
6. Measure water quality during low flow and storm flow conditions to determine the impacts of erosional processes and bacteria on the aquatic habitat.

Long-term Recommendations

1. Continue interim actions for Section 5.1 and incorporate adaptive management principles (Appendix G) into current management strategies.
2. Document occurrence and natural history for southern steelhead, tidewater goby and California red-legged frog on an annual basis to provide baseline information for monitoring species persistence over time.
3. Compile an inventory of plant, mammal, reptile, bird and amphibian species occurrences at the Preserve.

5.1.1. THREATENED, ENDANGERED AND SPECIAL STATUS SPECIES

The following species accounts attempt to incorporate natural history information specific to populations of TES species occurring at the Preserve. Few formal surveys have been conducted at Arroyo Hondo, and little is known about the population dynamics, structure, and habitat use of species known to occur there. The most complete natural history study of the Preserve was conducted by Paul Collins and John Storrer of the Santa Barbara Natural History Museum (Storrer 2001). Inventory work on the property has focused primarily on vertebrate species; little is known of the invertebrates or plants of the Preserve. Future surveys for these groups may uncover additional TES species.

5.1.1.1. Threatened and Endangered Species

Southern steelhead (*Oncorhynchus mykiss irideus*)
Federal Status: Endangered (1997) (Southern California ESU)

Status and Distribution: Southern steelhead are found in coastal streams from the Santa Maria River in San Luis Obispo County to Malibu Creek, Los Angeles County (National Marine Fisheries Service 1997). Within Arroyo Hondo creek, juvenile steelhead have been observed from the lagoon to the confluence of the two major tributaries, just north of the property boundary (W. Sears pers. obs.). Steelhead have been known to occur within the creek for at least several decades (J. J. Hollister pers. comm.). Steelhead populations in southern California have been affected by urban development, installation of culverts, dams, and other barriers to upstream migration, and climatic conditions including droughts, floods, and fire (National Marine Fisheries Service 1997).


Photo: Dan Dugan

An adult southern steelhead (*Oncorhynchus mykiss irideus*) using *Typha* roots as cover in the lagoon at Arroyo Hondo Preserve

Life History: Little is known of southern steelhead life history within Arroyo Hondo creek and the southern California ESU in general. As in other streams on the south coast, steelhead migration and life history patterns at Arroyo Hondo are probably constrained by the highly variable rainfall and streamflows in the region (National Marine Fisheries Service 1997). In California, juvenile steelhead generally spend one to three years in freshwater and two to three in the ocean as adults before returning to their natal streams to spawn (Moyle et al. 1995, National Marine Fisheries

Service 1997). Adult steelhead typically enter south coastal streams from November to June, peaking in January and February with high stream flows. Spawning may occur from January through June depending on rainfall and stream flow conditions (National Marine Fisheries Service 1997). Eggs are deposited and fertilized in spawning gravels during high flows in winter and hatch five to eight weeks later, depending on water temperatures (Fusaro 2000). After spawning, adult steelhead may return to the ocean and spawn the following year, although it is not known if southern steelhead are repeat spawners (Moyle et al. 1995, National Marine Fisheries Service 1997). Juvenile steelhead emerge from the gravels in spring or early summer, moving to shallow, low-velocity habitats.

Biological monitoring studies conducted from January to July 2001 as part of pipeline removal activities at Arroyo Hondo found one female adult steelhead and numerous juveniles in the lagoon during February and March 2001 (TENERA Environmental 2001). Observations by TENERA biologists indicate that the lagoon serves as important rearing habitat for young fish and staging habitat for older fish to undergo smoltification.

Habitat Requirements: Steelhead generally require clear, cool, well oxygenated flowing waters to persist. In southern California, survival of juvenile steelhead is likely constrained to streams containing numerous deep pools in which young can shelter during the warm, dry summer months (M. Capelli pers. comm.). Principal spawning and rearing areas in the region are typically found in higher elevation headwaters, although lowlands are important in wet years (Moyle et al. 1995). Well-oxygenated and relatively silt-free gravels are necessary for construction of spawning redds, which are often placed near the heads of riffles. Southern steelhead likely tolerate higher water temperatures than steelhead in the north; suitable water temperatures cited in the literature range between 10 and 15°C (50 and 59°F) (Moyle et al. 1995, National Marine Fisheries Service 1997).

Tidewater goby (*Eucyclogobuis newberryi*)

Federal Status: Endangered (1994), Proposed for De-listing

Status and Distribution: The tidewater goby is a small benthic species of coastal lagoons and streams from Del Norte to San Diego counties (Moyle et al. 1995). Several factors have been implicated in the decline of the tidewater goby in California, including various forms of habitat modification and degradation as well as regional drought (Thelander and Crabtree 1994, D. Dugan pers. comm.). For several decades, tidewater gobies were thought to have been extirpated at Arroyo Hondo, having not been observed there since 1934 (California Department of Fish and Game 2002). Subsequent surveys, including those conducted in 1993 and 1995 found tidewater gobies in nearby creeks, including Gaviota Creek (6.8 kilometers [4.2 miles] west) and Arroyo Quemado (2.7 kilometers [1.7 miles] east), but failed to document the species at Arroyo Hondo (Lafferty et al. 1999). In March 2001, tidewater gobies were rediscovered in the lagoon

at Arroyo Hondo during biological monitoring surveys associated with pipeline removal activities (TENERA Environmental 2001). Additional observations in June 2001 and March 2002 confirm that this species is extant in the lagoon (TENERA Environmental 2001, W. Sears pers. obs.). The discovery may confirm the notion that the tidewater goby are able to recolonize locations from source populations in nearby creeks (Storrer 2001).

Photo: Dan Dugan

A female tidewater goby (*Eucyclogobuis newberryi*) inhabiting the lagoon at Arroyo Hondo Preserve.

Life History: The tidewater goby is thought to complete its entire life cycle in the fresh or brackish waters of coastal lagoons and estuaries within a single year (Thelander and Crabtree 1994). In 2001, spawning in the lagoon at Arroyo Hondo occurred between April and June and resulted in approximately 10,000-15,000 larvae and juveniles; however, spawning may occur throughout the year in southern California (TENERA Environmental 2001, Moyle et al. 1995). During spawning, the male digs a vertical tunnel in sandy substrates, usually in shallow waters of 25-50 centimeters (8-10 inches) deep, where the female deposits from 640 to 800 eggs (Swift et al. 1989). The male guards the nest until the larvae emerge in 9 to 10 days. Larvae and juveniles live in the water column among vegetation until they reach 15-18 millimeters (0.5-0.7 inches) (Moyle et al. 1995).

Habitat Requirements: Tidewater gobies are found in brackish water lagoons and lower stream reaches with moderate flows and marshy backwater areas containing emergent vegetation (Moyle et al. 1995). Severe floods and rapid salinity changes are major stressors that affect survival and persistence in this species. Tidewater gobies are known to tolerate a wide range of salinities from fresh to full marine water and temperatures from 8 to 23 C (46.4 to 73.4 F) (Swift et al. 1989).

California red-legged frog (*Rana aurora draytonii*)
Federal Status: Threatened (1996)
State Status: Species of Concern (2001).

Status and Distribution: The California red-legged frog is currently known to occur from northwestern Baja California, Mexico to Marin County, California (Jennings and Hayes 1995). Within the Arroyo Hondo watershed, this species has been recorded from the lagoon to the confluence of the east and west forks of Arroyo Hondo Creek, north of the Preserve boundary (Storrer 2001, TENERA Environmental 2001). In the spring of 1993, at least six adult California red-legged frogs (*Rana aurora draytonii)* were

found during an informal diurnal survey of the creek. Several egg masses were observed in the lagoon during the spring of 2001 (J. Storrer pers. comm., D. Dugan pers. comm.).

The California red-legged frog has been extirpated from 70 percent of its former range, and is threatened by habitat fragmentation, livestock grazing, reservoirs and water diversions, and exotic predators (U.S. Fish and Wildlife Service 1996). Non-native species, particularly the bullfrog (*Rana catesbeiana*), have contributed significantly to the decline of this species in California (Jennings and Hayes 1995; U.S. Fish and Wildlife Service 1996). While bullfrogs are not known to occur at Arroyo Hondo Preserve, nearby populations (see Section 5.3.2) may be expanding and have the potential to threaten this species (P. Collins and J. Storrer pers. comm.). Lack of access to upland estivation (over-summering) sites may be a critical factor in California red-legged frog declines (U.S. Fish and Wildlife Service).

Life History: The California red-legged frog is the largest native frog species in the western United States, varying in size from 4 to 13 centimeters (1.5 to 5.1 inches). California red-legged frogs breed from November to April, with males arriving at breeding sites up to 4 weeks before females. Egg masses are attached to sturdy emergent vegetation and contain from 2,000 to 6,000 eggs. Embryos hatch out 6 to 14 days after fertilization; larvae require 4 to 5 months to reach metamorphosis, which typically occurs between July and September, and feed primarily on algae. In summer, as surface waters become scarce, California red-legged frogs will disperse to estivation (over-summering) sites in terrestrial riparian and upland areas (Jennings and Hayes 1994).

Photo: Dan Dugan

California red-legged frog egg mass attached to *Typha* within the lagoon at Arroyo Hondo Preserve.

Habitat Requirements: California red-legged frogs utilize dense, shrubby riparian vegetation, including arroyo willow (*Salix lasiolepis*), cattails (*Typha* spp.), and bulrushes (*Scirpus* spp.), near deep (less than 0.7 meter [2.3 feet]), still or slow-moving water. Ephemeral streams and ponds can support California red-legged frogs, but populations may not be able to persist in habitats where all surface water disappears. California red-legged frogs are not as far ranging as the northern red-legged frog (*Rana aurora aurora*), but may make seasonal migrations to breeding, feeding, and estivation sites (Jennings and Hayes 1994). Terrestrial riparian and upland areas provide critical estivation habitat for this species. California red-legged frogs have been observed to travel up to 30 meters (98 feet) from riparian areas, but may wander up to 91 meters (300 feet) in search of habitats suitable for estivation (U.S. Fish and Wildlife Service 1996, Jennings and

Hayes 1994). Estivation habitats may include boulders, rocks, downed trees and logs, or any other structural feature that provides a moist sheltered location in summer (U.S. Fish and Wildlife Service 1996).

Peregrine falcon (*Falco peregrinus*)
Federal Status: Endangered (1970), Delisted (1999)
State Status: Endangered (1971)/Fully Protected

Status and Distribution: The peregrine falcon has been sighted repeatedly at the Preserve and while no known breeding pair currently resides on the property, there is potential habitat for nests. This species is considered to be a transient visitor of the Preserve (Storrer 2001). The federal de-listing of the peregrine falcon in 1999 was due to reports indicating increasing populations throughout the country; therefore, the U.S Fish and Wildlife Service declared that the species was recovered. The peregrine falcon is now widely distributed throughout California and the recently expanded breeding range includes coastal southern and central California, the Channel Islands, inland north coastal mountains, the Sierra Nevada and the Cascade and Klamath ranges (California Department of Fish and Game 2000).

Habitat Requirements: Peregrine falcons typically create nests on ledges of high cliffs. This species is known to visit areas of open grassland, ponds, sloughs and the mouths of rivers (Lehman 1994). The habitat is not only limited to those areas; nesting and wintering habitat for the peregrine falcon can fluctuate and consist of woodlands, agricultural areas, coastal habitats, forested habitats and urbanized areas (California Department of Fish and Game 2000).

5.1.1.2. Special Status Species

Coast Range newt (*Taricha torosa torosa*)
State Status: Species of Special Concern

Status and Distribution: This diurnal salamander has been documented in coastal mountain drainages from Mendocino to San Diego counties and occurs from sea level to 1,800 meters (5,906 feet). Southern California occurrences of the Coast Range newt are highly fragmented in distribution and populations in the Santa Ynez Mountains have likely always been relatively small (Jennings and Hayes 1994). The fragmented distribution and small population sizes of local populations make this species potentially vulnerable to habitat alterations. Southern populations have been impacted by loss of habitat in urban areas such as Los Angeles, Orange, Riverside, and San Diego counties (Jennings and Hayes 1994). At Arroyo Hondo Preserve, Coast Range newts breed within the upper reaches of creek during the spring and inhabit the adjacent uplands for the remainder of the year.

Life History: In spring, males migrate to up to 1 kilometer (0.6 miles) to breeding sites in streams and ponds. After several days, females join them to mate, and internal

fertilization occurs when females pick up sperm packets deposited by males. Females deposit 3 to 6 egg masses, each containing 7 to 47 eggs, over rocks, stems or roots. Egg hatching occurs after 4 to 6 weeks after deposition, and larvae takes 3 to 6 months to metamorphose. Adult salamanders eat a wide variety of invertebrates as well as egg masses and larvae (Jennings and Hayes 1994).

Habitat Requirements: Coast Range newts inhabit terrestrial environments, but breed in streams and ponds (Jennings and Hayes 1994). They are typically found in rocky canyons with well-developed pools (Stephenson and Calcarone 1999).

Southwestern pond turtle (*Clemmys marmorata*)
State Status: Species of Special Concern

Status and Distribution: The southwestern pond turtle was once distributed continuously from Klickita County, Washington to Arroyo Santo Domingo, Baja California, Mexico in Pacific slope drainages at elevations from 0 to 1,500 meter (4,900 feet) (Jennings and Hayes 1994). Arroyo Hondo Preserve supports a significant population of southwestern pond turtle. Juvenile and adult southwestern pond turtles are common in many reaches of the creek and have also been observed in the lagoon. The presence of juvenile pond turtles at the Preserve suggests that a successful breeding population is well established in the canyon (J. Storrer pers. comm.).

Life History: *C. marmorata* is the only aquatic turtle native to California (Reese and Welsh 1997). Turtles normally leave aquatic sites to reproduce and aestivate, mating from late April to early May, and laying eggs several weeks later in upland areas. It is common for females to travel 400 meters (1,312 feet) or more to nest. Hatchling turtles seem to overwinter near nesting sites, then migrate in spring to shallow waters with relatively thick riparian vegetation. Southwestern pond turtles reach sexual maturity at seven to eleven years of age. Their diet as adults is dominated by slow-moving aquatic invertebrates and carrion, although vegetation may be eaten (Jennings and Hayes 1994).

Habitat Requirements: The persistence of southwestern pond turtle populations seems to depend on the availability of terrestrial and aquatic basking. Slow-flowing, shallow streams with moderately dense riparian vegetation are primary habitat for the adult and juvenile turtles. South-facing slopes seem to be preferred nesting sites. Hatchlings depend on relatively dense submergent and short emergent vegetation during their first year of activity (Jennings and Hayes 1994).

Two-striped garter snake (*Thamnophis hammondii*)
State Status: Species of Special Concern

Status and Distribution: The two-striped garter snake distribution extends from the south coast and peninsular ranges west of the San Joaquin Valley to the Baja California, Mexico. In the past century, this snake has declined in approximately 40% of its historic range. Populations in Santa Barbara County have been relatively stable in past years;

however, during the past decade this species has disappeared from several previously known localities (Jennings and Hayes 1994). There has been only one observation of the two-striped garter snake at Arroyo Hondo, though it is believed to occupy the property in greater numbers, given the quality of the riparian habitat present (Storrer 2001).

Life History: This snake used to be relatively common in aquatic areas (Jennings and Hayes 1994). However, its taxon has not been subject to intensive ecological studies therefore, the snake's life history is poorly known. Juveniles and adults hibernate in winter and adults of 2 to 3 years breed in spring. Evidence suggests that females can store sperm for more than 50 months, but it is believed that they mate every year. Juveniles and adults feed primarily on fish at different stages of development, tadpoles, earthworms and larval California Newts. Potential predators include: hawks, shrikes, herons, coyotes, largemouth bass, catfish, feral pigs and bullfrogs (Jennings and Hayes 1994).

Habitat Requirements: This species is normally found in the immediate vicinity of permanent or semi-permanent sources of water. During spring two-striped snakes utilize streamside sites and during winter, coastal sage scrub, grasslands and adjacent upland riparian areas (Jennings and Hayes 1994).

Coast horned lizard (*Phrynosoma coronatum*)
State Status: Species of Special Concern

Status and Distribution: The coast horned lizard ranges from the Central Valley of California to the mountains of southern California (California Department of Fish and Game 2000). This lizard can occur on both the coastal and inland side of mountains, like in the San Joaquin Valley of California (Stephenson and Calcarone 1999). In Santa Barbara County, the coast horned lizard is known to occur on the coastal slope of the Santa Ynez Mountains. This species occurs within the coastal sage scrub and chaparral communities of the Preserve.

Habitat Requirements: A wide variety of community types are utilized by the coast horned lizard, but the species is most commonly found in scrub dominated vegetation types (Stephenson and Calcarone 1999). Suitable habitat at Arroyo Hondo Preserve may include riparian woodlands, coastal sage scrub, and annual grasslands (California Department of Fish and Game 2000). Native ants are the primary food source for the coast range lizard. The species requires areas of fine, loose soil with a high portion of sand and open areas for basking. Nearby shrubs are used for cover (Stephenson and Calcarone 1999).

Yellow warbler (*Dendroica petechia*)
State Status: Species of Special Concern; Summer Resident

Status and Distribution: Throughout California yellow warblers were once a common species in riparian areas; today populations are thought to be less abundant and

in some cases extirpated (Remsen 1978). Results from the North American Bird Breeding Survey suggest that yellow warbler is declining in California (Sauer et al. 2001). Yellow warblers reside in low elevations in the summer and are considered uncommon to fairly common along the south coast of Santa Barbara County. Spring transients arrive between April and May (Lehman 1994). At Arroyo Hondo Preserve, the presence of singing birds throughout the spring and early summer indicates that yellow warblers nest on the property (J. Storrer pers. comm.).

Habitat Requirements: Riparian woodland is the primary breeding habitat for yellow warblers. Typical riparian trees utilized by the yellow warbler include willow (*Salix* spp.), California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii* spp. *fremontii*), black cottonwood (*Populus balsamifera* spp. *trichocarpa*), big-leaf maple (*Acer macrophyllum*), or white alder (*Alnus rhombifolia*) (Lehman 1994). Large trees are used for foraging and calling; understory brush and saplings are utilized for nesting (California Department of Fish and Game 2000).

Northern harrier (*Circus cyaneus*)
State Status: Species of Special Concern; Winter Visitor

Status and Distribution: The northern harrier (formerly known as the marsh hawk) is transient winter visitor (September – March) in Santa Barbara County (Lehman 1994). This species was a common resident of coastal southern California, however the last few decades have witnessed significant population declines (Remsen 1978). In localized areas the species can be abundant in suitable habitat. Population declines along the south coast may be due to habitat destruction and drought (Zeiner et al. 1990, Lehman 1994). This species has been observed as a fall and winter transient at Arroyo Hondo (J. Storrer pers. comm.).

Habitat Requirements: Northern harriers frequent open grassland, marshes, coastal sage scrub, desert sinks, wetlands and agricultural areas. Northern Harrier nesting areas are found mostly at the edge of wetlands within shrubby vegetation; grassland and sagebrush flats may also be used (Zeiner et al. 1990).

Cooper's hawk (*Accipiter cooperii*)
State Status: Species of Special Concern; Likely Resident

Status and Distribution: Cooper's hawks are found throughout most of the state from sea level to above 2,700 meters (8,858 feet), and are year long residents, although individuals from north of California are known to migrate south (Zeiner et al. 1990). This species is a rare to moderately common winter visitor and transient to Santa Barbara County (Lehman 1994). Observations of adults during the spring months and the presence of ideal woodland nesting habitat suggests this species is a resident breeder at Arroyo Hondo Preserve.

Habitat Requirements: Riparian forest and oak woodlands are typical nesting areas for Cooper's hawk. Eucalyptus groves may also be used as nesting sites (Stephenson and Calcarone 1999). Cooper's hawks feed in open grasslands and agricultural fields with nearby snags or perches (Lehman 1994).

Loggerhead shrike (*Lanius ludovicianus*)
State Status: Species of Special Concern; Winter Visitor

Status and Distribution: The loggerhead shrike ranges from southwest Canada to northwest Mexico and along the Gulf of Mexico, and is widely distributed at low elevations in open habitats with sparse shrubs, trees or other perches (Stephenson and Calcarone 1999, Zeiner et al. 1990). Populations in Santa Barbara County apparently declined beginning in the mid to late 1980s, but were found to be increasing during 1993-1994 (Lehman 1994). At Arroyo Hondo, shrikes are winter visitors (Storrer 2001).

Life history: Shrikes are diurnal predatory songbirds. Adults primarily prey on large insects, which they will often skewer on thorns, sticks or other sharp objects to cache for later feeding (Zeiner et al. 1990).

Habitat Requirements: Loggerhead shrikes frequent open habitats including grasslands, oak savannas, coastal sage scrub, open riparian woodland, and agricultural areas (Lehman 1994). Shrubs, trees, fences, and telephone poles are used as perches from which the shrike locates prey (Zeiner et al. 1990, Lehman 1994).

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
State Status: Species of Special Concern; Resident

Status and Distribution: The southern California rufous-crowned sparrow is widely distributed from northwestern Baja California to Santa Barbara County (Stephenson and Calcarone 1999). This species has been observed in coastal sage scrub and chaparral at Arroyo Hondo Preserve (P. Collins and J. Storrer pers. comm.).

Habitat Requirements: The habitat range for this subspecies coincides with well-developed areas of coastal sage scrub. A characteristic habitat area for this species is a south-facing slope with a combination of thin brush, rock outcrops and grasses. While the southern California rufous-crowned sparrow prefers coastal sage scrub, the species is adaptable can take advantage of rocky scrub-chaparral transition zones that are relatively open (Stephenson and Calcarone 1999).

Golden eagle (*Aquila chrysaetos*)
State Status: Species of Special Concern/Fully Protected; Transient

Status and Distribution: Golden eagles are considered to be rare on the south coast of Santa Barbara County and are uncommon residents of the interior mountain

ranges (Zeiner et al. 1990). Juvenile golden eagles were sighted on two occasions at Arroyo Hondo Preserve in the fall of 2000 (Storrer 2001).

Habitat Requirements: Golden eagles can be found in open country and semi-coniferous woodlands (Lehman 1994). Eagles usually nest in open habitats with large trees or in exposed areas of canyons and cliff ledges (Zeiner et al. 1990).

White-tailed kite (*Elanus leucurus*)
State Status: Fully Protected; Transient

Status and Distribution: The white-tailed kite is found in open country of southwestern California, and is also known in Central and South America. In Santa Barbara County, the white-tailed kite is considered to be a common to uncommon year-round resident that may shift roost sites between seasons. Although the white-tailed kite population can fluctuate locally, their overall range and abundance has increased in California (Zeiner et al. 1990). In the fall and winter the species is more commonly found in coastal areas, roosting in avocado and citrus orchards, oaks, willow and eucalyptus groves (Lehman 1994). White-tailed kites have been sighted at the Preserve during the winter months, most frequently in the open grassland and sparse scrub of the lower canyon (Storrer 2001).

Habitat Requirements: White-tailed kites inhabit open habitats and favor grassland, meadows and marshes (Lehman 1994). Nests are located in oak, willow or stands of other suitable trees and close to open areas for foraging. (Zeiner et al. 1990).

American Badger (*Taxidea taxus*)
State Status: Species of Special Concern; Resident

Status and Distribution: Badgers occur from northern Alberta, Canada, south to central Mexico and from the Pacific Coast east to Ohio (Williams 1986). The badger was once widespread within the open grassland habitats of California, but populations in the state have declined over the last century due primarily to agricultural and urban development, rodent and predator poisoning programs and trapping for the fur trade (Williams 1986). In southern California, the local distribution of this mammal is highly variable and not well documented (California Department of Fish and Game 2000). This species is known to occur at Arroyo Hondo, but its abundance and status is unknown (Storrer 2001).

Life history: Badgers are active year-round and are primarily nocturnal, but may be found foraging throughout the day and night. This species mates in the summer and early fall, and the gestation period ranges from 183-265 days. Litters of 2 to 5 young are typically born in March and April. Young are born in burrows typically dug in dry, sandy soils. These burrows are frequently in areas that are characterized by a sparse overstory cover (California Department of Fish and Game 2000).

Habitat Requirements: Badgers prefer arid open habitats including grasslands, mountain meadows and open scrub. Generally they inhabit areas with low to moderate slopes. Primary habitat requirements for the badger include friable soils, adequately open, uncultivated areas and ample burrowing rodents for feeding (Stephenson and Calcarone 1999). Badgers adjust their diet seasonally in response to prey abundance and will eat insects, eggs, worms and some reptile species (California Department of Fish and Game 2000).

Mountain lion (*Felis concolor*)
State Status: Fully Protected

Status and Distribution: Historically, mountain lions had one of the most extensive distributions of all American terrestrial mammals, ranging from northern Canada to southern Chile, but are now found almost exclusively in the southwest of the U.S. and north of Mexico (Rible 2001). Mountain lions are occasional visitors at Arroyo Hondo, and have been observed on at least three occasions (Storrer pers. comm., J.J. Hollister pers. comm.).

Life History: The mountain lion is mostly nocturnal and active yearlong with a typically large home range (8 to 250 square kilometers [3 to 96.5 square miles]). The ranges of female mountain lions may overlap when lacking cubs; males usually occupy separate areas. Most births occur in spring, although females can be in estrus any time of the year. Reproduction is limited to the availability of males within the female home range (California Department of Fish and Game 1988).

Habitat requirements: Mountain lions reside in a broad range of plant communities. In California, they typically utilize open woodlands and riparian communities (USDA Forest Service 2002b). Caves, dense vegetation or piles of boulders are often selected as den sites to protect cubs from weather and predators (California Department of Fish and Game 1988, USDA Forest Service 2001).

Catalina Mariposa Lily (*Calochortus catalinae* S. Watson)
California Native Plant Society: List 4

The Catalina mariposa lily is a perennial herb (bulb) in the lily family (Liliaceae). This species is found at elevations from 15 to 700 meters (50 to 2,297 feet) in chaparral, cismontane woodlands, coastal sage scrub and valley foothill grassland and is known to occur within the following counties: Los Angeles, Orange, Santa Barbara, San Bernardino, San Diego, San Luis Obispo, and Ventura (California Native Plant Society. The Catalina mariposa lily is also found on Santa Catalina, Santa Cruz and Santa Rosa islands. Light pink flowers appear from Mar to May; flowering may be locally extensive after fire (Smith 1998). According to the California Native Plant Society, this species is threatened by development (California Native Plant Society 2001). At Arroyo Hondo, this species has been observed in the coastal sage scrub community of the front country (J. Storrer pers. comm.).

Hoffmann's Nightshade (*Solanum xanti hoffmannii* Munz)
Local Endemic

Hoffmann's nightshade is a locally endemic, perennial subshrub in the family Solanaceae. This subspecies is not recognized in the *Jepson Manual* (Hickman 1993) and is treated as a synonym to *S.xanti* in that publication. The subspecies is known from the following locations: Refugio Canyon, Gaviota Pass, Hollister Ranch, Camp Drake, Nojoqui Falls, Alisal Road, Point Conception, Surf, Miguelito Canyon, Burton Mesa, Santa Rosa Road, and San Julian (Smith 1998). Purple flowers appear from February to July (Smith 1998). At Arroyo Hondo Preserve, this species is common in the chaparral along the Upper Outlaw Trail and is also found near the main creek crossing (J. Storrer pers. comm.).

5.1.2. MANAGEMENT OF HABITATS

The management approach for the species discussed above is primarily based on protecting the habitats upon which they depend. While there are some strategies targeting individual species, such as prohibiting the collection of plant and animal species on the Preserve, prohibiting hunting and fishing, and taking steps to control the introduction of non-native species, the actions discussed below are geared towards reducing the risk of habitat loss or destruction from public use and other existing or potential ecological stressors. Many of the management actions discussed in the other strategy sections offer protection to species and habitats as well; this section focuses strictly on those actions that are specifically targeted to such protection.

5.1.2.1. Aquatic and Riparian Habitats

The protection of the southern steelhead trout is a chief concern for the Land Trust since the species is listed as federally endangered. This anadromous species is found throughout the entire creek and in the lagoon, therefore the important habitat to protect spans across the entire length of the Preserve.

Prohibit recreational access in and around the creek and lagoon

Recreational access at the Preserve will be limited to designated trails and day use sites in order to minimize human impacts on aquatic and riparian species. There are currently four primary creek crossings on the property: the main creek crossing, the lower outlaw trail crossing, the west creek trail crossing, and the culvert crossing at the bottom of the canyon (see Map 6). The main creek crossing is the only point where vehicular crossing of the creek currently occurs in the Preserve.

Entering the creek and altering the pools through activities such as the movement of rocks can potentially disturb the sensitive aquatic environment. Restricting access to the lagoon and creek will provide an important level of protection for riparian and

aquatic habitats. As part of the rules and regulations of the Preserve (see Table 7 in Section 5.6), swimming in, wading in, or otherwise disturbing the creek or lagoon will not be permitted. The picnic area is currently the only defined location (other than the creek crossings) where public access is allowed to occur close to the banks of the creek. The use of only one focal impact area, such as this established group site, is highly recommended so as to concentrate the potential human disturbance to species and habitats to one primary location on the Preserve.

The main creek crossing is a relatively high use area. It is also an area that is known to provide habitat for sensitive species, as sightings of southwestern pond turtles and red-legged frogs have been reported in or near the crossing (J. J. Hollister pers. comm.) For that reason, the use of a sturdy portable boardwalk should be considered for the protection of aquatic species, and public safety. This boardwalk should be manageable enough for two people to carry, and should be designed in such a way that it can be secured to a tree or staked in the ground in order to prevent it from being washed downstream during high flow periods. Alternatively, it could be removed when the Preserve is closed to the public or when rainstorms are predicted.

Extra measures to ensure the protection of riparian species could be to post educational signs at the lagoon, creek crossings, and Hollister Meadow. One option that has been used in other preserves and national forests is the use of low-lying fencing to discourage access to the sensitive habitat of the riparian species (Stephenson and Calcarone 1999). The Coastal Plan for Santa Barbara makes similar recommendations for protecting habitat in environmentally sensitive habitat areas (Santa Barbara County 1999). Such steps would help to reduce the impact of humans on species and ensure the preservation of quality habitat in the future.

Some riparian species such as the red-legged frog, coast range newt and southwestern pond turtle use upland habitats during the course of the year. Prohibiting off-trail use throughout the Preserve can assist in the protection of these upland habitats. The creation of bootleg trails should be discouraged using standard trail maintenance techniques including the placement of brush, logs, and rock cairns.

Perform visual inspections at main creek crossing

Visual inspections performed for the presence of steelhead spawning redds, pond turtles, and red-legged frog egg masses before crossing the creek in a vehicle will help avoid the take of these species. Steelhead and red-legged frog are known to retreat in the presence of disturbance, but pond turtles may be less mobile. Road kill is thought to be a significant factor in the mortality of southwestern pond turtles (S. Andelman pers. comm.). These kinds of precautionary actions do not require much effort and could provide significant protection for the sensitive species of Arroyo Hondo.

Close ancillary stream crossings

The other creek crossings (Map 6) that are unnecessary for the trail network should be closed using low fencing or other types of trail closure methods (i.e. logs, brush, or rocks) to protect those areas from public access. Implementation of this management action helps to prevent or mitigate the impact of public access on sensitive species and habitat areas (Stephenson and Calcarone 1999).

The use of a low-lying fence with a sign at the end of the trail that follows the creek up towards the Sperling Family Wilderness area is recommended. This trail closure, at the "narrows" of the creek, will protect public safety. Trail conditions north of this point have deteriorated and are overgrown with poison oak. The area north of this trail closure has encountered minimal impact from humans in recent years and remains in a relatively natural state. Access to this area should be limited to inventory and monitoring activities to preserve its current condition.

Consult with experts about the effects of the elevated gull population

The expert opinion of local biologists should be solicited to assess the effects of the elevated gull population on the lagoon. Bacterial contamination has been recorded at nearby lagoons with similar numbers of visiting gulls that have been attracted to the area by the Tajiguas landfill (Peterson 2001). A consulting biologist can suggest potential research to fully evaluate the impact of the concentrated population on this rare and sensitive habitat. The Land Trust should seek mitigation if it is determined that the gulls are in fact contaminating the lagoon.

Measure water quality and bacteria annually

Measuring the creek for water quality will assist the Land Trust in assessing the impacts of natural and human induced stresses on the aquatic habitat. Sedimentation and turbidity are known to have detrimental effects on aquatic species. For example, juvenile steelhead trout exhibit stress at 2,000 ppm of fine sediment and avoid waters with turbidity levels of 22 to 265 nephelometric turbidity units (NTUs) (University of California Cooperative Extension 2002). In addition, dissolved oxygen, which can be reduced by erosion or sedimentation in the creek, plays an important role in the survival of steelhead trout.

Measure species occurrence and life stages of species yearly during breeding periods

Successful long-term management of sensitive species found on the Preserve will require a better understanding of the population dynamics of those species. Simply identifying the presence or absence of a species does not necessarily indicate whether or not the population is viable. Surveys should be made on an annual basis to assess the age-class structure, distribution, and general natural history of these species. This should

complement the monitoring program that is discussed below. These studies will be an integral part of a successful monitoring program.

5.1.2.2. Coastal Sage Scrub, Grassland, Coast Live Oak Woodland, and Chaparral

There are no specific interim actions or long-term recommendations that are considered active management strategies for the remaining habitats. The interim action to prohibit off-trial use will be beneficial to reduce the impact of human disturbance on the species found in these habitats. Other management considerations should include the restoration or enhancement of degraded habitats where feasible (see Section 5.2) and the control of exotic plant species in order to allow for the reestablishment of native vegetation communities (see Section 5.3).

5.1.3. REGULATORY CONSIDERATIONS

Endangered Species Act of 1973: The purpose of the Federal Endangered Species Act (ESA) is to protect the ecosystems that support endangered and threatened species, and to recover and preserve listed species. In accordance with the requirements of the ESA, a federal agency must establish if any threatened or endangered species exist within a project area, and conclude if there will be a potentially significant impact on the protected species by any proposed project in which a federal agency is involved. There are two federally endangered species that occur on the Preserve - the southern steelhead trout and the tidewater goby. The California red-legged frog is afforded the same protection as a federally threatened species. All three of these species are recognized by the Ventura office of U.S. Fish and Wildlife Service (FWS) to occur at the Preserve. Both the trout and goby fall under the jurisdiction of the National Marine Fisheries Service (NMFS) (ESA 1973).

California Endangered Species Act of 1984 (California Fish and Game Code 2050-2098): The California Endangered Species Act (CESA) utilizes criteria and requirements comparable to those under the federal ESA for listing species, and also identifies a responsible agency. The California Fish and Game Commission establishes the species listed under this law and the California Department of Fish and Game (CDFG) is responsible for maintaining the list and reviewing projects (CDFG 2001).

If the Land Trust proposes a project that would either require permits or approval by a local or state government, or could potentially lead to the taking of a state listed species, then the project would likely require review by the CDFG to ensure that potential impacts to the species are avoided or mitigated.

Coastal Act of 1976 – Local Coastal Plan (Environmentally Sensitive Habitat Areas): The Santa Barbara County Local Coastal Plan (LCP) represents the local enforcement and implementation of the California Coastal Act of 1976. One component of the LCP is the designation of Environmentally Sensitive Habitat Areas (ESHAs) within the coastal zone of Santa Barbara County. Arroyo Hondo Creek is designated as an ESHA,

therefore specific policies and recommendations are provided for this area of the Preserve. Sections 5.6 and 5.8 provide a discussion about how these policies are relevant to the development of infrastructure on the Preserve and what measures are required to protect species and habitat.

5.1.4. Limitations and Challenges

Compiling a flora and fauna species list would be beneficial to the long-term management of the Preserve, and information on additional species (especially plants) can help develop a more comprehensive species conservation program.

Most of the conservation strategies included in this management plan focus on the riparian areas because of the essential habitat they provide to most of the sensitive species found on the Preserve. Controlling access to the creek and trails will be difficult to monitor and enforce due to limited staffing. The use of barriers can be effective enforcement tools, but their utility may be limited given that they would most likely be unobtrusive to the public and leave considerable room for abuse.

Natural flow fluctuations due to variable rainfall in the region present a challenge to the management of steelhead populations. Some sections of the creek, especially between the main creek crossing and the culvert, periodically dry out, leaving barriers to migration and temporary loss of habitat. The Land Trust should consider working with the National Marine Fisheries Service to develop strategies for minimizing the potential loss of fish.

The presence of predatory non-native fish and amphibians can be a significant threat to the red-legged frog and southwestern pond turtle and decrease the population seriously. Controlling this potential stressor will be difficult, as there are many pathways for these animals to enter the Preserve. This issue is discussed further in Section 5.3 of this plan.

5.1.5. Information and Monitoring Needs

The management strategies set forth in this and other sections can benefit greatly from additional information, monitoring, and research. Before any monitoring can take place there must be baseline data against which monitoring results can be compared. In many cases, the distinction between inventory and monitoring is unclear. For Arroyo Hondo, given the paucity of current biological data, the first phase of the monitoring program should be focused on establishing a baseline inventory that can be used as a basis for future comparison.

The ability of the Land Trust to conduct any of the described information and monitoring needs will depend heavily upon grants or other outside funding sources. Other approaches to accomplishing the recommended tasks include cooperative agreements with university researchers, graduate students, private consultants, museums, non-profits, and/or volunteers.

Inventory

1. A comprehensive inventory of the plant and animal species on the Preserve should be conducted. This work will be ongoing and is not expected to be accomplished within a single year's time. The majority of the work could be done by volunteer botanists and biologists. There has already been an interest from local botanists to conduct a plant inventory at the Preserve. Local birding enthusiasts will continue to play an important part in expanding the current knowledge of bird species at the Preserve. Additional surveys for amphibian, reptile and mammal species may necessitate outside grant funding or other resources so that wildlife biologists could be contracted. Other options include the use of undergraduate or graduate students from local universities that have field training, or perhaps inviting a professor to conduct field classes at the Preserve.
2. Mapping aquatic habitat should be done for sensitive species to determine what sections of the creek are being used by the various species during different times of year. This can help identify areas for active management and areas that are essential to the recovery or protection of those species.

Monitoring

1. Monitor the water quality of the creek for the riparian species.
2. Measure turbidity, total suspended solids, total dissolved solids and total accumulated sediments to determine the impacts of erosional processes on water quality.
3. Monitor the bacteria levels of the lagoon at different periods of the year and compare across years to evaluate changes in overall water quality and assess the impact on the species found in the lagoon.
4. Survey tidewater goby population in the lagoon annually. The California Department of Fish and Game suggests that a known tidewater goby population in a lagoon should be surveyed at least every five years. This can help establish the condition of the population (California Department of Fish and Game 2002). This time period seems rather long and if the population is threatened by bacteria for example, then assessing the population's status every five years could be too late to recover the species.
5. Perform nighttime surveys of red-legged frogs to gather breeding data. This monitoring activity should be non-intrusive and be conducted under the supervision of a trained wildlife biologist.
6. Yearly egg mass surveys for red-legged frogs can be beneficial for establishing where breeding occurs for this species. This monitoring can be done by trained volunteers since egg masses are relatively easy to detect.
7. The data from post remediation monitoring of PCBs (from the former Shell Oil Natural Gas Processing) should be obtained on a periodic basis to determine if there is any contamination of PCBs into the lagoon or soil sediments.

8. Aerial photographs should be obtained from Pacific Western Aerial Surveys to assess the extent of the natural vegetation communities and detect change. The aerial photographs are taken for Santa Barbara County every 5 years.

Research

1. Lifecycle analysis of the steelhead population to better identify limiting factors to their viability.
2. A study to determine how far tidewater gobies travel upstream can help understand what habitat the species uses and how to incorporate management strategies to address the potential distribution of the species within the watershed. A survey from San Antonio Creek in Santa Barbara County reported that the species was found up to 8 kilometers (5 miles) upstream from the lagoon (Moyle et al. 1995).

5.1.6. COORDINATION AND PARTNERSHIPS

The list of possible partnerships and coordination efforts is by no means comprehensive. This section provides an initial contact list that will be developed, as the management of the Preserve requires more coordination with agencies, the County and the scientific community additional contact information will result from referrals.

Contacts:

National Marine Fisheries Service (NMFS)
Mark Capelli – Area Recovery Coordinator
Southern & Central California
735 State Street Suite 616
Santa Barbara, California 93101
Phone: 805-963-6478
Email: mark.capelli@noaa.gov

U.S. Fish and Wildlife Service:
Kate Symonds
Ventura Fish and Wildlife Office
Phone: 805-644-1766
Email: Kate_Symonds@r1.fws.gov

USDA Forest Service
Maeton Freel – biologist
Santa Barbara Ranger District
Los Padres National Forest
Phone: 805-961-5764
Email: mfreel@fs.fed.us

California Department of Fish and Game:
Maurice Cardenas – Fisheries Biologist / steelhead specialist
Phone: 805-640-1852
Email: mcardenas@dfg.ca.gov

Natasha Lohmus – Wildlife Biologist
Phone: 805-684-6281
Email: nlohmus@dfg.ca.gov

Santa Barbara Museum of Natural History
Paul Collins - vertebrate zoologist
Phone: 805-682-4711 Ext. 321
Email: pcollins@sbnature2.org

Wildlife Biologists and Botanists:
John Storrer – wildlife biologist, private consultant
Phone: 805-682-2065
Email: jstorrer@silcom.com

Kathy Rindlaub – botanist
Phone: 805-964-8425

Santa Barbara Coastal Ecosystem Long Term Ecological Research (LTER) Project: The data from monitoring of the creek by this LTER can help understand the effects of storm events on the sediment load and nutrients at the Preserve. This data is available to the Land Trust.

Contacts: John Melack – Professor
University of California, Santa Barbara
Phone: 805-893-3879
Email: melack@lifesci.ucsb.edu

Santa Barbara Botanical Garden: Little is known of the botanical resources of the Preserve. Botanists and other specialists associated with the Santa Barbara Botanical Garden can provide expertise for valid floristic surveys.

Contacts: Steve Junak, Herbarium Curator
Santa Barbara Botanical Garden
1212 Mission Canyon Road
Santa Barbara, California
Email: sjunak@sbbg.org

The Peregrine Fund:
5668 West Flying Hawk Lane
Boise, Idaho 83709
Phone: 208-362-3716
Email: tpf@peregrinefund.org
Web: www.peregrinefund.org

5.2. RESTORATION AND ENHANCEMENT

While Arroyo Hondo Preserve represents one of the least disturbed coastal watersheds in Santa Barbara County, habitats on the property have been degraded by over two centuries of ranching and agricultural use. Impacts to both terrestrial and aquatic habitats have been concentrated primarily in the front country of the Preserve, where the bulk of grazing and related ranch activities have taken place.

In the near-term, high priority invasive exotic plant species eradication (see Section 5.3) and control of trail related landslides and erosion will be a critical first step in providing conditions that are conducive to the restoration and ongoing health of the natural ecosystems at the Preserve (Higgs 1997). Long-term restoration goals and objectives should be integrated into a formal Restoration and Enhancement Plan for the Preserve, which would include a set of desired future conditions for the property.

Management Goal

To the extent feasible, restore and enhance native plant communities, degraded landforms, aquatic habitats, and natural processes to provide for diverse, self-sustaining ecosystems within the Preserve.

Objectives

1. Restore and enhance degraded native plant communities throughout the Preserve.
2. Enhance aquatic habitats for threatened and endangered species.
3. Repair and control human-induced landform degradation on the Preserve.
4. Utilize natural processes, such as fire, to maintain and enhance native plant communities and habitat diversity (see Section 5.4).

Interim Actions

1. Implement measures to control exotic invasive plant species (see Section 5.3).
2. Implement aquatic habitat enhancements.
3. Assess and repair trail and road-related erosion through trail design modifications and revegetation.

Long-term Recommendations

1. Develop a comprehensive Restoration and Enhancement Plan that integrates strategies for erosion control, vegetation management, exotic species control, and habitat enhancement.
2. Establish a native plant nursery at the Preserve, utilizing local plant propagation materials.

5.2.1. RESTORATION APPROACH

The primary challenge in restoring altered landscapes to a natural or native state is defining what the end state or condition should look like and how it should function. Many definitions of ecological restoration exist; a commonly cited definition describes restoration as a "return...to a close approximation of...condition prior to disturbance" (National Research Council 1992). However, for any given landscape, the exact "pre-disturbance" condition may be unknown or unattainable given available funding, pervasiveness of exotic species, permanently altered landforms, and adjacent land use practices.

A practical approach is to work toward restoring functioning habitats within a modern context, acknowledging the suite of irreversible environmental changes that have taken place since European colonization (i.e. the prevalence of annual Mediterranean grasses). Essential to this approach is the identification of underlying factors that are important in restoring the vitality of native communities. In the case of Arroyo Hondo Preserve, this may entail repairing human-induced landform degradation and restoring processes (i.e. fire) that enhance native plant communities.

5.2.2. NATIVE PLANT COMMUNITIES

5.2.2.1. Riparian Woodlands

Current Conditions

Low-elevation riparian habitats in southern California have declined significantly (up to 90%) from pre-European levels due to extensive channelization, stream diversion, and development (Stephenson and Calcarone 1999). While the riparian woodlands of the Preserve represent an exceptionally well-developed community for the region (Storrer 2001), the extent of riparian vegetation is probably reduced from historical levels. In the long ranching history of the Preserve, riparian woodlands abutting the grasslands and meadows of the front and backcountry were managed to enhance grazing opportunities on the property (J. Storrer pers. comm.). Likewise, the development of the east-side orchard narrowed the width of the riparian corridor in some areas to maximize planting area.

Restoration Opportunities

With the cessation of active orchard management in the early 1990s, extensive recruitment of native upland and riparian species has taken place in previously cultivated areas of the orchard. Existing avocado trees in the east-side orchard have provided conditions conducive to the establishment of many native plant species including coast live oak (*Quercus agrifolia*), bitter gooseberry (*Ribes amarum* var. *hoffmanii*), western virgin's bower (*Clematis ligusticifolia*), California cucumber (*Marah* spp.), and laurel sumac (*Malosma*

laurina). This recruitment process represents a distinct advantage in restoring native plant communities to the east-side orchard. Restoration planning for the Preserve should assess the need for expansion of riparian plant communities, especially in the front country, and may need to consider the realignment of selected trail sections to accommodate expanded riparian areas.

5.2.2.2. Grasslands

Current Conditions

As with most grasslands in California, the grassland areas of the Preserve are dominated by numerous common non-native annual grasses and forbs (Section 5.3, Table 2). Annual Mediterranean grasses were introduced early in California's European history, and spread throughout California as a result of grazing (Heady 1977). Little is known about the composition of native California grasslands, but researchers believe they were dominated by native perennial species, including needlegrass (*Nassella* spp.), bluegrass (*Poa* spp.), giant rye (*Elymus* spp.), *Leymus* spp., and oniongrass (*Melica* spp.) (Heady 1977). Native annual grasses, including fescue (*Festuca* spp.), and various broad-leaved forbs are thought to have formed a secondary component of native grasslands (Heady 1977). Remnant stands of *Nassella* spp., *Elymus* spp., and *Festuca* spp. are found on the front country slopes and various backcountry areas of the Preserve, persisting near stands of coastal sage scrub and in marginal habitats not yet colonized by exotic grasses.

Restoration Opportunities

Restoring native perennial grasslands on the Preserve is a challenging prospect, given the pervasiveness of non-native annual grasses and forbs in the region. The focus of restoration efforts for this vegetation community may be to expand existing stands of native grasses where appropriate. The deep, long-lived roots of native perennial grasses promote soil stability, increase water infiltration, and decrease damaging surface runoff, potentially providing an important erosion control resource. Existing patches of native grasses on the Preserve will provide an important source of localized, native seed material for revegetation projects.

5.2.2.3. Coastal Sage Scrub and Chaparral

Current Conditions

The extent of coastal sage scrub in southern California has been extensively reduced by conversion to agricultural, industrial, and residential land uses throughout the region. Approximately 15% of the original extent of coastal sage scrub remains in southern California (Stephenson and Calcarone 1999). Existing patches of intact coastal sage scrub are found on the front country slopes of the Preserve, and as an understory

component of live oak woodland elsewhere on the property. Original coastal sage scrub stands in the front country may have been cleared by early Spanish settlers to increase rangeland for cattle and sheep.

Chaparral vegetation comprises the bulk of the land cover on the Preserve, and is perhaps the most intact vegetation type. Impacts to this vegetation type have been limited primarily to trail-related landslides and erosion along the Upper Outlaw Trail, where non-native grasses have colonized the exposed soils.

Restoration Opportunities

Coastal sage scrub may have occupied many of the slopes now covered by annual grasslands in coastal California under pre-European conditions (W. Ferren pers. comm.). The existence of coastal sage scrub at the Preserve represents an opportunity to increase the extent of this rare plant community within the front country slopes. The expansion of this community may assist in stabilizing many of the slumps and landslides in the front country, and will provide expanded habitat for sensitive bird species, including the rufous-crowned sparrow (*Aimophila ruficeps*) (P. Collins and J. Storrer pers. comm.). Erosion control activities on the Upper Outlaw Trail should include revegetation with chaparral species in landslides areas.

5.2.3. AQUATIC HABITATS

Current Conditions

The installation of the highway berm and associated culvert at the mouth of Arroyo Hondo in 1949 was the most significant physical habitat modification to occur in the Preserve's recent history, permanently altering the fluvial geomorphology of the creek and lagoon. The culvert itself introduced a partial barrier to southern steelhead trout migration and significantly reduced the extent of estuarine habitat for steelhead and tidewater goby.

Photo: W. Sears

Northward view from the ocean's edge with the Arroyo Hondo lagoon in the foreground and the Highway 101 culvert and associated transportation infrastructure above.

Historically, natural meanders in the lower reaches of Arroyo Hondo creek had eroded the canyon walls and helped form the rich valley bottom floodplain. Entrenchment of the lower reaches ultimately confined the creek to a well-defined

channel, but occasional flooding continued to erode the banks of the creek, eventually threatening to undermine the western entrance road to the Preserve. In conjunction with the construction of the highway berm, the meander of the lower reaches (from the bridge to the culvert) was realigned, presumably to protect the integrity of the entrance road and highway fill (Map 7). In the years since the creek realignment, riparian vegetation has become re-established and is helping to armor the stream banks. However, the creek has continued to meander within the confines of the designed channel, causing continued erosion of the banks and portions of the berm fill near the upstream end of the culvert.

Along with the changes in the channel configuration, the 100 meter (330 foot) cement culvert introduced a partial barrier to steelhead migration. While fish passage is not completely impeded, as evidenced by the presence of steelhead above and below the culvert, long (greater than 30.5 meters [100 ft]), straight culverts create unnatural conditions under both high and low flows (National Marine Fisheries Service 2000, M. Capelli pers. comm.).

Restoration Opportunities

Options for removing a small patch of riprap armoring the right bank of the creek, just upstream of the culvert, should be considered. The perennial pool adjacent to the riprap is heavily used by juvenile steelhead, but lacks significant overhead riparian cover. Replacing the riprap with plantings of willow and other native pioneer riparian species would help stabilize the banks and provide essential cover for steelhead and other aquatic species.

Photo: W. Sears

The interior of the culvert passing beneath Highway 101 at Arroyo Hondo.

As mitigation for pipeline removal activities in the lagoon, Shell Oil has provided funds for fish passage enhancements to the Highway 101 culvert. Initial plans call for the installation of structural elements, including baffles or other streambed simulation elements, to the floor of the culvert. These elements would be designed to provide high flow refugia and increased water depth at low flow for enhanced fish passage (B. Dugas pers. comm.). Other options for improving passage conditions in the culvert should also be considered, including the removal and resetting of the existing concrete culvert bottom below the natural grade. This approach would eliminate the need to install and

regularly maintain baffles that will be likely to accumulate sediment and may be damaged by large bed-load materials. This type of enhancement is currently being investigated for the highway culvert at Rincon Creek (M. Capelli pers. comm.).

In the long-term, consideration should be given to removing the large concrete extension canal that extends from the ocean side of the culvert to the lagoon. This modification could help restore the historical extent of the estuary and wetlands at Arroyo Hondo.

5.2.4. LANDFORM DEGRADATION

In general, the native soils of the Preserve are highly erosion-prone and susceptible to landslides and slumping under natural conditions (USDA Soil Conservation Service 1981). Soil disturbance and vegetation removal associated with grazing and agricultural activities have increased the erosion potential of these soils and likely contributed to the extensive soil movement visible on the slopes of the front country.

Control of landslides and erosion will be a key element in the long-term restoration of Preserve habitats. Evaluation and planning for control of these features will likely require the expertise of a trained erosion control specialist.

5.2.4.1. East Side Avocado Orchard and Front Country Slopes

Current Conditions

Vegetation removal and grading associated with the development of the east-side avocado orchard contributed significantly to erosion processes in the front country by disturbing soil structure and reducing soil-binding vegetation. Successive winters of above average rainfall in the early 1990s caused extensive erosion within the east-side orchard, damaging irrigation piping and exposing the roots of many orchard trees (J. J. Hollister pers. comm.). Active management of the orchard ended after these events, and no effort was made to control erosion within the orchard (J. J. Hollister pers. comm.). Various large and small-scale erosion features have continued to expand, especially in the northern portion of the orchard.

The slumps and slides of the front country slopes are the likely result of a long history of grazing at the Preserve, coupled with the dominance of shallow-rooted annual grasses and naturally unstable soils.

Restoration Opportunities

Erosion control in the orchard should be coordinated with long-term restoration plans for this area. Interim actions may include the use of jute netting or other fiber over non-vegetated areas to slow surface runoff and provide soil protection. Landslides and slumps on the front country slopes will need to be assessed to determine their cause and potential for future movement.

5.2.4.2. Trail-related Landslides and Erosion

Current Conditions

The topography and soils of Arroyo Hondo Preserve provide a challenging environment for building and maintaining trails. Trail-related landslides and erosion along the Upper Outlaw Trail have caused extensive vegetation and soil loss, and may contribute to increased runoff and sediment loading within this sub-watershed. Heavy rains, coupled with the increased runoff and associated sediment load may have contributed to a debris flow during the winter of 2000/2001 that filled two culverts along the Lower Outlaw Loop Trail and resulted in the formation of gullies downstream from the filled culverts.

Restoration Opportunities

In general, the integrity of trails and roads throughout the Preserve should be evaluated. Existing landslides along the Upper Outlaw Trail should be repaired as soon as possible to prevent further loss of vegetation and soil. Trail maintenance and design techniques that reduce the potential for erosion should be utilized throughout the trail system of the Preserve (see Section 5.8). Rerouting or abandonment of trails should be considered as options in restoring areas such as the Lower Outlaw sub-watershed.

Photo: W. Sears

Trail-related erosion along the upper portion of a tributary to Arroyo Hondo Creek.

5.2.5. INTERIM RESTORATION AND ENHANCEMENT

Restoration activities in the near-term will be focused on the removal of high-priority non-native plants (see Section 5.3). Control of trail-related erosion will be critical in maintaining the recreational viability of the Upper and Lower Outlaw trails and in protecting riparian and aquatic habitats; an assessment of trail conditions and erosion control strategies should be undertaken as soon as funding is available. Fish passage enhancements in the Highway 101 culvert should be implemented as soon as possible.

5.2.6. Development Of A Comprehensive Restoration And Enhancement Plan

The scope and inter-related nature of restoration opportunities at Arroyo Hondo Preserve calls for a planning approach that provides a broader context for both interim and long-term restoration and enhancement activities. The development of the Restoration and Enhancement Plan will require an interdisciplinary team to study restoration needs and alternatives, and formulate the appropriate restoration strategies and priorities (Map 8). Ideally, the Restoration and Enhancement Plan will utilize an adaptive management framework in which specific restoration goals and success criteria are defined. A monitoring program should be established to assess progress towards reaching restoration goals (see Appendix F for details).

Restoration-related projects at the Preserve will consist of both one-time projects and ongoing efforts, including exotic species management (Section 5.3), erosion control, vegetation management (Section 5.4), and revegetation. Projects will need to be carefully phased to coordinate restoration efforts and provide for monitoring and evaluation of restoration and enhancement methods. Restoration planning should include exploring the feasibility of using prescribed fire or other vegetation management techniques for maintaining and enhancing plant communities at the Preserve (Section 5.4).

To provide materials for revegetation projects, a small native plant nursery should be established using native plant seeds and cuttings from existing plant communities on the Preserve. The use of local plant propagation materials will preserve the unique genetics of local plant populations. Initial efforts should focus on the propagation of native grassland, coastal sage scrub, and riparian plant species.

5.2.7. Regulatory Considerations

Restoration planning and implementation at the Preserve will benefit from consultation and coordination with appropriate specialists within various regulatory agencies. Certain aspects of restoration and enhancement, particularly those that take place within the riparian corridor or stream channel, may require permitting to protect special status species and critical habitats. Fish passage enhancements in the culvert will likely require coordination with National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game to ensure that the project will not lead to the incidental take of southern steelhead trout, California red-legged frogs, or tidewater gobies.

Contacts: Mark Capelli
Southern California Area Recovery Coordinator.
National Marine Fisheries Service
Phone: (805) 963-6478.
Email: mark.capelli@noaa.gov.

Kate Symonds
U.S. Fish and Wildlife Service, Ventura Office.
Phone: (805) 644-1766.

Natasha Lohmus
Streambed Alteration Agreement Coordinator for
Santa Barbara County
California Department of Fish and Game
Email: nlohmus@dfg.ca.gov

Maurice Cardenas
Fisheries Biologist/Steelhead Specialist
California Department of Fish and Game
Phone: (805) 640-1852.
Email: mcardenas@dfg.ca.gov.

5.2.8. Limitations And Challenges

Reducing human-induced erosion will prove challenging in the steep terrain and highly erosive soils of the Preserve. Restoration actions should aim to minimize the disturbance of soil and native vegetation cover.

While many of the recommended restoration actions can be done with volunteer help at nominal cost, some may require more costly professional input. The acquisition of outside funding, through grants and donations, will be essential in implementing a comprehensive restoration program at Arroyo Hondo Preserve.

5.2.9. Information And Monitoring Needs

The development of a Restoration and Enhancement Plan will require information regarding the condition of plant communities and other aspects of the Preserve's ecological systems. These information needs may be filled through partnerships with organizations listed below, and through primary fieldwork conducted by a restoration planning team. The Restoration and Enhancement Plan should include a detailed assessment and monitoring component that addresses relevant ecological conditions related to restoration efforts.

In the near-term, monitoring for the development of new road/trail-related landslides should be conducted on an annual basis (and after large storm events) by walking the trail network and documenting new features.

5.2.10. Coordination And Partnerships

Consultants and Academia: Experts in the field of restoration science will be useful sources of information in developing restoration and enhancement strategies. The

involvement and expertise of local exotic invasive plant species specialists will be crucial in the pursuit of control and eradication efforts. The Land Trust will benefit significantly from their continued involvement in the crafting of a Restoration and Enhancement Plan.

Contact: Greg Archbald, Non-Native Plants Specialist
Phone: (805) 966-3441.
Email: greg_archbald@hotmail.com.

Wayne Ferren, Executive Director
Museum of Systematics & Ecology.
University of California Santa Barbara
Santa Barbara, California 93106
Phone: (805) 893-2506.
Email: ferren@lifesci.ucsb.edu.

Volunteer Organizations: Restoration planning and implementation at the Preserve will benefit from the continued involvement and expertise of local volunteer-based restoration groups such as the Audubon Society. Members of the Audubon Society are already involved in initial planning for invasive exotic plant species control.

Contact: Darlene Chirman, Project Manager
Santa Barbara Audubon Society
Phone: (805) 692-2008.
Email: dchirman@rain.org

Bren School of Environmental Science and Management, U.C. Santa Barbara: The development of a Restoration and Enhancement Plan could provide a challenging group thesis project for graduate students in the School of Environmental Science and Management (ESM) at the University of California, Santa Barbara. ESM staff can assist the Land Trust in evaluating the utility of using ESM students to develop the plan, and can provide input for developing a proposal for the project. As with any planning effort of this nature, the project would likely require outside funding for professional consultations on various technical issues, and funding for one or more summer internships.

Contact: Jill Richardson, Group Project Coordinator
Bren School of Environmental Science and Management
University of California, Santa Barbara.
Phone: 805-893-7980.
Email: jrichardson@bren.ucsb.edu
Web: www.bren.ucsb.edu

5.3. EXOTIC SPECIES MANAGEMENT

The control of non-native species is an essential element of successful habitat protection and restoration (The Nature Conservancy 2001). Given the ecological havoc that exotic species have caused in many parts of California, Arroyo Hondo Preserve has escaped relatively unscathed – a majority of the Preserve, and the entire watershed, is dominated by native species. However, constant monitoring will be necessary for several non-native plant and animal species found in nearby watersheds. Exotic plant species currently found on the Preserve will require effective control or eradication to protect the natural heritage values and ecosystems of the Preserve.

Management Goal

Protect the integrity of native plant communities through eradication and control of invasive non-native plants throughout the Preserve, in conjunction with Restoration and Enhancement goals and objectives (Section 5.2). Prevent the establishment of additional invasive non-native plant and animal species on the Preserve.

Objectives

1. Maintain currently intact natural plant communities (including chaparral and coastal sage scrub) by preventing the introduction of non-native species and controlling pioneer invasive plant species populations.
2. Promote the restoration of degraded plant communities (including grasslands and riparian woodlands of the front country) through non-native plant species control efforts and revegetation with native plant species.
3. Monitor and prevent the introduction of new non-native plant and animal species to the Preserve.

Interim actions

1. Control or eradicate priority exotic plant species (see Table 4).
2. Utilize certified weed-free feed for resident horses boarding at the Preserve.
3. Remove goldfish (Carassius auratus) from watering troughs.
4. Monitor for the presence of new exotic plant species on a semi-annual basis.
5. Continuously monitor the Preserve for the presence of feral pigs, bullfrogs, and other non-native animal species. Develop contingency plans for controlling these species if they are found on the Preserve.
6. Avoid introducing landscaping and garden plants near the Adobe and other structures that are known to be invasive.

Long-term recommendations

1. Develop long-term strategies that provide for the detection, eradication or control, and monitoring of exotic plant and animal species. These strategies may be part of a larger integrated Restoration and Enhancement Plan for the Preserve (see Section 5.2).

5.3.1. EXOTIC INVASIVE PLANT SPECIES

Controlling existing non-native plant species and preventing new introductions of exotic pest plants throughout the Preserve is one of the single most effective ways to protect and enhance habitats on the property, and will likely prove to be one of the most challenging aspects of land management. Significant resources and sustained efforts will be needed to contain or eradicate incipient infestations, and maintain the health of the Preserve's plant communities.

Photo: W. Sears

Castor bean (*Ricinus communis*), black mustard (*Brassica nigra*) and milk thistle (*Silybum marianum*) are widespread non-native plant species in the front country of the Preserve.

Preliminary surveys (Archbald 2001) were conducted in the fall and winter of 2001 to assess the presence and extent of invasive exotic plant species at the Preserve (Table 4). The surveys found that plant communities of the backcountry are generally intact – chaparral communities of the Preserve are perhaps the most pristine. However, roads in the backcountry have provided corridors for dispersal of non-native grasses such as harding grass (*Phalaris aquatica)* and smilograss (*Piptatherum miliaceum)*. Grasslands and riparian woodlands contain several exotic plant species that will require immediate containment and eradication efforts to keep their populations in check. The abandoned eastside avocado orchard is almost completely dominated by non-native, ruderal species, including fennel (*Foeniculum vulgare*) and castor bean (*Ricinus communis*).

Despite the dominance of non-native plant species in the front country, a number of regionally common invasive exotic plant species are not found on the Preserve (Table 5). Most of these "watch list" species are highly invasive; early detection will be critical in avoiding new infestations.

Table 4. Identified non-native plants of Arroyo Hondo Preserve, excluding horticultural plants of the gardens and orchards (Archbald 2001, Storrer 2001, Santa Barbara Botanic Garden 2002).

Scientific name[1]	Common name	CalEPPC[2]	Comment
Anagallis arvensis	Scarlet pimpernel	-	
Arundo donax	Giant reed	A1	Small occurrence, near lagoon
Asphodelus fistulosus	Onionweed, pink asphodel	NMI	Meadow northeast of barn
Avena fatua	Slender oat grass	-	
Bidens pilosa	Beggar's ticks	-	
Brassica nigra	Black mustard	B	Widespread in grasslands
Bromus diandrus	Ripcut grass	-	
Bromus hordaceus	Soft chess	-	
Bromus madritensis spp. *rubens*	Foxtail chess	A2	
Chamomilla suaveolens	Pineapple weed, manzanilla	-	
Carduus pycnocephalus	Italian thistle	B	Hollister Meadow
Centaurea melitensis	Tocalote	B	
Conium maculatum	Poison hemlock	B	Scattered pioneer patches
Delairea odorata	Cape ivy (German ivy)	A1	Two known locations
Ehrharta calycina	Veldt grass	B	
Erodium botrys	Broadleaf filaree	-	Grasslands
Eucalyptus globulus	Tasmanian blue gum	A1	Three large trees near Adobe.
Euphorbia peplus	Petty spurge	-	
Foeniculum vulgare	Wild fennel	A1	Disturbed areas
Galium aparine	Goose grass	-	
Hirschfeldia incana	Mediterranean mustard	NMI	
Malva nicaeensis	Bull mallow	-	
Malva parviflora	Cheeseweed	-	Hollister Meadow
Marrubium vulgare	Horehound	-	Eastside orchard
Medicago polymorpha	California bur clover	CNL	Widespread in grasslands
Melilotus albus	White sweet clover	-	Entrance gate, burn pile area
Nicotiana glauca	Tree tobacco	NMI	Disturbed areas
Olea europaea	Olive	B	Spreading in the front country
Opuntia ficus-indica	Indian fig, nopal, tuna		
Oxalis pes-caprae	Bermuda buttercup	NMI	Near main creek crossing
Pennisetum setaceum	Fountain grass	A1	Eastside orchard
Phalaris aquatica	Harding grass	B	Front and backcountry areas
Phalaris canariensis	Canary grass	-	
Phalaris minor	Mediterranean canary grass	-	
Picris echioides	Bristly ox-tongue	CNL	Grasslands
Pinus radiata	Monterrey pine	-	Near water tank
Piptatherum miliaceum	Smilograss	NMI	Widespread
Plantago lanceolata	English plantain	-	
Raphanus sativus	Wild radish	-	Widespread in grasslands
Ricinus communis	Castor bean	B	Primarily in eastside orchard
Rubus discolor	Himalayan blackberry	A1	Eastside orchard
Rumex crispus	Curly dock	-	Near padre olive
Schinus molle	Peruvian pepper tree	B	Scattered occurrences
Sequoia sempervirens	Coast redwood	-	Planted by picnic area, well site

Scientific name[1]	Common name	CalEPPC[2]	Comment
Silybum marianum	Milk thistle	CNL	Widespread in disturbed areas
Sonchus oleraceus	Common sow thistle	-	Eastside orchard
Tetragonia tetragonioides	New Zealand spinach	-	Beach
Tropaeolum majus	Nasturtium	-	Small riparian patches
Vinca major	Periwinkle	B	Small riparian patch, near culvert

1. Nomenclature follows The Jepson Manual: Higher Plants of California (Hickman 1993).
2. California Exotic Pest Plant Council (www.caleppc.org), Exotic Pest Plant List (CalEPPC 1999).
A1: Widespread pests that are invasive in more than 3 Jepson regions.
A2: Regional pests invasive in 3 or fewer Jepson regions.
B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.
NMI (Need More Information): Plants for which current information does not adequately describe nature of threat to wildlands, distribution or invasiveness. Further information is requested from knowledgeable observers.
CNL (Considered, but not listed): Plants that, after review of status, do not appear to pose a significant threat to wildlands.

Table 5. Watch list: regionally common exotic invasive species not currently found at Arroyo Hondo Preserve (Archbald 2001)

Scientific name[1]	Common name	CalEPPC[2]	Comment
Ageratina adenophora	Eupatorum	B	
Centauria solstitialis	Yellow starthistle	A1	Possible sighting on Preserve
Cortaderia spp.	Pampas grass	A1	Includes *C. jubata* and *C. selloana*
Cynara cardunculus	Artichoke thistle		Known on adjacent ranch
Cytisus scoparius	Scotch broom	A1	
Genista monspessulana	French broom	A1	

1 and 2: See footnotes for Table 4 above.

5.3.1.1. Long-term Strategies for Invasive Exotic Plant Species Control

Long-term strategies for invasive exotic plant species detection, control, and monitoring should be integrated into a comprehensive Restoration and Enhancement Plan for the Preserve (described in Section 5.2). In general, the long-term strategy will focus on the goal of restoring impacted native plant communities to the fullest extent feasible, then transition to maintaining the health of these communities (Archbald 2001). The long-term plan should include provisions for two thorough inspections per year (spring and fall). Preserve managers and volunteers will need to be trained to recognize important non-native plant species in all seasons. A system for reporting new sightings and implementing control actions should be established and kept current. Geographic positioning system equipment (GPS) and computer-based geographic information system (GIS) software should be used to create a digital database of locations. Simple manual mapping onto U.S. Geological Survey topographic maps provides an effective, low-cost alternative.

The Restoration and Enhancement Plan will include a program designed to prevent or minimize activities that may introduce non-native seeds or other plant materials. The following potential sources should be considered (from Archbald 2001):

Horses

Only certified weed-free forage should be used to feed resident horses on the Preserve. In addition the range of the resident horses should be restricted to keep them from spreading non-native plant species throughout the Preserve. Extra measures should be taken to restrict their access into the riparian vegetation and creek. To reduce the risk of introducing non-native species, recreational equestrian use should be prohibited at the Preserve. The trailering-in of horses carries a high risk of introducing major weed species from not only the horses but also from the trailers themselves and any feed brought along.

Vehicles and Equipment.

Preserve stewards will need to implement procedures to keep equipment from spreading invasive plant material. When used in an area of extensive non-native plant infestation (eastside orchard, primarily), tools and vehicle tires should be inspected and cleaned before leaving the area, or at a central location designated for this use. Parking for Preserve visitors should be contained within designated parking areas to reduce the spread of non-native species.

Photo: Greg Archbald

Smilograss (*Piptatherum miliaceum*) is an invasive exotic grass species found along roads and trails at the Preserve.

Disturbance of Soil and Native Vegetation.

High levels of land and habitat disturbance favor the establishment of non-native flora (Stephenson and Calcarone 1999). Many weed species, such as fennel and mustard, are specifically adapted to colonize disturbed land. Preserve stewards, volunteers, and contractors should be trained and instructed to minimize any unnecessary form of land disturbance on the Preserve when undertaking restoration projects or infrastructure development. When land disturbance is necessary or inevitable, revegetation with native species and monitoring for exotic plant establishment should be undertaken.

Public Use

Visitors to the Preserve should be informed about non-native species issues upon arrival. This information can be incorporated into the visitor's guide and imparted to the public by docents during organized nature hikes. Children and group leaders should be prohibited from bringing plant materials to the Preserve and from picking plants and carrying them along on their walks (e.g. a fennel stalk with mature seeds could drop seed over a considerable distance if carried and waved around).

5.3.2. EXOTIC ANIMAL SPECIES

Aquatic habitats (the lagoon and creek) are perhaps the most pristine environments on the Preserve, and are not known to harbor any species of non-native fish, reptile, or amphibian. Table 6 provides a summary of the regionally common exotic animal species. The non-native bullfrog (*Rana catesbeiana*), while not known at the Preserve, has been implicated in the decline of red-legged frog, southwestern pond turtle, two-striped garter snakes, and various fish species (Jennings and Hayes 1994). Bullfrog populations are known to occur at Dos Pueblos (16 kilometers [9.9 miles] to the east) and Dos Vistas (3.5 kilometers [2.2 miles] to the northeast) (P. Collins and J. Storrer pers. comm.). The Dos Vistas bullfrog occurrence is of particular concern, since Arroyo Hondo Preserve may be within the dispersal range of this population (P. Collins and J. Storrer pers. comm.).

Goldfish (*Carassius auratus*) have been stocked in watering troughs at the Preserve (possibly for mosquito abatement) and continue to persist in at least one location. Given the isolated location of the troughs, and the habitat preferences of this species, it is unlikely that these aquarium pioneers could establish breeding populations in the dynamic environments of the creek and lagoon. However, despite this low level of risk, the Land Trust should remove these populations from the Preserve and intermittently drain the trough to reduce mosquito breeding. The mosquito fish (*Gambusia affinis*) is a more commonly introduced fish species used in mosquito abatement, and may be present in other troughs on the property. In the absence of goldfish or mosquito fish, native Pacific chorus frogs (*Pseudacris regilla*) may inhabit troughs on the Preserve if given some measure of cover (emergent vegetation, wood, etc), and provide a similar mosquito abating service.

In terrestrial habitats, potentially devastating non-native mammals, including the feral pig (*Sus scrofa*) and feral house cat (*Felis catus*) are not known to occur on the Preserve. Feral pigs can potentially inflict widespread damage to native plant communities while rooting for bulbs and insects. The rototilling effect of feral pigs disturbs soils and uproots native vegetation, providing bare soils that may be colonized by pioneer invasive plant species (Sweitzer and Van Vuren 2001). Feral pigs are also known to feed on snakes, including the two-striped garter snake (Jennings and Hayes 1994). Populations of feral pigs are known in the Santa Ynez Valley and within Gaviota

State Park, 7 kilometers (4.4 miles) west of Arroyo Hondo Preserve (P. Collins and J. Storrer pers. comm.).

The non-native red fox (*Vulpes vulpes*) has been found at the Preserve, and may occasionally prey on southwestern pond turtles (P. Collins and J. Storrer pers. comm., Jennings and Hayes 1994). Opossum (*Didelphus marsupialis*) are resident in the canyon but are thought to have relatively low impact on native species at the Preserve (P. Collins and J. Storrer pers. comm.).

Table 6. Status of regionally common exotic animal species at Arroyo Hondo Preserve

Scientific name	Common name	Status	Comment
Amphibians			
Rana catesbeiana	Bullfrog	Not observed	Known to occur on nearby properties including Dos Vistas and Dos Pueblos.
Fish			
Carassius auratus	Goldfish	Resident	Present in barn watering trough.
Gambusia affinis	Mosquito fish	Not observed	May be present in watering troughs.
Mammals			
Didelphus marsupialis	Opossum	Resident	
Felis catus	Feral house cat	Not observed	
Mus musculus	House mouse	Likely to occur	
Rattus spp.	Rat	Likely to occur	
Sus scrofa	Feral pig	Not observed	Known in the Santa Ynez Valley and Gaviota State Park.
Vulpes vulpes	Red fox	Resident	
Birds			
Columba livia	Rock dove	Resident	
Molothrus ater	Brown-headed cowbird	Resident	
Sturnus vulgaris	European starling	Resident	

Populations of two common non-native human-commensal rodents, rats (*Rattus* spp.) and the house mouse (*Mus musculus*) may persist in and around the Adobe and other structures on the Preserve, along with the native dusky-footed woodrat (*Neotoma fuscipes*), but pose a relatively low risk to wildlife or habitats. Nonetheless, rodent populations should be controlled within the structures to protect historical resources and the health and safety of residents and visitors (see Section 5.6.3 for further information).

Exotic bird species known to occur at the Preserve include the common pigeon or rock dove (*Columba livia*), the European starling (*Sturnus vulgaris*) and the brown-headed cowbird (*Molothrus ater*) (P. Collins and J. Storrer pers. comm.). The European starling can reduce breeding success in native birds by competing with cavity-nesters for nest sites (Stephenson and Calcarone 1999). Brown-headed cowbirds are native to North America, but have greatly increased in range and numbers with European colonization.

This species has been implicated in the decline of many native birds, especially those with "open-cup" type nests. Cowbirds are brood parasites, laying their eggs in the nests of other species; the host species often raises the more aggressive cowbird young instead of their own. Where cowbird populations are relatively high, the result can be a dramatic decline in the brood success of host species (Stephenson and Calcarone 1999). The extent to which exotic bird species are affecting populations of native birds at Arroyo Hondo is unknown.

5.3.3. Regulatory Considerations

Several exotic plant infestations occur within sensitive riparian and aquatic habitats harboring endangered and threatened species on the Preserve. Extensive exotic plant control activities near or within riparian and aquatic habitats will need to be carefully planned to avoid damaging these resources. When planning work in these areas, the Land Trust may wish to consult contacts (listed in Section 5.2) at the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and/or the California Department of Fish and Game for guidance on avoiding impacts to sensitive resources.

5.3.4. Limitations And Challenges

Exotic plant species control and eradication is a labor-intensive undertaking, requiring appropriate tools, coordination, and planning. Fortunately, community interest in restoring native plant communities at the Preserve is high, and a volunteer-based control program is underway.

Disposal of exotic plant materials should be carefully considered. On-site disposal options are limited, due to concerns with potentially spreading seeds or other propagation materials within the Preserve. Burning and composting plant material on-site are options, however both methods have drawbacks and could potentially spread seeds. Off-site options are limited to bagging and disposal at the neighboring Tajiguas landfill.

5.3.5. Information And Monitoring Needs

Only cursory information has been gathered on the extent of non-native plant species at the Preserve. More detailed surveys will be needed to fully understand the scope of the invasive exotic plant problem, and will likely involve additional mapping of known infestations. Such surveys may be associated with ongoing general floristic surveys conducted to establish baseline data on plant species biodiversity at the Preserve. A long-term monitoring plan for invasive exotic plant species should be developed within the Restoration and Enhancement Plan, and will likely take the form of annual or biennial surveys. Periodic photographic monitoring of areas where control actions have taken place can provide important information on the success of removal strategies.

Monitoring for non-native animal species should be conducted on an ongoing basis. Bullfrogs and feral pig are of particular concern, since these populations may be spreading from nearby locations. Monitoring may occur opportunistically, with Preserve stewards trained to recognize bullfrog calls, feral pig sign (patches of uprooted soil and vegetation), and non-native bird songs.

5.3.6. Coordination, Information Sources, and Partnerships

Exotic species control is an essential element of a comprehensive habitat restoration strategy. Information sources and contacts noted in Section 5.2.10 (Restoration and Enhancement) will be essential to exotic species control efforts.

5.4. FIRE AND VEGETATION MANAGEMENT

Fire is one of the most widespread and potent factors shaping the structure and composition of vegetation communities in southern California (Stephenson and Calcarone 1994, F. W. Davis and M. Moritz unpublished). In some areas of California, the advent of modern fire suppression policies and techniques over the last century has changed historical cycles of fire, generally shifting from smaller, more frequent fires to conflagrations that are larger and less frequent, but far more intense (Minnich 1987, The Nature Conservancy 2000). In the Santa Ynez Mountains, however, the historical fire regime over the last several centuries may have always been characterized by large and relatively infrequent fires with a 60-100 year return interval, even before modern fire suppression (Davis and Burrows 1994, Stephenson and Calcarone 1999).

The absence of significant fire events in the Gaviota Coast region within the last 47 years, combined with a buildup of fuels due to a lack of recent vegetation management in the grasslands and eastside orchard of the Preserve, has created a high fire risk environment on the property (S. Hobbs pers. comm.). In the past, cattle grazing was the prevalent land use at Arroyo Hondo and served to control grassland fuel loads; however, cattle were removed in 1998. The potential for large, intense fires in the region necessitates some level of vegetation management on the Preserve; fire risk management should be a priority for the Land Trust.

Management Goal

Manage fire risk on the Preserve to protect visitors, staff and infrastructure, and reduce the likelihood of large catastrophic wildfire events. Where possible, use fire and vegetation management techniques to maintain and enhance native plant communities and habitat diversity at the Preserve.

Objectives

1. Maintain defensible space around buildings, trails and other infrastructure utilizing fire resistant landscaping, mowing and brush clearing, and fire-retardant building materials.
2. Reduce fuel loads in grasslands and the eastside orchard utilizing some form of vegetation control. This may include controlled, low-density cattle grazing, seasonal use of goats, manual control and other methods consistent with resource protection and restoration and enhancement goals.
3. To the extent feasible, utilize prescribed fire to reduce the risk of catastrophic wildfire, control non-native species, and enhance native plant communities, in conjunction with restoration and enhancement goals.

Interim actions

1. Implement measures on an ongoing basis to reduce sources of ignition and fuel, provide defensible space, and ensure public safety (see Section 5.4.2 below).
2. Evaluate grassland vegetation management strategies and implement when feasible.

Long-term recommendations

1. Explore the use of prescribed fire on the Preserve with CDF and County Fire in conjunction with goals established in a Restoration and Enhancement Plan (Section 5.2).
2. Discuss the use of resource-sensitive fire fighting methods with County Fire.

5.4.1. Fire History And Current Conditions

Photo: W. Sears

A transformer fire in 2000 burned approximately 11 acres on the western ridge of Arroyo Hondo.

Very few fire events have occurred in the Preserve within the last 100 years (Map 9). Of the three fires that have occurred within the Arroyo Hondo watershed since 1926, two have burned within the Preserve boundary. The largest recorded fire affecting the property was the Refugio fire of September 1955, which consumed nearly 32,144 hectares (79,428 acres) from Gaviota Pass east to Goleta (California Dept of Forestry and Fire Protection 2001, Chesnut 1993). The Refugio fire burned the entire Arroyo Hondo watershed, and a majority of the Preserve, including the old schoolhouse, which was located in the eastside orchard near the current barn (J. J. Hollister pers. comm.). The massive reduction in vegetation within the watershed evidently caused extensive flooding in the lower reaches of Arroyo Hondo creek the following winter (Hvolboll 2001). The only other recorded fire on the property was a small transformer-caused fire that consumed 5.5 hectares (11 acres) of the western ridge in 2000 (J. J. Hollister pers. comm.).

The lack of significant recent fire on the Gaviota Coast has allowed much of the natural vegetation in the region to mature, creating a large amount of potential fuel. The chaparral vegetation covering a majority of the Preserve is particularly well developed. Grassland areas of the Preserve are also accumulating fuel in the absence of grazing over the last several years (J. J. Hollister pers. comm.). Lack of orchard and weed

management in the eastside orchard of the Preserve has resulted in a buildup of fuels there, mainly in the form of dead avocado trees and large patches of dried fennel flower stalks.

5.4.2. MANAGING VEGETATION AND FIRE RISK

A practical approach for reducing fire risk on the property will be to manage grasslands and vegetation immediately surrounding the developed portions of the Preserve to reduce fuel loads and protect infrastructure. Common methods for reducing fuels in grasslands include the use of managed grazing (cattle or goats), manual vegetation manipulation, and prescribed fire. Grazing has traditionally been used successfully to reduce fuels in California, but can have detrimental effects on soil stability, riparian habitats, and plant species diversity that are inconsistent with resource protection (Stephenson and Calcarone 1999). Managing cattle or other livestock should to be carefully considered; protections for aquatic, riparian, and other sensitive habitats will need to be implemented to minimize impacts to sensitive habitats. Manual vegetation management is useful in sensitive habitats, and has been used to reduce fuels in chaparral, grasslands, and riparian and oak woodlands. Methods include mowing (in grasslands) and selective hand removal of dead vegetation and selective trimming to reduce overall biomass. Manual vegetation management has proven to be costly and time-consuming, but is necessary where other methods are infeasible; volunteer labor can help minimize costs and resources required.

Prescribed fire may be used on a limited basis to reduce fuels in the front country of the Preserve. The California Department of Forestry and Fire Protection (CDF) established the Vegetation Management Program (VMP) in 1981 as a cost-sharing approach to reducing the risk of catastrophic wildfire and improving habitat conditions through prescribed fire and manual vegetation management (California Department of Forestry and Fire Protection 2001). In Santa Barbara County, the Santa Barbara County Fire Department (SBCFD) manages and implements the VMP for CDF (S. Hobbs pers. comm.). Initial consultations with the County Fire Department have downplayed the use of prescribed fire in managing vegetation in the Gaviota Coast region, due to high fuel loads and lack of a regional plan for fuels reduction (S. Perkins pers. comm.). However, prescribed fire should not be ruled out, since it is an integral part of a suite of methods for reducing the risks and impacts of catastrophic wildfire by strategically reducing fuel loads, and can provide important habitat enhancement and restoration benefits (S. Hobbs pers. comm., Riggan et al. 1994).

5.4.2.1. Guidelines for Reducing Fire Risk

The following recommended actions were developed in coordination with SBCFD personnel to reduce fire risk and improve fire-fighting conditions at the Preserve (S. Hobbs pers. comm., S. Perkins pers. comm.):

Policy

1. Maintain a policy of no smoking on the Preserve, and no fires except in designated fire pits as authorized by the Preserve stewards. Provide appropriate container or area for disposing of ashes from fires.

Information and Planning

1. Provide the County Fire Department and Gaviota Station 18 with a site map and GIS coordinates for Preserve structures, roads, trails, water system and possible helicopter landing areas (Map 10).
2. Provide the County Fire Department and Gaviota Station 18 a list of Land Trust emergency contact names and phone numbers and update as necessary.
3. Develop written emergency response procedures and ensure that all Preserve staff, docents and volunteers are aware of them. Keep emergency response instructions, contact names and phone numbers posted near phones.
4. For docent led or group hikes, provide the leader with a walkie-talkie to be able to contact the Preserve staff to report an emergency.
5. Designate as fire evacuation safety zones: (1) the Hollister Meadow; and (2) the fruit orchard south of the Adobe, where staff and visitors should gather in case of a fire to await further direction or evacuation by the County Fire Department.

Equipment and Maintenance

1. Equip the Adobe and the barn with smoke detectors. Test regularly and replace batteries annually.
2. Equip the Adobe, barn and group picnic area with fire extinguishers. Test and service extinguishers as recommended on the label.
3. Maintain electric and gas appliances and tools in good working order, including periodic inspections by Preserve staff and professional servicing, repair or replacement as necessary.
4. Preserve staff, volunteers and visitors are not expected to fight a wildfire. However, the Adobe and barn should be equipped with sufficient lengths of garden house to wet down the structures and nearby vegetation to defend the structures until the fire department arrives.
5. Investigate the cost of upgrading the 2.5 inch fire hydrant near the Adobe to a 4.0 inch hydrant. The existing hydrant does not meet current size standards; upgrading this hydrant will likely be a condition of approval of any county permit required for new or future facility improvements on the Preserve.

Fire Hazard Reduction and Defensible Space

1. Store any flammable or hazardous chemicals used on site in a fire-safe storage locker, not in the wood barn.

2. Mow or brush as necessary to clear dried weeds and grasses from the highway turnoff for the Preserve, and along the paved entrance road. Ten feet of clearance along both sides of the road is recommended, but does not necessarily include removal of native trees or shrubs.
3. Maintain upper eastside orchard road and west ridgeline trail/road for emergency vehicle access through annual brushing and clearing of landslides, which may block these roads.
4. Maintain defensible space along designated hiking trails and around Hollister Meadow at the picnic area. Where physically practical and not damaging to sensitive natural habitat, grasses and weeds that dry out in late spring should be brushed or mowed to provide 2-3 meters (7-10 feet) of clear space alongside trails.
5. Keep trees near the Adobe and the barn trimmed back several feet from the structures.
6. Designated parking areas should be kept clear of brush and weeds. Temporary overflow parking areas for larger events should be mowed before use.
7. Piles of dead tree limbs and brush generated by Preserve maintenance or restoration activities should not be allowed to accumulate. They should be chipped, mulched or disposed of at the county landfill. Burning is also an option that should be performed during the designated burn periods.
8. Compost or mulch piles to be used in the orchard or planting projects should be spread soon after delivery, and not left in piles, as they can spontaneously combust.
9. Tree limbs over the main Preserve access road, across the bridge to the barn, and up to the meadow and picnic area should be cut to a height of 14 feet above the ground to provide clearance for fire fighting equipment.

5.4.3. Regulatory Considerations

The Land Trust may wish to consult with personnel from the U.S. Fish and Wildlife Service and the California Department of Fish and Game to discuss resource-sensitive fuels reduction techniques suitable for the habitats of the front country (see Section 5.2.7 for contacts).

5.4.4. Limitations And Challenges

Fire and vegetation management options at the Preserve are limited by regional conditions and agency policies. The Land Trust will need to work within these constraints to develop sound vegetation management practices that enhance habitats and vegetation

Firefighting methods can result in resource damage when heavy equipment is used in clearing firebreaks. Current methods for firefighting have incorporated some protections for sensitive habitats; the Land Trust should discuss strategies for resource-sensitive fire response with the Santa Barbara County Fire Department.

5.4.5. Information And Monitoring Needs

The Land Trust should work with the Santa Barbara County Fire Department and CDF to assess the feasibility of using prescribed fire to reduce fuels and assist with restoration efforts at the Preserve, in conjunction with the VMP.

5.4.6. Coordination And Partnerships

Santa Barbara County Fire Department and California Department of Forestry and Fire Protection: Multiple benefits for reduction of exotic species and enhancement of native plant communities could be realized with the use of prescribed fire and other vegetation management techniques. Consultation with the Santa Barbara County Fire Department (SBCFD) to evaluate the feasibility of prescribed fire within the grassland areas of the front country is recommended. The Land Trust may consider enrolling Arroyo Hondo Preserve in the California Department of Forestry and Fire Protection's (CDF) cost-sharing Vegetation Management Program (VMP) to help provide funding.

Contacts:

Steve Hobbs, CDF Coordinator
Santa Barbara County Fire Department
Email: steve.hobbs@sbcfire.com

Sabin Perkins, Captain
Santa Barbara County Fire Department
Gaviota Station #18
17200 Mariposa Reina,
Gaviota, California 93117
Phone: (805) 681-5518

5.5. CULTURAL AND HISTORICAL RESOURCE MANAGEMENT

Preserving the historical and cultural features and resources of the Preserve is a fundamental concern for the Land Trust, as noted in the Arroyo Hondo Preserve Guiding Principles (Appendix A). The Preserve is a valuable representation of cultural and historical characteristics of the Gaviota Coast as well as Santa Barbara County, due to the inhabitance of the land by the Chumash, the historical land-uses, the regional significance of the property and its prominent past residents. The role of the Land Trust as stewards and curators of this noteworthy property is vital for preserving the heritage and land-use history of this area.

Photo: W. Sears

The remains of a Spanish-era adobe millhouse located near Hollister meadow.

Management Goal

Preserve the historical and cultural features of the Arroyo Hondo Preserve and enhance the public appreciation of these resources.

Objectives

1. Preserve and enhance the Ortega Adobe as a historical resource.
2. Protect the Chumash artifact site as an undisclosed location to the public in order to avoid the excavation and removal of the historic artifacts.
3. Create an inventory of historic documents, artifacts and photos; develop a system to archive the inventory.
4. Enhance visitor understanding and appreciation of historical and cultural resources.

Interim Actions

1. Apply for historical landmark status designation for the Ortega Adobe.
2. Obtain professional evaluation of measures to protect the Adobe walls and restore other features to historic condition where feasible.
3. Catalog and identify any historical and cultural resources from the Arroyo Hondo archives, and make backup copies of the archives for an off-site location.
4. Interview J.J. Hollister and others for historical accounts, description of existing photos, land-use/management and any other pertinent information.

5. Prepare an interpretive display for the Adobe about the significant historical and cultural resources of the Preserve.

Long-term Recommendations

1. Retain the Spanish-Mexican era aesthetics of the Preserve by utilizing period architecture in new construction and infrastructure.
2. Establish an historical and cultural interpretive trail.
3. Create a digital database of all historic documents and photos.
4. Develop an interactive database of historical documents and photos for use in an interpretive visitor center.
5. Prepare a short video of the Preserve highlighting historical and cultural resources and interviews with J.J Hollister.
6. Involve local Chumash representatives in representing and recognizing the historic presence of Native Americans at Arroyo Hondo.

5.5.1. Place Of Historical Merit And Landmark Status

The primary intact historic feature of this property is the Ortega Adobe. The continued preservation and enhancement of this building is a priority for both the interim and long-term management of the property. This structure will be the principal candidate on the property for a historical landmark status designation. The County local Coastal Plan (1999), Section 3.10.5 (Historical Resources), highlights the importance of the Adobe at the Preserve and states that the early adobe construction should be protected through county landmark status.

The following is a list of the steps required to achieve historical landmark designation for the Adobe (adapted from the County Landmark Information Sheet):

1. Submit a completed application form to the Landmark Commission through one of its members or through the County Planning and Development Department. The nomination is then put on the Commission agenda.
2. The nomination form is reviewed by the Commission and the Commission then evaluates the property, making a recommendation, which includes findings of facts related to established criteria for designation. A vote is taken to declare the property eligible to become a Place of Historical Merit. A date is set for a hearing for final action.
3. The applicant is notified of the hearing for final action on the determination of Place of Historical Merit. The Landmark Commission holds the public hearing and oral and written comments are received at the meeting. The Commission decides on whether or not the building is deemed a Place of Historical Merit at this meeting.
4. The Commission decides at this meeting whether or not to pursue full Landmark status. If so, procedures 2 and 3 are repeated for Landmark designation.

5. Approved Landmarks are forwarded to the Board of Supervisors for acceptance. The Landmark designation becomes effective upon adoption by the Board.

5.5.2. ADOBE PROTECTION AND FUTURE IMPROVEMENTS

The importance of the Adobe as a historical landmark on the Preserve regardless of its official status makes it a chief concern for future management. The objective to preserve this historically significant building needs to be addressed through the assistance of professional review and grant funding. A conservation audit by a trained inspector will need to be conducted on the Adobe to assess the condition of the building and determine what steps should be taken to preserve or restore it. The results of the audit can help to guide future enhancements and restoration of the structure. The Land Trust should seek grant funding for work on the Adobe since it is likely that long-term preservation of the Adobe will require a significant financial commitment beyond the current resources of the Land Trust. A priority should be to remove the concrete overlay patching that is supported by chicken wire and which was added to the original Adobe in the mid-1900s. This overlay is seen to be detrimental to the structural integrity of the building. Therefore, restoration projects such as this should be undertaken where feasible.

When any projects are considered for the restoration or maintenance of the Adobe and there is a significant amount of impact (i.e. more than painting, window replacement, etc.), then the recommendations developed by Padre Associates (2001) in their Phase I Environmental Site Assessment (page 18) should be followed as written:

A demolition asbestos survey should be conducted prior to any renovations of the Subject Property ranch house and a California-licensed asbestos consultant should conduct the asbestos survey. If asbestos is found in construction materials at the on-site buildings, the asbestos-containing materials should be abated prior to the commencement of demolition activities. A California-licensed asbestos abatement contractor should conduct abatement activities. Abatement activities should be observed by a third-party asbestos consultant to ensure that abatement activities are completed in accordance with applicable federal, state and local regulations. Asbestos-containing wastes should be disposed at a disposal facility licensed to accept such waste.

If additional infrastructure is developed on the property, such as restrooms or a new caretaker residence, it is recommended that it retain the current Spanish-Mexican era look and feel of the Preserve's front country. The maintenance of appropriate landscaping around the Adobe and any additional structures can assist with this appearance. Any future work projects should be cautious when grading, digging, drilling or any other type of soil disturbance throughout the property and especially in the area of the mapped Chumash archeological site in order to avoid impacting an archaeological resource. The Chumash archaeological site is considered to be a large campsite that was perhaps used seasonally (Santoro et al. 1993). The Chumash artifact site will remain undisclosed to the public to avoid the excavation and removal of historic artifacts.

5.5.3. HISTORICAL RECORDS

In order to preserve the historical records of Rancho Arroyo Hondo, the archives and any supplementary information should be identified and cataloged in an organized method. The photos should be scanned and reproduced; all documents should be copied and backup copies of the archives should be stored off-site in a fire safe box. The Santa Barbara Trust for Historic Preservation is currently working on building this archive in consultation with the Land Trust.

In addition to the existing information, an interim action should be to interview J.J. Hollister and any other relevant family members to document land-use, historical accounts and interesting anecdotes. The interviews can be helpful in organizing the photographs and figuring out what information would be interesting to the public. The information from these interviews can also help the Land Trust better understand the extent to which particular activities occurred on the property as an aid to understanding the causes of erosion or other evidence of human impacts.

While the Adobe is occupied by resident caretakers, it is important to maintain the entrance room with some historical artifacts and documents for visitors to view. Eventually the entrance room should have an interpretive display for the public to learn about the significant historical and cultural resources of the Preserve. An intern who could work directly with the Santa Barbara Trust for Historic Preservation and the Santa Barbara Historical Museum could potentially do part of this work.

5.5.4. LONG TERM RECOMMENDATIONS

There are several long-term recommendations for management of the historical and cultural resources of the Preserve. One is to establish a historic and cultural interpretive trail that is a loop around the front country stopping at significant landmarks or views. The historic pear and olive trees would certainly be important stops along the trail. Also, mention of the history of the missionaries in the area could be included since there are remnants of grape vineyards on the property. This trail could incorporate history of the land, people, and previous buildings, such as the former schoolhouse and types of activities that occurred on the property. Refer to Section 5.6 for a continued discussion of an interpretive trail.

Additionally, the Land Trust should work with the USDA Forest Service to protect the Ortega Cabin, which is situated in the upper reaches of the watershed and north of the Preserve boundary. Protection could include trimming the vegetation around the structure to provide a fire buffer, installing a low lying fence as a public safety and resource protection measure, and placing interpretive signage about the historical uses of the cabin. The latter two measures would only be necessary if a trail was created up to the cabin the future, as there is currently no public access to the cabin.

After the historic photos, documents and artifacts are archived a future step should be to develop a digital database for some of the relevant documents and photos that can

be used as part of the interpretive display in the Adobe with documents, photos, remembrances, and historical aerial photos. This can be achieved with little or no funding. The computer to be used for this could be part of a wish list developed by the Land Trust and donated for this purpose.

The Land Trust should consider videotaping the interviews with J.J. Hollister and other relevant people and have them available for public viewing in the Adobe. This would help to create a comprehensive multimedia historical and cultural display for public education and appreciation. The knowledge of local Chumash council members should be sought for the proper representation of their heritage and culture in these interpretive displays. The Santa Barbara Museum of Natural History can be an additional source of information and helpful for Chumash cultural and regional facts, maps and interesting folklore, music and traditional activities.

5.5.5. Regulatory Considerations

There are various benefits under federal, state and local programs for county landmarks. Local building officials may have the authorization under the State Historical Building Code to sanction departures from building codes in order to preserve historical structures (Santa Barbara County 1996). Historic properties can possibly qualify for rehabilitation loan financing, and if the county landmark is also listed on the National Register of Historic Places, then it could be eligible for particular grants or loans and certain types of tax benefits.

If projects that require County permits were to occur in the Chumash site area, then the California Environmental Quality Act (CEQA) may come into play to determine the affects of the proposed project on the cultural resources. Mitigation measures may be necessary, depending on the level of impact expected, to comply with CEQA. It is the intention of the Land Trust, however, to avoid any impacts to this archaeological site, so no projects will be conducted in that area. It is possible that other Chumash sites, yet to be discovered, exist on the property. As a precaution against irreparable damage to these resources, preliminary archaeological surveys should be conducted before any earth-moving projects are commenced. If such a site is discovered, the Land Trust will work with local Chumash and/or archaeologists to develop an appropriate course of action.

5.5.6. Limitations And Challenges

The key challenge facing the Land Trust in protecting and enhancing the historical and cultural resources found on the property is the level of funding necessary to embark on many of the projects that will likely be required for long-term protection. The Land Trust will rely on outside funding sources for the more costly projects and will engage in grant-writing and other fund-seeking activities on an ongoing basis in order to engage in the actions recommended by the conservation audit.

5.5.7. INFORMATION AND MONITORING NEEDS

The geographic extent of the Chumash archeological site should be considered in planning for any development, additions or improvements to infrastructure. Any projects must avoid disruption to the artifacts. Restoration of the Adobe walls should be based on consultation with the proper architect or historical experts to determine the proper techniques and goals of the structural restoration project.

The caretakers will monitor the impact that public visitors are having on the Adobe in order to ensure that it is adequately protected. If evidence is found indicating an adverse impact to the Adobe then appropriate measures will need to be taken to protect the resource.

5.5.8. COORDINATION AND PARTNERSHIPS

Santa Barbara Trust for Historic Preservation: The Land Trust has already established a relationship with the Santa Barbara Trust for Historic Preservation by having them out to the Preserve for consultation and for assistance with the documentation archives. This organization can play a supporting role in the designation of the Ortega Adobe as a County historical landmark.

Contacts:
P.O. Box 338
Santa Barbara, California 93102
Phone: 805-965-0093
Web: www.sbthp.org/home.htm

Santa Barbara County Historical Landmark Advisory Commission: The County Historical Landmark Advisory Commission will ultimately decide whether or not the Adobe receives historical landmark status.

Contacts:
Santa Barbara County Historical Landmark
Advisory Commission
c/o Planning and Development
123 East Anapamu Street
Santa Barbara, California 93101
Phone: 805-568-2000

The Santa Barbara Historical Museum: The museum and Preserve could benefit from a working relationship of information sharing. The historical and cultural information obtained from the Preserve could possibly be used in the cultural and education programs of the museum, and advice from the museum can help the Land Trust develop the Preserve's interpretive displays and historic trail.

Contacts:
135 East De la Guerra Street
Santa Barbara, California 93101
Phone: 805-966-1601
www.santabarbaramuseum.com/contactinformation

Santa Barbara Museum of Natural History: The anthropology department of the Museum of Natural History has information regarding the Chumash people. Consultation with the museum can be valuable for the Land Trust when developing an interpretive display for the Adobe.

Contacts: 2559 Puesta del Sol Road
Santa Barbara, California 93105
Phone: 805-682-4711
Web: http://www.sbnature.org/chumash/

Conservation Auditor: The professional evaluation of a conservation auditor will assist the Land Trust in assessing the condition of the Adobe and understanding the areas for potential enhancement and restoration. The Land Trust should restore and improve the Adobe when feasible with appropriate funding from outside sources. Wayne Donaldson is a Historic Architect that performs conservation audits on historic buildings.

Contacts: Wayne Donaldson
Phone: 619-239-7888

The Barbareno Chumash Indian Council: This council is recently organized and not currently recognized by the federal government. However, the council could still be a good resource for providing historical information and ensuring accurate representation of the Chumash in the Preserve's interpretive program.

Contacts: Email: papagana@earthlink.net
Web: www.expage.com/barbara44

5.6. PUBLIC USE: EDUCATION, RECREATION, AND RESEARCH

Management Goal

Provide opportunities for outdoor education, passive recreation, and research consistent with the protection of natural and cultural resources present on the Preserve.

Objectives

1. To provide for safe and enjoyable non-discriminatory public access consistent with the protection of the natural and cultural resources found at the Preserve, and the maintenance of the serenity of Arroyo Hondo.
2. To provide opportunities for outdoor education programs for schools and other visitor groups from throughout Santa Barbara County.
3. To provide opportunities at the Preserve for casual hiking, picnicking, and other public day use.
4. To promote opportunities for ecological and cultural research at the Preserve.
5. To provide opportunities for the use of the Preserve for retreats, picnics, and other group events by reservation consistent with the protection of the Preserve's resources.

Interim Actions

1. Evaluate the need to limit access through the culvert from the lagoon to the Preserve to restrict unauthorized access by the public into the Preserve.
2. Develop an interpretive program for the Preserve.
3. Provide regularly scheduled docent-led nature walks to the public on a reservation basis; recruit and train volunteer docents for these programs.
4. Develop a structured environmental education program for school groups.
5. Have public hiking days open on a limited reservation basis.
6. Establish a set of guidelines for public use, and use appropriate signage to convey the guidelines to the public.
7. Develop visitor guide and trail map for use by the public.
8. Monitor the impact of visitors on the Preserve and enforce guidelines by having staff member(s) on site during public events.
9. Develop application form for group events and review applications prior to approval.
10. Utilize the research application (Appendix H) for reviewing and approving proposed ecological research projects.
11. Promote the Preserve as a research site and explore opportunities to work further with UCSB and other research institutions.
12. Develop public safety guidelines such as restricting culvert beach access during high flows, fire and flood season measures, and evacuation plans.

13. Conduct tests to assess the current quality of the groundwater and other risks associated with environmental contamination.
14. Test the Adobe for radon gas levels as recommended by the environmental hazards report prepared prior to acquisition of the property.
15. Test for hantavirus in the barn and Adobe.

Long-term Recommendations

1. Continue to monitor the impact of visitors on the Preserve and enforce guidelines.
2. Continue to develop and refine the Preserve's interpretive program.
3. Determine intensity of public use that is compatible with resource protection.

5.6.1. PUBLIC ACCESS

The Preserve can be accessed by the public via three points. In the near-term, the primary access point will be the paved driveway entrance connecting the Preserve to the northbound lanes of U.S. Highway 101, between Refugio State Beach and Gaviota State Park. A locked gate at the entrance will be opened during days in which a group event or "hiking day" is planned.

Photo: W. Sears

Hikers on the trail through Hollister Meadow.

The second access point is from the beach, which can be reached from the Vista Point turnoff on southbound Highway 101. From there, a scramble down the railway trestle will permit a visitor to reach the lagoon and seawall. Once at the beach, the Preserve can be accessed by walking through the culvert under Highway 101. This access point will be discouraged, to protect the Preserve from unauthorized use, by the placement of "no trespassing" signs at several visible points by the lagoon and culvert. The Land Trust should monitor access from the beach to determine if that pathway is being used. If it is discovered that there is a problem of unauthorized entrance into the Preserve from that access point, the current boardwalk allowing pedestrian foot travel from the lagoon through the culvert could be blocked off (either with a gate, rope or removal during non-public days) to keep the public from illegally entering the Preserve.

The third access point(s) is at various locations from neighboring properties. Public entrance from neighboring properties will be minimal in the near term. This is due in part to the fact that the Preserve is bordered to the east by the county landfill, to the north by a small private 32-hectare (80-acre) in-holding and Los Padres National

Forest, and to the west by the 1,336-hectare (3,300-acre) Brinkman ranch and smaller Simon ranch. Currently, the historic trail that once connected the Preserve to the Los Padres National Forest is overgrown, so access from that area will be negligible in the near future. Since public access is not allowed on to the County landfill to the east, no trespassers are expected to enter the Preserve from that property. The Land Trust hopes in the future, however, to extend the trails beyond the boundaries of the property, creating links with trails into the County-owned Baron Ranch, the National Forest, and/or De Anza Coastal Trail.

If in the future those connections do exist, unmonitored public access into the Preserve by hikers and other recreating public will potentially become a bigger issue. Nevertheless, any access into the Preserve during times when the Preserve is closed is problematic because there will be no staff present to monitor activity and the Preserve entrance gate will be locked. It is unclear what people would do in those situations when they got to the bottom of the canyon. The Land Trust will need to take these issues into consideration when evaluating future trail linkages outside of the Preserve's boundaries. At a minimum, "no trespassing without authorization" signs and signs displaying the Preserve's days and times of operation along the trail at the property boundaries should be used unless evidence to the contrary suggests the need for stricter enforcement. Because the land to the west is in private ownership, trespassers from those properties are not expected to any noteworthy degree.

5.6.2. Types Of Public Use

Public use can be generally broken down into four categories: education, recreation, research, and other. While public use is an important feature of the Preserve, it must be compatible with the primary objective of the Land Trust, which is to protect the natural and cultural resources of the Preserve. If it is determined in the future that public use is having a deleterious impact on the resources, further restrictions on use will be required (see Section 5.6.6). The following subsections will highlight important issues for each type of use and discuss methods for long-term resource protection.

5.6.2.1. Education

The Preserve provides an excellent opportunity for hands-on learning about biology, stream ecology, geology, local history, and general environmental science. Therefore, in line with the Land Trust's guiding principles for the Preserve, outdoor/environmental education opportunities will be explored at the Preserve for schools and other visitor groups, and casual recreational visitors. Both formal and informal educational activities will take place at the Preserve.

The Land Trust plans to develop an informal interpretive program available to all visitors during public hiking days. This will likely take the form of interpretive signs placed at various key points of natural or cultural significance within the Preserve and in and around the Adobe. Interpretive signage may become part of a self-guided nature

trail, where visitors can learn about the ecological significance of the Arroyo Hondo watershed, as well as the history of human settlement in the Preserve. While the Adobe is currently being used as a residence for the Preserve's caretakers, the Land Trust may convert it into a visitor center containing educational material about the resources of the Preserve and the Gaviota Coast region. In the near-term, portions of the Adobe will serve as a visitor center until future plans are realized. If funding were available, the Land Trust could install a computer in the Adobe displaying a touch screen CD-ROM presentation featuring experts in various disciplines discussing local resources and natural and cultural history. Another suggestion is that the Land Trust invest in an inexpensive underwater camera for the lagoon for visitors to view the underwater habitats of the Preserve. This would provide a unique educational experience for the public and demonstrate the important ecological function supported by this coastal esturary. Development and refinement of the interpretive program will be an ongoing process as new information is discovered and more resources are made available.

In addition to the informal educational programs, there will be opportunities for formal learning. Formal educational programs will consist primarily of docent-led tours of the Preserve. These will be offered at regular intervals throughout the year, teaching visitors about the rich natural and cultural history of the property. They will be open to the public on a reservation basis and will include nominal costs to offset expenses and pay for the valuable time of the naturalists. Land Trust docent-led tours are initially being offered every third Saturday of each month and are limited to 30 people. Additional docent tours may be sponsored by groups other than the Land Trust, such as the Santa Barbara Museum of Natural History, Santa Barbara Botanic Garden, and Santa Barbara adult education programs.

A formal, structured educational program geared towards local and regional school groups should also be developed, offering opportunities for students to learn hands-on about the natural world. Arroyo Hondo is well located for this purpose, as it is a convenient driving distance for schools from both North and South County. The program would be designed as an organized outdoor classroom with structured activities and curricula appropriate for the age of the students and topics being covered in their school program. An educational program will likely begin as day programs, but could develop into overnight programs depending on community needs and the presence of suitable campground facilities. Adequate protections will need to be developed to ensure that overnight school programs are not adversely impacting the Preserve. Consideration of the age and size of school groups would be required before allowing overnight programs at the Preserve.

5.6.2.2. Recreation

It is anticipated that the Preserve will be a popular destination for public recreation along the Gaviota coast. While outdoor recreation is typically thought of as a low-impact land use, studies indicate that it can be a source of habitat destruction (Wilcove et

al. 1998). If allowed to occur without proper management, recreation can lead to environmental degradation such as trail erosion, destruction or trampling of native vegetation, forest fires, disturbance of wildlife species, litter, as well as septic and water requirements (Ffolliott et al. 2001, U.S. Environmental Protection Agency 2002, Marion and Reid 2001). Recreation will be monitored and controlled to minimize its impact on the environmental quality of the Preserve by limiting uses to low-impact activities, namely day hiking, picnicking, painting, photography and other similar low-impact activities, which have relatively minor environmental impacts. These activities, however, can cause damage to resources if allowed to take place uncontrolled, therefore limits will be placed on the intensity of public recreation.

This will take the form, at least in the short-term, of public recreation occurring on scheduled hiking days, initially four days per month, and will be limited to a specific number of people based on advance reservation. This number is currently set at 60 people per day, but may need to be adjusted in the future once there is better understanding of the impact that visitors are having on the Preserve. In order to ensure proper use of Preserve, the Land Trust will establish a clear set of guidelines for public use. Hikers will come with the understanding that all users of the site will abide by these rules set forth by the Land Trust. Table 7 is a list of the rules and regulations for use of the Preserve. It will likely have to be adjusted in the future in response to new discoveries and information. Education is one of the best tools for ensuring proper behavior and activities at the Preserve. To this end, signs will be used to educate visitors about the Preserve's guidelines and areas open to the public. The sign plan will be discussed further in Section 5.8 of this management plan.

The Land Trust has developed a visitor's brochure for the Preserve that includes the rules and regulations for use of the site and a trail map. The Land Trust intends to prepare a naturalist's guide for the property to be used for a self-guided nature hike. This will help to ensure that the public is educated about the Preserve and aware of the permitted versus prohibited activities on site.

In order to ensure that the guidelines for public use set forth by the Land Trust are being adhered to, there will be at least one staff person on site at all times during any public use of the Preserve. Staffing will be supplemented with volunteers who may work as docents or monitor visitors on the trails, picnic area, beach, and in the Adobe when it is open. This action is necessary to reduce the impact that recreation could have on the Preserve's resources. The staff person will monitor activities, record the number of visitors touring the Preserve, and serve as a source of information for the public. To help in this effort, the staff person will be at the parking area during public hiking days to sign visitors in. This will allow the Land Trust to better monitor the level of use and determine why visitors are coming to the Preserve (hiking, wildlife viewing, sketching/painting, etc.). The sign-in sheet may be left in the parking area for people to sign out when they leave. While not everyone would remember to do this, it would give visitors an opportunity to comment on their experiences at the Preserve and provide suggestions for ways in which the Land Trust can improve upon the Preserve.

Given that the Land Trust's primary goal is natural resource protection, it is strongly recommended that recreation be restricted to human foot travel. Dogs will not be allowed in the Preserve unless they are seeing-eye dogs or are otherwise assisting handicapped individuals. Unleashed dogs may cause significant ecological damage, including chasing and harming wildlife species, trampling native vegetation, eroding stream banks, contaminating water bodies, spreading invasive plant species; they also present a risk to other visitors (Hall 1991). Keeping dogs on leashes can mitigate many of these problems, but leash laws are difficult to enforce. Thus the precautionary principle dictates that prohibiting dogs from the Preserve is necessary for resource protection and general public enjoyment.

For similar reasons it is recommended that equestrian use also be prohibited. Horses have the potential to be very damaging to ecological systems. Horse manure can enter the creek through runoff and lead to nutrient loading and algal and aquatic plant blooms (U.S. Environmental Protection Agency 2002). This is of special concern considering the fact that much of the trail network is located within the riparian corridor. Manure also often contains seeds of exotic plants; these seeds can also be introduced from horse feed, equipment, and mud stuck to horses' hooves (Widner and Marion 1994). Therefore, it is highly likely that horses serve as unwitting dispersers of invasive plant species. In addition, it has been shown that horses can lead to greater erosion of trails and increased surface runoff by compacting soils. Prohibiting the use of horses within the Preserve is thus consistent with the primary goal of resource protection. In addition, horses have the potential to take away enjoyment from other visitors of the Preserve and may be in conflict with the Land Trust's guiding principle of guarding "the serenity of experiencing a walk in [the Preserve]." If, under special circumstances, horses are allowed on the Preserve, strict control of their activity will be enforced. These steps include the following:

- Separate equestrian days would be established to avoid conflict between the general public and horseback riders.
- Only a limited number of horses would be allowed on any given day.
- In order to protect resources and trails, equestrian use would not be permitted during and following rain events, as well as during critical breeding periods of endangered species if there were a possibility of disturbance.
- Trailers will be confined to the parking area in order to avoid or minimize the spread of exotic plants.
- Only certified weed-free horse feed will be allowed on the Preserve.
- Creek crossings would be minimized and horses would have to travel on designated trails only.
- Horses could be required to wear diapers to keep manure off the trails and out of the creek.

These efforts would help to minimize the ecological damage that horses can cause, but absolute prohibition would be the best way to protect the Preserve's resources.

It is recommended that mountain biking be prohibited at the Preserve. There is evidence to suggest that mountain bike use leads to a higher level of trail damage and subsequent erosion when compared with hiking-only trails. In the Golden Gate National Recreation Area, park officials have noted that mountain bike use causes significant erosion on certain steep narrow trails (Chavez 1996). The study found that downhill bicycle travel on steep slopes (as exist at the Preserve) is usually accompanied by braking and skidding which tends to push dislodged surface gravels into ditches, water bars, and drains, thus expediting erosion. It was found that mountain bike use of these trails hastened the need for trail maintenance and repair. A recent survey of resource managers throughout the National Forests found that 58% of those surveyed had seen evidence of resource damage resulting from mountain bikes (Chavez 1996). Trail, soil, and water damage were the most common types of degradation reported in the survey. Finally, exotic plant spores and seeds can be transported and spread via the mud stuck in bike tires. Permitting mountain biking at the Preserve, therefore, is inconsistent with the primary goal of resource protection and will need to be evaluated within that context.

If mountain biking were permitted, it would be done so on a very limited basis, avoiding interference with public hiking days and prohibited during wet periods to minimize erosion and habitat destruction. The Land Trust should assess the feasibility of mountain biking on the steep trails before any decision is made to open the trails up for that type of use. If the feasibility study determines that the trails are not currently suited for mountain biking or that resources would not sufficiently be protected, then it will not be permitted.

Motorcycle use and other off-road vehicles will be prohibited in the Preserve for the obvious conflicts they would present with respect to resource protection and the overall serenity of the property.

At this time, the Preserve does not have any formal camping areas or infrastructure to support overnight camping. Overnight camping may occur in the future, but it will be based on a written-permission and advanced reservation system; it will primarily serve research groups and volunteer work crews, along with the occasional recreational group. This will be discussed further in Section 5.8 of this document.

Hunting and fishing will not be allowed at the Preserve because they are contradictory to the Land Trust's primary goal of natural resource protection. Furthermore, these activities would detract from the serenity of the property and the overall enjoyment of the Preserve by the general public.

The above recommendations for limiting the types of recreational activities are consistent with other preservation groups; the Nature Conservancy and other land trusts

have many of the same restrictions for most of their preserves (The Nature Conservancy 2001a, Hall 1991, Big Sur Land Trust 2001).

5.6.2.3. Research

The Preserve is currently, and will continue to be, a significant location for ecological research. Providing access to the Preserve for research purposes is one of the guiding principles of the Land Trust. As mentioned in Section 3.5, the creek is part of a nationwide LTER Network sponsored by the National Science Foundation. Its proximity to UCSB, combined with its ecological features and biological richness, lend itself to future studies of similar importance. In addition, the Preserve may also serve as a research site for archaeological and anthropological studies, given the Chumash artifacts present and the historically significant human settlement occurring there since the 18th century. The Land Trust, however, will place limits on the type of research that can be initiated at the Preserve in order to ensure that its primary objective of resource protection is being met. In addition, the Land Trust will limit the number of concurrent research projects on the Preserve to protect resources and also ensure that research is not impeding on the use of the Preserve for education and recreation. The Land Trust will review all of the research proposals for the Preserve. This will help to ensure that the overall goals and objectives of the Land Trust are being met. The Land Trust will use the application found in Appendix H for authorizing compatible research activities at the Preserve (unless future findings suggest the need for stricter or looser requirements). Review of the applications will help to assess the compatibility of particular research projects and then approve or reject them accordingly. The Land Trust should develop an appropriate waiver or release form for researchers working at the Preserve to insulate itself from liability.

Research is beneficial not only for the participating scientists and the greater cause of scientific advancement, but it also provides useful information for the Land Trust in its future management of the Preserve. This management plan has identified several areas of concern that require additional information gathering for better resource management in the long run. While the Land Trust will likely need to contract out for some of this work, it is foreseeable that many of the research findings gathered at the Preserve will be useful for establishing baseline inventories. For this reason, efforts will be made to promote the Preserve as a research site and explore opportunities to work further with UCSB and other research institutions. There is also likely to be research that may not present a direct benefit to the Land Trust in the form of its findings. While such research may not be actively promoted, it can foster a positive relationship with research institutions and will therefore be permitted.

5.6.2.4. Other Uses

Aside from low-intensity recreation permitted at the Preserve, there will also be opportunities for occasional group events to take place. Such events may include,

among other things, group retreats and/or picnics, Boy or Girl Scout activities, and small weddings or receptions. Allowing such events at the Preserve would not only offer a unique opportunity for the public, but it would also bring in supplemental income to the Land Trust for continued management of the Preserve. It is very important, however, that the Land Trust ensure that these group events do not run in conflict with resource protection or general public access. For the near term, this means allowing such events on a very limited basis and monitoring their impacts on the resources, namely the riparian corridor and the wildlife that it supports. No amplified music will be allowed on the Preserve in order to reduce the potential impact to wildlife from these events and maintain the serene character of the canyon. In addition, limits will be placed on the number of individuals per event. This number may have to be updated up or down in the future depending on their level of impact. Initially, 100 people will be the maximum number allowed.

In order to book a group event at the Preserve, a process wherein the applicant fills out an application (to be developed) and meets with a staff member of the Land Trust to be educated about the sensitive resources present at the Preserve and go over the rules and regulations of conduct at the Preserve. Fees for reserved group use may vary depending on the nature of the activity, length of use, and requirements placed on the Land Trust. For every event, a member of the Land Trust (either staff or volunteer) will be present to monitor activity and ensure that the rules and policies are being upheld.

The limitations placed on the number of visitors for public hiking days, docent-led tours, and group events are based on the precautionary principle. If it is later determined that the Preserve can sustain larger sizes without adversely impacting the resources present, then the Land Trust may amend its limitations.

Table 7. Rules and Regulations for public use of the Preserve

Smoking is prohibited everywhere on the Preserve.
Fires are not permitted unless in designated fire pit, and with permission from the Land Trust.
Firearms are prohibited on the Preserve, unless used for authorized animal control.
No hunting or fishing is allowed within the Preserve.
Collecting of any kind is prohibited, unless for authorized research. This includes plants, flowers, mushrooms, animals (dead or alive), wood and rocks.
Pets shall not be allowed on the Preserve, unless they are Seeing Eye dogs or otherwise assisting disabled individuals.
Mountain biking and horseback riding are prohibited, unless pre-approved by the Land Trust.
All visitors must stay on the trails when hiking. There are sensitive resources present throughout the Preserve that cannot be disturbed. Also be advised that poison oak, ticks, rattlesnakes, and other natural hazards exist throughout the Preserve.
Vehicles are not allowed beyond the parking areas, unless for emergency purposes or other authorized use.
The Preserve will be closed no later than sunset.
No overnight camping is permitted without authorization by the Land Trust.

No amplified music permitted on the premises.
No swimming in, wading in, or otherwise disturbing the creek or lagoon.
All visitors must have permission from the Land Trust before entering the Preserve.

5.6.3. PRESERVE SECURITY, PUBLIC HEALTH AND SAFETY

The Land Trust for Santa Barbara County is committed to providing a safe and natural setting for Preserve visitors. To provide a contact point for visitors and pursue the day-to-day operations of the Preserve, a permanent presence will be maintained through on-site caretakers who will initially live in the Ortega Adobe. Upon sign in, visitors to the Preserve will be provided with information regarding public safety measures and precautions. Groups will provide a roster of participants, and will be required to keep account of all hikers. Groups may be provided a radio to contact caretakers in the event of an emergency. The Land Trust may purchase a small all-terrain vehicle (ATV) for patrols, maintenance, and public assistance when needed.

5.6.3.1. Emergency Services

Emergency services for the Preserve are provided by the Santa Barbara County Sheriff's and Fire Departments. The point of contact for emergency personnel will always be via the 911 telephone service. Generally, the Goleta Force of the County Sheriffs Department will provide police protection for the Preserve. Anticipated response time to the Preserve from Goleta is approximately 10 minutes. Since the Preserve is a public resource, the Sheriff's Department has a legal responsibility to patrol if deemed necessary. Search and rescue operations will be ordered if needed by the responding officer. Fire protection will be provided by County Fire Station 18; response time is approximately 5 minutes (S. Perkins pers. comm.). The Preserve gate will be equipped with a "Knox" lock that provides exclusive access to emergency services personnel. A reference map of the property will be provided to the fire department with potential locations for helicopter landing, fire-fighting water sources, and structure locations (Map 10).

5.6.3.2. Physical and Biological Hazards

Arroyo Hondo Preserve is a protected wildland environment and contains common physical and biological hazards that are an important part of all natural lands. Visitors will be informed of hazards to promote awareness and common sense use of the Preserve. The majority of the Preserve consists of rugged terrain with steep trails, loose rocks and soils, slippery creek crossings, and other possible hazards. A short description of common biological hazards and precautions is given below. Most hazards can be avoided by simply staying on established trails and using good backcountry sense, which includes packing in plenty of drinking water, remaining aware of your surroundings, keeping track of time and distance traveled, and being prepared for variable weather conditions.

Poisonous Plants

Several poisonous plants occur at the Preserve, however only four of the most commonly encountered species are discussed here (toxicity information from University of California San Diego 2002a, Fuller and McClintock 1986). The seeds of the non-native castor bean (*Ricinus communis*) are highly toxic to humans, animals, and insects if ingested. The barbed seed pods are conspicuous and attractive to children. All parts of the non-native tree tobacco (*Nicotiana glauca*) are poisonous if consumed; seedlings may appear succulent and edible to some people. The seeds and roots of the non-native poison hemlock (*Conium maculatum*) are potently toxic if ingested; all other parts of the plant are poisonous as well. Poison hemlock can be distinguished from fennel (*Foeniculum vulgare*) by the presence of irregular purple spots on the stems and petioles. Poison oak (*Toxicodendron diversilobum*) is a deciduous native shrub or vine common in many parts of the Preserve, from riparian woodlands to mature chaparral to shaded grasslands. All parts of the plant are toxic. Oils exuded from all parts of the plants cause various levels of dermatitis upon contact in most individuals. Oils are present throughout the year, even on defoliated stems, and can be carried by smoke when burned. Poison oak is easily avoided by becoming familiar with identification of the plant in both winter and summer, and staying on established trails.

Envenomating Animals

At Arroyo Hondo Preserve, only two common native animals, the Southern Pacific rattlesnake (*Crotalus viridis helleri*) and the black widow spider (*Latrodectus hesperus*) are venomous enough to be discussed here. Stinging bees (*Apis mellifera*) and wasps may also be found at the Preserve and can cause dangerous allergic reactions in some individuals. According to the Santa Barbara Coastal Vector Control District (SBCVCD) (2002), the more aggressive Africanized honey bee (*Apis mellifera scutellata*) is not known to have reached Santa Barbara County, but is currently found in Imperial, Los Angeles, Riverside, San Bernardino, and San Diego counties, and is expected to arrive within the next few years. With all stings and envenomations, children, the elderly, and those with high-blood pressure are the most susceptible victims; however even a healthy adult may experience severe illness (University of California San Diego 2002b).

The Southern Pacific rattlesnake (*Crotalus viridis helleri*) is commonly found in many parts of the Preserve including the old orchard and around the Adobe and barn, where they fill an important ecological role as rodent predators (P. Collins and J. Storrer pers. comm.). These dangerously venomous snakes are often heard before being seen, hissing or rattling their tail when alarmed (Stebbins 1985). In this region, the harmless San Diego gopher snake (*Pituophis melanoleucus annectens*) may mimic the rattlesnake by vibrating its tail among dry leaves (Stebbins 1985). Rattlesnakes will often avoid contact with humans when possible and usually only strike in defense. The severity of a rattlesnake bite depends on the size of the snake, the amount of venom injected, the location of the bite on the body, and the general health of the victim. Deaths resulting

from rattlesnake envenomations are extremely rare in victims that receive medical treatment and up to 20% of rattlesnake bite incidents result in no venom being injected (University of California San Diego 2002b). The chance of a rattlesnake bite can be reduced by wearing long pants and sturdy hiking boots, and hiking on established trails. In the event of a rattlesnake bite incident, the victim should be transported to the nearest medical facility as soon as possible.

The black widow spider is an extremely common venomous arachnid occurring throughout California and the West. Sometimes called the "hour glass spider", the black widow commonly sports a visible red hourglass-shaped coloration on the underside of the abdomen. Black widows are shy and retiring, tending to build webs in seldom-disturbed locations such woodpiles, garages, and storage sheds, where they have the potential to be discovered by Preserve stewards. The venom is reported to be up to 15 times more toxic than that of a rattlesnake, and the initial bite is painless, making this spider particularly dangerous. However, in some cases black widows will not inject venom. There is no effective first-aid treatment for black widow spider bites; if a bite occurs, the victim should be transported to the nearest medical facility as soon as possible for advice and treatment (University of California San Diego 2002b.).

Large Predators

The mountain lion (*Puma concolor*) and black bear (*Ursus americanus*) are two ecologically important native mammal species known to occur on the Preserve (Storrer 2001). While attacks on humans by both species are known in California, such events are extremely rare compared to risks posed by other natural hazards, such as lightening strikes. Both species are typically secretive and will try to avoid human contact. Even so, typical backcountry precautions should be taken to reduce the chance of an awkward encounter with these predators. Food and garbage from picnic areas and the Adobe should be secured to avoid attracting bears and mountain lion prey. Visitors should avoid hiking alone, especially at dusk or dawn. If confronted by an aggressive mountain lion or bear, it is best to neither approach it nor run away. If in a confined area, give the mountain lion or bear an escape route by backing away slowly without turning. Small children, as well as any defensive materials like rocks or sticks, should be picked up by bending at the knees. Attempts should be made to look as large as possible (California Department of Fish and Game 1998).

Animal-Vectored Diseases

Two diseases are of primary concern to visitors and stewards of the Preserve (from SBCVCD 2002 and UC Natural Reserve System 1999).

Lyme disease is a potentially debilitating tick-borne disease carried regionally by the western black-legged tick (*Ixodes pacificus*). This tick species can be encountered on the Preserve in chaparral, woodlands, or other brushy vegetation, such as the tall inflorescences of fennel in grassland areas. On average, only about 1 to 2% of the adult

I. pacificus ticks actually carry Lyme disease. The Santa Barbara Coastal Vector Control District conducts periodic tick collection surveys of local coastal woodlands and foothill areas to ascertain the presence of the spirochete (*Borrelia burgdorferi*) that causes Lyme disease. An emerging tick-borne disease, human granulocytic ehrlichiosis (HGE), is of increasing concern regionally, and appears to be vectored by the same tick species that causes Lyme disease. Contact with ticks can be avoided by staying on established trails, wearing light-colored pants and long-sleeved shirts, and checking occasionally for ticks while hiking and upon returning home.

Hantavirus is a potentially fatal disease vectored by three native rodent species and transmitted to humans when feces and urine of infected rodents are disturbed. In humans the virus causes Hantavirus Pulmonary Syndrome (HPS). Three strains of the virus are known in the Santa Barbara region. The western deer mouse (*Peromyscus maniculatus*) is known to carry the Sin Nombre strain, while the California meadow vole (*Microtis californicus*) and the western harvest mouse (*Reithrodontomys megalotis*) are known to carry the El Morro and Isla Vista strains of hantavirus, respectively. The Vector Control District periodically tests rodents for hantavirus infection (SBCVCD 2002). Exposure to hantavirus is best avoided by using caution when working in areas with copious visible rodent droppings.

5.6.3.3. Strategies for Ensuring Public Safety

In order to effectively provide for the safety of visitors to the Preserve the Land Trust will develop public safety guidelines geared towards minimizing public exposure to hazards and educating the public about the hazards that exist. There are a number of precautionary measures the Land Trust will take to reduce the potential for hazards to inflict harm. Some of the site rules listed in Table 7 help to increase public safety at the Preserve, including prohibiting smoking; restricting activities to designated trails and group areas only; prohibiting the use of firearms; and closing the Preserve before dark. Such restrictions are critical in providing safe public access to the Preserve.

Natural events such as rainstorms can present a significant public hazard if access is not managed properly at those times. In particular, the risk of landslides, lightening, flooding, and trail destabilization during rainstorms is increased. Therefore, in order to protect the public and the Preserve's resources and infrastructure, the property will be closed during and immediately following heavy rain events. For similar reasons, any physical improvements or infrastructure development made within the Preserve will be done in consideration of the potential for erosion and flooding to occur. For example, extension of a trail will not be done in an area of the Preserve that is sensitive to landslides or other earth movement. In addition to these measure, public access through the culvert to the lagoon will be closed during periods of high flow in order to avoid the safety risk associated with walking through the slippery tunnel. A sign will be posted at the parking area and information will be presented in the visitor guides warning hikers about these hazards.

The Land Trust will develop an emergency evacuation plan for the Preserve, so that visitors can easily find their way to safety in the event of a fire or flood. This information will be presented to visitors in the visitor's guide.

The Land Trust will also take precautions to reduce the likelihood of human exposure to environmental contaminants and animal-borne diseases. The Phase I Environmental Site Assessment of the property conducted by Padre Associates in 2001 recommended several actions in this regard. Radon screening should be performed on the Adobe since it is located over the Rincon shale formation, a geologic formation known in the area to have "increased likelihood of elevated radon emissions" (Padre Associates 2001). The assessment also recommended that the electrical transformers on the property be periodically inspected for leakage of PCBs, even though no leakage was recorded in 2001.

As mentioned in Section 3.4.1.1, the Draft EIR for the Tajiguas landfill expansion mentioned the possibility of a hydrologic connection between the aquifers underneath the landfill and adjacent canyons. The Land Trust should conduct water quality testing of the wells serving the Preserve to ensure that the water is safe for public consumption.

The Land Trust will also take measures to ensure that the public and Preserve managers are not exposed to animal-borne viruses and diseases, since the Adobe and barn have a healthy rodent population. To this end, the Land Trust will test these animals for hantavirus. Similarly, the Land Trust should test the resident tick population for Lyme disease. All of the above measures will help to ensure that the Preserve is consistent with the guiding principle (Appendix B) of providing "safe and enjoyable public access."

5.6.4. Regulatory Considerations

The Conservation Element of Santa Barbara County's Comprehensive Plan (1994) outlines recommendations for protecting natural resources in balance with human development. These recommendations are referred to by County planners when approving projects or otherwise participating in a planning process. For this reason, it is important that the activities which take place on the Preserve are not contrary to the recommendations found in the Conservation Element (and other sections of the Comprehensive Plan). Even though Arroyo Hondo is being established as a nature preserve, there are still some activities and projects that need to be properly managed in order to ensure compatibility. Fortunately, the goals of the Land Trust are generally consistent with those of the County – protect resources, while providing opportunities for public use and enjoyment.

The Conservation Element states that freshwater streams of the County are delicate habitats that warrant protection. However, Arroyo Hondo is placed into the category of "streams deserving greater protection than that afforded to those simply classified as delicate habitats" (Santa Barbara County 1994a). For these streams, it is recommended that they be preserved as scientific study areas and areas of light

recreation (which includes hiking, backcountry camping, educational programs without collecting, and low-density informal picnicking without tables or cooking facilities).

In addition to the Conservation Element, the Local Coastal Plan of Santa Barbara County, which represents the local implementation of the California Coastal Act of 1976, outlines among other things actions that are necessary to protect sensitive areas within the county. Arroyo Hondo Creek is considered by the County as an Environmentally Sensitive Habitat Area (ESHA). As such, there are certain guidelines provided for the protection of these areas. While public trails are allowed within the buffer zone of these areas (30 meters [100 feet] on either side of the creek), it is suggested that educational signs and fencing be used to protect the value of the habitat when appropriate (Santa Barbara County Coastal Plan 1999).

Horseback riding and camping within the riparian corridor at the Preserve (within at least 30 meters [100 feet] on either side of the stream) are thus not consistent with the policy recommendations of the Conservation Element and Local Coastal Plan, and will therefore be evaluated in that context before permitted on the property. Picnicking and cooking facilities, however, are existing uses integrated into the property. Therefore, even though they lie within the buffer zone of the creek, these historical facilities will continue to be used as such. The human imprint on the picnic area is already present, and the impact on the creek from public use of the area does not appear to be significant. This is evidenced by the fact that steelhead trout are able to travel through that section of the creek on their way to and from the ocean (Storrer 2001, P. Collins and J. Storrer pers. comm.). Furthermore, confining the public impact from picnicking to this existing developed area is likely to provide some measure of environmental protection by keeping impacts localized, as opposed to allowing people to picnic wherever they please (Stephenson and Calcarone 1999).

It has been suggested that there may be a need for the Land Trust to get an incidental take permit from the USFWS or CDFG for accidental loss of listed species associated with operation of the Preserve. It is possible that recreation activities taking place at the Preserve could result in the "taking" of a species, as defined by the Federal Endangered Species Act and California Endangered Species Act. If that is found to be the case, development of a Habitat Conservation Plan (HCP) may be required in the future. This is unlikely, however. HCPs are rarely required for recreational impacts to listed species, and in most of these cases they are required for high intensity recreational use (e.g. off-road vehicles), rather than low-impact activities such as those that will occur at Arroyo Hondo (National Center for Environmental Decision-making Research 2002). Compared to other natural areas with listed species, the level and intensity of recreation allowable at the Preserve is minor. Nonetheless, the Land Trust will consult with the appropriate federal, state, and local agency staff in developing management and protective measures for the ESH areas and listed species on the property.

5.6.5. LIMITATIONS AND CHALLENGES

Monitoring the conduct of public will be one of the greatest challenges facing the Land Trust. Ensuring that visitors are not smoking, hiking off trail, and/or disturbing wildlife will be difficult. Education will be the key to preventing these occurrences. Signs displayed throughout the public areas of the Preserve and information within the visitor's brochure will help to remind the public what behavior and activities are appropriate. Keeping a limit to the number of visitors on any given day will also help to protect the resources from these disturbances. Land Trust staff and trained volunteers equipped with walkie-talkies will be present during public access days to monitor visitor use and behavior.

To further meet this objective, the Land Trust will work to identify the carrying capacity of the Preserve in terms of public use. In 1978, the National Park Service (NPS) developed the definition of "carrying capacity" to help park managers determine the appropriate level of public use consistent with resource protection. The NPS defined carrying capacity as "the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions that complement the purposes of the park units and their management objectives" (East Bay Regional Parks District 2000). Determining this capacity will be difficult and will likely rely on the use of adaptive management. The Land Trust should work in the next few years to develop clearer and more measurable definitions for desired future conditions in order to help in this determination.

Controlling public access once other access points are developed through trail links with Los Padres National Forest, other neighboring public and private lands, and coastal trails will be another challenge facing the Land Trust. Since these trails are likely open all year around there will a conflict with the Preserve since it will only be open on a limited basis. It is unclear at this point what can be done to mitigate this conflict aside from posting "no trespassing without authorization" signs and signs indicating the days and hours that the Preserve is open for hikers. If this is proving ineffective, then the feasibility of installing gates or fences at these junctions should be evaluated. A sign-in sheet at these junctions would help the Land Trust monitor how many hikers are using these linkages so that future efforts to control access (if found necessary) will be predicated on better information.

Another challenge for the Land Trust will be ensuring the safety of its visitors. Signing in visitors as they enter the Preserve will help to get a count of who is present, but it is impractical to expect that everyone will sign out before they leave. During public hiking days the Preserve will close before dusk in an effort to help visitors find their way back out of the Preserve before nightfall. This effort, combined with regular trail maintenance and signs marking trails and clearly stating rules about staying on trails, should be sufficient for protecting public safety. In the event that a member of the public is thought to be missing in the backcountry, the Land Trust will call upon Santa

Barbara County Search and Rescue and Santa Barbara County Sheriff's Department to come in to recover the lost hiker(s).

5.6.6. INFORMATION AND MONITORING NEEDS

There is a general paucity of scientific information on the ecological effects of recreation activities on resources (Stephenson and Calcarone 1999). For truly effective management of a natural preserve there is the need for formalized scientific investigation to assess the impacts of public access on sensitive species and habitats. Unfortunately, this may not be practical at Arroyo Hondo given the limited resources of the Land Trust. All this aside, in order to help determine the appropriate "carrying capacity" of the Preserve, some type of monitoring program will have to be developed to examine the impact that public activities are having on the Preserve's resources. The focus for this monitoring will be in the areas of high public use, mainly the picnic area and hiking trails. Impacts to monitor include excessive trail wear or cutting of new unintended trails by visitors, leading to erosion and degradation of terrestrial and aquatic habitat, as well as species composition around these areas. Annual assessments of the change in species populations will help to evaluate what impact, if any, the public is having on the resources.

Some of this work could be done by trained volunteers. While there will be staff on site for every public access day monitoring activity and signing in visitors, a more thorough walk through of the Preserve during a typical public day should be conducted on a bi-monthly basis. Volunteers could monitor where people are going, where trash is being found, where people are picnicking, where people are entering the creek, and where people may be cutting trails. This information would help to determine areas of concern on the property and what efforts should be taken to minimize public impacts on the Preserve.

The Land Trust has requested that the County establish a monitoring program at the Preserve to properly address the issue of groundwater contamination from the neighboring Tajiguas landfill. Such monitoring could also extend to Arroyo Hondo Creek since some of its water comes from springs and other underground sources.

5.6.7. COORDINATION AND PARTNERSHIPS

The Los Marineros educational program carried out by the Santa Barbara Museum of Natural History can provide guidance for the development of the educational program for the Preserve, although it is only designed for 5th and 6th graders. It is approved by the County Office of Education and is incorporated into the curricula for those grades. The Santa Barbara Botanic Garden can be another useful resource in the development of an educational/interpretive program for the Preserve. Furthermore, the Land Trust will consult with teachers from local school districts and private schools to help develop an environmental education program that can be integrated into the

schools' curricula. Santa Barbara City College Adult Education has already expressed interest in holding classes at the Preserve.

There may be other public and non-profit education organizations that may wish to sponsor their own activities at Arroyo Hondo, such as UCSB, Allan Hancock College, Santa Barbara Botanical Garden, Santa Barbara Museum of Natural History, and various arts organizations. Partnerships with these organizations will be encouraged by the Land Trust to foster a positive community relationship throughout Santa Barbara County and draw further public support for Arroyo Hondo Preserve.

There should be an ongoing program of volunteer recruitment and training to support the school and public education programs. The Land Trust should work with naturalists and resource specialists to help train volunteers to be docents at the Preserve. The Land Trust will be looking for guides knowledgeable about birds, geology, plants, animals, and historical and cultural history of the region.

The Land Trust will work with the County Sheriff's Department, Santa Barbara County Search and Rescue, and the County Fire Department to develop formal staff and volunteer training and emergency response procedures. Public safety agencies will be called immediately when issues that cannot be dealt with by staff and volunteers relating to public safety and security arise. An emergency contact list and emergency procedures will be posted near the phone in the Adobe.

The Land Trust should coordinate with the Santa Barbara Coastal Vector Control District (SBCVCD) for issues and actions related to Lyme disease, hantavirus, and any other animal-borne diseases that may present a potential human health hazard.

Contacts: SBCVCD
P.O. Box 1389
Summerland, California 93067
Phone: (805) 969-5050
Fax: (805) 969-5643
http://www.silcom.com/~vector/

5.7. AGRICULTURAL MANAGEMENT

The Gaviota Coast has a unique climate conducive to agriculture. The south facing slopes of the Santa Ynez Mountains and the warmer waters produced by the southern California countercurrent combine to produce mild climatic conditions year-round. These conditions are ideal for growing subtropical orchard crops, including avocado (*Persea* spp.) and citrus (*Citrus* spp.), which are grown commercially throughout the region.

At Arroyo Hondo, two separate orchard areas have been developed: the historical westside orchard containing a variety of orchard trees including citrus and avocado, and the derelict and more recently established eastside avocado orchard. In the near-term, management actions will focus on basic maintenance and assessment of orchard conditions, especially within the eastside orchard. In the long-term, the feasibility of retaining portions of the eastside orchard for small-scale avocado production will be assessed within the context of a Restoration and Enhancement Plan (Section 5.2).

Management Goal

Maintain small-scale agriculture at Arroyo Hondo Preserve consistent with resource protection to provide opportunities for interpretation of regional agricultural history and organic orchard management techniques.

Objectives

1. Rehabilitate selected portions of the eastside avocado orchard in coordination with restoration efforts (Section 5.2).
2. Continue to maintain westside orchards and gardens.
3. Protect and maintain the health and vigor of historical pear and olive plantings.

Interim actions

1. Control orchard weeds in a manner consistent with resource protection and in coordination with restoration efforts (Section 5.2) and exotic plant control (Section 5.3).
2. Assess the status of the irrigation systems and water distribution on the Preserve.
3. Continue to allow seasonal beekeeping on the Preserve, to be reviewed on an annual basis.
4. Develop and maintain a schedule for pruning trees in both orchards.
5. Acquire a medium-size chipper for managing prunings and to facilitate on-site creation of organic compost and mulching materials.

Long-term recommendations

1. Within the context of a Restoration and Enhancement Plan, determine the feasibility of retaining and enhancing portions of the eastside orchard for small-scale avocado production.
2. Remove dead, dying, and diseased avocado trees in coordination with restoration efforts.
3. Upgrade, repair or replace irrigation systems in retained avocado production areas.
4. Consider partnering with a local grower to facilitate maintenance, harvest, and marketing of avocados.
5. Develop a resource-sensitive integrated pest management (IPM) strategy.

5.7.1. CURRENT CONDITIONS

5.7.1.1. Westside Orchard

Photo: W. Sears

Avocado trees in the eastside orchard.

The west-side orchard consists primarily of citrus and avocado plantings, and has apparently been used as an orchard site since at least the 1850s (Greenwell 1873). Several avocado varieties are present here including Reed, McCarthur, Hass, and Fuerte. A number of citrus varieties are present, including orange, lemon, and grapefruit. One of the lemon trees (possibly a "Ponderosa" variety) present in the orchard is thought to have been planted in 1885, the year Vicente Ortega was born (Cappon 1993). Several lesser-known subtropical fruit tree varieties can be found in the orchard including cherimoya (*Annona cherimola*), white sapote (*Casimiroa edulis*), pineapple guava (*Feijoa sellowiana*), loquat (*Eriobotrya japonica*), and pomegranate (*Punica granatum*). Kiwi (*Actinidia* spp.) vines were planted next to the Adobe and produce fruit, although the mild coastal climate of Arroyo Hondo may not ideal for chilling requirements and fruit ripening. Other plantings include a single persimmon tree (*Diospyros kaki*) of an unknown variety, a pear (*Phyrus* spp. cultivars of unknown variety), and two walnut (*Juglans regia*) trees (variety also unknown). A small annual vegetable garden has been maintained here over the years as well.

5.7.1.2. Eastside Orchard

In 1972, approximately 6 hectares (15 acres) east of the creek were planted with avocado for commercial harvest (J. J. Hollister pers. comm.). The orchard was actively maintained and harvested until the wet winters of the early 1990s, which washed out irrigation piping and caused extensive erosion throughout the orchard (J. J. Hollister pers. comm.). The majority of the orchard was planted in the Hass variety; other varieties present include Mexicola, Fuerte, and Zutano.

5.7.1.3. Other Agricultural Plantings

Olive plantings along the entrance road to the Preserve produce abundant fruit, and provide shade and screening for the road. A single olive tree planted along the main road to Hollister Meadow and pear tree located within the eastside orchard are all that remain of orchards thought to have been planted by the Santa Ynez mission padres (Cappon 1993).

5.7.2. GUIDELINES FOR ORCHARD MANAGEMENT

The proximity of both orchards to the sensitive riparian and aquatic habitats of the Preserve's front country calls for orchard management techniques that minimize erosion and protect water quality. Chemical fertilizers, pesticides, and herbicides have the potential to negatively impact native species and degrade aquatic environments. The use of resource sensitive orchard management techniques, including mulching, organic fertilizers, and ecologically sensitive pest management will reduce impacts to species and habitats and would be consistent with the goal of managing the property as a natural preserve.

This following text is intended to provide general concepts and guidelines. The University of California Cooperative Extension website (listed under Coordination and Partnerships below) provides extensive information regarding orchard management.

5.7.2.1. Irrigation

Summer irrigation is necessary for the successful growth and fruiting of avocado and citrus at the Preserve. Irrigation systems in the eastside orchard are in disrepair and will require extensive reworking to provide functional water delivery to retained avocado groves. Appropriate drip or low-flow emitters should be employed to reduce water consumption and damaging surface runoff. Repair or construction of this irrigation system should be done in consideration of the erosional processes that damaged the system in the mid-1990s in an effort to make it more resistant to such processes in the long run.

5.7.2.2. Pruning

Many of the avocado trees in the eastside orchard are overgrown and will require extensive pruning to facilitate harvest and reinvigorate growth. Pruning should be performed by Preserve stewards or others familiar with current orchard pruning techniques. Neglect and lack of irrigation have caused the decline of avocado trees in various areas throughout the eastside orchard. Dead and dying trees should be removed from the orchard to reduce fire hazard and improve aesthetics, in coordination with restoration and resource protection activities. The Land Trust may consider acquiring a small chipper to use in reducing pruning biomass and providing compost and mulch.

5.7.2.3. Mulching and Weed Management

Avocado and citrus trees have shallow roots and are susceptible to drought stress. A thick layer of mulch should be maintained in both orchards to shade soils and assist in moisture retention. Mulching will cut down on exotic weedy species, and provide a measure of fertility. Organic mulches should be used to avoid adversely impacting the nearby aquatic environment. Existing exotic plants in the understory should be mowed regularly to cut down on seed production and provide mulch (B. A. Faber pers. comm.). Any mowing however, should be coordinated with restoration activities to retain native plants. Once sufficient leaf litter has accumulated, the need for active weed management should decline.

5.7.2.4. Disease and Pest Management

Avocado root rots (caused principally by the fungus *Phytophthora cinnamomi*) are a serious problem effecting avocado production throughout southern California (Faber 2000). Root rot may be present in the avocado orchards of the Preserve, although years of inadequate irrigation make it difficult to distinguish the effects of under-irrigation from those of root rot (B. A. Faber pers. comm.). The poorly draining clay soils of Arroyo Hondo are not ideal for avocado cultivation; when combined with over-irrigation and lack of mulching ground cover, root rots can spread rapidly (B. A. Faber pers comm.). Treatments with gypsum and mulch create conditions that discourage the spread of the fungus. Retaining trees in upland areas with better soil drainage will decrease the chance of root rot. Upland areas are less subject to frost damage, but are also subject to increased erosion and slumping if irrigation and ground cover are poorly managed. Testing for avocado root rot should be performed to determine the presence and extent of this disease.

Olive plantings along the entrance road to the Preserve are infested with olive fruit fly (*Bactrocera oleae*), a recently introduced Mediterranean native that poses a serious threat to the California olive industry (Sibbett et al. 2000, B. A. Faber pers. comm.). In the winter and early spring, adult fruit flies deposit eggs in mature olive fruit, where larvae consume the fruit pulp and eventually pupate into adults during the summer and fall

(Sibbett et al. 2000). There is no known organic control for olive fruit fly; current methods for small groves include mass bait trapping and insecticide sprays (B. A. Faber pers. comm.). The Land Trust may choose to work with the Santa Barbara County Agricultural Commissioners office to control olive fruit fly at the Preserve.

The Land Trust should develop an integrated pest management strategy that provides for ecologically sensitive control of diseases and pests found at the Preserve.

5.7.2.5. Management Costs and Marketing

Management costs will consist primarily of labor, materials, and electricity. Pruning, mowing and weed management, harvesting, and application of organic fertilizers are the primary labor costs. Repairs to irrigation piping, and ongoing maintenance to clear clogged emitters are primary material costs. Although water supply is not an issue at the Preserve, costs associated with pumping well water may increase with summer irrigation.

The Land Trust may choose to sell avocados, citrus and other products to visitors of the Preserve to offset management costs and provide income. Other venues for marketing the agricultural products of the Preserve may include local grocery stores and farmer's markets. A partnership with a local grower or marketing organization may help reduce costs associated with packing and transportation of produce. Another possibility for the Land Trust to consider, given its limited human and financial capital, is to lease out the avocado orchard to a local grower. If considering this option, the Land Trust should seek a partnership with a farmer who practices organic or similarly resource-sensitive agriculture in order to be consistent with the primary goal of resource protection.

5.7.3. Regulatory Considerations

The California Department of Food and Agriculture (CDFA) regulates the sale of agricultural products within the state. Sales of produce from the Preserve may require permits from CDFA and other state or local agencies.

Pesticide use is regulated by the California Department of Pesticide Regulation (CDPR). Any use of agricultural chemicals on the Preserve should be performed in compliance with CDPR regulations and in conjunction with an adequate integrated pest management strategy.

5.7.4. Limitations And Challenges

The soils of Arroyo Hondo Preserve are not ideal for the commercial cultivation of avocados (B. A. Faber pers. comm.). Soil management that includes mulching and organic amendments will help improve soil structure and drainage.

Costs associated with active orchard maintenance may become prohibitive within the financial constraints of the Land Trust. Avocado trees may eventually be removed completely from the eastside orchard to accommodate habitat restoration goals and eliminate costs associated with orchard maintenance. Individual trees may be retained near the barn and parking areas for aesthetic purposes and to retain the agricultural history of Arroyo Hondo.

5.7.5. Information And Monitoring Needs

Testing for root rot in the orchards of the Preserve will be an important step in assessing the viability of agriculture at the Preserve. Monitoring for symptoms of root rot and other diseases will be necessary to the ongoing maintenance of the Preserve's orchards. Reestablished irrigation systems will require ongoing monitoring to ensure that the system is functioning.

5.7.6. Coordination And Partnerships

University of California Cooperative Extension: Agricultural experts associated with the Ventura Cooperative Extension office of the University of California are an excellent source of information for disease identification and treatment, cultivation, and other facets of orchard management. The Cooperative Extension website, listed below, contains valuable information on integrated pest management, weed abatement, mulching, irrigation, and maintenance costs. Local organic growers may be able to assist in the development of strategies for management of the orchards and marketing of specialty agricultural products.

Contact: Ben A. Faber, Ph.D. Farm Advisor.
University of California Agriculture and
Natural Resources Cooperative Extension
Phone: 805-645-1462.
Email: bafaber@ucdavis.edu.
Web: http://ceventura.ucdavis.edu/

Local Avocado Growers: Previous owners of the Preserve have contracted with a local avocado grower to maintain and harvest avocados in the eastside orchard. If the Land Trust pursues the goal of maintaining a portion of the old orchard in avocado production, a similar arrangement may be beneficial. In any arrangement, management techniques and philosophy should be thoroughly discussed with the grower to ensure the protection of natural resources on the Preserve.

Beekeeping: An independent honey producer has kept bees seasonally at the Preserve since 1991. The Land Trust intends to continue to allow the placement of managed hives on a season-by-season basis, and will assess any potential conflicts bee keeping may have with other intended uses of the Preserve. From an agricultural perspective, managed hives are valued for their role in enhancing pollination in orchards.

Contact: Bruce Wilmer, Beekeeper.
Wilmer Farms.
37869 State Highway #313
Warroad, Minnesota 56763.
Phone: 281-386-2225. Email: swilmer@wiktel.com

5.8. MAINTENANCE, ADMINISTRATION, AND PLANNING

An important issue for any property is proper management of its facilities and infrastructure. In order to meet the Land Trust's goals for the Preserve care will be required to ensure that infrastructure is sufficiently maintained and future needs and wants are adequately planned for. This section discusses issues relating to public use of the Preserve and infrastructure maintenance and development beneficial to resource protection.

Management Goal

Provide the necessary infrastructure, maintenance, and planning to protect the Preserve's natural and cultural resources and support compatible public use of the Preserve.

Objectives

1. To provide opportunities for safe and enjoyable hiking, picnicking, and other group activities to the Preserve and develop an infrastructure that is necessary to support these opportunities.
2. To maintain this infrastructure over time to ensure that it is kept in good condition.
3. To develop the infrastructure necessary to protect the Preserve from overuse and misuse by the public.
4. To provide access, where feasible, to the Preserve for people with disabilities.

Interim Actions

1. Maintain the existing trails by clearing overgrown brush on an ongoing basis.
2. Provide a secure space for volunteer tools and docent materials.
3. Bring in outside experts to discuss options, costs, and physical feasibility for expanding the current trail system.
4. Consult with adjacent public and private landowners about trail easements and connections to expand hiking opportunities.
5. Enforce periodic trail closures and/or closure of Preserve as necessary to protect resources and infrastructure.
6. Evaluate alternatives for providing safe and environmentally appropriate access to the beach.
7. Remove existing pit toilets at Hollister Meadow and replace them with temporary portapotties until permanent toilets are designed and installed in the vicinity of the meadow and the parking area.
8. Identify and build unpaved parking area(s) in the avocado orchard and near the barn for public use.

9. Evaluate the feasibility of building a deceleration lane off Highway 101.
10. Install drinking fountain or other water source for visitors at parking area and/or picnic area.
11. Install signs at trailhead by parking area and picnic area explaining the guidelines for public use at the Preserve (Table 7), warning the public of natural hazards in the canyon, and directing the public to appropriate trails.
12. Develop interpretive displays for installation along the trails and in and around Adobe.
13. Inspect wiring within the Adobe and barn, to the picnic area, and from the well #3 going across the creek to ensure safety and prevent electrical fire. Rewire if necessary for safety.
14. Conduct tests to assess the septic system status and its capacity to handle future waste levels.
15. Develop a work plan for the Preserve with tasks, budgetary requirements, target dates, and responsible parties.
16. Investigate the pros and cons of rezoning the property to Resource Management to reflect the primary goals of the Preserve.

Long-term Recommendations

1. Continue to maintain existing trails.
2. Install permanent restrooms at parking area and Hollister Meadow.
3. Extend trails and create linkages where it has been found appropriate based on inspections and consultations described above in the 3rd and 4th interim actions.
4. Consider development of a group campsite only if it is found to be compatible with protection of the resources and with the management goals and capacity of the Preserve.
5. Build outdoor shower for use by work crews if the need exists.
6. Turn the Adobe into visitor center and build caretaker residence on the eastern side of the lower canyon.
7. Maintain septic system and expand if necessary to accommodate increased use.
8. Consult with County Planning & Development regarding the Preserve's continued inclusion in the Agricultural Preserve program.

5.8.1. TRAILS

There currently exists a rather extensive trail system through the Preserve (Map 11). Most of the trails are on old ranch roads so they are wide enough to accommodate group hikes. The trails throughout the lower canyon are in good condition, but the ridge trails are significantly overgrown and eroded, hindering attempts by the public to access them at this point in time. In order to provide good quality low-intensity recreational activities consistent with the management goals, the first objective of the Land Trust is to clear the brush along the overgrown trails that are to be utilized for hiking. This will be rather straightforward, entailing the use of a brush cutter and possibly some volunteer

assistance. This will be done at least on an annual basis to keep the trails in good, passable condition (more often if found necessary).

More significant efforts to maintain the current trail system into the future will entail assessing the trails for stability and ensuring that they follow certain established trail standards. This is primarily concerned with erosion control and public safety and will involve more significant trail work to facilitate proper drainage and sloping (Student Conservation Association 1996). The Land Trust should invite local trail experts out to the Preserve to hike the trails and assess what needs to be done to achieve those goals.

Since most of the trail maintenance will be done with the help of volunteers, the Land Trust will purchase or have donated a collection of tools to support these efforts. The Land Trust will need to find a secure place on the property to store these tools so that they are accessible for use by volunteers on workdays. This storage area can also be used to house any docent materials that are developed or collected.

Photo: W. Sears

A portion of the main canyon trail through Arroyo Hondo as it crosses Arroyo Hondo Creek.

One of the long-term goals of the Land Trust is to provide opportunities for extended hiking from the Preserve. This could take the form of longer loop trails within the Preserve or creating linkages with trails outside the Preserve's borders. Possible connections include the County-owned Baron Ranch to the east (above the landfill), Los Padres National Forest to the north, the proposed trail easement on Dos Vistas Ranch, and other private lands bordering the Preserve. In the near-term, the Land Trust should work with trail experts to discuss options for expanding the current trail system and investigate the costs and benefits associated with connecting to the Baron Ranch and neighboring private lands. In order to develop these hiking opportunities, the Land Trust should consult with these neighboring landowners about trail easements and connections to get their input and involvement in the process. The process could initially begin with informal surveying and GPS work to identify suitable trail connections. If consultations and initial surveys lead to the decision that expanding the current trail system beyond the Preserve's borders is both physically feasible and financially practical, then the Land Trust should consider undertaking those efforts in the long-run.

Connecting with the Los Padres National Forest and Camino Cielo is something that the Land Trust will be looking into in the long-term. It is unlikely that this would

happen during the first few years of ownership. While creating a trail that runs from the ocean to the top of the ridge of the Santa Ynez Mountains would be a great commodity in many ways, it would also present several additional management challenges to the Preserve. Furthermore, the process of creating such a link is long and would be time-consuming and financially burdensome. Nevertheless it is a project that the Land Trust will consider.

The establishment of new trails and/or the extension of current trails will be done in a manner that is sensitive to resources. This means that biological and cultural resource and ecological assessments would be undertaken before new trails were created to ensure that sensitive species and resources would not be adversely impacted by the project(s). This also means that the trails would be designed in such ways as to minimize erosion by allowing proper drainage off the trails. Meandering on and off ridgelines, building check dams or water bars, maintaining proper trail sloping, and implementing other protective measures will be some of the techniques used to that end. Trail design standards can be gleaned from various sources, including East Bay Regional Parks District, Student Conservation Association's Lightly on the Land, and local trail experts.

Trails are more susceptible to damage during and after heavy rains. Hiking or other public activities during or immediately following these events can lead to increased erosion and irreparable damage to trails, such as the creation or exacerbation of trail gullies (Green Mountain Club 2002). For this reason, the Land Trust will likely close many of the trails, if not all, (since most of them are sensitive to erosion) in the event of rain. After the rain is over, a staff member will inspect the trails to ensure that they have not been damaged and to determine whether they should be reopened. A general rule of thumb is that if it is so muddy that a hiker would need to go off trail to get around it then it should remain closed. If damage has occurred, then the trail should remain closed until appropriate repairs are made. Significant damage to a trail, or identification of a trail section that is frequently damaged after rain events, may point to the need to redesign or redirect the trail in order to provide a long-term solution to the problem.

Periodic closures are necessary not only to protect the trails and other infrastructure from damage, but also to ensure public safety and the health of surrounding resources, including vegetation and the creek that could be damaged from increased erosion and/or sedimentation. As a rule the entire Preserve will be closed during and immediately following heavy rains in order to protect the Preserve's infrastructure and resources. Public access days may also be cancelled if heavy rains are predicted as a precaution. Besides the reasons outlined above, cars can also lead to significant damage when the ground is wet. If the public parking area were unpaved, this action would be necessary in order to maintain the parking area in good condition and keep loosened soil from entering the creek.

In addition to trail closures during and immediately following rain events, there may also be a need for periodic trail closures in order to protect biological resources. There is currently not enough information regarding the individual populations of

different species on the Preserve, but if information gathered in the future identifies key points within the Preserve that are vital to the survival of a given population, then closing those areas off to the public may be a necessary management action. This would likely take the form of keeping visitors out of the creek and riparian corridor, as that is the primary habitat for most of the sensitive species on the property. Similarly, areas of the Preserve that are being restored or otherwise worked on will be roped, fenced, or signed off to keep the public from disturbing the sites.

The current public pathway from the canyon bottom to the beach is by way of the culvert underneath Highway 101. While the opening of the culvert is large enough to allow human passage, it was not designed with that in mind. The rounded bottom and slippery walking surface make walking in the culvert difficult, especially when it is wet. It also has implications for sensitive species. There is the potential for increased disturbance of tidewater gobies, southern steelhead trout, and red-legged frog by visitors as they travel through the culvert. In the future, the Land Trust may consider developing an alternative public access path from the canyon to the beach to provide a safer public route and to increase the protection of sensitive species. The Land Trust will need to coordinate with CalTrans to determine the feasibility of developing such a route. In the meantime, however, the Land Trust should consider improving the current system by installing a rope or metal hand rail along the eastern wall of the culvert so that visitors are less likely to slip or walk in the water flow, thus increasing public safety and reducing the possible disturbance to species.

5.8.2. Public Services And Facilities

The Preserve is already situated with a public picnic area by the Hollister Meadow, a short walk from the parking area. There are currently two pit toilets and one shower located in the meadow. These will be removed in the near term, as the toilets are not suitable for high intensity use, and both the toilets and the shower are too close to the creek. The Land Trust will initiate initial design and planning for the installation of new permanent restrooms in the vicinity of the meadow and parking area. Temporary portapotties have been installed on the Preserve to serve visitors until these permanent toilets are built. In order to comply with County laws regarding setbacks from Environmentally Sensitive Habitat Areas, of which the creek is one, these toilets and other public facilities will not be built within a minimum of 30.5 meters (100 feet) of the creek (Santa Barbara County Coastal Plan 1999). The actual distance from the creek for toilets will depend on their structure and design. If they are connected to self-contained septic systems, then the required 30.5-meter (100-foot) setback may be sufficient. If, on the other hand, a leach field is involved, the distance should be increased in order to ensure the protection of the aquatic environment. Once these permanent toilets are constructed, they will need to be regularly cleaned and maintained to ensure proper functioning and support the public's appreciation of the Preserve.

As was mentioned in Section 5.6, the Land Trust may convert the Adobe into a visitor's center for use by the public for educational purposes. In order for this to occur, the Land Trust would need to construct a new caretaker residence on the property. This project is more of a long-term goal for the Land Trust because of the amount of time and money required to complete it. Therefore, it will only be pursued in the future if resources permit and a suitable location is found for the new residence.

The Land Trust may consider the development of a group campsite in the future. It would exist for use by groups through advanced reservation, field researchers, or volunteer work crews that are staying on the property. It would be established for tent camping only and would be used on a limited basis. The Land Trust would not likely operate a public campground due to environmental and staffing constraints. The potential site for this has not yet been determined, but it would most likely fall within the current avocado orchard set back from the creek by at least 30 meters (100 feet). A shower may be installed for work crews if a real need is determined in the next few years. This may be necessary if trails crews are working in areas of considerable poison oak (many such areas exist on the property). If camping does occur in the future, it is recommended that it be low-intensity, meaning not more than 30 to 40 people would be permitted on any given occasion. The current tent platforms next to the creek in the picnic area should be removed in the near term to ensure that they are not mistakenly used by the general public. Any future group campsite should be situated in an area of the lower canyon that is already disturbed, such as the old avocado grove. Considerations for campground placement should include: disturbance of native vegetation, proximity to the creek, disturbance of normal hiking and picnicking, vehicular access (no or few creek crossings), water supply, fire safety, and erosion. The campsite would be built only if it was determined that it would not adversely impact the resources of the Preserve or be in conflict with the guiding principles set forth by the Land Trust (Appendix A).

There is currently limited public parking at the Preserve. The area next to the barn across the bridge from the Adobe can accommodate approximately 25 vehicles. There is also an overflow parking area on the eastern side of the creek along the road going towards the meadow. This can accommodate more cars than would ever be necessary, however it is not a well-situated parking site. For that reason the Land Trust is working on developing additional parking for the public's use near the barn and around the avocado grove. It is expected that space for approximately 50 to 60 cars will be developed in that area. This will help to discourage visitor parking in the existing asphalt driveway adjacent to the Adobe in order to preserve the rural and historic setting. A design for the permanent parking area is currently underway, but a temporary site will be created in the old avocado orchard along the agricultural road to hold additional cars in the meantime. This will likely entail basic mowing and some orchard (non-native) tree removal, but no grading will be required. Some gravel may be placed in the these parking areas to protect the soil from vehicular damage, keep the area from becoming muddy, and suppress weeds. It is the hope of the Land Trust that the permanent

parking area can be built with minimal disturbance. If more than 50 cubic yards of earthwork is required for the parking area, then the Land Trust would have to obtain a grading permit from the County. In addition, the parking area must be located outside of the 30 meter (100-foot) setback from the creek required by law (Santa Barbara Grading Ordinance 1998, Santa Barbara County Coastal Plan 1999).

Garbage and recycling receptacles will be placed at the parking and picnic areas and next to the Adobe in order to reduce the likelihood of trash being thrown on the ground and degrading the natural setting. These will need to come with secure lids and be sturdy enough to withstand assaults by animals, such as raccoons and black bears. An alternative would be to enforce a "pack it in, pack it out" system in order to foster individual stewardship of the Preserve. While most visitors would follow such an approach, common sense dictates that some visitors would not. Therefore, in order to enhance resource protection, the provision of waste receptacles is the best approach. In addition to trash resulting from public use of the Preserve, there is also the chance of trash entering the Preserve and polluting the creek and lagoon from vehicles traveling on Highway 101. In order to address that stress on the resources, the Land Trust should do a trash sweep of the areas on either side of the highway on a bi-monthly basis (more or less frequently depending on the level of trash that is discovered). Another option for the Land Trust is to identify whether that section the highway is managed in the "Adopt-A-Highway" program; if it is determined that it is not, then the Land Trust should either "adopt" it itself or seek out an organization or company that would like to get involved.

Given the fact that the property will be experiencing increased vehicular traffic over historical levels it is important that the entrance road and bridge over the creek are maintained in good condition. The Land Trust should visually inspect the condition of the road on an ongoing basis and repair areas that have been damaged. In addition, the Land Trust should have an engineer inspect the bridge over the creek to ensure that it is structurally sound and capable of accommodating the increased traffic (which may include buses from time to time).

Another issue relating to the increased traffic coming into the Preserve is the safety of vehicles entering the Preserve from the Highway 101. It is currently a potential traffic hazard for vehicles to slow down and pull off of the highway at the entrance road because there is no established ingress at that intersection. For this reason the Land Trust is currently in discussions with CalTrans regarding the feasibility of constructing a deceleration lane along the highway leading up to the Preserve's entrance. Development of this ingress lane would help to reduce the risk of traffic accidents occurring as a result of an inadequate opportunity to safely pull into the Preserve. Along these lines, the Land Trust will encourage visitors leaving the Preserve to drive to the interchange at Gaviota State Park, rather than use the existing u-turn crossings, before turning around to travel southbound on Highway 101. This too will help to reduce the risk of traffic accidents occurring as visitors exit the Preserve.

As part of the Land Trust's goal to provide the public with the necessary infrastructure for use and enjoyment of the Preserve, the Land Trust will be installing a drinking fountain or other potable water source, subject to feasibility, at or near the parking or picnic area. This would also be helpful in ensuring public safety by reducing the likelihood of dehydration among hikers. The regulatory requirements associated with this project are detailed below.

5.8.3. SIGNS AND INFORMATION

It has been mentioned throughout this document that education will be emphasized at the Preserve. This will take the combined form of educating the public about visitor guidelines and the importance of minimizing their impact on the Preserve's resources, and teaching the public about the rich natural and cultural history of both the Preserve and the Gaviota Coast as a whole. In the first sense, education will be used as a primary tool to reduce the potential impact that public use can have on the Preserve's resources. The basic philosophy behind this approach is that the more people know about the sensitivity of an area, for example, the more likely they are to take the basic steps necessary to protect it. To this end signs will be displayed in critical areas of the Preserve to inform visitors about proper use and behavior. There should be permanent signs posted at the main entrance and parking area displaying the rules of the Preserve (as listed in Table 7), and temporary signs demarcating restoration and research project areas and areas placed off limits to protect seasonal animal nesting or breeding locations (once known). There will also be signs to direct visitors to the appropriate places, such as the parking area, restroom facilities, and trail markers. There may also be small signs placed at creek crossings informing visitors about the sensitive species present and instructing them to cross the creeks with care. In addition, it is recommended that a sign displaying the rules of the Preserve be placed at the picnic area, since that will likely be an area where people congregate and will be tempted to play in the creek. Finally, a sign will be displayed at the parking area trailhead denoting public safety hazards, such as rattlesnakes, poison oak, and landslides.

Information will also be presented to visitors for the purpose of their own education. Education will be a primary activity for visitors at the Preserve. Interpretive displays conveying interesting ecological, biological, geological, cultural, and historical facts to visitors may be positioned at key points along the trails, at the picnic area, and in and around the Adobe.

5.8.4. UTILITIES

The Preserve is serviced by electricity in the Adobe, barn, picnic area, and water wells. In order to prevent possible electrical fires, the electrical wiring within the Preserve will be inspected in the near future to ensure that it is up to code. The wiring from the well that crosses the creek below the first creek crossing will also be evaluated and possibly rerouted to reduce the potential fire hazard and exposure to visitors.

The septic system is located next to the Adobe underneath the pavement. The associated leach field fans out from the septic tank into the west-side orchard. The entire system will be analyzed in the near future to determine its present condition and assess its capacity to accommodate future waste levels. In addition to the initial check, there should be periodic inspection and maintenance of the septic system to ensure that it is working properly. Siting and construction of the future restrooms will take into consideration the current septic system and a determination will be made as to whether there is need for it to be expanded or a new system built. Expansion may be required if the new restrooms are hooked up to the same system. If, on the other hand, the restrooms are self-contained or connected to their own system, it is unlikely that the current septic system will receive much higher levels of waste than what has traditionally been processed. In addition, if a new caretaker residence is constructed, pressure will be taken off of the current septic system. Given the possible location of the caretaker residence (across the creek from the Adobe), it is likely that an entirely new system would need to be developed to process its waste.

The Land Trust, in consultation with architects, contractors, and engineers, should examine the feasibility of connecting both of the new restrooms and the new caretaker residence to a new septic system in the canyon on the eastern side of the creek. The wells would also need to be examined for their potential connection to these new facilities and the siting of future water lines would need to be evaluated.

5.8.5. ADMINISTRATION

In order to appropriately assign tasks and dole out the Land Trust's limited resources, it will be important for the Land Trust to develop a work plan. This management plan has identified a long list of both interim and long-term actions to be implemented. Each year the Land Trust should develop a plan for infrastructure development and maintenance, restoration and enhancement projects, and the development of educational programs. This plan should include tasks, target dates, estimated budget requirements, and responsible parties. This will help the Land Trust to manage its resources effectively and ensure that resources are appropriated to priority actions. It could also be used as a basis for effective management of Land Trust and Preserve staff and help to identify when funding from outside sources is required for undertaking a given project.

5.8.6. REGULATORY CONSIDERATIONS

One issue facing the Land Trust in the future management of the Preserve is ensuring that the property is compliant with requirements under the Americans with Disabilities Act (ADA), passed by Congress in 1990 (Jensen 2001). Newly proposed guidelines will impact the way that the Land Trust builds new trails and public facilities, or substantially alters existing infrastructure. Trails, beach access routes, picnic elements, fixed trash and recycling containers, overlooks and viewing areas, fixed benches, fixed pit

toilets, camping facilities, and outdoor rinsing showers are just some of the outdoor developments covered by the new guidelines. General repair and maintenance of trails and other facilities in their existing condition on the property will not likely trigger the new ADA requirements.

The guidelines set forth technical provisions for projects to adhere to, but there are also several exceptions to these standards that may be applicable for development projects at the Preserve. The guidelines state that the technical provisions may be modified when adherence to them would cause substantial harm to cultural, historic, or significant natural features on the property. In addition, modifications may occur when adherence to the standards would not be feasible given the terrain or prevailing construction practices. In his article in the "Land Trust Exchange", Jensen (2001) suggests that this exception could apply in circumstances that the Land Trust will likely face in new trail construction on the upper ridge of the Preserve. The Land Trust will rely heavily on volunteers for trail construction, who may not have the expertise necessary to achieve the technical requirements for trail width and grade in all instances. Furthermore, in many cases on the property the grades are too steep for compliance and the environmental impact of attempting to build flatter or wider trails in some areas would be too great.

The Land Trust will make every effort feasible to comply with ADA requirements. It is recommended that the Land Trust document its process when establishing new trails or facilities in the future to demonstrate that ADA requirements were considered. This documentation should include information regarding why the new trail or facility was designed and located where it is, and if and why the project departs from ADA requirements. Consultation with an individual familiar with accessibility guidelines related to outdoor development projects is encouraged before undertaking any project that may trigger ADA review. In the short term, the Land Trust will take some basic steps to help make the Preserve more accessible. These include enhancing the access from the meadow down to the picnic area by leveling the path down to the tables, since currently there is a rather steep descent; building a ramp up to the porch of the Adobe; and allowing those in wheelchairs to use the restroom in the Adobe until a wheelchair-accessible temporary or permanent toilet is brought on to the Preserve. The current requirement under the Americans with Disabilities Act for door widths is 32 inches (U.S. Department of Justice 1994). While it may not be feasible to have all the doors in the historic Adobe comply with this, the construction of future facilities will take this figure into account. In addition, Land Trust staff or volunteers will be available during public days or group events to drive visitors who are unable to walk the trail to the picnic area.

Another issue that impacts the current and future planning of the Land Trust is the County Zoning Ordinance. As one can see from the map in Appendix I most of the Preserve's front country falls within the coastal zone. This places the management of the Preserve under the purview of the California Coastal Act of 1976. Because of this, coastal development permits are required before "commencing any work pertaining to any development or use in the Coastal Zone of the County, wherein permits are required

under the provisions of [the Coastal Zoning Ordinance]" (Santa Barbara County 1997). The part of the property that falls within this boundary is currently zoned Agriculture II (Appendix I), which applies to agricultural land in rural areas of the County. Since the property no longer has agriculture as its primary objective, the Land Trust may seek to rezone the property to Resource Management. Under the current zoning restrictions, future development of low-intensity recreational infrastructure, such as trails and campgrounds, will likely trigger the need to obtain a conditional use permit from the County. Similarly, building permits will need to be obtained from the County for the installation of public restrooms and the future caretaker residence.

Upon initial review, the zoning district that best suits the resource management goals of the Land Trust is the Resource Management zone (Appendix J). The underlying principle behind this district is the protection of lands that are unsuited for intensive development and/or have "outstanding resource values such as environmentally sensitive habitat areas" (Santa Barbara County 1997). As stated in Section 35-90.3 of the Coastal Zoning Ordinance for Santa Barbara County, permitted uses under this zoning district include:

1. One single family dwelling per legal lot.
2. One guesthouse.
3. Agricultural grazing.
4. The non-commercial keeping of animals.
5. Limited facilities or developments for educational purposes or scientific research, e.g. water quality monitoring stations, access roads, storage facilities, etc.
6. Accessory uses, buildings and structures which are customarily incidental to the above uses.

Construction of a campground with minimal facilities will again require a conditional use permit, as will the cultivation of agriculture. It is unclear how trail construction is treated under this zoning district, though as long as it is done with consideration of the sensitive resources present, it is foreseeable that such projects would be approved.

Since the Resource Management zoning district is seemingly more consistent with the goals of the Land Trust for the Preserve than is the Agriculture II zoning district, the Land Trust will consult with County Planning and Development Department to determine whether the property should be rezoned given the new management strategies for the Preserve. Another option is to apply for a conditional use permit (CUP) for preserve operation and any planned improvements. A third option is to wait until the County updates the Comprehensive Plan and Local Coastal Program for the Gaviota region in the next few years and work to have the Preserve rezoned as part of that process. Consultation with the County and considerations of cost and feasibility will be necessary before a course of action is pursued.

Another regulatory issue that effects the management and administration of the Preserve is associated with the California Land Conservation Act of 1965. Commonly

referred to as the Williamson Act or Agriculture Preserve program, the law states that private owners of agricultural land can enter into contracts with local governments to restrict the land to agriculture and/or open space, thus keeping the land from being developed (California Department of Conservation 2002). The contracts are typically 10 years in duration but are automatically renewed each year. In exchange for maintaining the land in agriculture or open space, the landowner receives property tax reductions. The previous owners of Arroyo Hondo Ranch entered into such a contract with the government and so the Preserve is currently enrolled into the Williamson Act program.

The Land Trust has applied for non-profit tax-exempt status for the property. If approved, then the value of remaining in the Agricultural Preserve program is questionable. If tax-exempt status is achieved for the property the Land Trust should review the contract with the County Planning and Development Department to discuss what is the best path for the Preserve and the Land Trust. If it is decided that the best plan is to withdraw from the Williamson Act contract in the future then there are two methods of proceeding. Contracts can be exited by initiating a process of contact non-renewal. Because contracts last 10 years and are automatically renewed each year, however, this means that the Land Trust will remain under the contract for at least 9 years. Non-renewal needs to be noticed at least 90 days prior to the renewal date to take effect. Another possible option is to "cancel" the contract. A contract can be cancelled if it is found that the alternative for the property will still be rural in character and will not lead to improper development (California Department of Conservation 2001). It is foreseeable that the County will accept a cancellation of the contract given the fact that the property will maintain its rural character as a natural Preserve.

While the property has permits for the construction of the water wells and for the electrical system servicing the wells, in discussion with the County Environmental Health Services (EHS) department it became apparent that the Land Trust did not have a permit for domestic water supply for the Preserve (N. Fujimoto pers. comm.). EHS recommended that a single parcel domestic water supply permit be secured. This will be required if the Land Trust wants to modify or expand the use of the domestic water system (for example, to serve a new caretaker residence). The permit application costs $470 and requires the following (Santa Barbara County 1994b):

1. A detailed plot plan to scale prepared and signed by an approved water system designer (C-57 licensed water well contractor, C-61 licensed pump contractor, or registered civil engineer). The plot plan must include:

- Location and elevation of all existing and proposed water system components.
- Water source, treatment and treatment wastewater discharge (if any).
- Storage tank, pumping and pressurization equipment.
- Distribution piping, water connections, irrigation connections and cross-connection (backflow prevention) devices.

- Location of all possible sources of contamination within 61 meters (200 feet) of the water source, including any animal enclosures.
- Property lines.
- Existing and proposed easements for property access and for water or sewer facilities.
- Existing and proposed structures.

2. Schematic diagram prepared by an approved designer showing the water system components.
3. Water source yield test report performed within 5 years of the date of the permit application.
4. Complete chemical analysis of the water source by a state approved laboratory within 3 years of the date of the permit application.
5. Signed copy of the well driller's log.
6. Copies of water system equipment specifications.
7. Treatment equipment specifications (if any).
8. Declaration of exclusive parcel ownership and a copy of the grant deed.

In order to install a drinking fountain or other potable water source for the public or provide a restroom with running water, the Land Trust must first obtain an additional permit for public water supply. Based on the California Department of Health Services regulations entitled "Technical, Managerial and Financial Capacity Criteria for Non-community Water Systems" (1999), the regulations require private suppliers of water used by the public to demonstrate the technical, management, and financial capacity to operate a public water supply system to ensure protection of public health. Included in the regulations are requirements such as system operator qualifications, operation plans, emergency/disaster response plans, financial reserves, and verification of water rights. While EHS staff recognizes that these requirements are intended for larger water systems serving a number of private residences and/or public facilities, the state permit requirements do apparently apply to any private water system that is developed for public use. There is an initial plan review fee and an annual system fee of $350. The Land Trust will need to carefully evaluate the regulatory requirements, permitting and compliance costs, and feasibility of providing any potable water source to the public at the Preserve before deciding to pursue such improvements. Unfortunately, serving the Preserve from a public water source is not feasible since Arroyo Hondo is not within the service area of any existing city or water district.

5.8.7. Limitations And Challenges

Managing a 316-hectare (782-acre) preserve for resource protection and public access can require a significant monetary commitment by the landowner. In the case of the Land Trust, it will be challenging to plan for future costs associated with the management of the Preserve. The Land Trust hopes to be in a position to afford

unanticipated expenses that arise in the future. Fortunately, the Land Trust has raised enough money through grants and private donations to establish an endowment for the Preserve. However, the endowment is insufficient to be able to afford all of the actions and recommendations discussed in this management plan. Thus, it is even more critical that prudent management of the endowment be carried out. Given this fact it is likely that the Land Trust will have to seek additional funding to carry out some of the proposed projects. This budgetary issue will be discussed further in Section 6 of this document.

It may be challenging for the Land Trust to manage trail linkages with Los Padres National Forest and the County-owned Baron Ranch because of the different philosophies on public use. National Forests and County parks are managed for multiple uses, and their trails reflect that principle (C. Garciacelay pers. comm., K. Kellogg pers. comm.). Most trails within the Los Padres National Forest are open to mountain biking and horseback riding unless they fall within designated wilderness areas (USDA Forest Service 2002c). In addition to the challenge of controlling the times of access (as was discussed in Sections 5.6.1 and 5.6.4) creating trail linkages between the Preserve and the national forest or Baron Ranch (or any other property outside of the Preserve's boundaries) would lead to the challenge of controlling the types of access into the Preserve. Since the Preserve will only be open to the public on certain days, and mountain biking and horseback riding on the Preserve will be restricted, if not prohibited, controlling both the timing and types of use on these connected trails will be difficult. If such connections do occur in the future, efforts beyond the use of signs (gates, fences, etc.) may be necessary in order to effectively control the types of access. The Land Trust will have to work with the relevant agencies or landowners to determine the appropriate actions to address this issue.

In addition to the problems of access, building a trail in Los Padres National Forest would require a number of steps that may make possible future linkages impractical. A Phase 1 Archaeological survey, biological and botanical assessments, and some form of an environmental report are required to ensure that the trail would not lead to substantial environmental degradation (K. Kellogg pers. comm.). The Land Trust lacks the resources to initiate such a project, therefore the development of future trail connections into Forest Service land would likely require support from the USDA Forest Service or grants and donations.

5.8.8. Information And Monitoring Needs

In order to protect infrastructure and resources, efforts will be taken to avoid building facilities or trails in areas of the Preserve that are especially prone to erosional processes. Future trail construction will only be done in areas where it is found to not pose a notable threat of erosion, landsliding, or sedimentation of the creek. Proper planning, therefore, will require greater knowledge of the geologic features of the property than what currently exists. Before such developments are undertaken, the Land

Trust, with the help of geologists and trail specialists, will have to survey the areas in question to determine their stability and whether or not a structure or trail should be built there. Similarly, consideration of the 100-year floodplain should be incorporated into future plans for infrastructure design and development. The restrooms and caretaker residence (if pursued) should be constructed in areas to reduce the potential for future flood damage.

Periodic monitoring of the septic system will be required to ensure that potential problems are identified and remedied before damage is done. This should be done annually given the age of the system. If, upon inspection, it is determined that the septic system needs to be expanded to accommodate the increased waste levels, the Land Trust will have to take the necessary steps to address the problem.

5.8.9. COORDINATION AND PARTNERSHIPS

The Land Trust has compiled a list of individuals who have offered their time to perform trail maintenance and repair. The Land Trust will explore the option of working with groups like the California Conservation Corps, Student Conservation Association, or Los Padres Forest Association for larger scale trail projects in the future if the need arises.

Trails Organizations: The Land Trust can benefit from the expertise of several local trails-related organizations with experience in building volunteer-based trail rehabilitation and maintenance programs, as well as creating trail linkages outside of the Preserve's boundaries.

Contacts:

Vie Obern
Santa Barbara County Trails Council
4140 Marina Drive
Santa Barbara, California 93110-2430
Phone: (805) 682-3175 Fax: (805) 682-3175

Kerry Kellogg, Recreation Specialist
USDA Forest Service
Los Prietos Ranger Station
Phone: (805) 967-3481

Claude Garciacelay, Park Planner
Santa Barbara County Parks
610 Mission Canyon Road
Santa Barbara, California 93105
Phone: (805) 568-2469 Fax: (805) 568-2459
E-mail: cgarcia@co.santa-barbara.ca.us

Ray Ford
Los Padres Forest Association
Phone: (805) 683-4917
riveray@cox.net

California Department of Transportation: The Land Trust will need to work with the California Department of Transportation (CalTrans) to discuss the feasibility of building the deceleration lane and developing an alternative public access route from the lower canyon to the beach.

Contacts: California Department of Transportation
District 5
50 Higuera Street
San Luis Obispo, California 93401-5415
Phone: (805) 568-0858

Facilities: The Land Trust will need to work with an architect to design the restroom facilities and possible caretaker residence. Cost and environmental sensitivity should be considered when choosing an architect. Blackbird Architects is one firm that specializes in environmentally minded design.

Contacts: Blackbird Architects
235 Palm Avenue
Santa Barbara, California 93101
Phone: (805) 957-1315 Fax: (805) 957-1317

6. MANAGEMENT COSTS

This section presents a financial picture of the Arroyo Hondo Preserve as of March 2002, and the Land Trust's preliminary estimates of income and expenses for (a) annual operation of the Preserve, and (b) some of the one-time expenses identified as priority items for the first year.

Annual operating expenses will include preserve staff support (preserve manager, volunteer coordinator, grant writing, bookkeeping, program administration and development); maintenance of the buildings, water wells, roads, trails, orchards and other facilities; utilities, insurance, and costs associated with carrying out the habitat management/restoration projects and providing public access and environmental education programs at the Preserve.

First year expenditures include items such as a truck and tractor, tools, signs, parking improvements, invasive weed control, plants, docent program development and materials, ecological investigations, professional consultants, and permit application fees.

As part of its acquisition fundraising campaign, the Land Trust raised enough money to create an $800,000 endowment for the Arroyo Hondo Preserve, and to provide approximately $150,000 for first year expenses to establish and equip the Preserve. While raising these funds was a critically important factor in the Trust's decision to own and manage the property, neither source is sufficient to provide for all of the operating or one-time capital and programmatic expenses suggested by this preliminary management plan. The Land Trust will need to continue to engage in fundraising and grant writing to achieve its objectives and create the range of environmental and community benefits that the Preserve could ultimately offer. To date, the Land Trust has received two grants and a private pledge totaling $13,000 for environmental enhancements at the Preserve, and the promise of a third grant of $10,000 toward trail improvements.

The Arroyo Hondo Preserve Endowment Fund will be invested in accord with the adopted investment policy of the Land Trust, as overseen by the Land Trust Finance Committee. For planning purposes, it is assumed that investment of the endowment will allow for five percent of the net asset value to be spent annually (initially $40,000) while preserving and building the invested principal.

The Land Trust will continue to solicit and receive donations from visitors and others who learn about the Preserve, and may conduct fundraising events to help sustain Preserve activities. In addition, the Trust intends to charge a fee to groups wishing to reserve access to the picnic area or sponsor special events outside of the established public access days. These sources are essential to provide operating funds budgeted beyond the annual endowment earnings.

The ability to implement many of the significant improvements, projects and programs at the Preserve suggested by this plan will depend on the Land Trust or its

partners successfully raising grants from public agencies and private foundations or major gifts from individual donors. Preserve enhancements that will not be possible to implement without additional outside funding include: construction of permanent restrooms, a separate manager's residence, highway deceleration lane, restoration of the historic Ortega Adobe, and new trails and connections to other publicly accessible trails. Some activities, such as outdoor education for local schools, invasive weed control, habitat restoration and scientific monitoring of natural resource conditions on the Preserve can be started in a limited way with the Land Trust's current resources and the enthusiasm of volunteers. Expanding these efforts to the level desired will require additional fundraising.

The budget estimates provided herein for annual operations (Table 8) and for initial one-time facility or program development needs (Table 9), should be considered preliminary. The Land Trust is still evaluating the cost of some projects and programs, and will need to monitor and revise its income and expense projections regularly during the first year of managing the Preserve.

Table 8. Estimated annual operating expenses for the Preserve

Arroyo Hondo Preserve estimated annual operating expenses *Revised 3/19/02*			
Description	**Monthly**	**Annual**	**Notes**
Electricity	220	2,640	
Phone/Fax	130	1,560	
Internet service	20	240	
Natural gas	40	480	
Trash service/disposal fees	85	1,020	dumpster rental
Adobe cleaning service	60	720	
Landscape & maintenance service	300	3,600	
Misc. maintenance, tools, garden supplies, repairs	150	1,800	
Restroom rental & servicing	125	1,500	
Property taxes	26	314	non-profit exemption filed for basic property tax; portion payable is flood control district assessment
Property Insurance	0	0	paid by Land Trust
Preserve Co-managers	1,500	18,000	salary, benefits, payroll tax, workers compensation insurance
Project Director	500	6,000	Central Coast Consulting - on-going role in preserve program development and management
Land Trust Staff & Admin. Costs	1,000	12,000	projected annual staff support and office expenses provided to preserve
Bookkeeping	60	720	
Volunteer Coordinator	600	7,200	$500 stipend, $100 mileage allowance
Preserve office supplies	50	600	
Truck insurance	70	840	
Truck maintenance	100	1,200	
Truck fuel	40	480	
Trail maintenance	100	1,200	mowing, debris disposal, fencing, erosion control
Volunteer work days (outreach, refreshments)	60	720	
Recreational & educational hikes (outreach, refreshments)	180	2,160	
Docent program (docent stipends, training, supplies outreach)	250	3,000	seek grant funding to develop
Total Operating Expenses	$5,666	$67,994	
Sources of Income		$40,000	5% annual disbursement from endowment fund
Visitor donations, group use fees, special events and grants		$28,000	

Table 9. One-time capital improvement and other expenses for the Preserve

Arroyo Hondo Preserve one-time capital improvement and other expenses October 17, 2001 - December 31, 2002 (*Revised 3/19/02*)				
Description	**Actual Expenses to Date**	**Estimated Expenses**	**Estimated Income**	**Notes**
Truck & Tractor		25,000		Seek donation or discount
New Floor	5,469			
Carpeting	1,428			
Drainage Repairs	3,480			
Service Master Cleaning	395			
Equipping Adobe	773	250		Appliances, kitchen supplies, cleaning supplies, etc.
Paint Supplies for Adobe	144			
Water Quality Testing		575		domestic water quality tests
Well Evaluation & Repairs	230			
Engineering Plans for Water System, Permit Fees		2,470		$2,000 est. engineering costs + $470 domestic water system permit
Project Director		12,000		Start up planning, grant admin, hiring, program development from 11/1/01-12/31/02
Land Trust Staff & Administrative Costs	11,770	20,640		High level of administrative support during start-up; on-going administrative costs shown in operating budget
Brochure Design & Printing		1,500		
Education Program Material		1,000		Books, photos, teaching supplies
Habitat Restoration Projects		16,000	11,000	USFWS Partners for Wildlife $10,000 grant (approved); $1,000 individual pledge
Existing and New Trail Improvements		10,000	10,000	Income - Kiewit Foundation; Expenses - planning, design, permits, construction, tools, equipment rental/ operator
Signs	775	10,000		
Dedication/Donor Event		1,000		
U.S. 101 Turnout Project – design/permitting		12,000		Design engineering services; project will require additional outside funding to install
Steelhead Culvert Mitigation Project		12,000	12,000	Funded by mitigation grant from Shell Western Exploration and Prod. Inc.
Parking area		750		Clearing, mowing, gravel
Misc. Landscape & Repairs	2,029			
Preliminary Management Plan	3,144	500		Bren School: mapping, summer intern stipends, copies
Adobe conservation audit		1,200		
TOTALS	$29,637	$126,885	$33,000	

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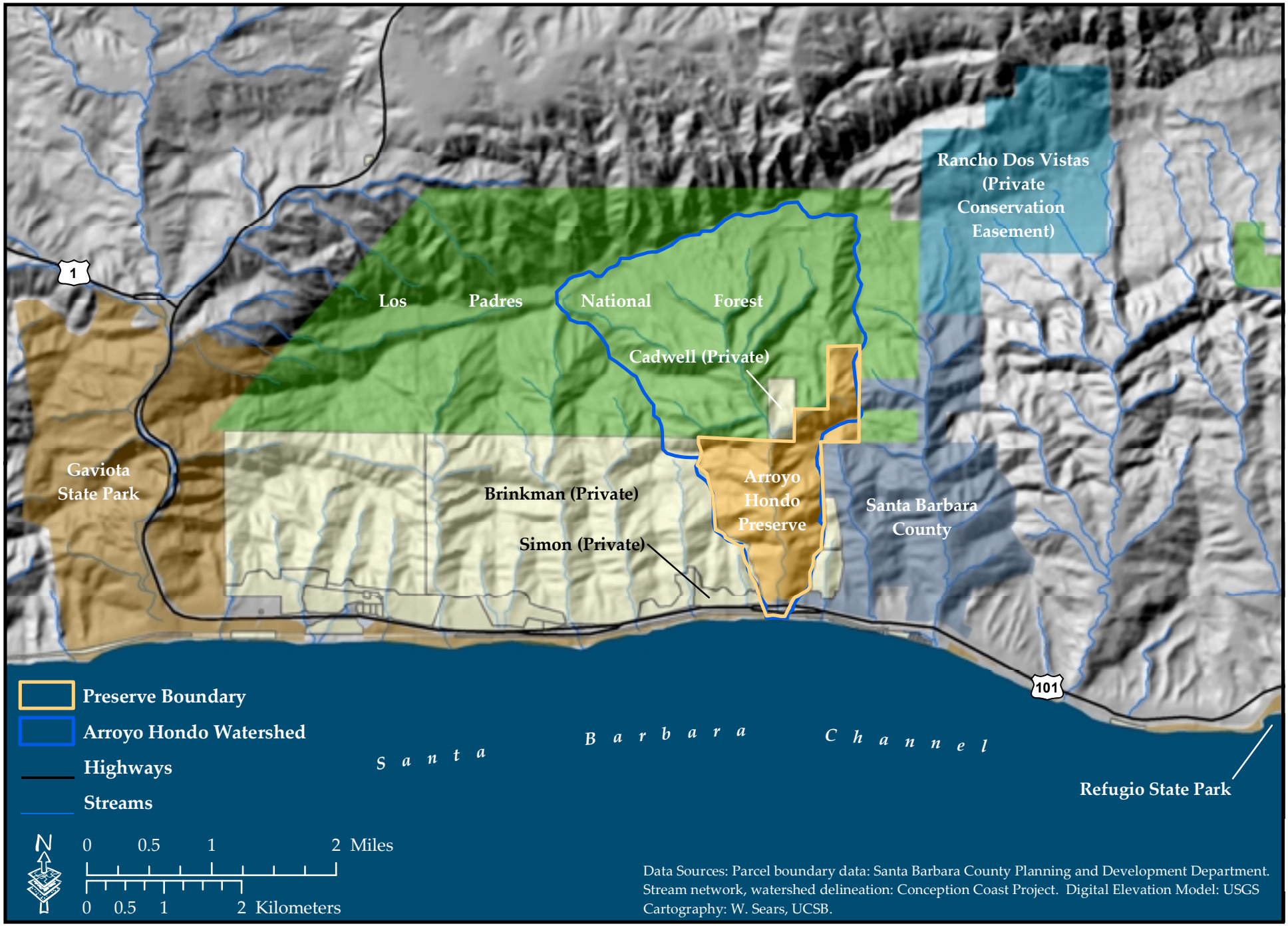
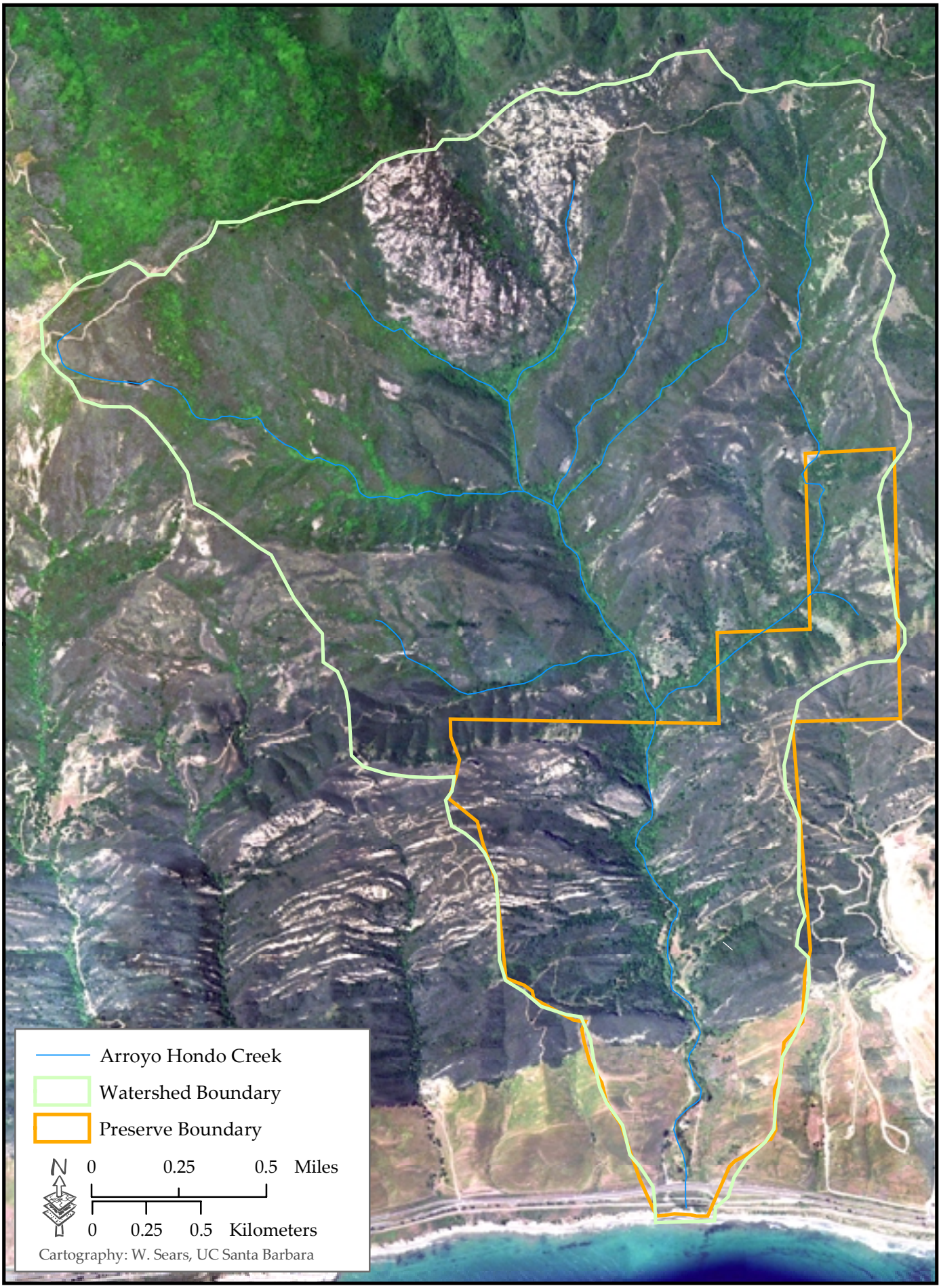
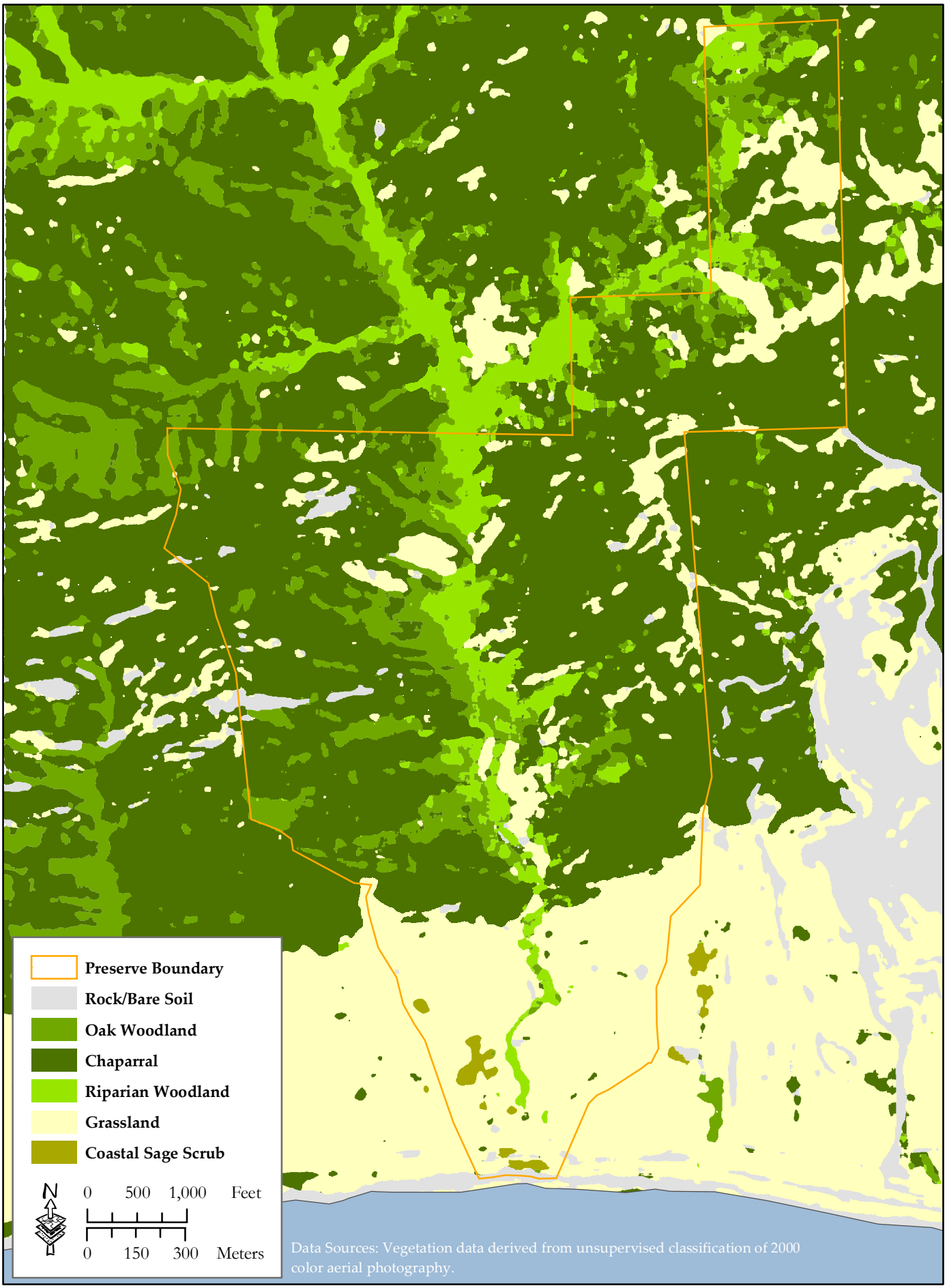
Map 1. The Gaviota Coast region.



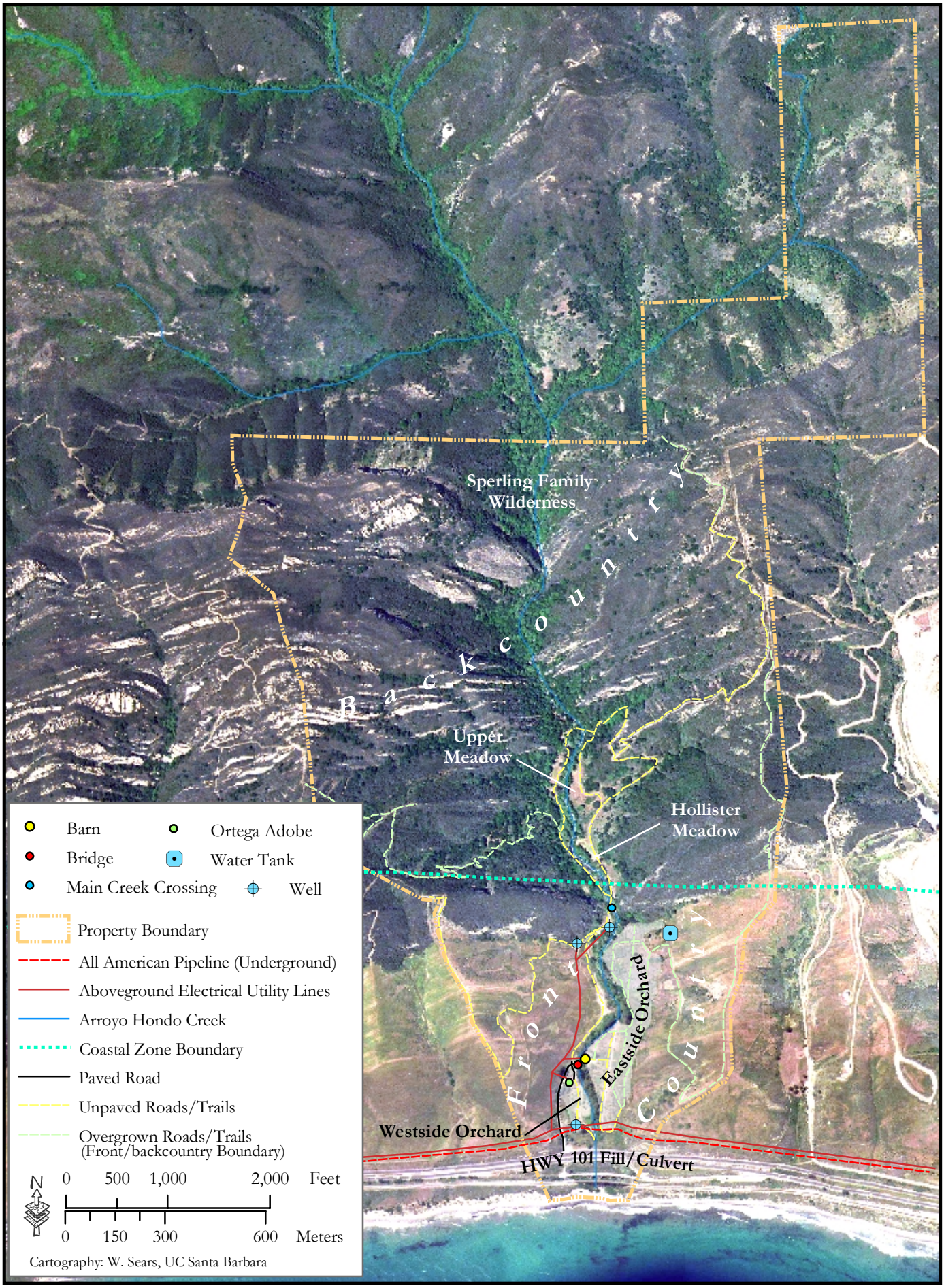
Map 2. Property ownership in the vicinity of Arroyo Hondo Preserve.



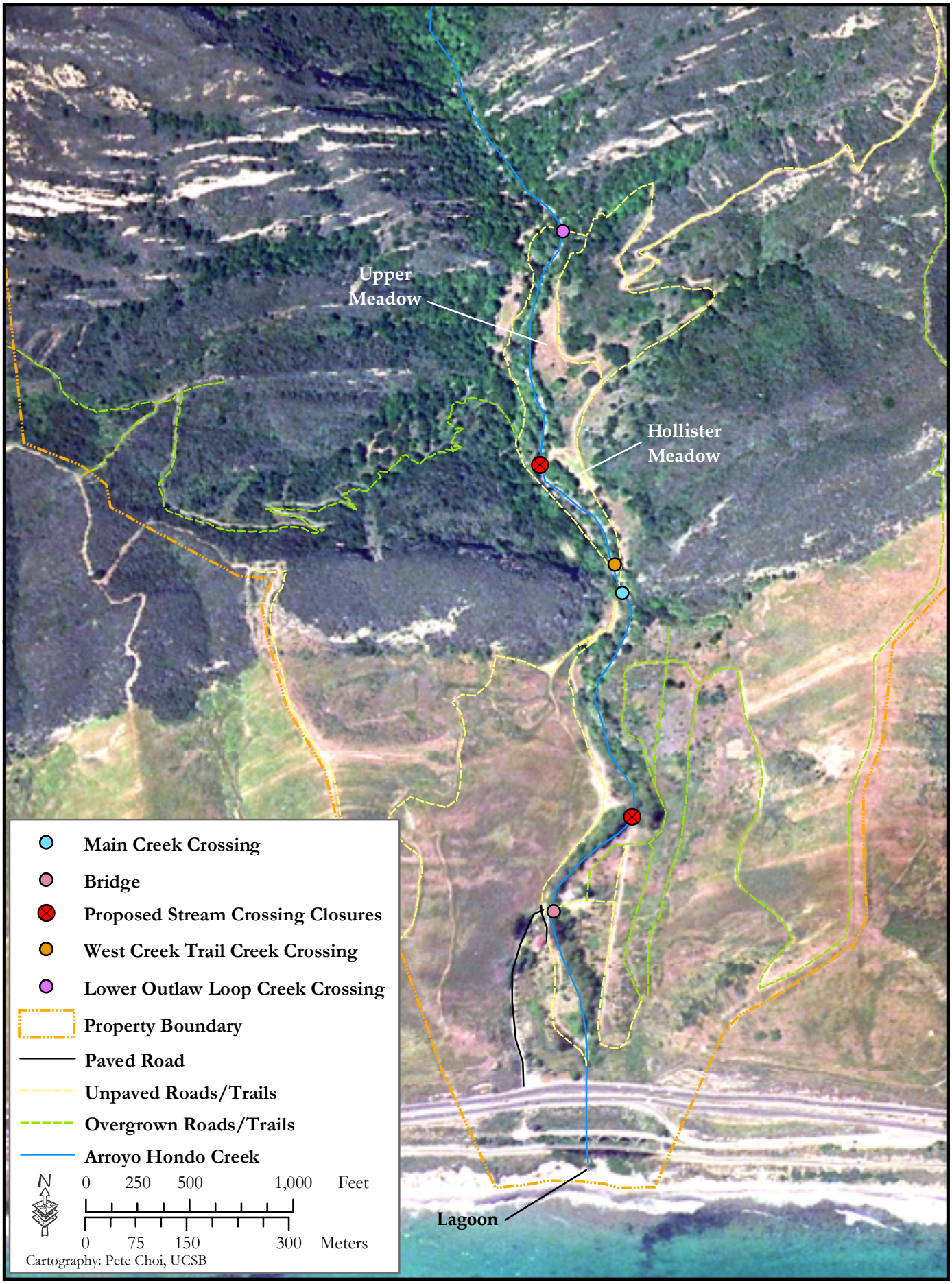
Map 3. The Arroyo Hondo watershed.



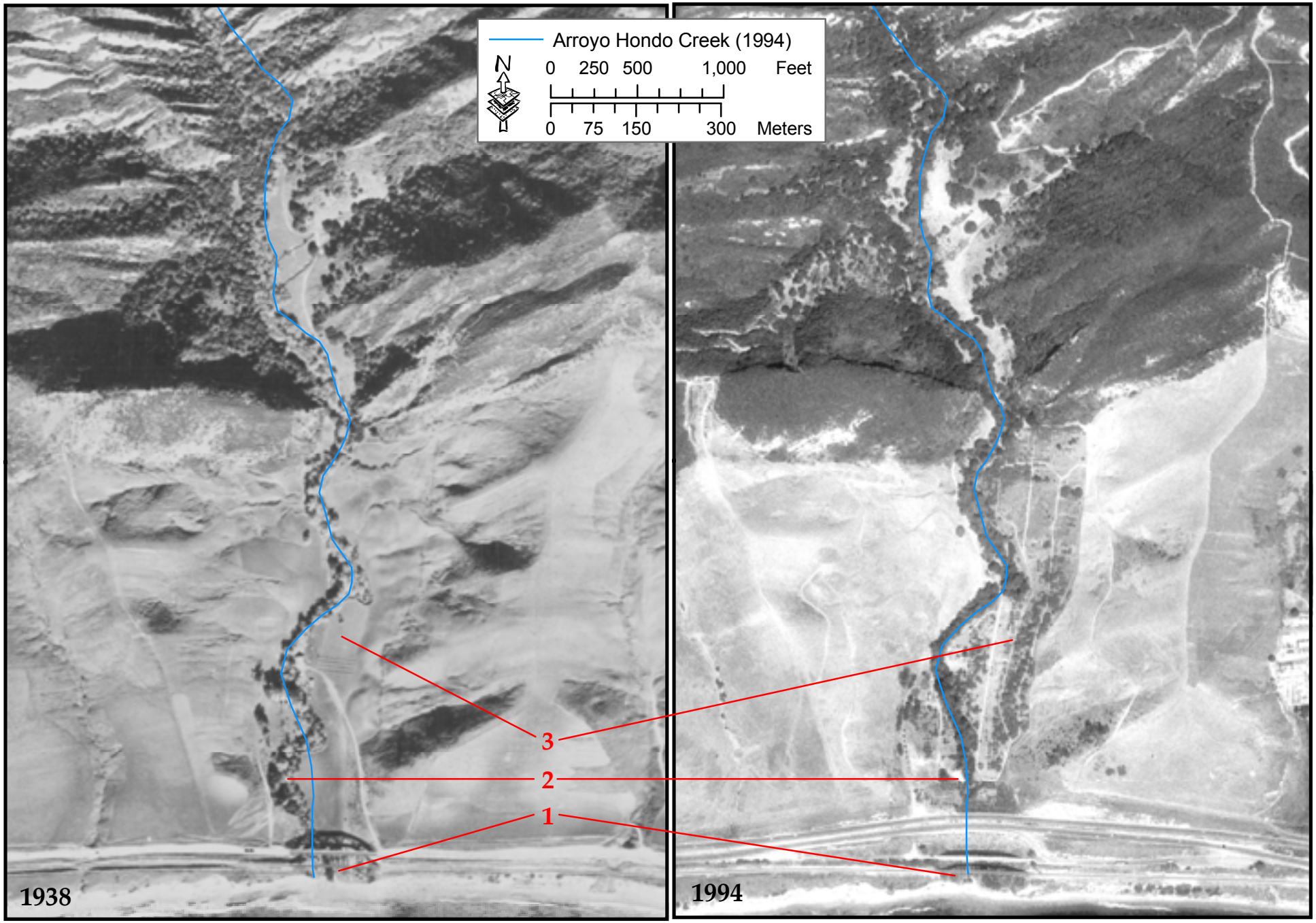
Map 4. Generalized natural vegetation communities of Arroyo Hondo Preserve.



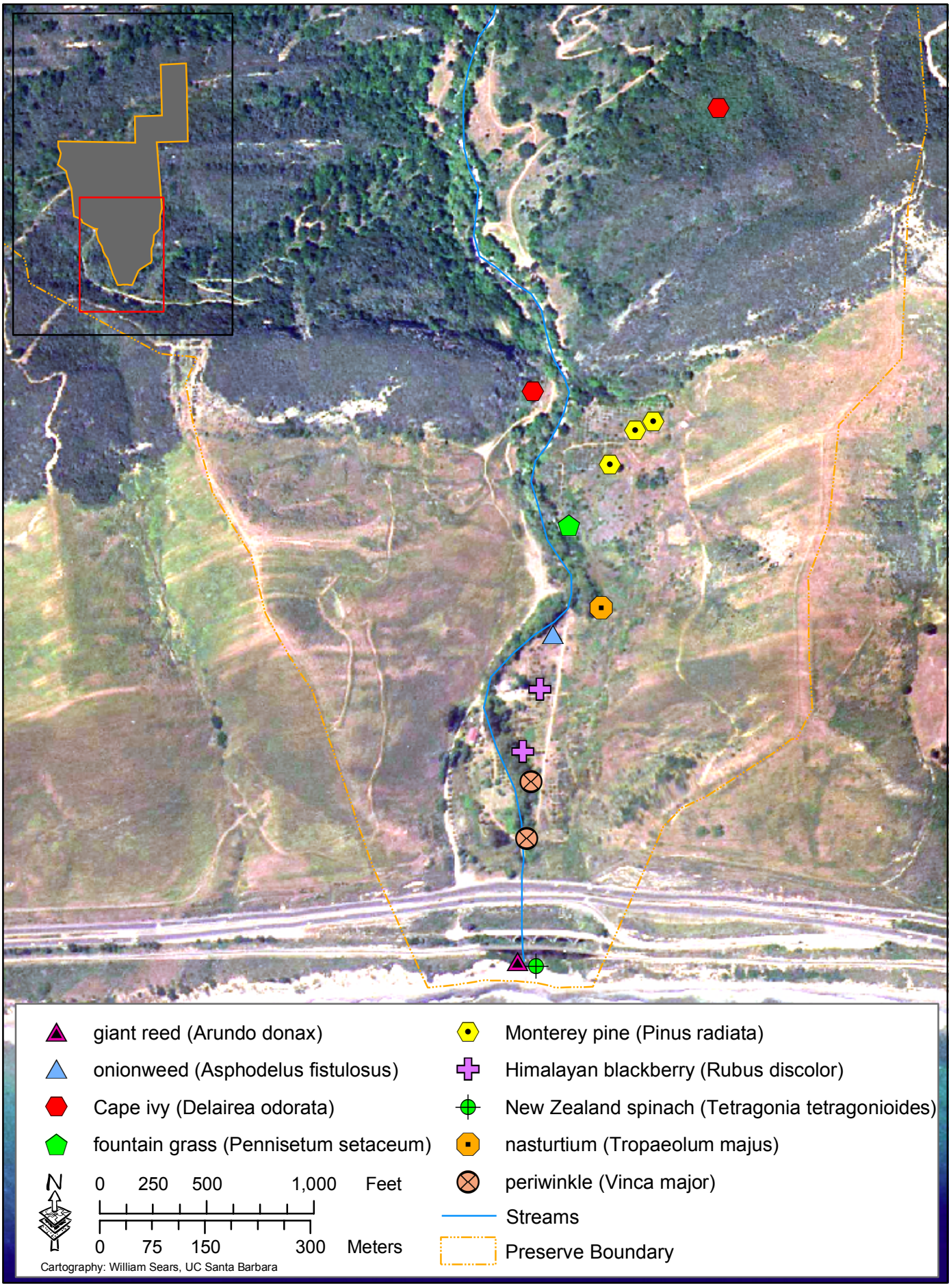
Map 5. Infrastructure and physical features of Arroyo Hondo Preserve.



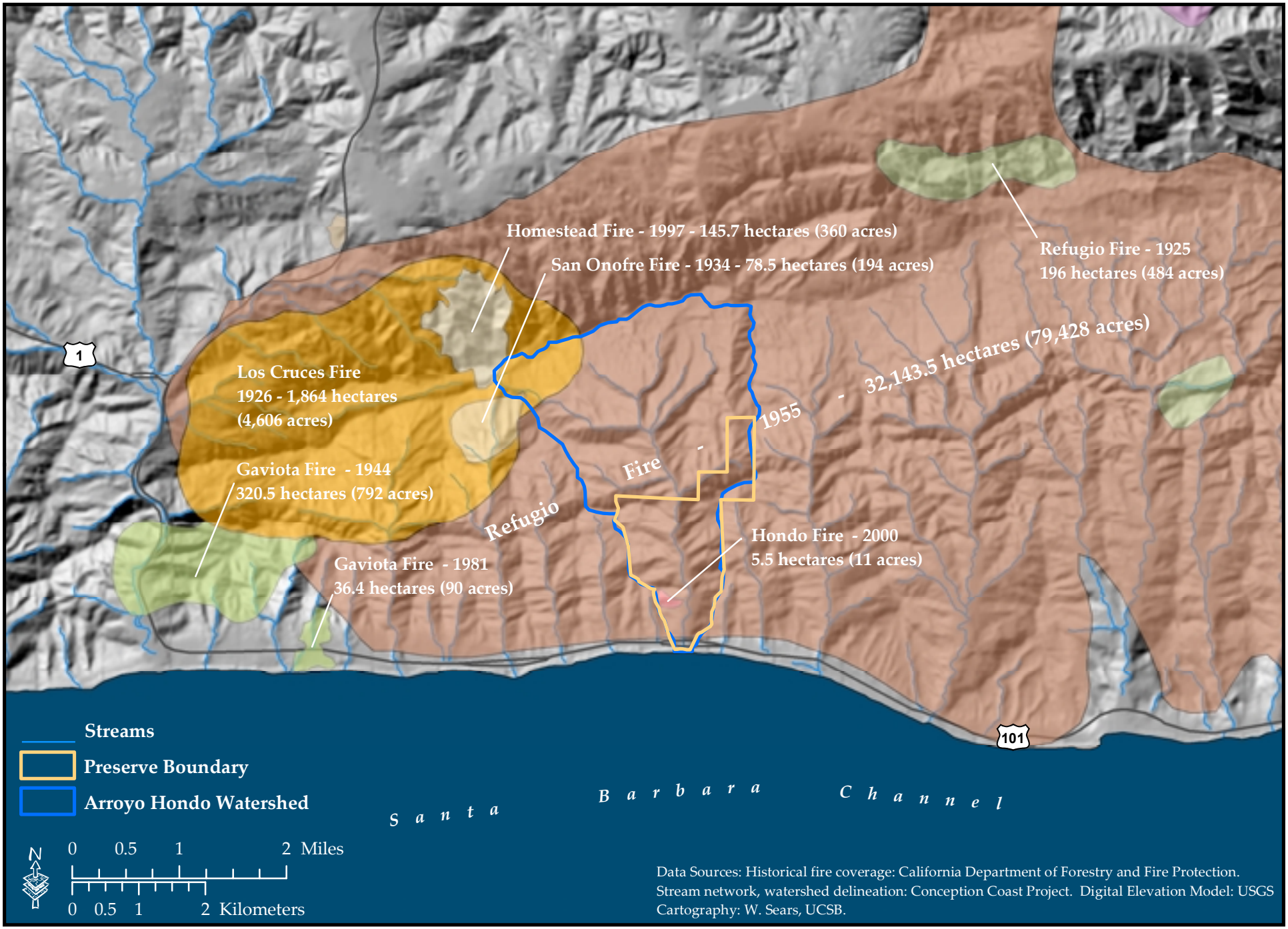
Map 6. Existing creek crossings and proposed crossing closures for Arroyo Hondo Creek.



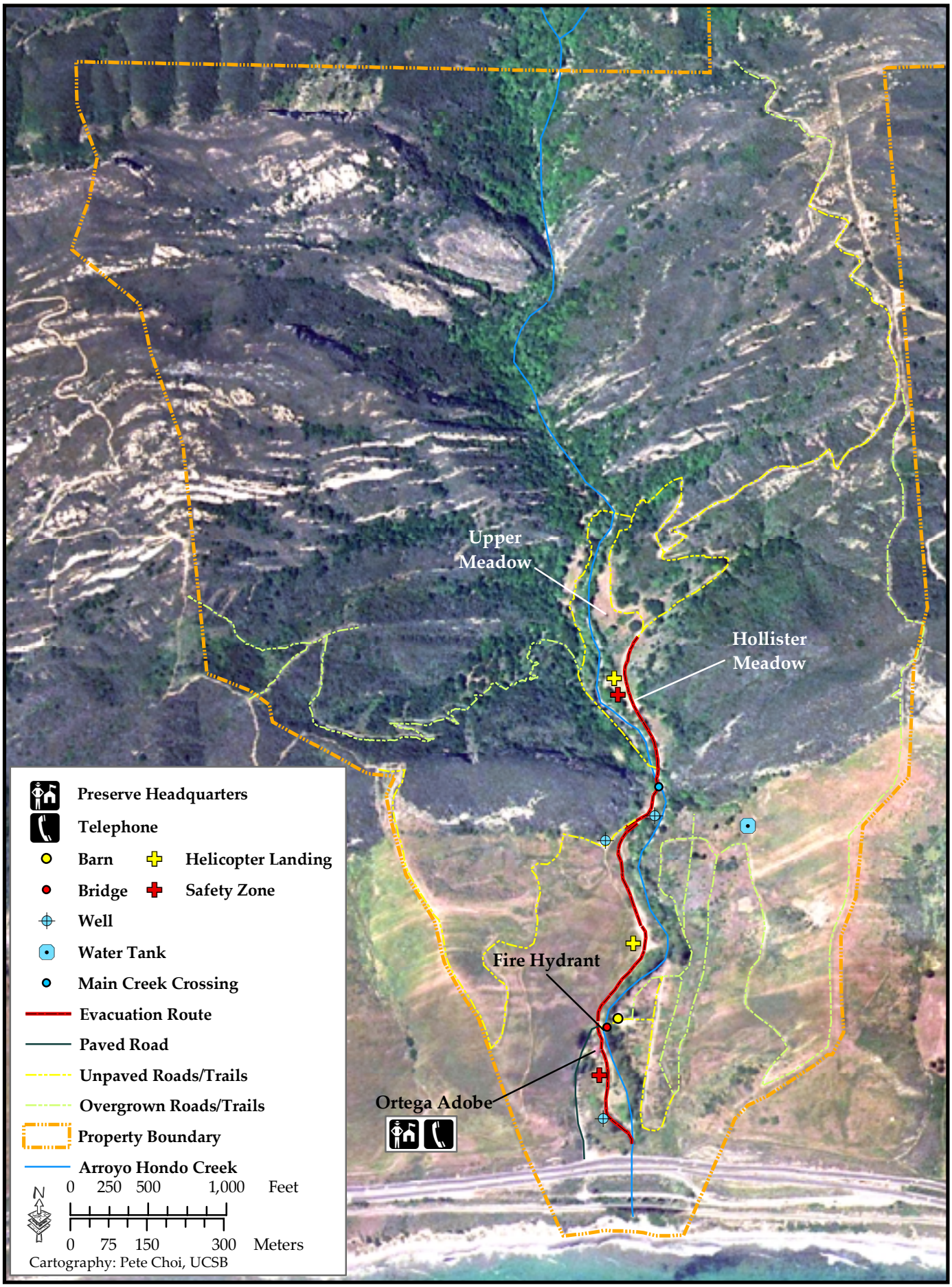
Map 7. Major historical changes in habitats and land use at Arroyo Hondo Preserve: (1) dramatic reduction of estuarine habitat due to Highway 101 fill, (2) channel alterations and (3) commercial agriculture. (Aerial photography courtesy of MIL, UCSB.)



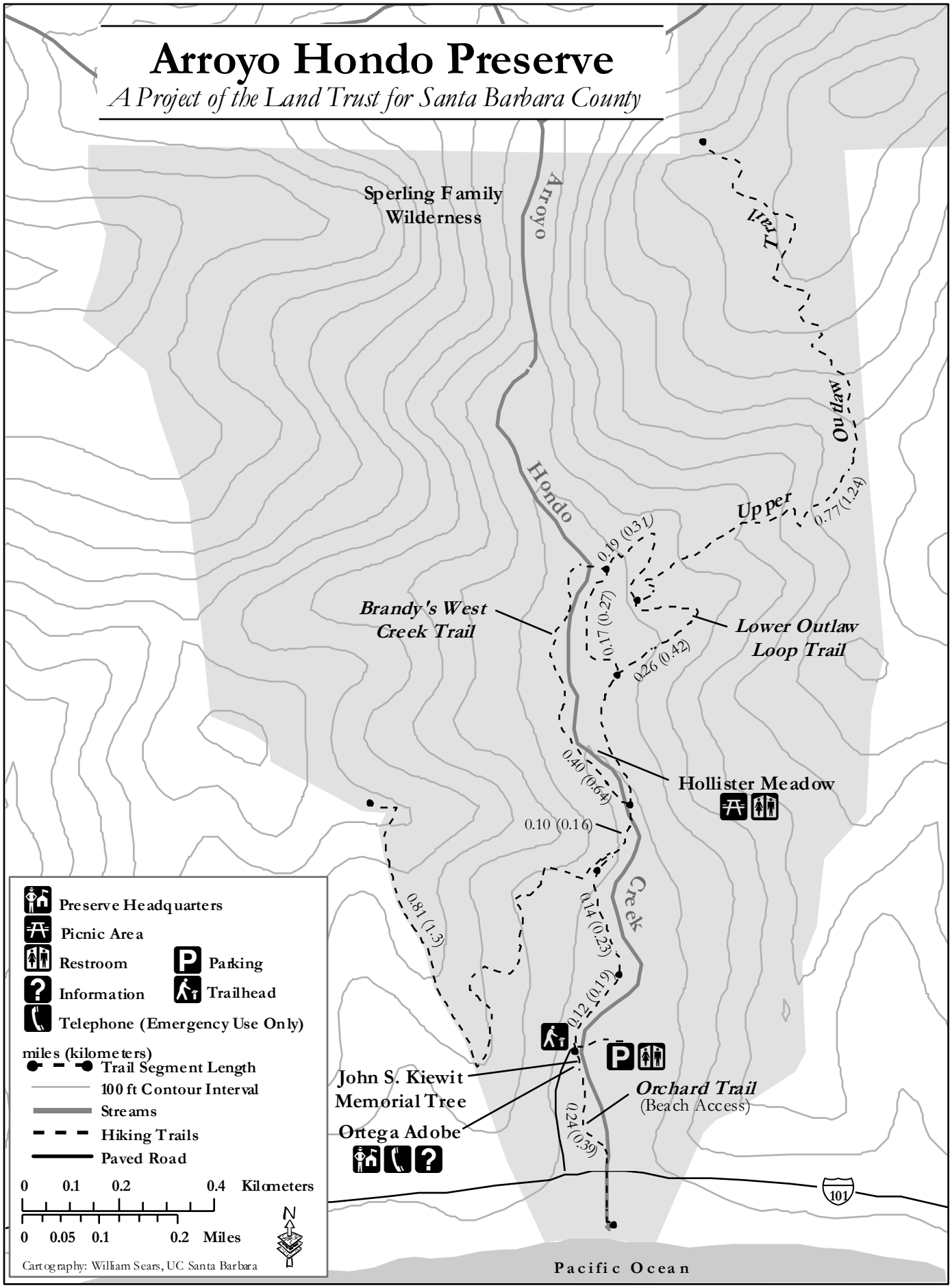
Map 8. Locations of selected invasive exotic plant species at Arroyo Hondo Preserve.



Map 9. Fire history of Arroyo Hondo Preserve and surrounding lands



Map 10. Fire safety zones and evacuation route for Arroyo Hondo Preserve.



Map 11. Trails of Arroyo Hondo Preserve.

Appendix A. Fundraising Campaign Summary

ARROYO HONDO PRESERVE
FUNDRAISING CAMPAIGN SUMMARY
OCTOBER 2001

PROJECT BUDGET (Two years: July 2000 – June 2002)

Property Acquisition	6,176,000
Transaction Expenses (escrow, title insurance, taxes, etc.)	29,000
Endowment for Stewardship & Maintenance	800,000
First Year Planning & Public Safety Improvements	180,000
Fundraising, Preserve Programs, Project Management	145,000
Total Project Expenses	**7,330,000**

FUNDRAISING INCOME

GOVERNMENT GRANTS

California Coastal Conservancy	4,000,000	
Wildlife Conservation Board	1,500,000	
Environmental Enhancement and Mitigation	500,000	
Coastal Resources Enhancement Fund	233,929	
Total Government Grants		**$ 6,233,929**

FOUNDATION GRANTS

Goleta Valley Land Trust	275,000	
David and Lucille Packard Foundation	100,000	
Santa Barbara Foundation	75,000	
John S. Kiewit Memorial Foundation	33,000	
The Looker Foundation	6,000	
Terri Chernick Charitable Fund	5,000	
Koffler Family Foundation	5,000	
Arthur N. Rupe Foundation	5,000	
Crawford Idema Family Foundation	3,500	
Audubon Society SB Chapter	2,000	
Teton-Landis Family Foundation	1,000	
Surfrider Foundation	1,000	
Total Foundation Grants		**$ 510,500**

INDIVIDUAL CONTRIBUTIONS, EVENTS
Total **$ 571,457**

TOTAL AMOUNT RAISED **$7,315,886**

Appendix B. Arroyo Hondo Preserve Guiding Principles

THE LAND TRUST FOR SANTA BARBARA COUNTY
• preserving natural lands and our agricultural heritage •

Resolution of the Board of Trustees of
The Land Trust for Santa Barbara County

Arroyo Hondo Preserve Guiding Principles

It is resolved by the Board of Trustees that, if the Land Trust succeeds in acquiring the Arroyo Hondo Ranch, we intend to establish the Arroyo Hondo Preserve based on these initial guiding principles:

1. To protect Arroyo Hondo as a natural and historic preserve by a permanent deed restriction. The non-profit Land Trust for Santa Barbara County intends to own and manage Arroyo Hondo for the foreseeable future.

2. To develop a preserve stewardship plan that has as its foremost goal preservation of the extraordinary historic, cultural, natural and scenic resources of Arroyo Hondo, and to implement management practices that conserve its value as habitat for a diversity of native wildlife.

3. To provide for non-discriminatory, safe and enjoyable public access, carefully designed to protect natural and cultural resources, respect the value of the canyon as wildlife habitat, and guard the serenity of experiencing a walk in Arroyo Hondo. The management plan will include specific measures to control the timing and numbers of visitors, and the type of activities permitted in the preserve.

4. To provide opportunities at the preserve for casual hiking, picnicking and other public day use; for outdoor education programs for schools and other visitor groups from throughout Santa Barbara County; and for on-going ecological research.

5. To develop the Land Trust's resources and expertise to manage and provide careful stewardship for Arroyo Hondo, and to finance this primarily by raising an endowment fund from grants and community donations during the land acquisition campaign.

6. To consult with public agencies, nearby landowners, various specialists, community organizations and interested individuals in developing a management plan.

7. To continue raising funds for management, conservation, education and outreach activities at the Arroyo Hondo Preserve through grants, events and donations.

Approved March 12, 2001 by unanimous vote of the trustees present.

Christina McGinnis
Christina McGinnis, Secretary

P.O. Box 91830 • Santa Barbara, CA • 93190 • phone (805) 966-4520 • fax (805) 963-5988 • ltshc@silcom.com

Appendix C. Grant Deed Restrictions for Arroyo Hondo Preserve

Grant Deed Restriction for Arroyo Hondo Preserve

This Grant Deed is specifically subject to the following restrictions in perpetuity:

1. The real property shall be used for: (a) preservation, protection, restoration and management of the wildlife habitat, cultural resources, historic ranch structures and scenic values of the property; (b) compatible, non-discriminatory, public access opportunities such as hiking, non-motorized recreational riding, camping, picnicking, retreats, arts activities, outdoor education and ecological research; (c) retaining the limited existing and historic agricultural use in a manner compatible with preservation of the wildlife habitat, cultural, historic and scenic resources.

2. Facilities and improvements including agricultural planting, but exclusive of unpaved roads and trails, to support any of the above uses shall be limited to a cumulative maximum total of 24 acres.

3. The real property may not be further subdivided, developed, transferred or otherwise used for any private residential, commercial or industrial purpose, or used as security for any debt.

4. Any transfer of the real property shall only be to a qualified non-profit or government organization with sufficient financial capacity to own and manage the property pursuant to the restrictions enumerated in the Grant Deed; and that any such transfer, or any modification to this deed restriction, is subject to the approval of the California Coastal Conservancy, California Department of Transportation, California Wildlife Conservation Board, and the County of Santa Barbara.

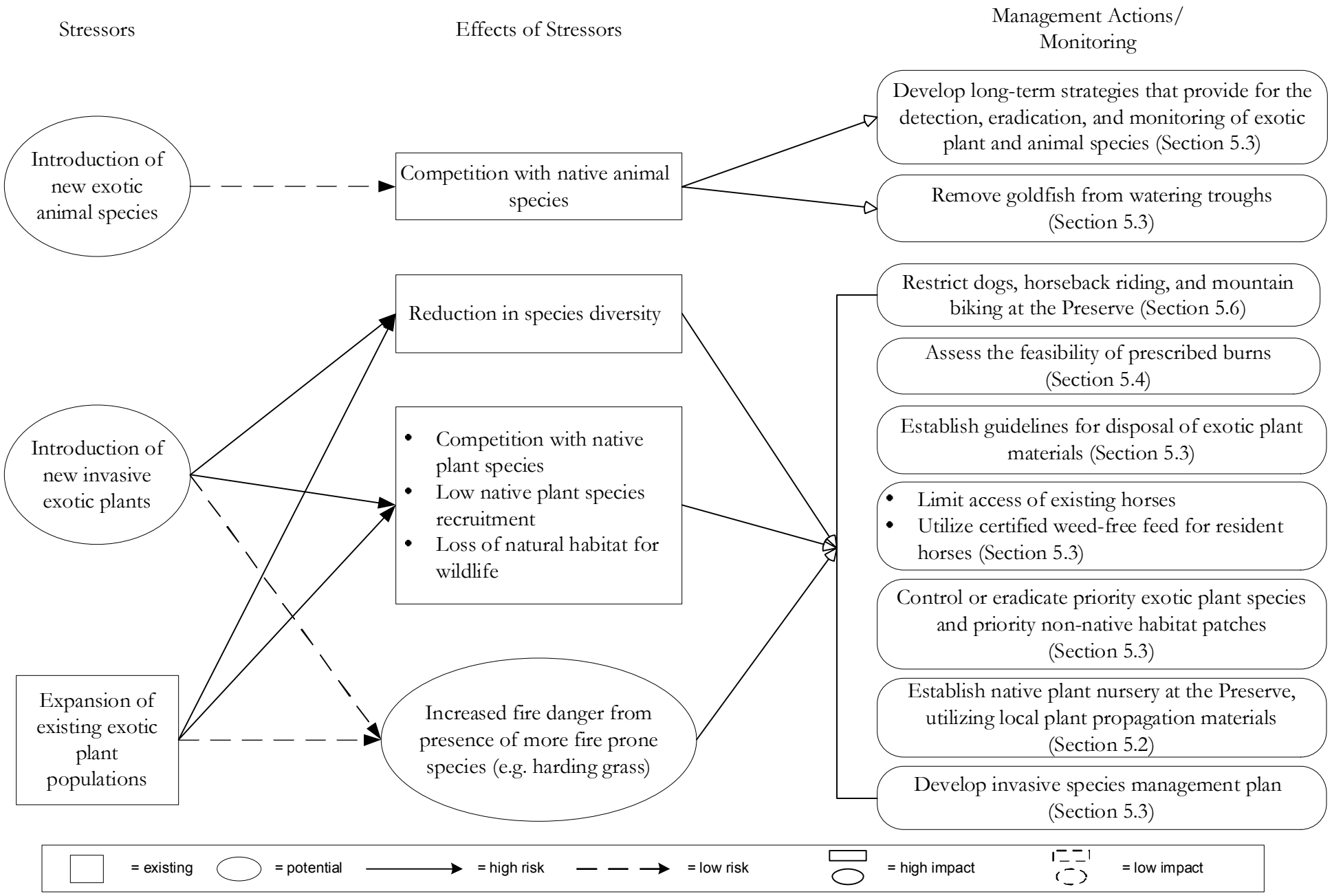
5. The essential terms and conditions of the following grant agreements are incorporated herein by reference: State Coastal Conservancy Grant Agreement No. 00-096; County of Santa Barbara Coastal Resource Enhancement Fund Grant Agreement No. BC02-066; California Transportation Commission Environmental Enhancement and Mitigation Program Grant Agreement No. EEM-2001(118); and California Wildlife Conservation Board Grant Agreement No. 1014DM.

6. If the existence of the grantee or subsequent owner of the property ceases for any reason, or if any of the essential grant terms and conditions are violated, then the grantee or subsequent owner shall be required to reimburse the above grant funds, or the right, title and interest in the real property shall automatically vest in the State of California, as specifically provided in the above referenced grant agreements.

Appendix D. Conceptual Models.

Conceptual Model of Invasive Plant Species Issues

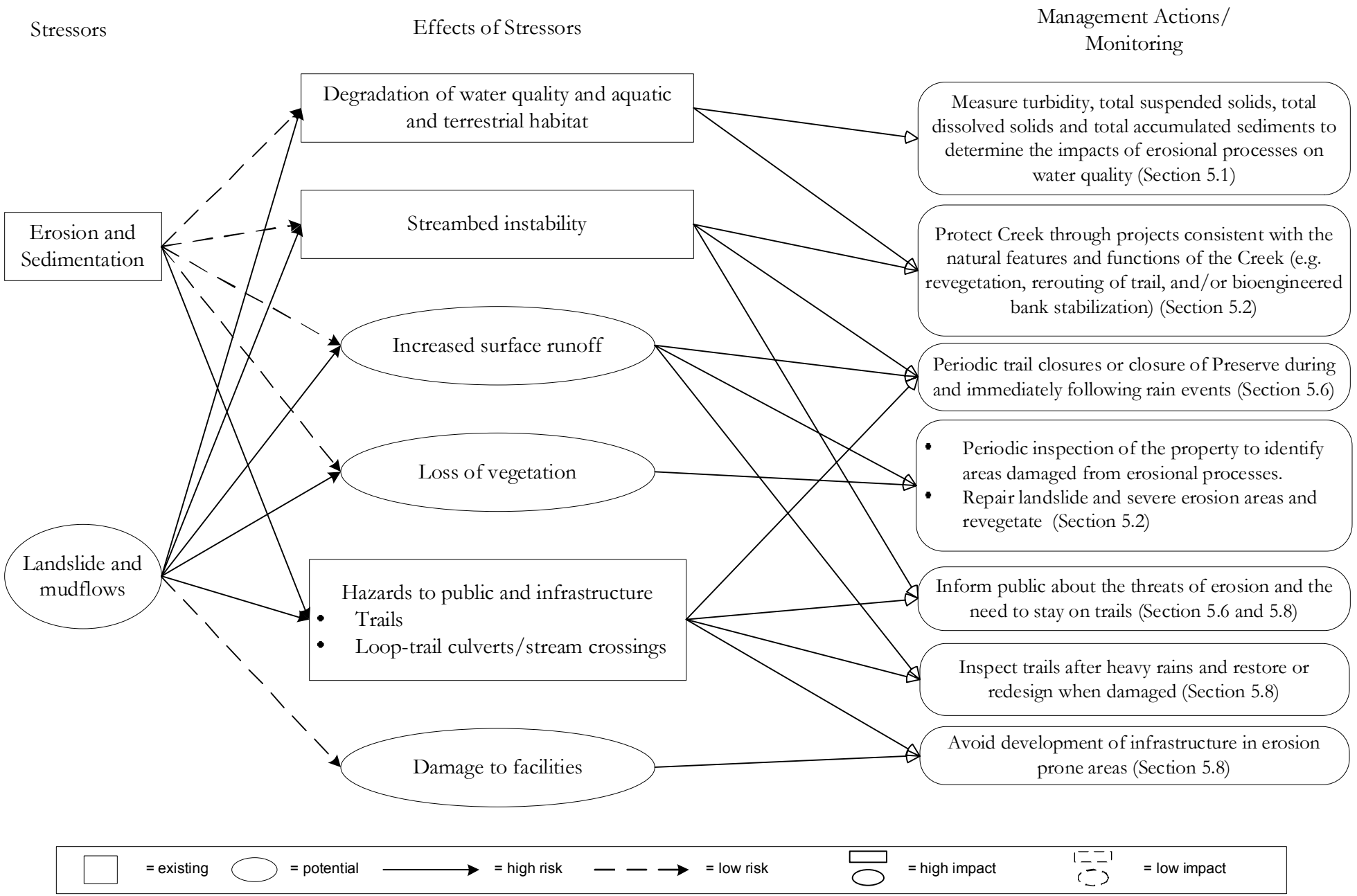
Sources of the stressors include public use (hiking, horseback riding, mountain biking), existing invasive species, birds, adjacent land occurrences, and existing horses



Appendix D. Conceptual Models.

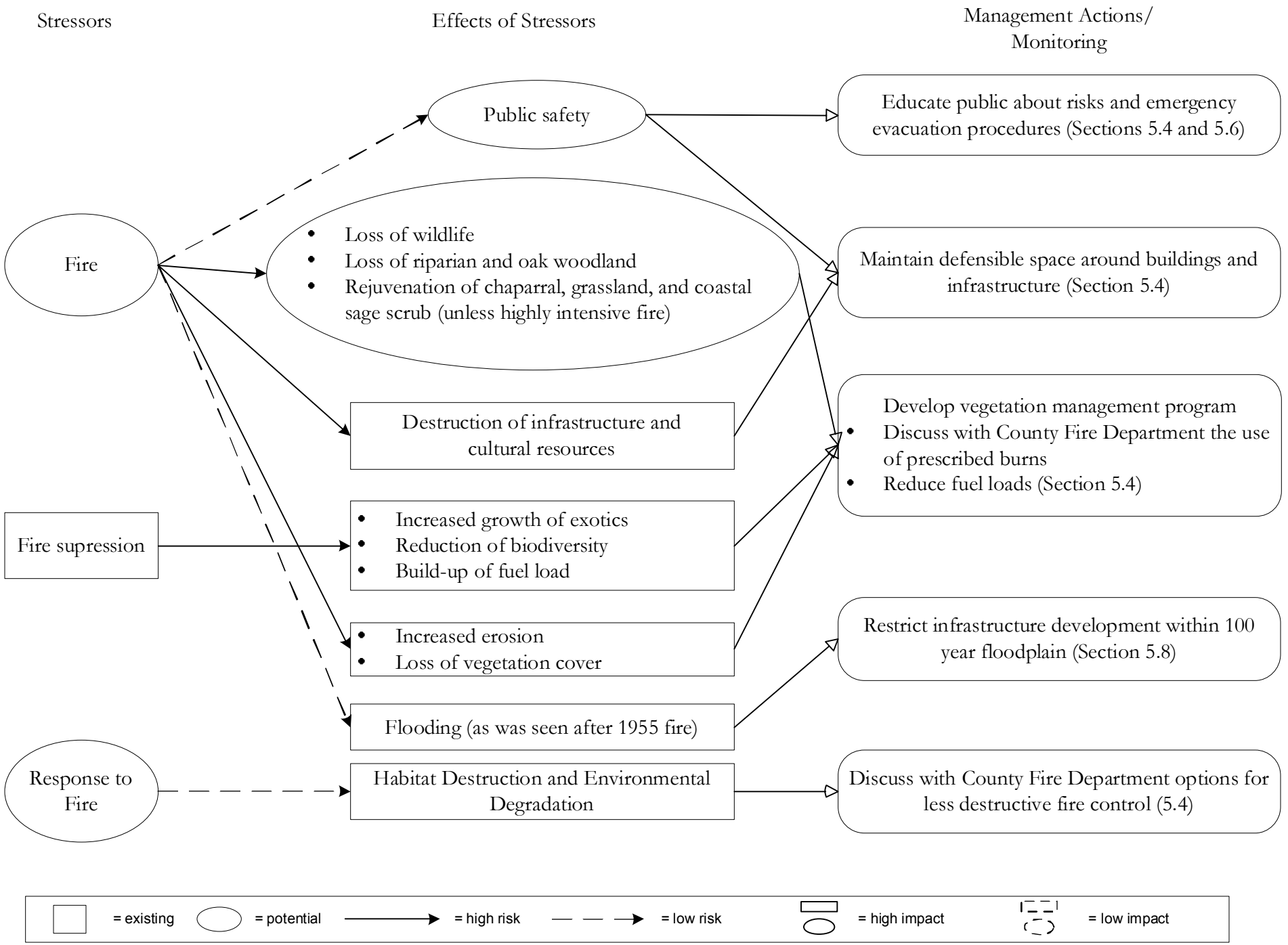
Conceptual Model of Erosional Processes

Sources of erosion may include natural soil instability, trail use and design, fire, rain, non-native grasses, and human-induced disturbances of soils and vegetation



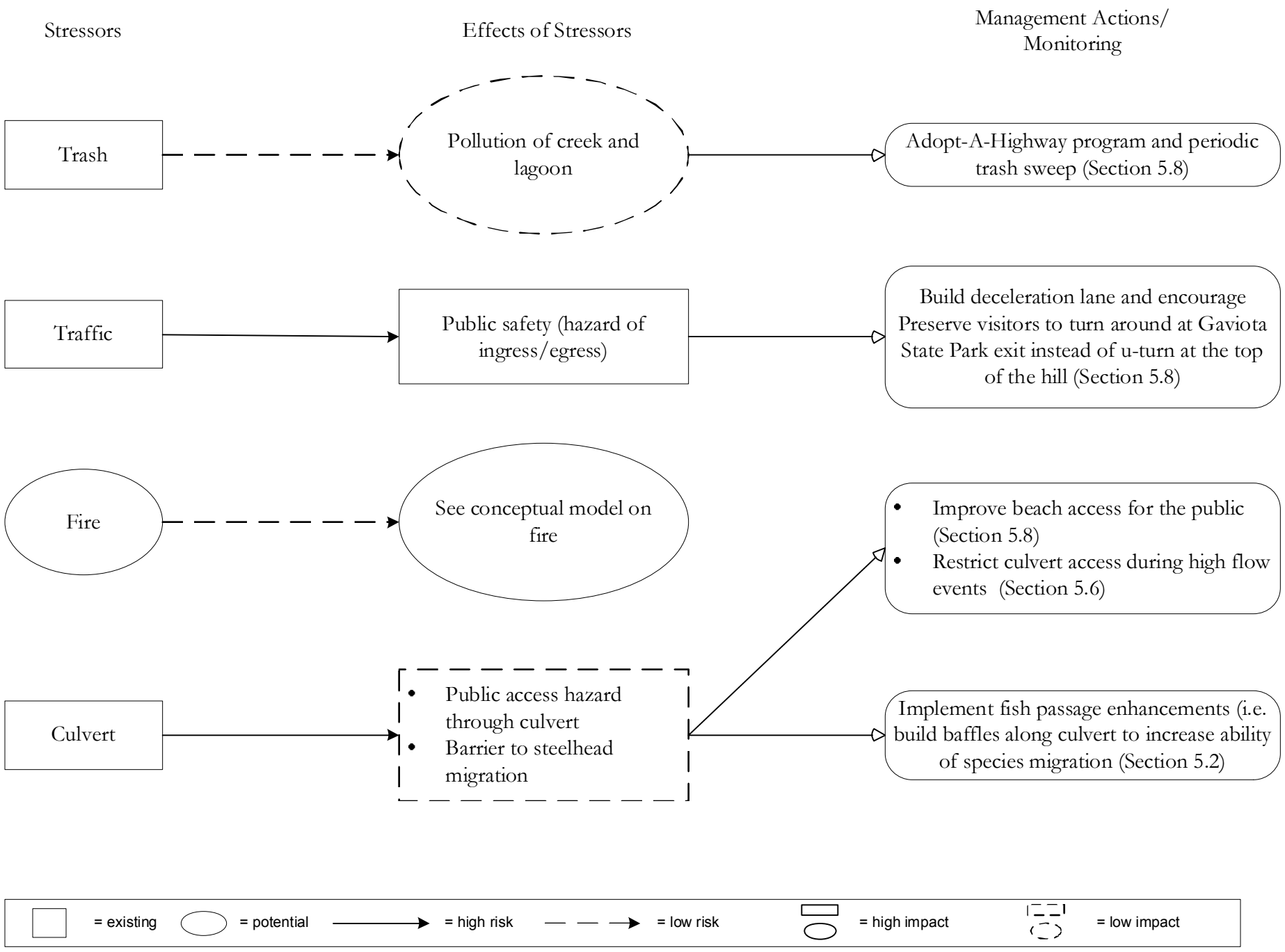
Appendix D. Conceptual Models.

Conceptual Model of Fire Issues - Sources of fire include natural causes such as lightening and human induced causes from cigarettes and campfires



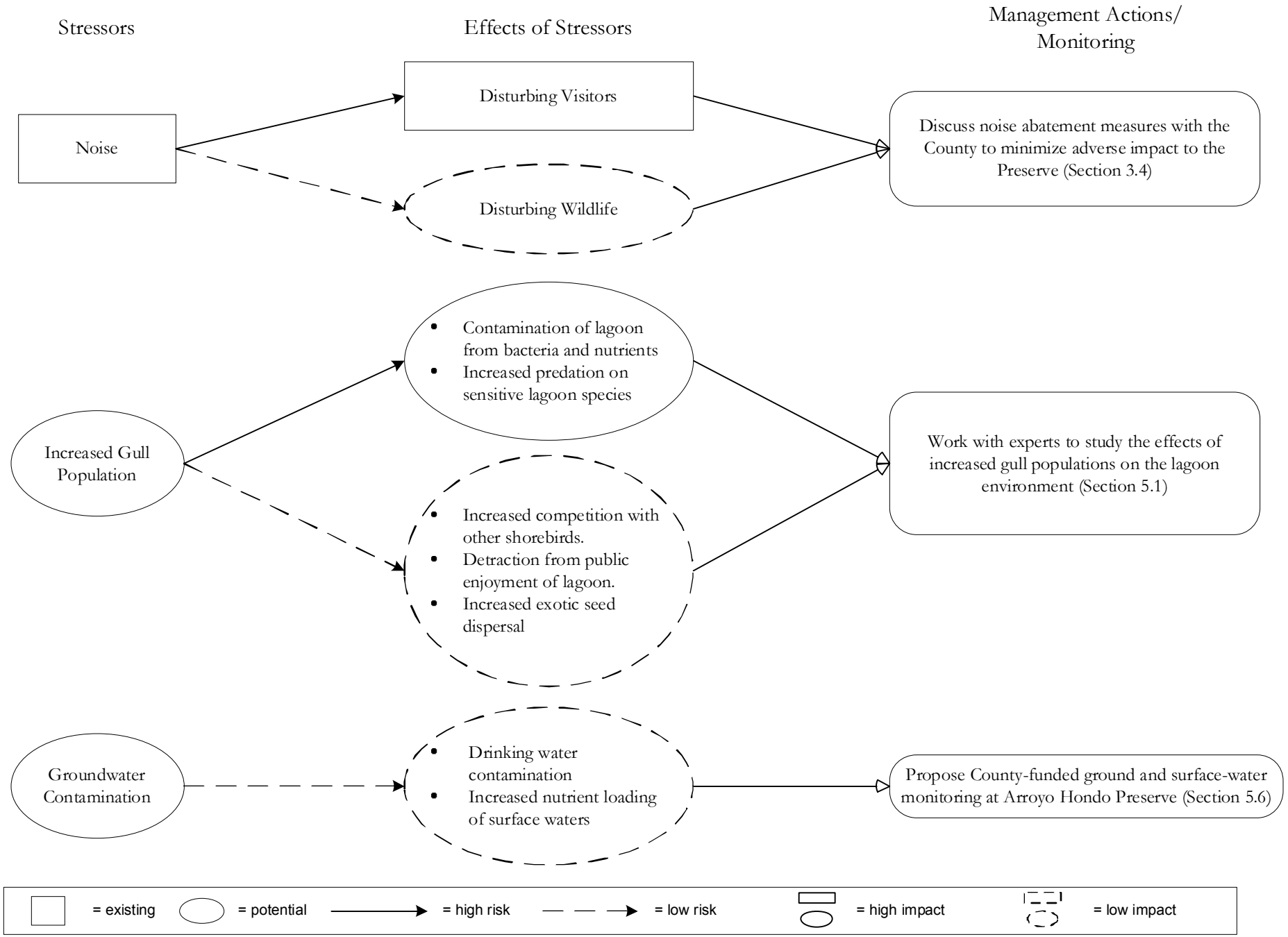
Appendix D. Conceptual Models.

Conceptual Model of Highway 101 Issues



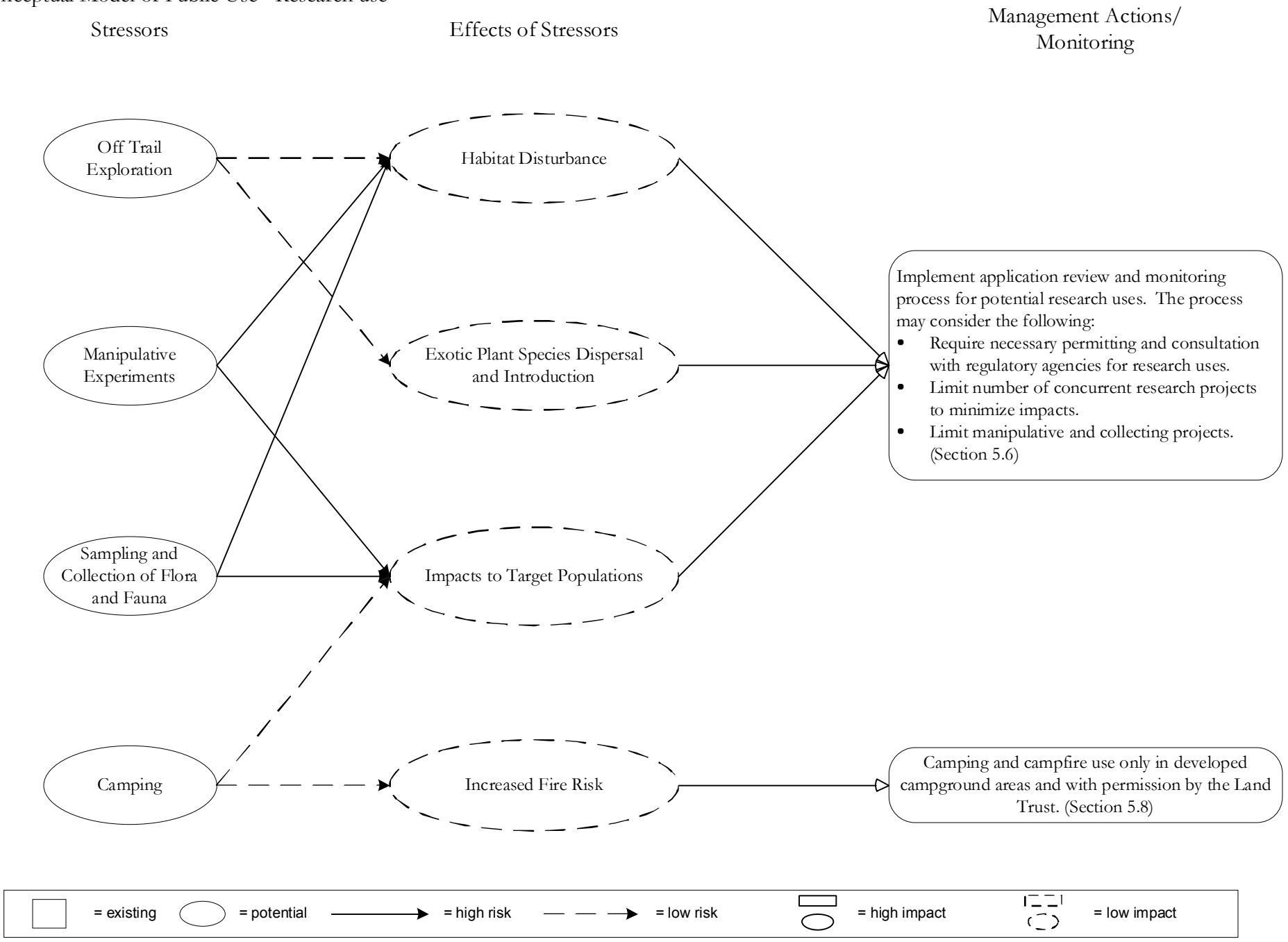
Appendix D. Conceptual Models.

Conceptual Model of Tajiguas Landfill Issues



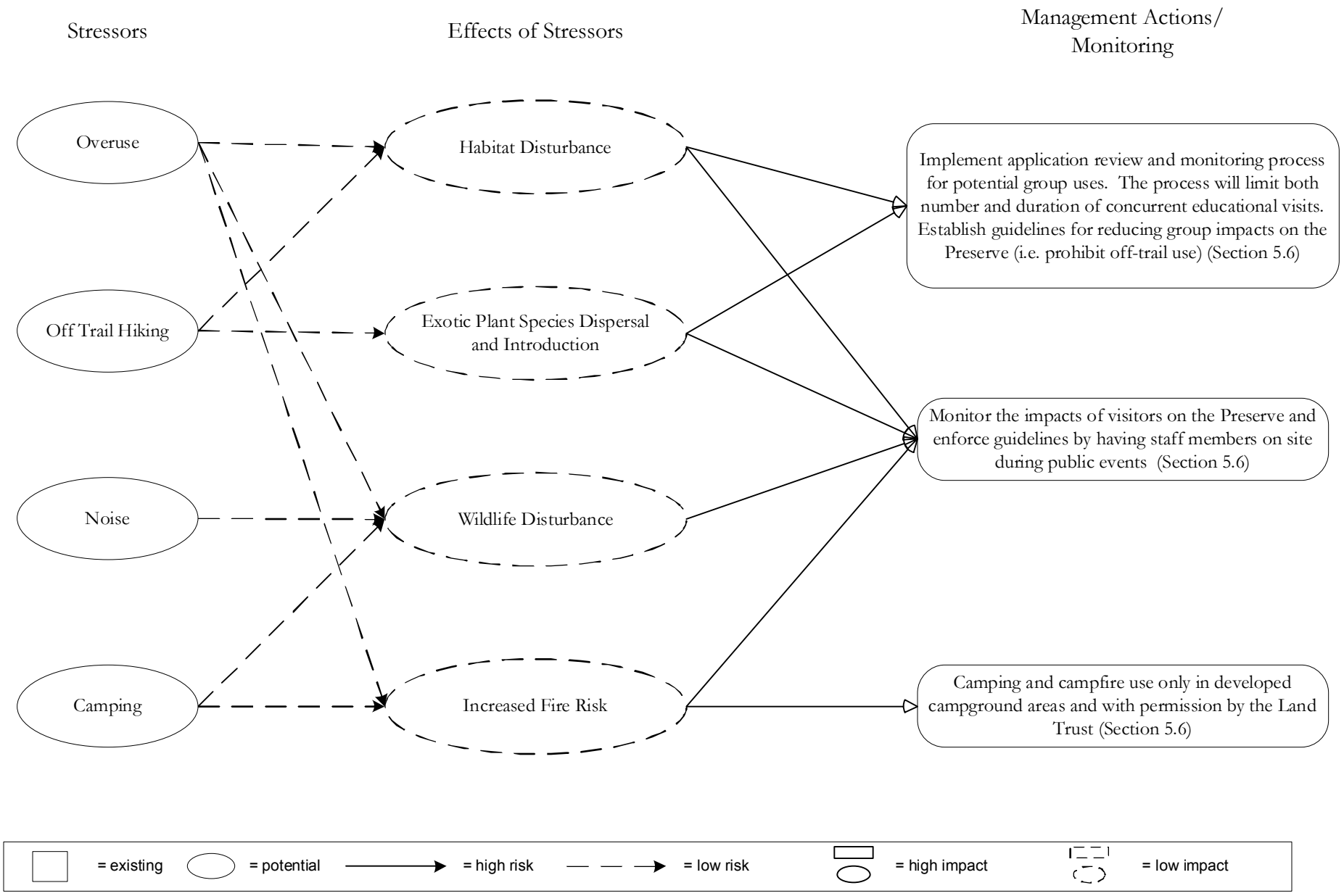
Appendix D. Conceptual Models.

Conceptual Model of Public Use - Research use



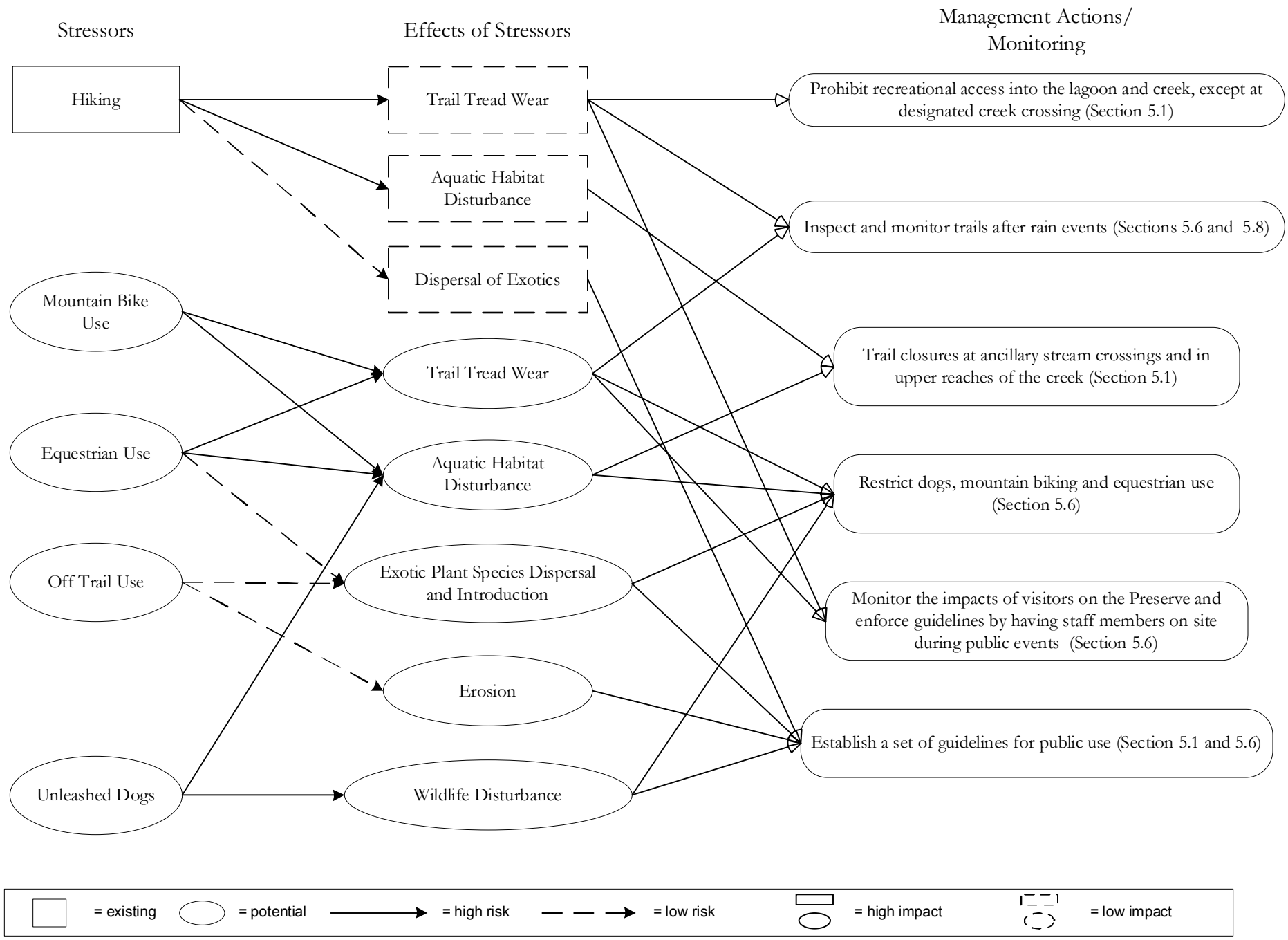
Appendix D. Conceptual Models.

Conceptual Model of Public Use - Group and Education use



Appendix D. Conceptual Models.

Conceptual Model of Public Use - Recreation



Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

		Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
5.1 Guidelines for Sensitive Species and Habitats						
Interim	1.	Prohibit recreational access in the lagoon, and in and around the creek, except at designated creek crossings and established day use sites, through the use of signs, fencing, or other barriers.	1	2	LT, DE	Picnic area should be monitored and the rule enforced
	2.	Perform visual inspections for California red-legged frog, southern steelhead trout, and southwestern pond turtle at vehicular creek crossing before driving a vehicle across.	2	1	LT, DE	Any parties driving across the creek; sign would help as a reminder
	3.	Prohibit off-trail use in order to protect all habitats for species.	1	2	LT, DE, V	Education will be a key to implementation
	4.	Work with experts to study the effects of the elevated gull population on the lagoon environment and seek mitigation if negative effects are determined.	2	1	C	Biological Consultant
	5.	Close ancillary stream crossings reduce visitor intrusion into riparian habitat.	2	1	LT	Low-lying fencing may be used
	6.	Measure water quality during low flow and storm flow conditions to determine the impacts of erosional processes and bacteria on the aquatic habitat.	2	2	C, F	Consultant or could work with UCSB to get this incorporated into a class
Long term	1.	Continue interim actions for Section 5.1 and incorporate adaptive management principles (Appendix F) into current management strategies.	1	2	LT	The above parties would likely continue to provide a role
Monitoring	1.	Document occurrence and natural history for southern steelhead, tidewater goby and California red-legged frog on an annual basis to provide baseline information for monitoring species persistence over time.	1	2	C, F, V	Contracted Wildlife Biologists and Fisheries Biologists; volunteers can also be used to count egg masses along the creek
	2.	Compile an inventory of plant, mammal, reptile, bird and amphibian species occurrences at the Preserve.	1	1	C, V	Contracted and Volunteer Wildlife Biologists and Botanists
5.2 Restoration and Enhancement						
Interim	1.	Implement measures to control exotic invasive plant species (Section 5.3).	1	1	LT, V	Would benefit from specialist in exotic plant control

1. Priority for implementation: 1 = Essential to a management goal; 2 = Should do if at all possible; 3 = Desirable – do if resources permit
2. Implementation feasibility: 1 = High Feasibility, 3 = Low Feasibility. **RP** = requires permit or regulatory oversight; **F** = likely requires outside funding; **LT** = can be done with minimal resources by Land Trust staff **DE** = difficult enforcement; **V** = can be done with volunteer labor; **C** = will require outside help (e.g. consultant, contractor, resource specialist)

Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

		Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	2.	Implement aquatic habitat enhancements.	2	1	F, RP, C	Biological Consultant, National Marine Fisheries Service, CDFG
	3.	Assess and repair trail-related erosion through trail design modifications and revegetation.	2	2	LT, V, F, C	Could require funding and experienced trail crew for more complex projects
Long term	1.	Develop a comprehensive Restoration and Enhancement Plan that integrates strategies for erosion control, vegetation management, exotic species control, and habitat enhancement.	1	2	C, F	This would likely take a concerted effort from multiple parties, including the Land Trust, consultants, and volunteers; it could potentially be a task for another Bren School project
	2.	Establish a small native plant nursery at the Preserve, utilizing local plant propagation materials.	3	1	LT, V	The Santa Barbara Botanic Garden would be a good resource for this
5.3 Exotic Species Management						
Interim	1.	Control or eradicate priority exotic plant species (see Table 4).	1	1	LT, V	Agricultural Commissioner's office – the Weed Management District - would be a good resource
	2.	Utilize certified weed-free feed for resident horses boarding at the Preserve.	1	1	LT	Nagels manage the resident horses
	3.	Remove goldfish from watering trough near the barn. Inspect other troughs on the property for goldfish or mosquito fish and if present, remove these populations from the Preserve.	2	1	LT	
	4.	Continuously monitor the Preserve for the presence of feral pigs, bullfrogs, and other non-native animal species. Develop contingency plans for controlling these species (animal damage control).	1	2	LT, V	Bull frogs can be detected by their recognizable call, feral pigs by their rooting
	5.	Avoid introducing landscaping and garden plants near the adobe and other structures that are known to be invasive.	1	1	LT	Work with the Botanic Garden to select native species
Long term	1.	Develop long-term strategies that provide for the detection, eradication, and monitoring of exotic plant and animal species. These strategies may be part of a larger Integrated Restoration Plan for the Preserve (see Section 5.2).	1	2	C	Botanist, biologist

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

		Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
5.4 Fire and Vegetation Management						
Interim	1.	Implement measures on an ongoing basis to reduce sources of ignition and fuel, provide defensible space, and ensure public safety (see Section 5.4.2).	1	1-3	LT, V, C	Should consult with botanist/biologist to ensure no adverse impact to resources; should work with County Fire and CDF on implementing strategies
	2.	Evaluate grassland vegetation management strategies and implement when feasible.	1	1	LT	Any vegetation management strategy should integrate protections for sensitive habitats.
Long term	1.	Explore the use of prescribed fire on the Preserve with CDF and County Fire Department in conjunction with goals established in a Restoration and Enhancement Plan (Section 5.2).	2	3	RP, C	CDF, County Fire; this will likely take considerable coordination and political acceptance to be feasible
	2.	Discuss the use of resource-sensitive fire fighting methods with County Fire.	3	3	RP, C	County Fire, CDF
5.5 Historical and Cultural Resources Management						
Interim	1.	Apply for historical landmark status designation for the Ortega Adobe.	2	1	LT, RP	Santa Barbara County Landmarks Commission
	2.	Obtain professional evaluation of measures to protect the Adobe walls and restore other features to historic condition where feasible.	2	2	F, C	Contractor, Santa Barbara Trust for Historical Preservation
	3.	Catalog and identify any historical and cultural resources from the Arroyo Hondo archives, and make backup copies of the archives for an off-site location.	2	1	LT, V	Santa Barbara Trust for Historical Preservation; could be part of internship program
	4.	Interview J.J. Hollister and others for historical accounts, description of existing photos, land-use/management and any other pertinent information.	2	1	LT, V	Could be part of internship position; could be videotaped for addition to the interpretive program
	5.	Prepare an interpretive display for the Adobe about the significant historical and cultural resources of the Preserve.	2	1	LT, V	Santa Barbara Trust for Historical Preservation and SB Natural History Museum would be good resources for this
Long term	1.	Retain the Spanish-Mexican era aesthetic appearance especially in the front country	2	3	C, F	Architects – designs for restrooms and other structures should incorporate this

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

	Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	2. Establish a historical and cultural interpretive trail.	2	2	LT, V	Could be integrated with self-guided nature trail
	3. Create a digital database of all historic documents and photos.	3	1	LT	Santa Barbara Trust for Historical Preservation; internship position
	4. Develop an interactive database of historical documents and photos for use in an interpretive visitor center	3	2	LT, V	Santa Barbara Trust for Historical Preservation and SBNHM; internship position
	5. Prepare a short video of the Preserve highlighting historical and cultural resources and interviews with J.J Hollister.	3	1	LT, V	Could be part of internship position
	6. Consult with local Chumash representatives for appropriate measures to represent and recognize the historic Chumash presence in Arroyo Hondo.	2	1	LT	The Barbareno Chumash Indian Council could be a good resource for this
5.6 Public Use: Education, Recreation, Research					
Interim	1. Evaluate the need to limit access through the culvert from the lagoon to the Preserve to restrict unauthorized access by the public into the Preserve.	2	2	LT, DE	Will need to determine how many trespassers would require an action response
	2. Develop an interpretive program for the Preserve.	1	1	LT, V	Naturalists may also be consulted
	3. Provide regularly scheduled docent-led nature walks to the public on a reservation basis; recruit and train volunteer docents for these programs.	1	1	V	Volunteers will be trained to do this
	4. Develop a structured environmental education program for school groups.	2	2	V, C	Environmental Educators, School Contacts may also be consulted
	5. Have public hiking days open on a limited reservation basis.	1	1	LT	
	6. Establish a set of guidelines for public use, and use appropriate signage to display the guidelines to the public.	1	1	LT	
	7. Develop visitor guide and trail map for use by the public.	1	1	LT	
	8. Monitor the impact of visitors on the Preserve and enforce guidelines by having staff member(s) on site during public events.	1	2	LT/V, DE	May require volunteers walking the trails and patrolling the picnic area
	9. Develop application form for group events and review applications prior to approval.	1	1	LT	

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

	Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	10. Utilize the research application (Appendix H) for reviewing and approving proposed ecological research projects.	1	1	LT	
	11. Promote the Preserve as a research site and explore opportunities to work further with UCSB and other research institutions.	3	2	LT	Should work with UCSB professors to promote its use for class field trips and low-key experiments and studies
	12. Develop safety guidelines such as restricting culvert access during high flows, fire and flood season measures, evacuation plans, etc.	1	1	LT	Should incorporate information into signs and the visitor's guide
	13. Conduct tests to assess the current quality of the groundwater and other risks associated with environmental contamination.	2	2	C, F	Padre Associates or other consultant
	14. Test the Adobe for radon gas levels as recommended by the environmental hazards report prepared prior to acquisition of the property.	1	1	LT	Test kits are readily available
	15. Test for Hantavirus in the barn and Adobe.	2	1	C	Santa Barbara Coastal Vector Control District
Long term	1. Continue to have staff monitor the impact of visitors on the Preserve during public events and enforce guidelines.	1	2	LT/V, DE	
	2. Continue to develop and refine the Preserve's interpretive program.	2	1	LT, V	Naturalists should also be consulted
	3. Determine intensity of public use that is compatible with resource protection.	1	3	LT, C	Resource Specialists (e.g. John Storrer, Paul Collins, Wayne Ferren)
5.7 Agricultural Management					
Interim	1. Control orchard weeds in a manner consistent with resource protection and in coordination with restoration efforts (Section 5.2) and exotic plant control (Section 5.3).	1	1	LT, V	UC Cooperative Extension could be a useful resource in resource-sensitive strategies
	2. Assess the status of the irrigation systems and water distribution on the Preserve.	2	1	LT, C	May require Agricultural consultant or UC Cooperative Extension
	3. Continue to allow seasonal beekeeping on the Preserve, to be reviewed on an annual basis.	2	1	LT	

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

		Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	4.	Develop and maintain a schedule for pruning trees in both orchards.	1	1	LT	May require informal consultation with orchard farmer
	5.	Aquire a medium-size chipper for managing prunings and to facilitate on-site creation of organic compost and mulching materials.	3	2	F	
Long term	1.	Within the context of a Restoration and Enhancement Plan, determine determine the feasibility of retaining and enhancing portions of the eastside orchard for small-scale avocado production.	2	2	LT, C	May require consultation with UC Cooperative Extension or local orchard farmer
	2.	Remove dead, dying, and diseased avocado trees in coordination with restoration efforts.	2	2	LT, V	Should consult with resource specialist to ensure no loss of wildlife habitat
	3.	Upgrade, repair or replace irrigation systems in retained avocado production areas.	1	2	F, C	Contractor
	4.	Consider partnering with a local grower to facilitate maintenance, harvest, and marketing of avocados.	3	2	LT, C	Ensure that farmer engages in resource-sensitive farming practices
	5.	Develop a resource-sensitive integrated pest management (IPM) strategy.	1	2	LT, C	County Agricultural Commission, UC Cooperative Extension
5.8 Maintenance, Administration, and Planning						
Interim	1.	Maintain the existing trails by clearing overgrown brush on an ongoing basis.	1	1	LT, V	
	2.	Provide a secure space for volunteer tools and docent materials.	3	1	LT	
	3.	Bring in outside experts to discuss options, costs, and physical feasibility for expanding the current trail system.	2	2	C	Trail design specialists (SB Trails Alliance, Los Padres Forest Association, SB Parks and Recreation)
	4.	Consult with adjacent public and private landowners about trail easements and connections to expand hiking opportunities.	2	2	LT	US Forest Service, SB Parks and Recreation, private landowners
	5.	Enforce periodic trail closures and/or closure of Preserve to protect resources and infrastructure.	1	1	LT, DE	Should notify visitors upon registration the closure policy in the event of rain
	6.	Evaluate alternatives for providing safe and environmentally appropriate access to the beach.	2	2/3	C, RP, F	Contractor, CalTrans, County Planning & Development

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

	Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	7. Remove existing pit toilets at Hollister meadow and replace them with temporary portapotties until permanent toilets are designed and installed in the vicinity of the meadow and parking area.	2	2	C	Contractor
	8. Identify and build unpaved parking area(s) in the avocado orchard and near the barn for public use.	2	2	C	Land Trust, Contractors
	9. Evaluate the feasibility of building a deceleration lane off Highway 101.	2	2	RP, F	Contractor, CalTrans, County Planning & Development
	10. Install drinking fountain or other water source for visitors at parking area and/or picnic area.	2	2	RP, C	Contractor; need permit from County Environmental Health & Safety
	11. Install signs at trailhead by parking area explaining the guidelines for public use at the Preserve (refer to Table 7), warning the public of natural hazards in the canyon, and directing the public to appropriate trails.	1	1	LT	Caretakers can help to develop signs
	12. Develop interpretive displays for installation along the trails and in and around Adobe.	1	1	LT	Volunteers should be sought out for help with this, as well as SBMNH for guidance
	13. Inspect wiring within the Adobe and barn, to the picnic area, and from the well #3 going across the creek to ensure safety and prevent future electrical fire. Rewire if necessary for safety.	2	1	C	Electrician
	14. Conduct tests to assess the septic system status and its capacity to handle future waste levels.	1	1	C	Septic System Engineer, Plumber
	15. Develop a work plan for the Preserve with tasks, budgetary requirements, target dates, and responsible parties.	1	2	LT	
	16. Investigate the pros and cons of rezoning the property to Resource Management to reflect the primary goals of the Preserve.	2	1	RP, LT	County Planning & Development Department
Long term	1. Continue to maintain existing trails.	1	1	LT, V	More significant repair or maintenance may require more experienced trail crews
	2. Install permanent restrooms at parking area and Hollister meadow.	2	2	F, RP, C	Architect, Contractor; building permit required from County P&D

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Appendix E. Priority and Feasibility of Management Actions and Monitoring Schemes

	Management Action	Priority[1]	Feasibility[2]		Responsible Party/Comments
	3. Extend trails and create linkages where it has been found appropriate based on inspections described above in the 3rd and 4th interim actions.	2	2 or 3	F, RP, C	Volunteers, Experienced Trail Crews, National Forest, SB County Parks and Recreation, Adjacent Landowners, National Park Service
	4. Consider development of a group campsite only if it is found to be compatible with protection of the resources and with the management goals and capacity of the Preserve.	3	2	RP, C	Contractor or maybe volunteers depending on nature of work; would require permits from County P&D or Coastal Commission
	5. Build outdoor shower for use by work crews if the need exists.	3	2	RP, C	Contractor; permit likely required by County P&D
	6. Turn the Adobe into visitor center and build caretaker residence on the eastern side of the lower canyon.	3	2	RP, C, F	Architect, Contractor; building permit required
	7. Maintain septic system and expand if necessary to accommodate increased use.	1	2	RP, F, C	Plumber, Engineer; expanding it would require permit from County
	8. Consult with County Planning & Development regarding the Preserve's inclusion in the Agricultural Preserve program.	3	1	RP, LT	County Planning & Development Department
Monitoring	1. Inspect and monitor trails after rain events to check for damage; repair or close off in necessary.	1	1	LT	

1. Priority for implementation: 1 = Essential to a management goal; 2 = Should do if at all possible; 3 = Desirable – do if resources permit
2. Implementation feasibility: 1 = High Feasibility, 3 = Low Feasibility. **RP** = requires permit or regulatory oversight; **F** = likely requires outside funding; **LT** = can be done with minimal resources by Land Trust staff **DE** = difficult enforcement; **V** = can be done with volunteer labor; **C** = will require outside help (e.g. consultant, contractor, resource specialist)

Appendix F. Guidelines for Data Collection and Adaptive Management Implementation

DATA COLLECTION AND INVENTORY IMPLEMENTATION

Considerations for efficient collection of data:

- Scale of data. Certain attributes of the landscape can only be measured at specific scales; therefore the scale at which surveying and data collection occurs needs to be carefully considered.
- Information needs and data required.
- Priority of information needs and data collection.
- Periodicity of data collection.
- Selection of appropriate sampling approaches, methods and tools.

Factors limiting effective use of data:

- Lack of commitment to the use of science.
- Inadequate framing of the question to be answered.
- Unclear objectives.
- Inappropriate interpretation of the data collected.
- Inappropriate scale of work.
- Use of poor data causing misleading assessments, incorrect choices and expensive management mistakes.

Data technologies:

- GIS
- Remote sensing
- Internet
- Database packages

Basic sampling methods:

- Census or complete inventory of the population of interest. This method minimizes the risk of not having representative data (e.g. number of individuals per population and age-structure) on the population of interest. This approach is most useful when the population is small or the data is critical enough to justify the expense.

- Mapping. This option is appropriate when spatial features need to be recorded.

- Non-statistical sample. This option is most appropriate when: (1) sampling is expensive and the variation between elements of the population are large; (2) information needs are urgent and a decision must be made before a well

executed statistical sample can be executed; when funding is short or unavailable and the only alternative is to use existing information and extrapolate to the population of interest; and when approximate knowledge of some of the population parameters are needed to design an efficient statistical sample.

- Statistical sample. Collection of data representative of the population of interest in a scientifically acceptable manner.

ADAPTIVE MANAGEMENT

Adaptive management is a valuable tool whenever there is significant uncertainty about the outcomes of a management strategy. For example, in Arroyo Hondo Preserve, the carrying capacity for public use has not yet been determined. In other words, it is uncertain what affect a specific quantity and intensity of pubic access will have on the conservation of natural and historical resources.

Adaptive management is an approach that relies on comparative analysis that blends conservation planning concepts with the observation of the effects of management actions (Paola 2002). It allows for the adjustment of management actions if the outcomes of existing ones did not lead to the desired outcome.

The formal adaptive management approach consists of four phases (1) planning, (2) acting, (3) monitoring, and (4) evaluating. Planning is what was accomplished through this management plan. Acting is the implementation of the management actions suggested. Monitoring is the insights into cause-effect relationships between environmental stressors and anticipated ecological responses. The essential steps for effective monitoring identified by Mulder (1999) are: (1) identify specific goals and objectives; (2) characterize stressors and disturbances; (3) develop conceptual models; (4) select indicators; (5) determine detection limits for indicators (look at the sampling design in this Appendix); (6) establish strategies for management intervention; and (7) establish an implementation program. Finally, evaluating refers to the comparison of the desired outcomes with the actual ones. The results of this comparison are then used to inform a new planning process, thus restarting the four-phased adaptive management approach.

Appendix G. Checklists of Plant and Animal Species

Santa Barbara Botanic
the GARDEN PLANTS OF ARROYO HONDO

FERNS

SCIENTIFIC NAME	COMMON NAME
☐ *Adiantum jordani*	California maidenhair fern
☐ *Dryopteris arguta*	Coastal wood fern
☐ *Pellaea andromedaefolia*	Coffee fern
☐ *Pellaea mucronata*	Bird's-foot fern
☐ *Pentagramma triangularis*	Gold back fern
☐ *Polypodium californicum*	California polypody fern
☐ **Pteridium aquilinum*	Bracken fern
☐ *Thelypteris puberula*	Downy wood fern
☐ *Woodwardia fimbriata*	Giant chain fern

OTHER NON-FLOWERING PLANTS

☐ Lichens	various species
☐ *Marchantia* sp.	Liverwort
☐ Mosses	various species
☐ *Selaginella* sp.	Spike moss
☐ *Equisetum telmateia* ssp. *Braunii*	Giant Horsetail

FLOWERING PLANTS (142 species)

SCIENTIFIC NAME	COMMON NAME
☐ *Acer macrophyllum*	Bigleaf maple
☐ *Adenostoma fasciculatum*	Chamise
☐ *Agrostis pallens*	Bent grass
☐ *Alnus rhombifolia*	White alder
☐ *Ambrosia psilostachya*	Western Ragweed
☐ *Anagallis arvensis*	Scarlet pimpernel*
☐ *Antirrhinum multiflorum*	Sticky snapdragon
☐ *Arctostaphlos glauca*	Big-berried manzanita
☐ *Arctostaphylos refugioensis*	Refugio Manzanita
☐ *Artemisia californica*	Sagebrush
☐ *Artemisia douglasiana*	Mugwort
☐ *Aster sp.*	Aster
☐ *Avena fatua.*	Slender oat grass*
☐ *Baccharis pilularis subsp. consanguinea*	Coyote brush
☐ *Bidens pilosa*	Beggar's ticks*
☐ *Boykinia occidentalis*	Brook foam
☐ *Brassica nigra*	Black mustard
☐ *Brickellia californica*	California brickellbush
☐ *Bromus diandrus*	Ripgut grass*
☐ *Bromus hordaceus.*	Soft chess*
☐ *Bromus madritensis ssp. rubens.*	Foxtail chess*
☐ *Bromus carinatus*	California brome
☐ *Calystegia macrostegia*	Morning-glory
☐ *Castilleja attenuata.*	Owl's clover
☐ *Castilleja sp.*	Indian paintbrush,
☐ *Ceanothus cuneatus*	Common Buck Brush
☐ *Ceanothus megacarpus*	Bigpod ceanothus
☐ *Ceanothus spinosus*	Greenbark ceanothus
☐ *Centaurea melitensis*	Tocalote*
☐ *Cercocarpus betuloides*	Mountain mahogany
☐ *Chamomilla suaveolens*	Pineapple weed, Manzanilla*
☐ *Chenopodium californicum*	Soap plant
☐ *Clematis lasiantha (ligusticifolia?)*	Chaparral clematis
☐ *Conium maculatum*	Poison hemlock*
☐ *Cryptantha intermedia.*	Common cryptantha

A private non-profit member supported organization dedicated to advancing the knowledge and understanding of biodiversity and conservation through an emphasis on California's native plants.

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Santa Barbara, California 93105-2126
(805) 682-4726 FAX (805) 563-0352

- [ ] *Dichelostemma capitatum* ..... Blue dicks, Brodaiea
- [ ] *Dodecatheon clevelandii* ..... Shooting star
- [ ] *Dudleya lanceolata* ..... Live forever, Rock lettuce
- [ ] *Ehrharta calycina* ..... Veldt grass*
- [ ] *Encelia californica* ..... Bush sunflower
- [ ] *Epipactis gigantea* ..... Stream orchid
- [ ] *Eriodictyon crassifolium var. nigrescens* ..... Yerba santa
- [ ] *Eriogonum fasciculatum* ..... Buckwheat
- [ ] *Eriophyllum confertiflorum* ..... Golden yarrow
- [ ] *Eschscholzia californica* ..... California poppy
- [ ] *Euphorbia peplus* ..... Petty Spurge*
- [ ] *Foeniculum vulgare* ..... Fennel*
- [ ] *Galium angustifolium* ..... Narrow-leaved bedstraw
- [ ] *Galium aparine* ..... Goose grass*
- [ ] *Geranium molle* ..... Soft geranium
- [ ] *Gnaphalium bicolor* ..... Bicolored everlasting
- [ ] *Gnaphalium californicum* ..... Green everlasting
- [ ] *Gnaphalium canescens ssp. microcephalum* ..... White everlasting
- [ ] *Hazardia squarrosa* ..... Sawtooth goldenbush
- [ ] *Helenium puberulum* ..... Sneezeweed
- [ ] *Helianthemum scoparium* ..... Rushrose
- [ ] *Heteromeles arbutifolia* ..... Toyon
- [ ] *Heterotheca grandiflora* ..... Telegraph weed
- [ ] *Hirschfeldia incana* ..... Mediterranean mustard*
- [ ] *Horkelia cuneata* ..... Honeydew
- [ ] *Juncus patens* ..... Common rush
- [ ] *Juncus xiphioides* ..... Iris-leaved rush
- [ ] *Keckiella cordifolia* ..... Climbing or honeysuckle *penstemon*
- [ ] *Lathyrus vestitus* ..... Wild sweetpea
- [ ] *Lepichinia calycina* ..... Pitcher sage
- [ ] *Leptodactylon (Leptosiphon) californicum* ..... Prickly phlox
- [ ] *Lessingia filaginifolia* ..... California aster
- [ ] *Leymus condensatus* ..... Giant rye
- [ ] *Lilium humboldtii* ..... Humboldt lily
- [ ] *Lonicera subspicata* ..... Santa Barbara honeysuckle
- [ ] *Lotus grandiflorus* ..... Chaparral lotus
- [ ] *Lotus scoparius* ..... Deerweed
- [ ] *Lupinus bicolor* ..... Lindley's annual lupine
- [ ] *Lupinus hirsutissimus* ..... Nettle lupine
- [ ] *Lupinus succulentus* ..... Succulent lupine
- [ ] *Malacothrix saxatilis* ..... Cliff-aster
- [ ] *Malosma laurina* ..... Laurel sumac
- [ ] *Malva nicaeensis* ..... Bull mallow*
- [ ] *Malva parviflora* ..... Cheeseweed, malva*
- [ ] *Marah fabaceus* ..... California man-root
- [ ] *Marrubium vulgare* ..... Horehound*
- [ ] *Medicago polymorpha* ..... Bur clover*
- [ ] *Melica imperfecta* ..... Small-flowered melic
- [ ] *Mimulus cardinalis* ..... Scarlet monkey flower
- [ ] *Mimulus aurantiacus* ..... Southern bush monkey flower
- [ ] *Muhlenbergia rigens* ..... Deer grass
- [ ] *Nassella pulchra* ..... Purple Needle grass
- [ ] *Nicotiana glauca* ..... Tree tobacco*
- [ ] *Olea europea* ..... European Olive*
- [ ] *Opuntia ficus-indica* ..... Indian Fig, Nopal, Tuna*
- [ ] *Paeonia californica* ..... Peony
- [ ] *Phacelia ramosissima* ..... Rambling phacelia
- [ ] *Phalaris aquatica* ..... Harding Grass*
- [ ] *Phalaris canariensis* ..... Canary Grass*
- [ ] *Phalaris minor* ..... Mediterranean Canary Grass*

- ☐ *Pickeringia montana* ..... Chaparral pea
- ☐ *Piptatherum miliaceum* ..... Smilo, Rice grass*
- ☐ *Plagiobothrys nothofulvus.* ..... Popcorn flower
- ☐ *Plantago erecta* ..... California plantain
- ☐ *Plantago lanceolata* ..... English plantain*
- ☐ *Platanus racemosa* ..... Western sycamore
- ☐ *Populus balsamifera subsp. trichocarpa* ..... Black Cottonwood
- ☐ *Prunus ilicifolia* ..... Holly-leaved cherry, Islay
- ☐ *Quercus agrifolia* ..... Coast live oak
- ☐ *Raphanus sativus* ..... Wild radish*
- ☐ *Rhamnus californica* ..... Coffee berry
- ☐ *Rhamnus crocea* ..... Redberry
- ☐ *Rhus integrifolia* ..... Sugar bush
- ☐ *Rhus integrifolia X ovata* ..... Lemonade berry-Sugar bush hybrids
- ☐ *Ribes amarum* ..... Bitter Gooseberry
- ☐ *Ribes malvaceum* ..... Chaparral currant
- ☐ *Ribes speciosum* ..... Fuchsia-flowered gooseberry
- ☐ *Ricinus communis* ..... Castor bean*
- ☐ *Rosa californica* ..... California wild rose
- ☐ *Rumex hymenosepalus.* ..... Wild rhubarb
- ☐ *Salix lasiolepis* ..... Arroyo willow
- ☐ *Salvia mellifera* ..... Black sage
- ☐ *Salvia spathacea* ..... Hummingbird sage
- ☐ *Sambucus mexicana* ..... Elderberry
- ☐ *Sanicula crassicaulis* ..... Pacific sanicle
- ☐ *Scrophularia californica* ..... California figwort
- ☐ *Silene lacinata* ..... Indian pink
- ☐ *Silybum marianum* ..... Milk thistle*
- ☐ *Sisyrinchium bellum* ..... Blue-eyed grass
- ☐ *Solanum douglasii* ..... Douglas' nightshade
- ☐ *Solanum xanti var. hoffmannii* ..... Hoffmann's Purple nightshade
- ☐ *Solidago californica* ..... California goldenrod
- ☐ *Sonchus oleraceus* ..... Common Sow thistle*
- ☐ *Stachys bullata* ..... Wood mint
- ☐ *Stephanomeria cichoriacea* ..... Fort Tejon Milk-Aster
- ☐ *Symphoricarpos mollis* ..... Nuttall's snowberry
- ☐ *Tauschia arguta* ..... Southern tauschia
- ☐ *Thalictrum fendleri* ..... Meadow rue
- ☐ *Toxicodendron diversilobum* ..... Poison oak
- ☐ *Trifolium spp* ..... Clover
- ☐ *Umbellularia californica* ..... California bay laurel
- ☐ *Urtica dioica subsp. holosericea* ..... Giant creek nettle
- ☐ *Venegasia carpesioides* ..... Canyon sunflower
- ☐ *Verbena lasiostachys* ..... Western vervain
- ☐ *Vitis vinifera* ..... Mission Grape*
- ☐ *Yucca whipplei* ..... Chaparral yucca, Spanish bayonet
- ☐ *Zigadenus fremontii* ..... Chaparral zygadene

* = denotes an introduced species

Birds of Arroyo Hondo Preserve

Grebes
Aechomophorus Grebes (Clark's or Western)

Pelicans
Brown Pelican

Comorants
Double-crested Cormorant

Herons
Great Blue Heron
Snowy Egret
Green-backed Heron

Ducks
Surf Scoter

New World Vultures
Turkey Vulture

Hawks & Allies
White-tailed Kite
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle

Falcons
American Kestrel
Peregrine Falcon

Quail
California Quail

Plovers
Black-bellied Plover

Oystercatchers
Black Oystercatcher

Sandpipers
Spotted Sandpiper
Whimbrel
Sanderling

Gulls
Heerman's Gull
California Gull
Western Gull

Pigeons & Doves
Rock Dove
Band-tailed Pigeon
Mourning Dove

Cuckoos
Greater Roadrunner

Owls
Barn Owl
Western Screech-Owl
Great Horned Owl
Northern Pygmy-Owl

Swifts
Vaux's Swift
White-throated Swift

Hummingbirds
Anna's Hummingbird
Costa's Hummingbird
Allen's Hummingbird

Kingfishers
Belted Kingfisher

Woodpeckers
Acorn Woodpecker
Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker

Flycatchers
Olive-Sided Flycatcher
Western Wood-Pewee
Pacific Slope Flycatcher
Black Phoebe
Say's Phoebe
Ash-throated Flycatcher
Cassin's Kingbird
Western Kingbird

Swallows
Violet-green Swallow
Northern Rough-winged Swallow
Cliff Swallow
Barn Swallow

Jays & Allies
- Western Scrub Jay
- American Crow
- Common Raven

Titmice
- Oak Titmouse

Bushtits
- Bushtit

Wrens
- Rock Wren
- Canyon Wren
- Bewick's Wren
- House Wren

Kinglets, Thrushes & Allies
- Ruby-crowned Kinglet
- Blue-Gray Gnatcatcher
- Hermit Thrush
- American Robin
- Wrentit

Thrashers
- California Thrasher

Waxwings
- Cedar Waxwing

Silky Flycatchers
- Phainopepla

Shrikes
- Loggerhead Shrike

Starlings
- European Starling

Vireos
- Cassin's Vireo
- Hutton's Vireo
- Warbling Vireo

Warblers
- Orange-crowned Warbler
- Yellow Warbler
- Yellow-Rumped Warbler
- Black-throated Gray Warbler
- Townsend's Warbler
- Hermit Warbler
- Kentucky Warbler
- Common Yellowthroat
- Wilson's Warbler

Tanagers
- Summer Tanager
- Western Tanager

Grosbeaks & Buntings
- Lazuli Bunting
- Black-Headed Grosbeak

Towhees & Sparrows
- Spotted Towhee
- California Towhee
- Rufous-crowned Sparrow
- Black-chinned Sparrow
- Lark Sparrow
- Sage Sparrow
- Song Sparrow
- Lincoln's Sparrow
- Golden-crowned Sparrow
- White-crowned Sparrow
- Dark-eyed Junco

Blackbirds & Orioles
- Red-winged Blackbird
- Brewer's Blackbird
- Brown-headed Cowbird
- Hooded Oriole
- Bullock's Oriole

Finches
- Purple Finch
- House Finch
- Pine Siskin
- Lesser Goldfinch

Sources:

Collins, Paul Field Notes 4/29/99
Collins, Paul Field Notes 6/22/99
Lentz, Joan Arroyo Hondo Ranch Bird List 5/27/01
Storrer, John Field Notes 4/29/99
Storrer, John Habitats & Species of Arroyo Hondo 4/1/01
Whitney, Kathleen Field Notes 4/29/99
Whitney, Kathleen & Dave Compton Field Notes 10/2/99

Compiled by
- Walden, Chris
- 112 species

Mammals

Scientific Name	Common Name	Comment
Ursus americanus	Black bear	
Felis concolor	Mountain lion	
Odocoileus hemionus	Mule deer	
Canis latrans	Coyote	
Urocyon cinereoargenteus	Gray fox	
Vulpes vulpes	Red fox	Introduced
Felis rufus	Bobcat	
Sciurus griseus	Western gray squirrel	
Mephitis mephitis	Striped skunk	
Procyon lotor	Raccoon	
Spermophilus beecheyi	California ground squirrel	
Taxidea taxus	Badger	
Didelphis virginiana	Opossum	Introduced
Neotoma fuscipes	Dusky-footed woodrat	
Myotis californicus	California myotis	
Chaetodipus californicus	California pocket mouse	
Peromyscus maniculatus	deer mouse	
Peromyscus californicus	California mouse	
Reithrodontomys megalotis	western harvest mouse	
Peromyscus boylii	brush mouse	

Reptiles and Amphibians

Scientific Name	Common Name	Comment
Rana aurora draytonii	California red-legged frog	
Taricha torosa torosa	Coast Range newt	
Clemmys marmorata pallida	Southwestern pond turtle	
Thamnophis hammondii	Two-striped garter snake	
Thamnophis elegans	Western terrestrial garter snake	
Phrynosoma coronatum	Coast horned lizard	
Aneides lugubris	Arboreal salamander	
Crotalus viridis helleri	Southern Pacific rattlesnake	
Ensatina eschscholtzii	Ensatina	
Batrachoseps nigriventris	Black-bellied slender salamander	
Pseudacris regilla	Pacific chorus frog	
Pseudacris cadaverina	Canyon chorus frog	
Sceloporus occidentalis	Western fence lizard	
Pituophis melanoleucus annecten	San Diego gopher snake	
Lampropeltis getulus californiae	California kingsnake	

Fish

Scientific Name	Common Name	Comment
Oncorhynchus mykiss irideus	Southern steelhead	
Eucyclogobius newberryi	Tidewater goby	

Appendix H. Research Application

The Land Trust for Santa Barbara County

Research Application **(adapted from the UC Reserve System Research Application)**

Please fill out one application per research project.

1. Applicant's Name and Title: _____

   Are you the principle investigator on this project? Y / N
   If not, please enter the name of the principle investigator: _____

2. Institution and Department: _____

   Mailing Address: _____

   Office Phone #: _____Office Fax #: _____

   Email Address: _____

3. Full Project Title: _____

4. Contact Person (if other than applicant): _____Phone #: _____
   Email: _____

5. Estimated Project Duration Dates: Beginning _____Ending _____

6. Frequency of visits to the Preserve: _____

7. Requested Arrival and Departure dates (be as exact as possible):_____

8. Explanation of Proposed Project (include technical explanation of the project, including exact locations of field areas – be as specific as possible. Attach project description or more pages if necessary):

9. Please list the Name, Title, Academic status, Department and Institution of All Participants who will require access to the property:

Title and Name	Academic Status	Department and/or Institution

10. Describe any equipment to be installed, how such equipment will be secured against disturbance from other visitors to the Preserve, and any other special site needs for the project (attach photos of equipment if appropriate):

11. In case of emergency, contact: _____
Phone #: (w)_____
(h)_____
(c)_____

12. Does your project involve capturing, holding in captivity, marking, banding, or impacting the natural behavior of a vertebrate animal? Y / N

If Yes, please describe to how and to what degree:

13. Permit requirements (you will not be allowed access to the Preserve until you obtain the necessary permit(s), or the Land Trust has been informed by the appropriate agency that no permits are required):

    a. Does your project involve the collecting of wild animals or marine plants or marine invertebrates? Y / N

       If Yes, you will need to obtain a scientific collecting permit from the California Department of Fish and Game (please attach permit to application).

    b. Does your project involve the collecting and/or banding, and/or color marking of birds? Y / N

       If Yes, you will need a federal permit from the U.S. Fish and Wildlife Service (please attach permit).

    c. Does your project involve handling plants or animals that are California State listed species of special concern, threatened, or endangered? Y / N

       If Yes, you will need to obtain a Memorandum of Understanding (MOU) from the California Department of Fish and Game (please attach MOU).

    d. Does your project involve handling plants or animals that are Federally listed threatened or endangered species? Y / N

       If Yes, you will need to obtain a permit from the U.S. Fish and Wildlife Service (please attach permit).

14. Does your project involve the introduction of plant or animal species to the Preserve or the translocation of individuals within the Preserve? Y / N

    If Yes, please explain how, why, and to what extent? Be as detailed as possible.

Preserve Policies

- If the project is approved, the researchers must abide by the rules and regulations of the Preserve and provide all required federal and state permits. All researchers must sign a release agreement before beginning their work on the Preserve.
- All publications and data collection resulting from the research will be supplied to the Land Trust.
- Before information on sensitive resources at the Preserve is made public, authorization from the Land Trust must be obtained, unless otherwise exempted.
- Firearms are prohibited at the Preserve, as are domestic animals.
- All users of the Preserve are asked to leave the site in better condition than they found it.
- Researchers will need to make specific arrangements for property access with the Preserve manager

Please print and sign your name and date below to confirm that you have read the above policies and answered the application questions truthfully and to the best of your ability.

Print Name: _____ Date:_____

Signature: _____

For Land Trust Use Only:

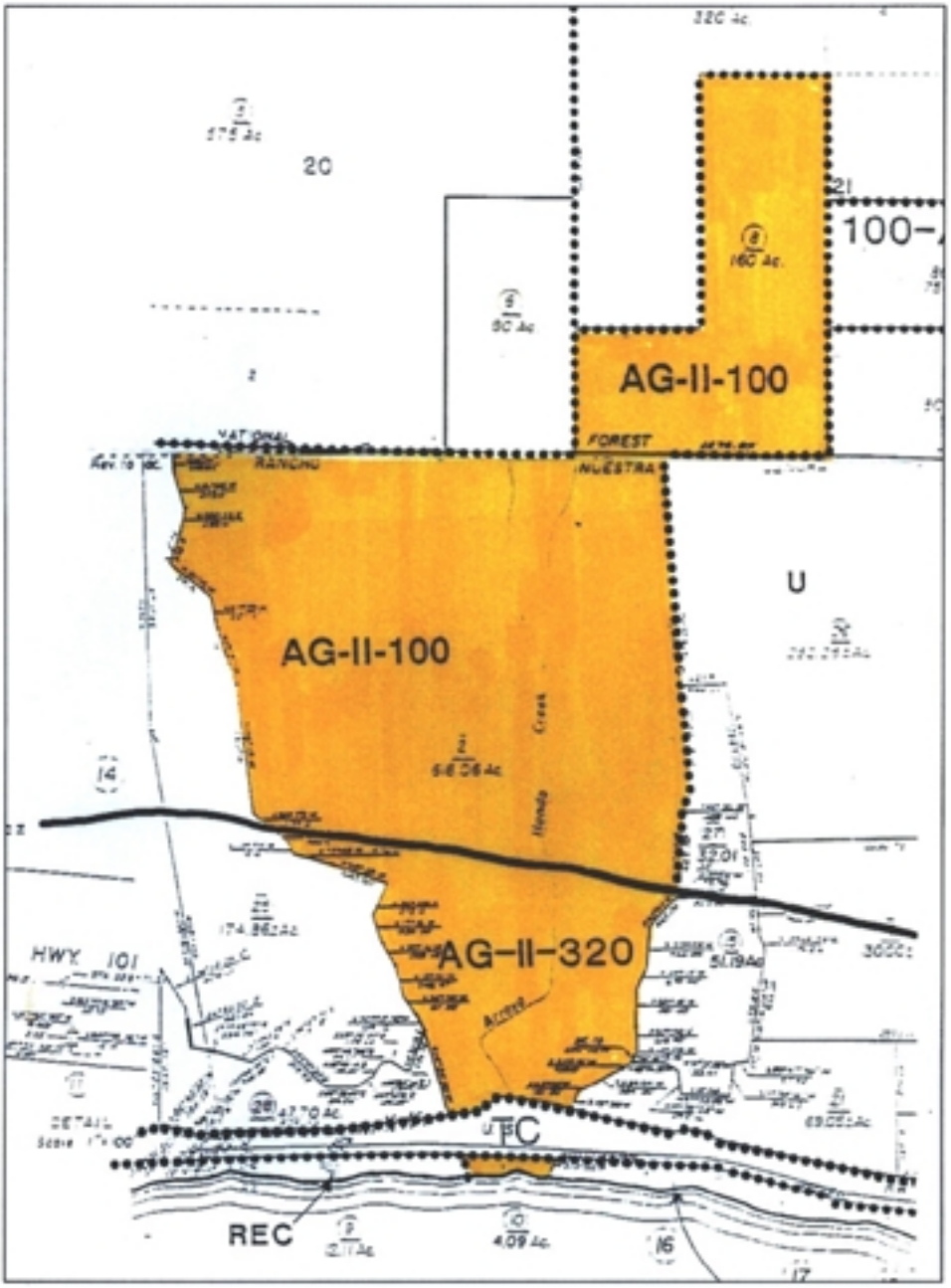
Application Reviewed by: _____ Date: _____ □ Application Complete?

□ Necessary Permit(s) acquired? □ Application Approved?

Land Trust Contact Person for this Project: _____

Signature _____

Appendix I. Santa Barbara County Zoning of the Arroyo Hondo Preserve



Appendix J. Resource Management Zoning District

Sec. 35-90. RES Resource Management.

Sec. 35-90.1. Purpose and Intent.

The purpose of this district is to ensure protection of lands that are unsuited for intensive development and have one or more of the following characteristics:

1. Slopes in excess of 40 percent.
2. Isolated table land surrounded by slopes exceeding 40 percent.
3. Areas which have outstanding resource values such as environmentally sensitive habitat areas.

The intent is to allow limited development in these areas due to the presence of extreme fire hazards, minimum services, and/or environmental constraints and to encourage the preservation of these areas for uses such as grazing, scientific and educational study, and limited residential uses.

Sec. 35-90.2. Processing.

No permit for development including grading shall be issued except in conformance with Sec. 35-169. (Coastal Development Permits).

Sec. 35-90.3. Permitted Uses.

1. One single family dwelling per legal lot.
2. One guest house subject to the provisions of Sec. 35-120. (General Regulations).
3. Agricultural grazing.
4. The non-commercial keeping of animals.
5. Limited facilities or developments for educational purposes or scientific research , e.g. water quality monitoring stations, access roads, storage facilities, etc.
6. Accessory uses, buildings and structures which are customarily incidental to the above uses.

Sec. 35-90.4. Uses Permitted With a Major Conditional Use Permit.

1. Low intensity recreational uses such as summer camps, dude ranches, hunting clubs, and facilities for group retreats.
2. Campgrounds with minimum facilities not including accommodations for recreational vehicles.
3. Resource dependent uses such as mining and quarrying.

Appendix J. Resource Management Zoning District

4. Onshore oil development, including exploratory and production wells, pipelines, storage tanks, processing facilities for onshore oil and gas, and truck terminals subject to the requirements set forth in DIVISION 9--OIL AND GAS FACILITIES.
5. Aquaculture, subject to the provisions of Sec. 35-136 (General Regulations).
6. Cultivated agriculture, e.g., orchards.

Sec. 35-90.5. Uses Permitted With a Minor Conditional Use Permit.

1. Artist's studio.

Sec. 35-90.6. Findings Required for Conditional Use Permit.

In addition to the findings required for approval of a Conditional Use Permit in Sec. 35-172., no Conditional Use Permit shall be approved unless the Planning Commission also makes all of the following findings:

1. The project does not require extensive alteration of the topography.
2. The project does not cause erosion or sedimentation of downstream water courses or water bodies.
3. The project will not cause any significant adverse effect on environmentally sensitive habitat areas.

Sec. 35-90.7. Minimum Lot Size.

Each lot shall have a minimum gross lot area as indicated below for the symbol shown on the lot on the applicable Santa Barbara County Zoning Map.

Zoning Symbol	Minimum Lot Size
RES-40	40 acres
RES-100	100 acres
RES-320	320 acres

A dwelling may be located upon a smaller lot if such lot is shown as a legal lot either on a recorded subdivision or parcel map or is a legal lot as evidenced by a recorded certificate of compliance.

Appendix J. Resource Management Zoning District

Sec. 35-90.8. Setbacks for Buildings and Structures.

Fifty (50) feet from the centerline of any street and twenty (20) feet from the lot lines of the lot on which the building or structure is located.

Sec. 35-90.9. Height Limit.

No building or structure shall exceed a height of twenty-five (25) feet.

Sec. 35-90.10. Parking.

As provided in DIVISION 6--PARKING REGULATIONS.

Appendix K. Management Actions Species Table

Section	Species	Rationale
5.1	**Prohibit recreational access in and around the lagoon and creek, except at designed creek crossings and established day use sites, through the use of signs, fencing or other barriers.**	
	Steelhead	Recreational use potentially increases turbidity and sedimentation in pools which may affect steelhead spawning (approx. Jan-June).
	Red legged frog	Recreational use may potentially disturb red-legged frogs during breeding season (Nov-April).
	Tidewater goby	Travel through the culvert may potentially disturb tidewater gobies.
	Coast range newt	Recreational use potentially disturbs the coast range newt during its breeding season (Jan-May).
	Southwestern pond turtle	Recreational use potentially diminishes the water quality required by the Southwestern pond turtle to breed.
	Two-striped garter snake	The snake is restricted to riparian vegetation and is sensitive to habitat disturbance.
5.1	**Perform visual inspections at main creek crossing before driving a vehicle across.**	
	Red-legged frog	Red-legged frogs are known make pronounced seasonal movements within their local aquatic and terrestrial habitats and have been sighted near the main creek crossing.
	Steelhead	Steelhead use all sections of the lower creek during migration.
	Two-striped garter snake	The snake is restricted to the riparian corridor and has been sighted in the area of the creek crossing.
	Southwestern pond turtle	Southwestern pond turtle have been sighted at the main creek crossing.
5.1	**Prohibit off-trail use.**	
	ALL SPECIES	Off trail use potentially degrades habitat for most species in the Preserve, for specific habitat requirements, refer to section 5.1.
5.1	**Work with experts to study the effects of elevated gull populations on the lagoon and seek mitigation if negative impacts are determined.**	
	Steelhead	Gulls may degrade the water quality of the lagoon via bacterial contamination because of their elevated presence from the nearby landfill.
	Red legged frog	Gulls may degrade the water quality of the lagoon via bacterial contamination because of their elevated presence from the nearby landfill.
	Tidewater goby	Gulls may degrade the water quality of the lagoon via bacterial contamination because of their elevated presence from the nearby landfill.

Appendix K. Management Actions Species Table

Section	Species	Rationale
5.1	**Close ancillary stream crossings to reduce visitor intrusion.**	
	Steelhead	Open access to all stream crossings potentially causes more disturbance and turbidity of the sections of the creek used by steelhead for spawning and migration (Jan-Jun).
	Red-legged frog	Open access to all stream crossings can lead to increased disturbance of habitat and increased turbidity in the sections of the creek used by red-legged frog during their breeding season (Nov-Jun).
	Tidewater goby	Critical habitat for this species in other creeks designates at least 1 kilometer (0.6 mile) of full protection from the ocean. Breeding season (Apr-May) would require closure of all crossings.
	Southwestern pond turtle	Open access to all stream crossings can lead to increased disturbance of habitat and increased turbidity in the sections of the creek used by the Southwestern pond turtle for habitat and breeding.
5.1	**Measure water quality annually to determine the impacts of erosional processes and bacteria on the aquatic habitat.**	
	Steelhead	Steelhead spawn in clear and well oxigenated streams with depths of at least 18 cm. Sedimentation increases turbidity and reduces substrate suitable for steelhead spawning. Sedimentation can reduce the dissolved oxygen levels in the stream and temporarily reduce the water depth requirements for steelhead.
	Red legged frog	The spawning frequencyof red-legged frogs is said to be dependent on water quality. Sedimentation can increases turbidity and gulls may cause bacterial contamination of the lagoon.
	Tidewater goby	Coastal lagoons are highly susceptible to degradation through pollution and siltation, thus degrading tidewater goby habitat.
	Southwestern pond turtle	Sedimentation and bacterial contamination may lead to a decrease of nekton or other food supply available for southwestern pond turtle juveniles.
5.2	**Assess and repair trail-related erosion through trail design modifications and revegetation.**	
	ALL SPECIES	Trails and clearcuts accelerate sediment production, thus degrading habitat quality for species.
	AQUATIC SPECIES	Poorly designed and managed trails can potentially increase erosion, causing deep pools to fill with gravel thereby decreasing the amount of holding habitat and increasing the vulnerability of aquatic species to predators.
5.2	**Implement aquatic habitat enhancements.**	
	Steelhead and tidewater goby	Improving the fish passage through the culvert by adding in baffles or other measures would help to facilitate easier upstream migration for both species.
5.3	**Utilize certified weed-free feed for resident horses boarding at the Preserve.**	

Appendix K. Management Actions Species Table

Section	Species	Rationale
	ALL SPECIES	Horses disperse seeds through their excrement and can spread non-native plants throughout the native habitats upon which most species depend.
5.3	**Control or eradicate priority plant species.**	
	ALL SPECIES	Invasive exotic plant species can outcompete native vegetation, thus removing natural habitat for the species present at the Preserve.
5.3	**Continuously monitor the Preserve for the presence of feral pigs, bullfrogs, and other non-native animal species. Develop contingency plans for controlling these species if they are found on the Preserve.**	
	Red legged frog	Bull frogs and crayfish prey on red-legged frogs, contributing considerably to their decline.
	Tidewater goby	Bullforgs and smallmouth bass prey on tidewater gobies.
	Southwestern pond turtle	Bullforgs prey on hatchlings and juvenile southwestern pond turtles.
	Two-striped garter snake	Bullfrogs, feral pigs and largemouth bass prey on two-striped garter snakes.
5.6	**Have public hiking days open on a limited reservation basis.**	
	ALL SPECIES	Excessive recreational use could lead to a shift in the goals of the Preserve, becoming more of an open space rather than a preserve managed for the protection and enhancement of natural resources.
5.6	**Establish a set of guidelines for public use and enforce the guidelines with a staff or volunteer monitor during public use days.**	
	ALL SPECIES	Uncontrolled access can lead to the collection of species, trampling of vegetation, and disturbance of the aquatic habitat through wading and dam-building. Enforcing public use guidelines will help to reduce the potential for these activities to degrade species habitat.
5.8	**Enforce periodic trail closures and/or closure of Preserve to protect resources and infrastructure.**	
	ALL SPECIES	Recreational use during the rainy season may exacerbate the effects of storm events and the subsequent erosion on aquatic and terrestrial species.
5.8	**Conduct tests to assess the septic system status and its capacity to handle future waste levels.**	
	AQUATIC SPECIES	Septic problems could lead to the release of sewage into the creek, severely degrading the aquatic habitat needed by many sensitive species.