# Interim Management and Monitoring Plan for the Coyote Ridge Open Space Preserve

**Santa Clara Valley**
**Open Space Authority**
**July 2015**

# *Interim Management and Monitoring Plan*

# *for the*

# *Coyote Ridge Open Space Preserve*

***Prepared by***

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# Acknowledgements

This plan was developed with input from staff of the Santa Clara Valley Open Space Authority, who developed the initial public access plan and roads and trails plan:

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Nicholas Kautzman (ARCADIS) facilitated access to the property and provided background information.

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# Executive Summary

This interim management and monitoring plan (IMMP) outlines the approaches the Santa Clara Valley Open Space Authority (Authority) will take to manage and monitor the Coyote Ridge Open Space Preserve (the Preserve)—a 1,831-acre property located on Coyote Ridge in central Santa Clara County (Figure 1). The Authority is acquiring the Preserve from United Technologies Corporation (UTC), which managed the property as open space for decades as a buffer for its rocket testing facility to the east. Land within the Preserve is undeveloped and features infrastructure for cattle grazing, including unpaved roads, fences, and troughs, as well as utility transmission and service lines.

The Preserve is of exceptional conservation value for rare plants and animals endemic to serpentine grasslands as well as threatened pond-breeding amphibians; it also provides habitat for tule elk (*Cervus canadensis nannodes*) and is critical to maintaining regional landscape connectivity. The Preserve also presents important outdoor education, interpretation, and recreation opportunities. Protection, active management, and enhancement of the habitat can achieve a suite of goals and objectives related to safeguarding these values as well as protect cultural resources, water quality, scenic resources, and working lands (Section 3).

## Terrestrial Communities

*Serpentine Grassland*
*Photograph by Jodi McGraw*

The Preserve features grasslands, chaparral, and oak woodlands that are largely underlain by serpentine soil (Section 2.4). These serpentine communities support unique and diverse assemblages of plants and animals adapted to the low-nutrient conditions and the habitat it creates, including nine species found primarily or exclusively on serpentine soils (Table 3). These serpentine endemics include the federally-threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*), and the federally endangered Metcalf jewelflower (*Streptanthus glandulosus* ssp. *albidus*) and Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *setchellii*; Section 2.5). Owing to the relatively large size and intact nature of the habitat and its landscape context, the Preserve has been identified as essential for recovery of these and other rare serpentine species (USFWS 1998).

The Preserve's grasslands also provide habitat for raptors including western burrowing owl (*Athene cunicularia*), golden eagle (*Aquila chrysaetos*), and white tailed-kite (*Elanus leucurus*), while the mosaic of habitats may also support sensitive bat species including pallid bat (Antrozous pallidus) and Yuma myotis (*Myotis yumanensis*; Section 2.5)

## Exotic Plant Management

Though largely intact due to their low-intensity historic land use, the terrestrial communities of the Preserve will require active management to, among other things, control populations of exotic plants

that compete with native plant species (Section 2.6). To address this, the Authority implement will a suite of coordinated strategies to reduce invasive species such as barb goat grass (*Aegilops triuncialis*), artichoke thistle (*Cynara cardunculus*), and yellow star-thistle (*Centaurea solstitialis*), among others (Table 5), and implement an early detection and rapid response program to prevent the invasion of new exotic plants (Section 4.2).

## Grazing Management

The primary strategy for controlling more widespread exotic plants, including European annual grasses and forbs, will be managed grazing (Section 4.1). Cattle grazing has been shown to reduce thatch and promote native plant species richness by reducing competition from non-native annual grasses (D'Antonio et al. 2001, Hayes and Holl 2003, Huntsinger et al. 2007). These beneficial effects of grazing are regarded as essential to maintaining habitat for serpentine endemic species including Bay checkerspot butterfly, the host plants of which are suppressed by dense annual grasses (Weiss 1999, Weiss et al. 2007). Cattle grazing is also a principal vegetation management tool on the other preserves on Coyote Ridge that the Authority manages: the 548-acre VTA-Coyote Ridge Property (VTA 2006, Guenther 2013) and the 688-acre Santa Clara Valley Water District Coyote Ridge Preserve (SCVWD 2014).

*Coyote Ridge grazed area with wildflowers (right) and ungrazed area dominated by grasses (left)*
*Photograph by Jodi McGraw*

Consistent with its conservation grazing policy (SCOSA 2013), the Authority will use cattle to maintain or enhance populations of listed plants and animals, control exotic plants, and reduce the risk of anthropogenic fires. As elsewhere on Coyote Ridge, conservative-intensity, early-season (November to March) grazing is recommended to control exotic annual grasses and forbs, while reducing cattle impacts on grazing-sensitive resources including flowering serpentine plants and native bunchgrasses, seasonal drainages, and oak woodlands (Section 4.1.4.2). Grazing infrastructure including troughs, corrals, and fences, as well as other aspects of the grazing program will be managed to further enhance springs and ponds, while limiting impacts of grazing on grazing-sensitive plants, cultural resources, and visitor experiences (Section 4.1.6). As with all aspects of management, grazing will be implemented through an adaptive framework in which adjustments to management strategies will be made, over time, to enhance their effectiveness at achieving the goals and objectives for the site (Section 5).

## Aquatic Communities

The serpentine communities are interspersed by streams and ponds that provide breeding habitat for the federally-threatened California red-legged frog (*Rana draytonii*), and California tiger salamander (*Ambystoma californiense*) and give rise to freshwater wetlands (Section 2.3). The Preserve's 3.2 miles of

*Preserve pond that supports breeding California red-legged frog and California tiger salamander*
*Photograph by Jodi McGraw*

intermittent streams primarily flow to Coyote Creek, and can contribute to maintenance of rearing and migration habitat for Central California Coast steelhead (*Oncorhynchus mykiss*).

Located primarily within the seasonal drainages, the spring-fed ponds require active management to maintain the appropriate habitat for the listed amphibians and limit impacts to the streams and springs (Section 4.3). Following acquisition of the Preserve, the Authority will assess the ponds to identify specific strategies for their management, which are anticipated to include: removing accumulated sediment and repairing berms (spillways) to promote desired hydrologic conditions (i.e. wet until July) and prevent sediment inputs, and regulating cattle use to maintain appropriate vegetation conditions (e.g. 10-35% edge and emergent vegetation). The Authority will also work with cattle tenants to upgrade water infrastructure (e.g. troughs and tanks) to more effectively use springs, to restore their hydrologic functions needed to support serpentine seep communities and streams habitat conditions, and to limit cattle impacts to drainages to prevent sedimentation (Section 4.3.3).

## Habitat Connectivity

Land within the Preserve has been characterized as essential to maintaining a critical landscape linkage connecting the southern Santa Cruz Mountains and the southern Diablo Range Mountains, across Coyote Valley—a relatively narrow portion of the southern Santa Clara Valley where habitat in the two ranges is in close proximity (Spencer et al. 2010, McGraw 2012, Penrod et al. 2013, SCOSA 2014). As part of its management of the property, the Authority will seek to enhance permeability of the habitat to animals. Notably, the Authority is seeking a reciprocal easement with UTC that will enable the agency to replace an existing chain link fence on a portion of the eastern border of the property, with a wildlife-friendly fence (Section 4.1.6.4.1). Following acquisition, the Authority will work with its partners including Cal Trans, to identify techniques to promote connectivity across Highway 101, a six-lane freeway that presents a barrier to east-west movement across the Coyote Valley. Potential opportunities include upgrading a culvert under the Highway, which is located on the western perimeter of the Preserve, to make it more usable by wildlife (McGraw 2012; Section 2.7).

## Climate Change Resiliency

By maintaining habitat linkages, the Preserve can facilitate movement by plants and animals to stay within their climatic envelop, or tolerance, in the face of a future drier and likely hotter climate (Section 2.8). The Preserve will connect, buffer, and expand protected habitat in the Diablo Range, where more than 325,000 acres of conservation lands protect a more than 70-mile long latitudinal gradient from the southern edge of Pleasanton and the Livermore Valley to Pacheco Pass near California's Great Central Valley. Additionally, the Preserve features a 1,170-foot elevational gradient between Coyote Valley and

Coyote Ridge, where it connects (via remaining, intact habitat) to the Mount Hamilton Ridge, which is more than 4,200-foot above mean sea level. These latitudinal and elevational gradients will allow plants and animals to move to areas with cooler temperatures at higher elevations in responses to temperature increases (Breshears et al. 2008).

*Highway 101 and Coyote Valley from the Preserve*
*Photograph by Jodi McGraw*

Additionally, the Preserve's undulating topography creates a range of microclimatic conditions, including cooler, moister, drainages and north-facing slopes, which add resiliency to populations on site, such as the Bay checkerspot butterfly, which can be greatly affected by interannual variability in weather as well long-term climate change. Finally, the Preserve's abundant seeps, springs, streams, ponds, and wetlands feature cooler microclimates, provide sources of free water, and may indicate areas of greater groundwater that may be resilient in the face of climate change (Howard and Merrifield 2010).

## Public Access

Its intact habitat supporting numerous listed species and its critical location for landscape connectivity render the Preserve an important site for research to inform regional conservation (Section 4.4). Land within the Preserve also provides important outdoor education, interpretation, and recreation opportunities, due to its close proximity to the densely populated portions of the Bay Area and its location between other conservation lands. The existing ranch roads can be used to create a loop trail that affords exceptional opportunities for wildlife-dependent recreation including wildflower and wildlife (e.g. tule elk) viewing; the road atop Coyote Ridge can serve as a segment of the Bay Area Ridge Trial that can help connect Joseph D. Grant and Anderson Lake county parks.

The Authority will manage public access according to a recreation plan which is designed to ensure that access achieves the multiple goals for management, including for conservation of biodiversity and protection of cultural resources. Initial public access to the Preserve will include the following low-intensity uses (Section 4.4.3.2):

- Passive trail use, including walking or hiking, horseback riding, and mountain biking located primarily on existing ranch roads;
- Education and interpretive programs for groups, including school programs and docent-led activities;
- Volunteer stewardship projects led by Authority staff, and similar programs to provide hands-on learning opportunities for students;
- An active science and research program to use the Preserve as an outdoor lab, with an emphasis on research projects that inform Preserve management; and

- Up to two permit-based hike-in camping sites that can accommodate groups of up to ten individuals, accessible via the Bay Area Ridge Trail.

*School field trip on Coyote Ridge*
*Photograph by the Authority*

Providing the public with opportunities to learn about the endemic serpentine species and communities and the important role of the site in their conservation, as well as habitat connectivity, will enhance public awareness and support for land protection and stewardship activities in the region.

## Cultural Resources Management

The Preserve occurs within an area of prehistoric land use, and one known resource area (a lithic scatter) has been recorded on the site (Section 2.1.2.1). Future surveys would likely reveal additional resources (NWIC 2013), including artifacts or features on or beneath the ground surface. Ground-disturbing activities, as well as other aspects of management, have the potential to impact the integrity of sites as well as landscapes through a variety of mechanisms.

The Authority will protect cultural resources from potential impacts associated with management (Section 4.5). Specific management strategies to protect cultural resources will include: conducting surveys to identity cultural resources within areas to be affected by management, or the Preserve more broadly; maintaining a spatial and literature database with information about the cultural resources within the site and broader region; consulting with stakeholders about proposed management strategies and to obtain information for interpretive and educational programs; and interpreting cultural resources, including important cultural landscapes such as Coyote Ridge, in public programs offered onsite (Section 4.5.3).

## Facilities Management

Though undeveloped, land within the Preserve currently features infrastructure associated with cattle grazing including fences, gates, troughs and waterlines, as well as unpaved roads. Maintaining these facilities in good repair will be essential to implementing effective grazing management and providing safe and enjoyable public access. Effective facilities management is also needed to protect cultural and aquatic resources, and to reduce long-term maintenance costs (Section 4.6).

As noted above, the Authority will work to replace the existing fences with wildlife-friendly fence designs (Section 4.6.3.2) when feasible in order to limit the barriers to animal movement, and upgrade grazing infrastructure to enhance springs, ponds, and streams as well as effectiveness of grazing as a management tool in the serpentine grasslands (Section 4.1.6.4).

The Authority will also use best management practices to maintain roads and other facilities in good condition, and work with easement holders to encourage similar management, in order to limit impacts to sensitive species and communities in the Preserve (Section 4.6.3.1). The Authority intends to

discontinue use of 5.25 miles of existing roads if they are no longer needed for access. Some excessively steep and otherwise erosive sections of roads will be restored or realigned, where needed for management, to ensure positive drainage and to reduce erosion and sediment delivery to drainages. Following acquisition of the Preserve, the Authority will conduct a more comprehensive assessment of the roads and refine the proposed roads and trails plan outlined in this plan (Section 4.4.3.3).

## Adaptive Management and Monitoring

The Authority will implement management of the Preserve through an adaptive framework (Section 5) in which monitoring will be used to identify adjustments to management strategies to enhance their effectiveness at achieving the goals for the property (Section 3). The Authority will implement a suite of coordinated monitoring protocols (Table 6) which will supplement observations during routine management and maintenance of the site, and be used to refine management strategies. The Authority will monitor residual dry matter and keep a log of cattle use by pasture, to assess the intensity and seasonality of grazing and ensure the desired grazing prescription is being implemented (Section 5.2). The Authority will also combine also use applicable results of the monitoring studies used to evaluate the biological effectiveness of grazing on the VTA property adjacent to the Preserve to refine grazing management on the Coyote Ridge Open Space Preserve (Section 5.2).

*Resource manager, biologist, and grazing lessee*
*Photograph by Jodi McGraw*

## Management Implementation Phases

The Authority envisions managing the Preserve in three main phases (Section 5.4; Table 7). The initial, five-year phase will begin when the Authority takes ownership of the property. In that phase, the Authority will work with the Santa Clara Valley Habitat Agency to enroll the Preserve into the Valley Habitat Plan Reserve System—a system of conservation lands that will be managed to mitigate impacts of development and other activities on rare and endangered species in the Santa Clara Valley (SCVHA 2013). Following enrollment, the VHA will work with the Authority to incorporate the IMMP into a more comprehensive Management and Monitoring Plan (MMP). Preparation of the MMP will include additional surveys and assessments to evaluate occurrences of rare plants and animals covered by the Valley Habitat Plan, as well as identify management needs and projects.

During the initial phase, the Authority will also work to implement priority biodiversity management strategies, including conservation grazing to maintain grassland conditions required by the rare serpentine species, and targeted invasive plant control, to address the priority species and occurrences identified through an inventory of the site. The Authority will also take steps to make the Preserve available for public access, including developing a recreation plan, beginning to implement programs for education and interpretive programs and scientific research, and conducting outreach to collaborators to establish a segment of the Bay Area Ridge Trail and identify other regional trail connections (Table 7).

During the second phase (e.g. years 6-15), the Authority will work with the Valley Habitat Agency and other partners to take additional steps to manage, restore, and enhance habitat. The Authority will also continue work to meet the public access, cultural resources, and facilities management objectives (Table 7). During this phase, the Authority anticipates working with the VHA to prepare a Reserve Unit Management Plan (RUMP), which will update the MMP based on results of work to date and guide long-term management and monitoring of the Preserve during the third phase.

During the third management phase, which is anticipated to continue in perpetuity, the Authority will work to maintain or enhance the natural and cultural resources, while continuing to provide opportunities for compatible public use. The precise nature of the management activities during this phase will depend on the conditions of the habitat in the future; however, they are anticipated to include tasks similar to those outlined in the mid-term, with less of an emphasis on restoration, and more emphasis on maintenance of habitat conditions once restored.

*Coyote Valley and the Santa Cruz Mountains from the Preserve, with tule elk*
*Photograph by Jodi McGraw*

# 1 Introduction

The Coyote Ridge Open Space Preserve (Preserve) is a 1,831-acre property located on Coyote Ridge in central Santa Clara County (Figure 1). The Preserve is being acquired by the Santa Clara Valley Open Space Authority (Authority)—a special district established to preserve and restore the natural environment within its jurisdiction, which includes the eastern and southern three quarters of Santa Clara County (inset box). This Management and Monitoring Plan (IMMP or Plan) was developed during the acquisition process, to outline a framework for future management of the Preserve, including public access, and to identify priority land management actions in the short- and long-term.

**Mission**

The Open Space Authority conserves the natural environment, supports agriculture and connects people to nature, by protecting open spaces, natural areas, and working farms and ranches for future generations.

**Our Vision, Our Valley, Our Future**

We envision the Santa Clara Valley and its surrounding hillsides as a beautiful place where a vibrant network of interconnected open spaces, trails, wildlife habitats and thriving agricultural lands enrich the region's cities, making our Valley an exceptional and healthy place to live, work, learn and play. In our vision of the Santa Clara Valley:

- A well-managed network of open spaces, farms and ranches sustains our natural heritage and provides resilience to a changing environment
- All members of our community are aware of the values of nature and have convenient access to local recreational and environmental education opportunities
- Our drinking water is safeguarded by protecting our local creeks and watersheds, from their headwaters in the surrounding hills to the Bay
- Community investment in nature -- and the essential benefits that nature provides -- sustains and enhances a healthy environment and economy
- The rich heritage of the Valley's agriculture is thriving, with locally grown foods contributing to healthy communities and creating a sense of place and pride in our region
- The Open Space Authority contributes to the region's quality of life by building and sustaining public and private partnerships in all our communities.

## 1.1 The Preserve

Located within a large network of existing public and private conservation lands (Figure 1), the Preserve can advance regional conservation goals for imperiled species and sensitive communities, and enhance landscape connectivity and resiliency to climate change, while providing important opportunities for low-intensity, nature-based recreation and environmental education and interpretive activities.

The Preserve features relatively intact native plant communities, including grasslands, chaparral, and oak woodlands that are largely underlain by serpentine soil. The serpentine communities of the Preserve support nine species found primarily or exclusively on serpentine soils including the federally-threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*), and the federally endangered Metcalf jewelflower (*Streptanthus glandulosus* ssp. *albidus*) and Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *setchellii*). The serpentine communities are interspersed by streams and ponds that providing breeding habitat for the threatened California red-legged frog and California tiger salamander and give rise to freshwater wetlands; the Preserve's intermittent streams flow to Coyote Creek, which is an essential stream for threatened steelhead trout (*Oncorhynchus mykiss*).

Owing to the relatively large size and intact nature of the habitat and its landscape context, the Preserve has been identified as essential for recovery of rare serpentine species, including Bay checkerspot butterfly (USFWS

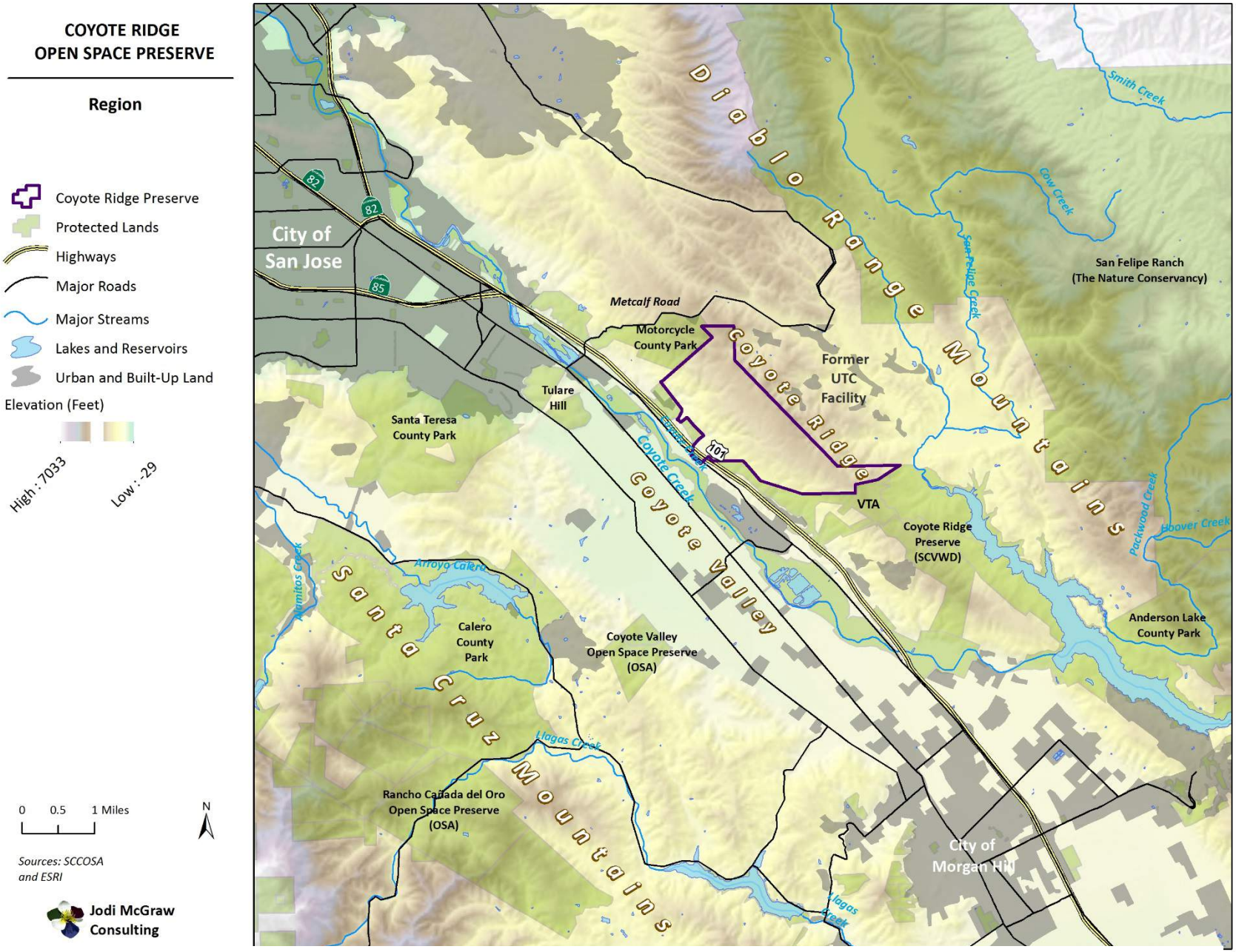


**Figure 1: Region**

1998). It has also been identified as critical to maintaining regional habitat connectivity. Specifically, it is within the critical linkage connecting the southern Santa Cruz and Diablo Range mountains, across Coyote Valley—a relatively narrow portion of the southern Santa Clara Valley where habitat in the two ranges is in close proximity (McGraw 2012, Penrod et al. 2013). Protection of habitat in the Preserve can help secure this linkage essential to preventing isolation of the Santa Cruz Mountains Bioregion.

Protection and stewardship of the Preserve will also connect, buffer, and expand protected habitat in the Diablo Range, where more than 325,000 acres of conservation lands stretch for almost 70 miles from the southern edge of Pleasanton and the Livermore Valley to Pacheco Pass near California's Great Central Valley. By protecting these important habitat linkages, the Preserve can facilitate species' movements in response a changing climate.

As a result of its close proximity to the densely populated portions of the Bay Area and its location between other conservation lands, the Preserve also provides important outdoor education and recreation opportunities. Its endemic species and communities, amazing wildflower displays, and herd of tule elk (*Cervus canadensis nannodes*), provide opportunities for wildlife-dependent recreation, which can be compatible with protection of biodiversity. The existing ranch roads create a 3.8-mile long loop trail that can be used to interpret the diverse serpentine communities, to enhance awareness of their uniqueness and support for their protection and stewardship. The 3.2-mile long Ridge Road, which offers excellent views of the Coyote Valley and Diablo and Santa Cruz mountains, can help complete a segment of the Bay Area Ridge Trail—a more than 550-mile route encircling the San Francisco Bay.

## 1.2 Management Need

Though the habitat within the Preserve is largely intact and in good condition, active management will be needed to protect and where possible, restore habitat, by addressing factors that can degrade it. Most notably, management will be needed to control exotic plants, which outcompete native plants, degrade habitat for animals including the Bay checkerspot butterfly, and can increase the risk of fire. A conservation grazing program, in which livestock are used to control exotic plant populations, has been proven to be an effective tool in serpentine communities in the region, including other properties on Coyote Ridge, and other open space preserves managed by the Authority (VTA 2006, McGraw 2012, 2013a, 2013b, SCVWD 2014). Active management will also be needed to maintain condition of ponds required by breeding amphibians, safeguard cultural resources and landscapes, limit impacts of public access and provide opportunities for environmental interpretation, and maintain facilities. The Preserve provides excellent opportunities to enhance populations of other listed species, such as western burrowing owl (*Athene cunicularia*), and implement infrastructure projects that can help wildlife move across Coyote Valley.

## 1.3 Plan Objectives and Approach

This management plan was developed during the acquisition process to inform initial management and monitoring, as well as subsequent management planning. Specific objectives were to:

1. Document baseline conditions including distribution of natural communities and sensitive habitats, ponds, and other significant natural resource features, as well as basic Preserve infrastructure, based on existing data and reconnaissance-level site visits;
2. Develop management goals and objectives related to the protection, restoration and enhancement of habitat for listed species;

3. Identify and prioritize short- and long-term management actions, including recommendations for preparation of more detailed management plan elements, such as a recreation plan;
4. Identify appropriate management measures to integrate public access and environmental interpretation with protection of sensitive resources; and
5. Develop a pragmatic adaptive management and monitoring program that can be implemented by the Authority to evaluate the effects of management on sensitive resources, and their conditions relative to the baseline.

Upon acquisition of the property, the Authority anticipates enrolling the Preserve into the Valley Habitat Plan Reserve System—a network of protected lands that will be managed to compensate for the impacts of the activities covered under the habitat conservation plan (HCP) and natural community conservation plan (NCCP) that was developed for the Santa Clara Valley (SCVHA 2012). The Preserve was identified as a top conservation priority with the plan, which is designed primarily to benefit the rare species and natural communities covered by the plan, but will also allow compatible public use.

Accordingly, this plan was prepared in consideration of the anticipated terms of a conservation easement and associated management plan that will be prepared by the Valley Habitat Agency in consultation with the California Department of Fish and Wildlife, United States Fish and Wildlife Service, and the Authority. It was developed based on the Valley Habitat Plan's Draft Management and Monitoring Plan outline (SCVHA 2014), in hopes that this plan would facilitate development of a Reserve Unit Management Plan (RUMP) once the Authority enrolls the preserve into Valley Habitat Plan Reserve System.

The Authority anticipates managing the Preserve in conjunction with other conservation lands in its care on Coyote Ridge, including the VTA mitigation property and the Santa Clara County Water District's Coyote Ridge Preserve (the former Castle and Cooke Property). These lands are being actively managed to achieve similar conservation goals and objectives, per the terms outlined in their respective management plans (VTA 2006, Guenther 2013, and SCVWD 2014). To facilitate seamless management, this plan was developed in consideration of the management of these others sites. Notably, this plan incorporates aspects of grazing management on the VTA and SCVWD sites, where conservation grazing is being used primarily to promote biodiversity, and is being implemented across multiple land ownerships, including portions of the Preserve, and is carefully monitored following protocols that can help inform grazing management on this Preserve as well as elsewhere on Coyote Ridge.

## 1.4 Organization

This plan contains the following components:

- **Preserve Description and Baseline Conditions (Section 2):** An assessment of the baseline conditions of the Preserve with an emphasis on factors that will affect stewardship, in order to inform development of management goals and strategies;
- **Management Goals (Section 3):** Goals for management of biodiversity at the landscape, community, and species levels, and goals for protecting working lands, water resources and cultural resources, providing public access for recreation and education, and managing facilities;
- **Management Approaches and Strategies (Section 4)**: An outline of key management steps to attain the goals (Section 3) based on the Preserve conditions (Section 2); and

- **Adaptive Management and Monitoring (Section 5):** Recommended approaches to monitoring the biological systems and aspects of management to promote attainment of the goals over time, as part of an adaptive management framework, and an outline of the phased approach to implementing management at the site.

*Coyote Ridge visitor*
*Photograph by the Authority*

# 2 Preserve Description and Baseline Conditions

This section generally describes the Coyote Ridge Open Space Preserve, with emphasis on aspects of the property that are relevant to its management. It was developed based on review of existing documents and spatial data for the property, including prior surveys and assessments of its biological systems (inset box). Information from these prior studies was supplemented with aerial image interpretation and reconnaissance-level site visits conducted in October 2014 and February and March 2015. Additional on-the-ground assessments and surveys of the site will be conducted following acquisition of the Preserve, to further inform the management strategies (Section 4). As discussed in the sections that follow, recommended studies include:

- A roads assessment to identify roads that present drainage issues and methods to remedy them;
- An updated survey and assessment of the aquatic systems, including streams, ponds, and springs;
- A fine-scale map of the grasslands and wetlands, which can complement the detailed map of the shrublands and woodlands prepared by Evans and San (2004) and be used to characterize habitat for the rare plants and insects; and
- An exotic plant inventory and invasive plant mapping study, which can inform exotic plant management.

**Biological Studies Completed to Date**

Vegetation and Habitats

Plant community (vegetation) classification and mapping of the Coyote Ridge (Evens and San 2004)

Vegetation/Land Cover Mapping (primarily from aerial imagery) (SCVHA 2012)

2004 Wetland and listed species habitat mapping (WRA 2004)

Rare Species

1989 Biological Study for Rare Animals and Plants (ECS 1990)

2005 Biological Survey for Rare Plants and Animals, incl. Streams and Ponds (BBL 2005)

2008 Rare Serpentine Plant Survey (ARCADIS 2008)

2006-2008 Pond Surveys for Threatened Amphibians (Biosearch 2008)

2009 Burrowing Owl survey (Arcadis 2009)

## 2.1 Setting

### 2.1.1 Location

The Coyote Ridge Open Space Preserve is located in an unincorporated portion of southern Santa Clara County, southeast of the City of San Jose and north of the City of Morgan Hill (Figure 1). It is east of Highway 101 and south of Metcalf Road, which can be used to access the northeastern portion of the property. The northwestern portion of the Preserve is accessed from Malech Road which is accessed from the Bailey Avenue Exit to Highway 101. This frontage road also provides access to the Authority's Malech Property—a 29.5-property that was previously acquired by the Authority and will be managed in conjunction with the Coyote Ridge Open Space Preserve (Figure 1).

The Preserve is located in the Morgan Hill US Geologic Service 7.5 minute quadrangle and includes portions of Sections 13, 14, 23, 24, 25, and 26 of Township 8 S and Range 2 E, as well as portions of Sections 19, 29, and 30 of Township 8 Range 3 E, of the Mount Diablo Base and Meridian. It consists of nine County of Santa Clara assessor's parcels used solely for purposes of tax assessment (Figure 2); the Preserve is comprised of a single, legal parcel (Valbridge 2013). As measured in the GIS used to prepare this plan, the assessor's parcels range in size from 2.3 acres to 589 acres and total 1,802 acres; the County records show that the parcels total 1,831 acres. Because the GIS was used to characterize the Preserve, acreages reported in this plan differ from those referenced in other documents describing the property.

### 2.1.2 Land Use

Land within the Preserve is undeveloped and has experienced only low-intensity land use, which has largely left the native plant communities largely in good condition.

#### 2.1.2.1 Historic Land Use

Archeological discoveries place Ohlone Indian settlements in the region as early as 8000 BC (NPS 2015). At the time of European contact, the Native Americans that lived in the Coyote Valley area were part of the Costanoan (also known as Ohlone) language family, and spoke the Tamyen (Tamien) language (NWIC 2013). Prior surveys of the Preserve, which have covered just 10 percent of the area, revealed a lithic scatter—a Native American archaeological resource consisting of lithic flakes produced during tool production and maintenance, and tools or tool fragments, which generally indicate occupation in an area. Native Americans may have used land within the Preserve for foraging, hunting, and travel routes, often located along ridges (Pacific Legacy 2013b).

Habitat within the Preserve has likely been grazed by livestock, at least intermittently, since the 1700s when European settlers began colonizing the greater Santa Clara Valley (San Francisco Estuarine Institute 2008). Land within the Preserve was part of two large ranches: land west of the Coyote Ridge was within the La Laguna Seca Rancho, which included the western slope of the ridge and Coyote Valley north of Morgan Hill; land to the east was within the Rancho Cañada de San Felipe y Las Animas, which extended along San Felipe and Las Animals creeks to the east. Land within the La Laguna Seca Rancho later became managed as part of the Fisher Ranch, while land within Rancho Cañada de San Felipe y Las Animas was eventually managed as part of the Weber Ranch. There are no known historical resources within the Preserve, which was likely used primarily for livestock grazing (NWIC 2013).

#### 2.1.2.2 Current Land Use

Land within the Preserve was acquired by United Technologies Corporation (UTC) in 1961 to create an open space buffer to insulate the 3,017-acre rocket propulsion systems facility to the east, which was developed beginning in the 1950s. Between 1959 and 2005, the UTC facility developed, manufactured, and tested and missile propulsion systems. The facility featured buildings, paved roads, and other facilities concentrated in an approximately 1,711-acre area primarily within the Shingle Valley. Ongoing site closure programs, which began in 2006, have included remediation of soil, groundwater, and surface water, and decommissioning, decontamination, and demolition of over 200 structures (Biosearch 2008).

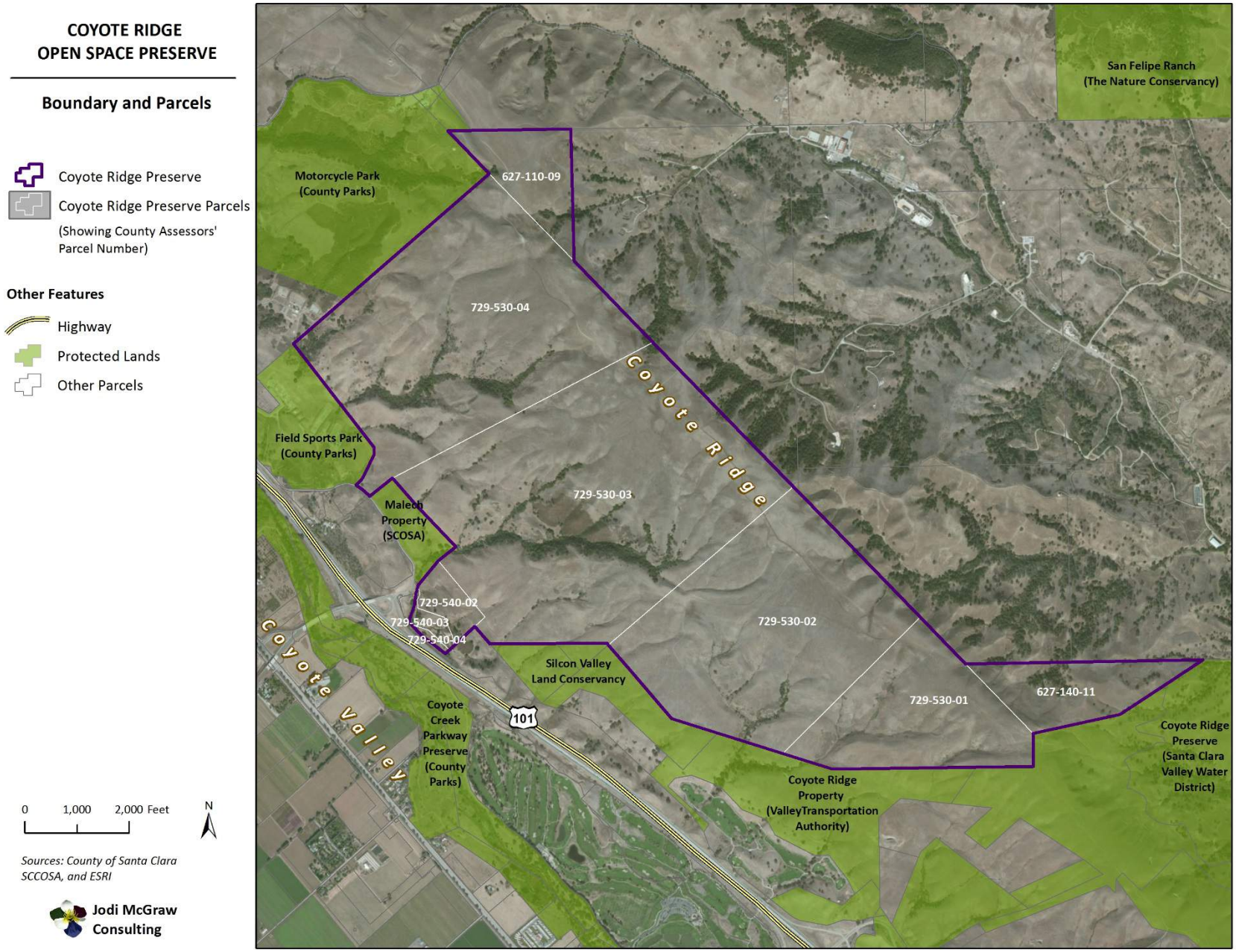


**Figure 2: Boundary and parcels**

As noted, land within the Coyote Ridge Open Space Preserve was characterized as an open space buffer zone and not utilized for any other purpose by the property owner (Valbridge 2013). As a result, unlike the UTC property to the east where soil and groundwater have been impacted by chemicals released by historic industrial operations, land within the Preserve is assumed to not contain any contamination above normal screening levels (Valbridge 2013).

Land within the Preserve was leased for cattle grazing as part of two separate operations: the Fields family has grazed cattle on the northern portion of the property, while Anderson Cattle Company operates on the southern portion.

The Field family has grazed cattle within the Coyote Ridge/Metcalf Road area since 1962. As part of the current cow-calf operation, Justin Fields currently utilizes land within approximately 1,610 acres within the Preserve as well as a portion of the UTC land adjacent to the Preserve, his 700-acre home ranch on Metcalf Road, and an additional 2,000 acres north of Metcalf Road. Fields grazes an estimated 125-150 cow-calf pairs year round within the UTC lands, including land to be included in the Preserve.

*Cattle grazing within the Preserve.*
*Photograph by Jodi McGraw*

The seasonality of use within the Preserve varies, depending on the forage conditions, which are greatly influenced by annual rainfall. Typically cattle are grazed on the UTC property in the early season, when the higher-productivity California annual grasslands and oak woodlands and forests there feature greater productivity due to their more fertile soils (i.e. they green up sooner). Fields then pushes the cattle into the Preserve once the serpentine grasslands feature greater grass growth, which is typically later in the late winter. The cattle tend to utilize the California annual grasslands on the ridge and upper western slope initially, and then will move down into the serpentine grasslands on the western slopes as growth increases there. Cattle are removed once forage is insufficient, which varies year to year based on annual stocking rates and rainfall (J. Fields, pers. comm. 2015).

The southern 191-acre portion of the Preserve is located within the West Ridge pasture—an approximately 1,416 acre unit that is currently managed as part of a conservation grazing program by the Authority on lands south of the Preserve. The pasture is one of six units totaling 3,200 acres that are grazed by the Anderson Cattle Company by 240 to 265 cow/calf pairs between approximately November and May 15 of each year; an additional 20 to 60 head of livestock occasionally graze during the summer (Guenther 2013). Remaining land within the West Ridge Pasture is largely owned by the Santa Clara Valley Transportation Agency (VTA) and the Santa Clara Valley Water District (SCVWD), though it also includes land owned by Waste Management and the Silver Creek Preserve.

#### 2.1.2.3 Land Use Planning

##### 2.1.2.3.1 Zoning

The land on and west of the Coyote Ridge, which includes approximately 90% of the Preserve area, is within the Hillside zoning district; the land east of the ridgeline is zoned Ranchlands. These rural base zoning districts are designed to maintain and preserve the predominantly rural character of lands by regulating the type of land uses and intensity of development permitted in a manner that protects natural resources and maintains compatibility between uses (Valbridge 2013).

The Hillside district was designated to preserve in open space mountainous lands that are unsuitable for urban development, and to promote those uses which support and enhance a rural character, which protect and promote the wise use of natural resources, and which avoid the risks imposed by natural hazards found in these areas. These watershed lands may also provide important resources including minerals, forests, animal habitat, rare or locally unique plant and animal communities, historic and archeological sites, scenic beauty, grazing lands, and recreational areas. Additionally, lands zoned Hillside define the setting or viewshed for the urban area of the county. Accordingly, development in the Hillside district is to be limited to avoid the need for public services and facilities. Permitted uses include agriculture and grazing, very low density residential use, low density and low intensity recreation, mineral and other resource extraction, and land in its natural state. Low-intensity commercial, industrial, and institutional uses may also be allowed if they require a remote, rural setting in order to primarily serve the rural residents or community, or if they support the recreational or productive use (Valbridge 2013).

The Agricultural Ranchlands (AR) district is designated to preserve ranching, the natural resources, and the rural character of the areas to which it applies. Permitted uses on these parcels designated Ranchlands in the general plan include ranching or agriculture, low-intensity recreation, mineral extraction, and land in its natural state. Very-low-intensity residential, commercial, industrial and institutional uses may also be allowed if they primarily serve the rural ranchland residents or are necessary for the enhancement and protection of the natural resources of the area and do not require a substantially higher level of service than presently provided (Valbridge 2013).

*Docent-led tour on Coyote Ridge during the spring*
*Photograph by Jodi McGraw*

##### 2.1.2.3.2 Countywide Trails Master Plan

The Santa Clara County Countywide Trails Master Plan illustrates a segment of the Bay Area Ridge Trail along the Coyote Ridge, connecting Anderson Lake County Park to Motorcycle County Park (County of Santa Clara 1995). The Bay Area Ridge Trail is a more than 550-mile route for hikers, equestrians, and cyclists, which is being developed to encircle the San Francisco Bay, largely on ridgelines which provide stunning views of open space. Gaps in the route, which currently total 350 miles, are filled as part of projects to preserve and restore key upland habitats; opening the trail allows the

public to experience and enjoy these areas (Bay Area Ridge Trail Council 2015). In Santa Clara, trails are intended for day-use only, except when within a public road right-of-way or when a special permit is obtained (County of Santa Clara 1995).

Using the existing ranch road located atop Coyote Ridge as the trail alignment, the Bay Area Ridge Trail segment would extend approximately 3.2 miles from the southern border which adjoins the VTA Coyote Ridge Preserve, and the northern end of the Preserve just east of Motorcycle Park; there, a 0.2 mile long segment would connect the trail to Metcalf Road through an existing easement through the UTC facility property (Sections 2.2.3.1).

#### 2.1.2.4 Regional Land Use

Much of the land within the Coyote Ridge area is similarly zoned for low-intensity land use, including Ranchland, Hillside, and Regional Parks, and is used as private ranchlands, rural residential home sites on large parcels, or open space. To the south and west, the Preserve adjoins open space that is protected by the Valley Transportation Authority (VTA), the Santa Clara Valley Water District (SCVWD), and the Silicon Valley Land Conservancy (15 acres). The Authority holds a conservation easement over portions of the 1,760-acre SCVWD property, which it manages along with the 561-acre VTA property pursuant to their respective management plans designed to facilitate biodiversity conservation and watershed protection (VTA 2006, SCVWD 2014).

These preserves are part of a broader network of conservation lands located to the north and east of the Preserve. North of the UTC facility property, much of the land is in large, privately held parcels that support rangelands and are used primarily for cattle grazing. Further east lies the 10-mile long, 28,539-acre Rancho San Felipe, which is owned by the Hewlett and Packard families and is protected by a conservation easement held by the Nature Conservancy. The San Felipe Ranch connects the 9,560-acre Joseph D. Grant County Park to the north, with the 58,724-acre Henry Coe State Park to the south.

The Preserve also adjoins or is near land within Coyote Ridge that has been managed in ways that do not promote protection of natural and cultural resources. As noted above, on its eastern border, the Preserve adjoins the 3,282-acre UTC facility property, which was partially developed and used for rocket and explosives testing; the facility is closed and being remediated to address contamination (Section 2.1.2.2). On its northwest and northern borders, the Preserve abuts the Field Sports Park, and the Motorcycle County Park, both of which are managed by the SCCPRD and allow more intensive recreational activities, including off-highway vehicle use in the Motorcycle Park. South of the VTA Preserve and west of the SCVWD Preserve is the Kirby Canyon Landfill—a 852-acre waste disposal site operated by Waste Management.

The western portion of the Coyote Ridge abuts a mosaic of agricultural, residential, and recreational land uses in the Coyote Valley. West of Highway 101, near the western border of the Preserve, a suite of parks and recreation venues line Coyote Creek—a perennial stream that flows south to north through the valley. Much of the stream corridor features native communities including riparian woodlands, which can facilitate wildlife movement through the area. The adjacent floodplain includes reservoirs for fishing and a golf course, which straddles the highway.

West of Coyote Creek, the northern portion of the valley features primarily larger parcels used for cultivated agriculture; the southern half of the valley features moderate density residential development. Securing a linkage across the Coyote Valley to maintain connectivity between the

southern Santa Cruz and Diablo Range mountains has been a key goal for regional conservation plans (Penrod et al. 2013) and is a priority for the Authority as described in the Santa Clara Valley Greenprint (SCOSA 2014). The Coyote Ridge Open Space Preserve was identified as critical to securing this linkage (McGraw 2012).

### 2.1.3 Fire History

Land within the Preserve has burned in three separate recorded wildfires (CalFire 2013) (Figure 3). In 1979, the so-called Sheriff Fire burned 429 acres of serpentine grassland and chaparral in the central western portion of the Preserve; the cause was unknown. Two years later, the 1981 Pistol Range Fire burned 306 acres of which 284 acres were in the central western portion of the Preserve, including much of the area burned by the Sheriff Fire; this fire may have been caused by gunfire at the firing range on the adjacent County-owned Field Sports Park (J. Fields, pers. comm. 2015). In 1999, the 1,200 acre Malech Fire, which was ignited by equipment use, burned 1,029 acres in the center and northern portion of the Preserve, burning again much of the land that had previously burned two decades before in the Sheriff and Pistol Range fires (Figure 3).

The Preserve likely burned during other fires that were not recorded because they were less than 300 acres or occurred prior to central record keeping (CalFire 2013). The summer drought characteristic of the Mediterranean climate in the region, combined with the fine fuels in grasslands and the highly flammable woody vegetation within the Preserve's chaparral community, create conditions conducive to recurring fire. Such fires are a natural part of the disturbance regime in the upland communities of the site; however, human activities may result in too-frequent fire, which can negatively impact species adapted to a longer fire return interval. Potential anthropogenic ignition sources within or near the Preserve include:

1. Vehicle use on or near the Property, including Highway 101 and Motorcycle County Park;
2. Electrical lines, including high-power transmission lines, which traverse the western edge of the Preserve;
3. Gunfire at the Rifle and Pistol Range within the County's Field Sports Park; and
4. Equipment use (e.g. mowing) in adjacent parks and open space.

Vegetation management, including grazing, can help reduce the risk of fire and its rate of spread.

### 2.1.4 Easements, Encumbrances and Leases

Prior easements on the Preserve grant access to utility companies' utilities (Section 2.1.4.1; additionally, the owner of land within the Preserve is granted easement over certain adjacent properties (Section 2.1.4.2). Land within the Preserve has previously been leased to Justin Fields for cattle grazing.

#### 2.1.4.1 Easements and Encumbrances within the Preserve

The Preserve is encumbered by a series of access easements identified through review of the title report (Valbridge 2013), with the exceptions listed in parentheses. Boundaries of referenced parcels referenced below are shown in Figure 2. Existing facilities including roads and utilities associated with these easements are described in Section 2.2.3.

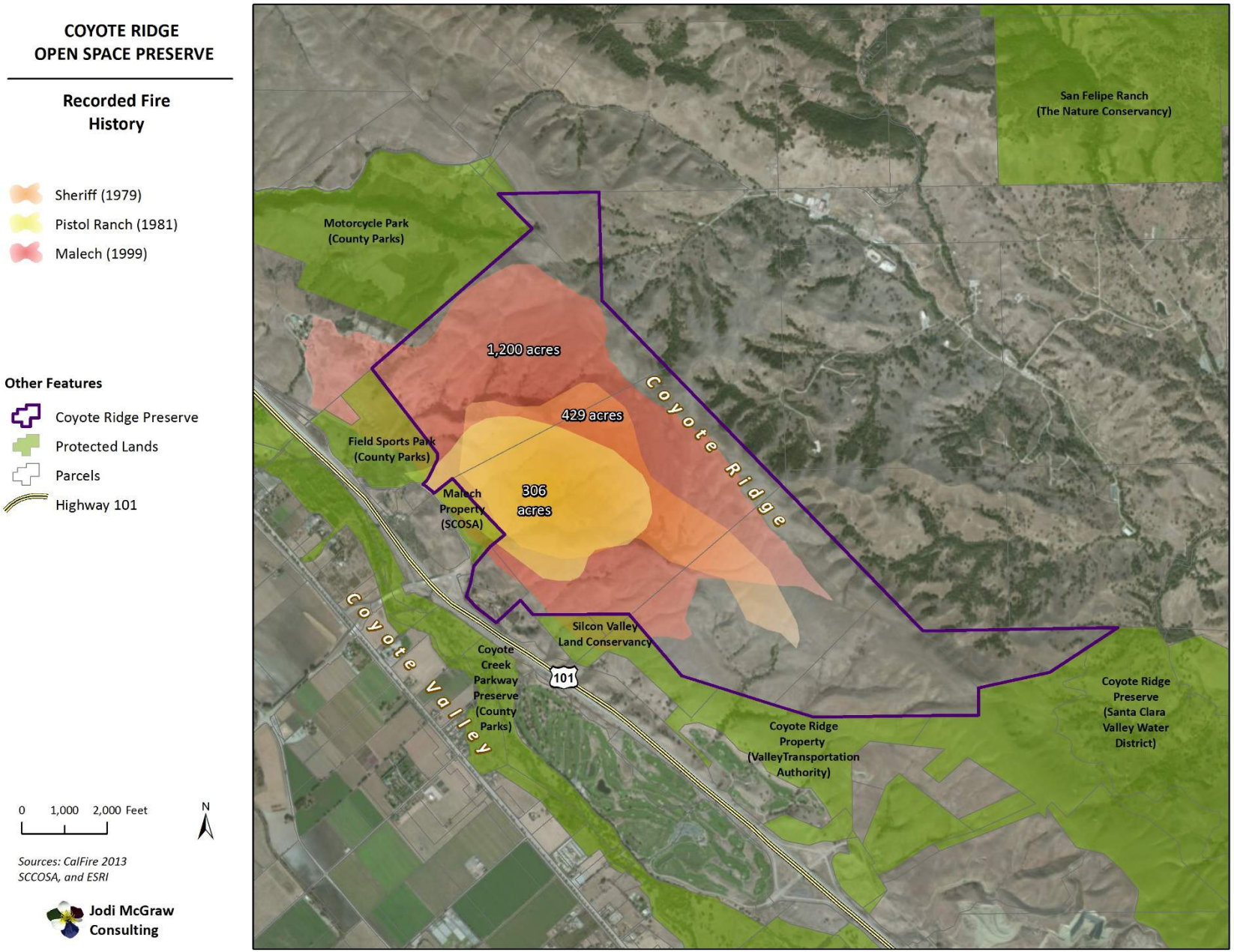


**Figure 3: Recorded fire history**

1. **Electricity right-of-way (Exceptions 18, 27, and 39)**: Pacific Gas and Electric (PG&E) holds three easements for transmission and distribution of electricity, as well as ingress egress rights for construction and maintenance, across the southwestern portion of parcel 729-23-003.
2. **Telephone right-of-way (Exception 19):** PG&E also holds a right of way for a single line of poles and appurtenances, as well ingress and egress, which is thought to be in the same location as the electricity right-of-way.
3. **Gas, Oil, and Water right-of-way (Exception 20):** PG&E has an easement granted in 1929 to convey and transport gas, oil, and water in a 15-foot-wide belowground pipeline right-of-way. The easement includes ingress egress rights and allows temporary construction extending 15 feet on either side of the pipeline. The easement is thought be in the extreme southwest corner of parcel 729-23-003, west of the electricity right-of-way.
4. **Water Canal Easement (Exception 25):** The Santa Clara Valley Water District holds an easement for an extant water canal that crosses the extreme southwestern portion of parcel 729-53-003.
5. **Gas Pipeline (Exception 26):** PG&E holds a separate easement for a 54-foot-wide strip of land extending over the lower portion of parcel 729-53-003 for gas pipelines and appurtenance.
6. **North-South Gas Pipeline (Exception 30):** PG&E holds a 50-foot wide gas pipeline easement that extends across the entire north/south length of the Preserve running generally parallel to and west of its eastern boundary. In addition to ingress egress rights, this easement allows the beneficiary to grade the entire strip and also the right to make cuts and fills as reasonably necessary.
7. **Electricity and Communication Facilities (Exception 34):** PG&E holds an easement for electricity and communications facilities that comprises a 40-foot wide strip that extends northeast across the extreme south corner of parcel 729-53-003 and continue across the northern portion of adjacent parcel 729-53-002.

Other exceptions listed on the tile report relate to areas outside of the Preserve.

As part of the transaction in which the Authority will acquire the Preserve, the Authority will grant an easement to UTC for continued use of the existing microwave site located in the northeast corner of the Preserve and to maintain security fencing along portions of the eastern Preserve boundary (Figure 9).

There are no known claims of prescriptive access rights over any portion of the Preserve, or evidence of implied easements encumbering the property, consistent with the Gion Doctrine (Valbridge 2013).

#### 2.1.4.2 Easements over Adjacent Properties

As part of its fee-title acquisition of the Preserve, the Authority will also acquire from UTC an easement for access and utilities to and from Metcalf Road across two parcels that UTC owns and will be retaining. This easement provides physical access to the northeastern portion of the Preserve from Metcalf Road. Access to this higher elevation portion of the Preserve from a paved county road will facilitate Preserve management, and enable public access to the Ridge Road, which is planned to become a dedicated segment of the Bay Area Ridge Trail (Sections 2.2.3.1 and 4.4.3.3).

#### 2.1.4.3 Grazing Lease

The Fields family has grazed cattle on the Preserve for approximately 50 years, as part of a cattle operation involving multiple lands in the area (Section 2.1.2.2). In recent years, UTC had a lease with Justin Fields; although currently grazing occurs without such a formal agreement (Valbridge 2013). The Authority will contract with qualified grazers to implement a conservation grazing program (Section 4.2) designed to promote both biodiversity and working lands goals for the Preserve, including maintaining and enhancing the natural community structure and species composition within the serpentine grasslands (Section 3.1) and preserving the agricultural heritage of the region (Section 3.2).

## 2.2 Physical Conditions

### 2.2.1 Topography and Climate

The Preserve is situated in the western foothills of the Diablo Range just east of Coyote Valley—a narrow portion of the southern Santa Clara Valley between the cities of San Jose and Morgan Hill (Figure 1). Elevation ranges between 280 feet above mean sea level (MSL) at the Malech Road Frontage, to 1,450 feet MSL atop Coyote Ridge on the northeastern corner of the Preserve. The upper (eastern) portion of the Preserve generally features a relatively gently sloped, rounded ridgetop, though the northeastern and southeastern parcels, which are located east of the ridgeline, feature steeper terrain. The west-facing hillside features moderately steep slopes interspersed by steeper drainages, which feature both north and southern aspects.

The Preserve experiences a Mediterranean climate characterized by cool, wet winters, and relatively hot, dry summers. Temperatures are greatest near the valley floor, where the mean maximum daily temperature is 73 °F; temperatures are lowest in the northeastern corner of the preserve, the mean minimum daily temperature is just 49.6 °F (PRISM 2011). On average, the Preserve receives 20 inches of precipitation each year, most of which falls as rain; snow occasionally falls in the higher elevation portions of the Preserve, though rarely lasts for more than a day. Interannual variability in rainfall is high can result in dramatic changes in plant productivity in the grasslands (Section 2.4.1), which can have implications for grazing management within the site (Section 4.1).

### 2.2.2 Geology and Soils

The Preserve is largely underlain by sheared serpentinite rock—an intensely stressed, foliate, and shiny metamorphic rock comprised of hydrous magnesium silicate minerals, that ranges in color from light green to a moderately deep green in fresh exposures (Bailey and Everhart 1964). California's state rock, serpentinite is well known for giving rise for diverse and unique communities of plants and animals owing the generally inimical conditions for plant growth and unique microhabitat conditions that it creates (Kruckeberg 1984).

The eastern portion of the property is underlain by Pliocene and/or Pleistoce era sedimentary rocks, which are also beneath the toe of the slope in the western portion of parcel 729-54-002, the western edge of which is underlain by a small area coarse-grained Holocene alluvium (Jennings 1977).

The varied geology, terrain, and hydrology give rise to a mosaic of mapped soil series within the Preserve (Figure 4). The following five types are generally serpentine derived (USDA 2010):

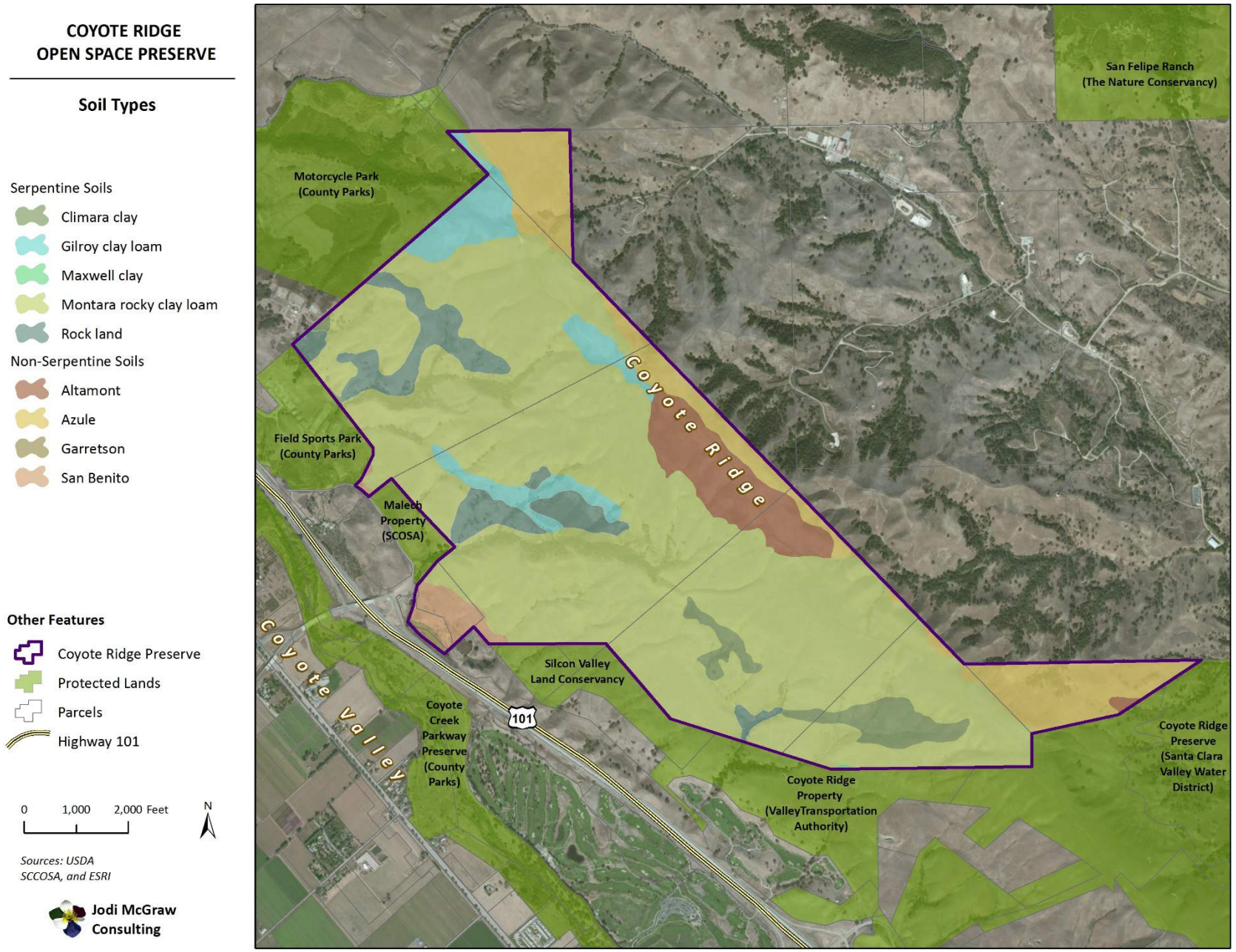


**Figure 4: Soil types**

1. **Montara Rocky Clay Loam:** The predominate soil on the western slope of the Preserve, this serpentine-derived soil is shallow (10-20 inches) and well drained, meaning it features medium and high runoff potential and moderately slow permeability. Within the Preserve, it occurs on slopes between 15 and 50%.
2. **Gilroy Clay Loam:** This moderately deep, well-drained soil formed from the weathering of igneous and metamorphic rocks is mapped in a mosaic with soils of the Montara series and may also be serpentine derived; they occur on generally 30 and 50% slopes and are deeper (20-40 inches).
3. **Climara Clay:** Located in the headwaters of the southern drainage to Coyote Creek, this well-drained soil is formed in mass movement deposits derived from serpentine and other metamorphic rocks. When compared to Montara soils, they are finer-textured and feature slickensides—slip surfaces that form during expansion and contraction of the clay. This soil may be transitional between serpentine and non-serpentine.
4. **Maxwell Clay:** Less than an acre of this deep, somewhat poorly drained soil derived from the alluvium of serpentine rock occurs on the southwestern border of the Preserve.
5. **Rock Land:** In and around the above-described serpentine soils**,** the Preserve features 111 acres of mapped rock outcroppings—areas where serpentine rock bedrock is at the surface and only shallow pockets of soil are found amidst the rock.

Additionally, the Preserve contains four soil types that are underlain by the sedimentary rocks and alluvium and are generally non-serpentine derived (USDA 2010) (Figure 4). Importantly, the serpentine and non-serpentine soils intergrade, rather than occurring in discrete areas as illustrated in the map.

*Serpentine Rock Outcropping.*
*Photograph by Jodi McGraw*

1. **Altamont Clay:** This moderately deep (20-40 inches), well-drained soil derived from fine-grained sandstone and shale is mapped on nearly 100 acres on the eastern edge of the Preserve.
2. **Azule Clay Loam:** Straddling the center ridgeline on the Preserve, this soil is like the Altamont Clay in that it is moderately deep (20-40 inches), well-drained, and formed in material weathered from consolidated alluvium as well as soft shale and fine-grained sandstone. However, Azule Clay Loam generally occurs on steeper slopes (30-75%) than the Altamont Clay (most are 15-30%).
3. **San Benito Clay Loam:** Located in a 29-acre area at the toe of the western slope, this relatively deep (40 – 60 inches) soil largely occurs on steep slopes (30-50%) and is derived from shale and sandstone.
4. **Garretson Loam:** This soil occurs on less than four acres located west of the San Benito Clay Loam, near the valley floor.

Within the Preserve, these soils differ as well as internally vary in aspects of their texture and chemistry that influence their fertility, which interacts with microclimate to greatly influence plant species composition and community structure (Section 2.4). The serpentine soils feature high concentrations of magnesium, iron, and nickel, and low availability of calcium, nitrogen, phosphorus, potassium, and molybdenum. These conditions, particularly the low calcium to magnesium ratio, are generally inimical to plant growth; however, serpentine endemic plants have evolved adaptations that enable them to grow in serpentine-derived soils (Kruckeberg 1984). Though these plants typically can grow on non-serpentine soils, they are competitively excluded from these areas by both native and non-native (exotic) species. Fertilization of serpentine soils through nitrogen deposition has been found to promote growth of exotic plants, particularly European annual grasses, which then outcompete species adapted to growth on serpentine soils (Huenneke et al. 1990, Weiss 1999, Weiss 2003).

Within serpentine soils, soil depth can also influence the abundance of exotic plants (USFWS 1998, Harrison and Viers 2007). Native plant cover tends to be higher on hillsides, where soils are shallow and rocky, than on flatter areas where soils are deeper (Gelbard and Harrison 2003). Grazing management is recommended as a primary tool to reduce competition by exotic herbs on native plants and promote populations of serpentine endemics (Weiss et al. 2007).

Owing to their greater depth and higher fertility, the non-serpentine soils are more productive than the serpentine soils. As a result, they feature a greater abundance of exotic annual grasses and forbs, which compete with the native plants, create thatch that can promote fire, and degrade habitat for native animals. Grazing management can be used to reduce the competition of exotic herbaceous plants, and tip the balance toward native plants, while reducing thatch and the risk of wildfire (Section 4.2).

### 2.2.3 Infrastructure

The Preserve features roads and fences as well as other infrastructure to facilitate cattle grazing (Figure 5), a number of PG&E Electric transmission lines, and a PG&E natural gas pipeline, portions of which are exposed aboveground, and water-related infrastructure.

#### 2.2.3.1 Roads

The Preserve currently features approximately 15 miles of roads, all of which are unpaved and naturally surfaced (Figure 5). The roads were created to install and maintain utility transmission lines within the designated easements (Section 2.1.4.1), as well as to facilitate cattle grazing by providing access to install and maintain troughs and fences (Section 2.1.2.2). The primary routes include the 3.2-mile long Ridge Road, which traverses Coyote Ridge on the eastern end of the property; the 1.2 mile long North Ascent Road, which provides access to the Ridge Road from the Authority's Malech Property; and the 1.9-mile long South Ascent Road, which provides access to the Ridge Road from a more southerly ridgeline where the water pipeline was installed (Section 2.2.3.5; Figure 5).

The Authority intends to maintain 10.5 miles of roads, for management of the Preserve including public trail use (Sections 4.4.3.3 and 4.6.3.1.2). The Authority will eliminate remaining roads, if no longer needed (Section 4.6.3.1.1). To prevent erosion and sedimentation in order to protect water quality and aquatic habitat in Coyote Creek, which is a steelhead stream (Section 2.3.2), the Authority will conduct road improvements including realignments and maintain the roads and trails following best management practices. Section 4.6.3.1.2 outlines anticipated road improvements, which will be updated based on a more thorough assessment of the roads, and implemented as resources become available.

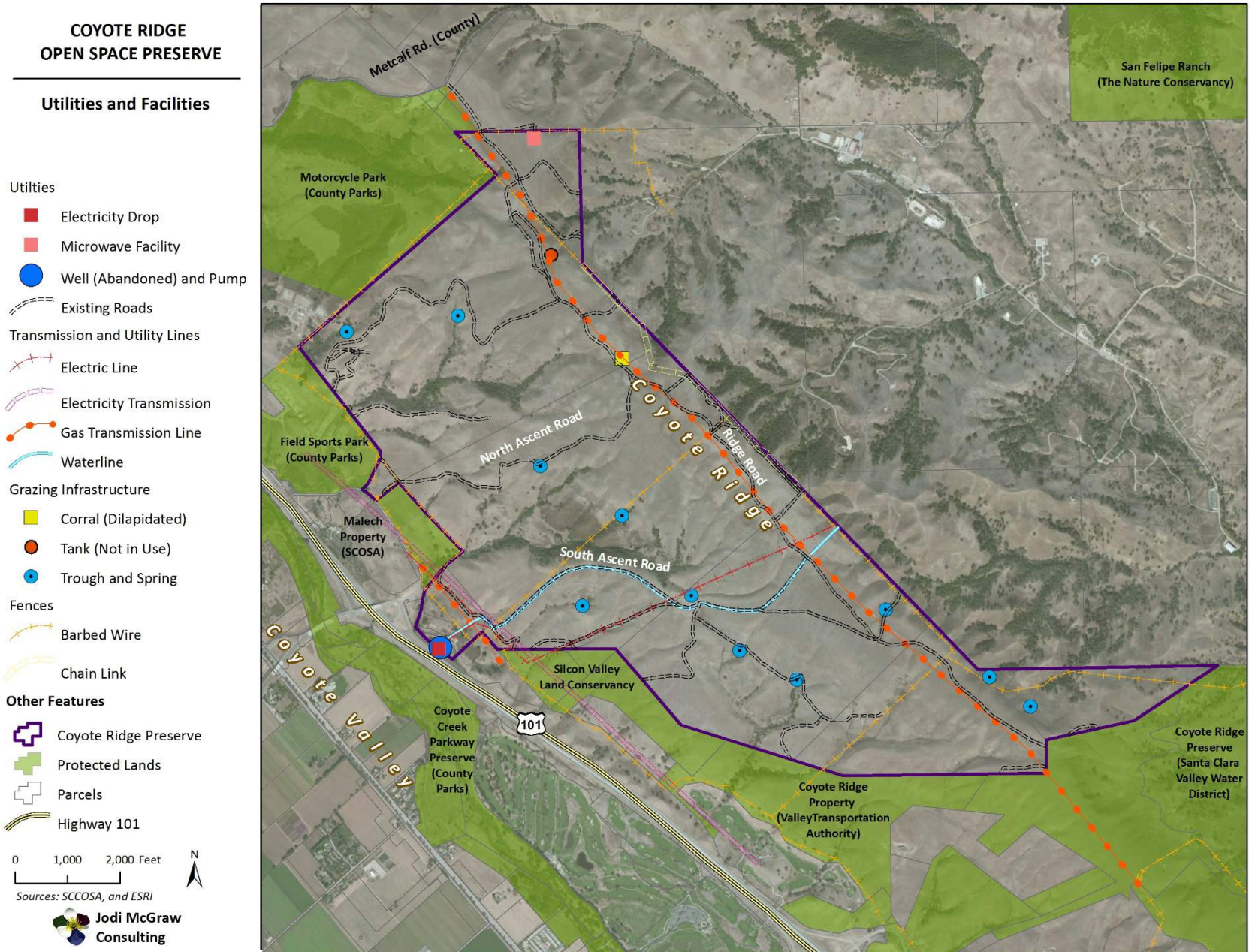


**Figure 5: Utilities and facilities**

#### 2.2.3.2 Fences and Gates

The Preserve features a chain link fence along a portion of the eastern boundary, and barbed-wire fences established to contain cattle (Figure 5). The Preserve also features a series of gates, which are on or near the perimeter of the property. The following sections describe the fences based on available data and reconnaissance level examination of the property; a more detailed inventory of the infrastructure would help inform plans for its maintenance or improvement and facilitate management.

##### 2.2.3.2.1 Chain-Link Fence on Eastern Boundary

An approximately 1.2-mile long section along the eastern boundary of the Preserve features a six-foot tall chain-link fence with three stands of barbed wire on top that angle back into the Preserve. It was installed by UTC to prevent trespass into the facility from the west (Figure 5). In most places, the fence was installed just west of a barbed-wire fence that was located along the property line. In some places, however, the chain link fence was installed further west, inside the Preserve, to keep the fence out of the upper drainages on the eastern slope of the ridge, and thus ease installation.

The fence inhibits east-west movement by animals along its length. Tule elk, mountain lions, deer, and other large and medium sized animals, need to move laterally along the fence until they reach the more permeable barbed-wire fence north or south. Since the sensitive facilities and operations on the adjacent UTC Property, which the fence was installed to protect, have been removed and discontinued, the chain-link fence should be replaced with wildlife-friendly fence (Section 4.6.3.2). The Authority is working to develop a reciprocal easement agreement with UTC which will allow the Authority to replace the chain link fence with a wildlife-friendly fence, to enhance landscape permeability (Section 2.7). The Authority will make this and other fence upgrades as resources allow (Section 4.6.3.2).

*Chain-link fence along the eastern Preserve border*
*Photograph by Jodi McGraw*

##### 2.2.3.2.2 Barbed-Wire Fence

Remaining fences on the property are approximately four-feet tall, and consist of four to six-strand barbed wire. They were installed primarily to contain cattle as part of historic and ongoing operations (Section 2.1.2.2). The barbed-wire fences are largely supported by wooden stakes, with some metal t-posts installed to replace stakes that burned in wildfires in the past several decades (Section 2.1.3). Due in part to the tule elk, which will go through and damage fences, the fences feature numerous breaches, particularly on the interior (pasture) fences.

Because land within the Preserve was once part of a much larger holding (the O'Connell Ranch), the Preserve boundary does not feature a complete perimeter fence. Instead, the system of perimeter and internal fences creates pastures that encompass multiple, separate land holdings (Figure 5; Section 4.2).

#### 2.2.3.3 Corral

The Preserve features a dilapidated wire corral located atop the ridge, which was previously used to tend to livestock (Figure 5). It has not been used in recent years, and instead, cattle are moved on and off of the property from a corral on the Fields Property via the adjacent UTC land to the east (J. Fields, pers. comm. 2015). The Authority will work to site a new corral to support the grazing management program (Section 4.1.6.4.3).

#### 2.2.3.4 Troughs

The property features 13 troughs installed to provide cattle with water (Figure 5). The troughs are also likely used by black-tailed deer (*Odocoileus hemionus columbianus*), tule elk, mountain lion (*Felis concolor*), as well as perhaps bats and other species.

The troughs are filled by springs in drainages or seeps on the hillslope. Water is piped directly to the troughs; there is a single water tank on the ridge top that was historically used to supply water to land east of the ridge. Because water from the springs is piped directly to troughs, which lack float valves, more water is being taken from the springs than is needed to support he livestock operation. Some of the spring-fed troughs overflow, giving rise to artificial freshwater wetlands downslope.

#### 2.2.3.5 Utilities

The Preserve features a series of utility lines that transmit water, gas, and electricity across the property (Figure 5). These utilities are maintained by PG&E and the SCVWD, which hold easements across their property (Section 2.1.4.1). The transmission lines include:

1. **Electricity transmission lines**: The southwestern portion of the property is traversed by electricity transmission lines supported by a series of tall towers; and
2. **Gas Transmission Line:** an underground gas line used to transport natural gas follows the Ridge Road alignment, and is indicated by periodic aboveground signs. An additional above-ground line runs along the western portion of the Preserve from the Malech Property to the Silicon Valley Land Conservancy property.

The Preserve also features utility lines installed to provide electricity and water to the UTC property to the east (Figure 5).

1. **Electric Utility lines:** a series of power poles bisects the property east to west, bringing electricity service to the UTC property to the east from an electricity drop on the westernmost parcel (729-54-004). PG&E indicates plans to remove these electrical lines, if they are no longer required (Valbridge 2013).
2. **Water Pipeline:** A water pipeline was installed along the South Ascent Road to provide water to the UTC property to the

*Electricity transmission and service lines on the western portion of the Preserve*
*Photograph by Jodi McGraw*

east with water from a total of three wells and a pump station in parcel 729-54-004 on the western edge of the Preserve (Figure 5). It features hookups located at intervals along the road; however they do not supply water as the well was abandoned by UTC in 2011 (Valbridge 2013).

#### 2.2.3.6 Communications Facility

The Preserve features an approximately 0.25-acre microwave facility in the northeastern corner of the site which is used by UTC for communications on the adjacent property (Figure 5). The Authority will be granting an easement to UTC to allow access to the facility for maintenance across a short (265-foot) dirt road.

## 2.3 Aquatic Systems

### 2.3.1 Watershed

The Preserve is located in the Coyote Creek Watershed, which drains a 370-square mile area along the southwestern slope of the Diablo Range Mountains north, through the Coyote Valley to the southern tip of the San Francisco Bay. Within this larger watershed, the Preserve largely drains to the west and is located in the South Coyote Creek subwatershed—a 25,514 acre area from the southern tip of the Anderson Valley Reservoir to just north of the Preserve (Figure 6). The eastern slope of the Preserve drains to the San Felipe subwatershed to the east.

### 2.3.2 Streams

The Preserve features approximately 3.15 miles of intermittent streams of which 2.98 miles (95%) flow to Coyote Creek; the remaining 0.17 miles are in the upper headwaters of Las Animals Creek, which flows southeast into the Anderson Valley Reservoir after its confluence with San Felipe Creek (Figure 6).

These streams feature springs, areas where groundwater comes in contact with the surface, that contribute to flows and support freshwater wetlands. The streams are lined primarily with Coast Live Oak Woodlands, and support coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*) rather than riparian vegetation dominated by willows (*Salix* spp.), cottonwoods (*Populus* spp.), and California sycamore (*Platanus racemosa*), or other species adapted to greater soil moisture (Sections 2.4.3 and 2.4.4).

The streams have been assessed as providing excellent breeding habitat for California red-legged frog; specifically, areas with drop pools of at least a foot in depth can be used for breeding (WRA 2004). However, the presence of this species in streams was not examined as part of prior surveys of the

*Intermittent stream lined by valley oaks*
*Photograph by Jodi McGraw*

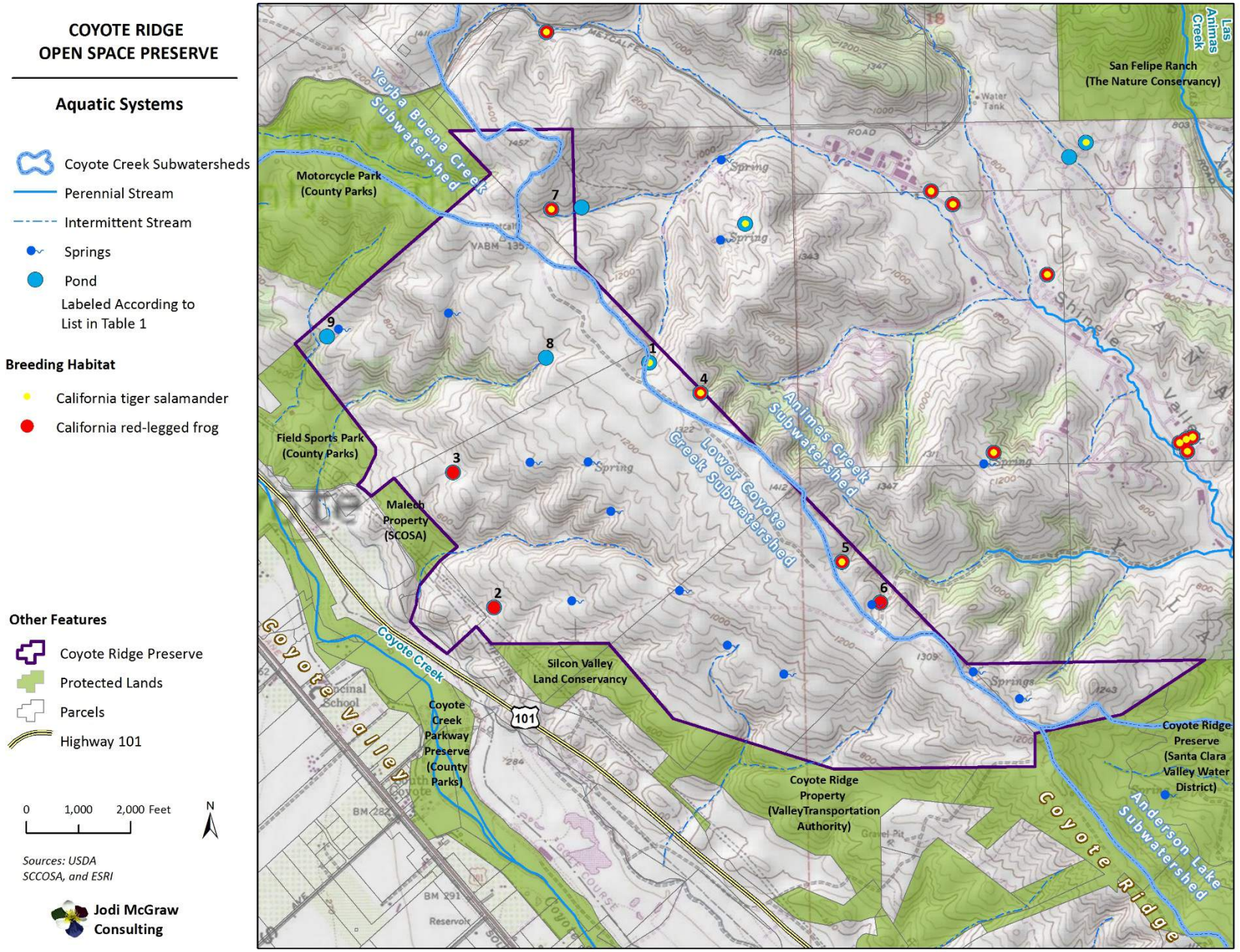


**Figure 6: Aquatic systems**

ponds on the property (Biosearch 2008). The streams also provide water to Coyote Creek, and can contribute to maintenance of rearing and migration habitat for Central California Coast steelhead (*Oncorhynchus mykiss*). The Authority will manage roads and grazing using strategies that will reduce sedimentation and other impacts to water quality in these drainages (Sections 4.1.6.1 and 4.6.3.1)

### 2.3.3 Seeps and Springs

As a result of the serpentine geology, the Preserve features many springs. Three springs are mapped by the US Geological Survey: two in the Las Animals Creek headwaters drainage in the southeastern parcel, and one in the upper portion of the drainage in the center of the Preserve (Figure 6; USGS 2005). However the ponds and troughs on the Preserve are fed by additional, unmapped springs (J. Fields, pers. comm. 2015)

*Serpentine spring supporting Mount Hamilton fountain thistle*
*Photograph by Jodi McGraw*

Uncaptured flow from the springs gives rise to freshwater wetlands, featuring rushes (*Juncus* spp.), sedges (*Carex* spp.), and other species adapted to inundated conditions, including Mt. Hamilton fountain thistle (*Cirsium fontinale* var. *campylon*)— a rare serpentine species endemic to wetlands on serpentine soils in the southern Diablo Range (Section 2.5.1). The springs feature signs of use (i.e. footprints) by large mammals, including cattle, tule elk, and wild pig (*Sus scrofa*).

### 2.3.4 Ponds

The Preserve features eight ponds, of which one is thought to be a naturally-occurring depression in the drainage; the other seven were created to provide water to cattle, by damming drainages or creating hollows downslope of springs to capture their flows (Table 1, Figure 6). The ponds are fairly shallow; all are no more than six feet deep and three are less than two feet deep, due in part to accumulation of silt. Despite this, five of the seven ponds hold water year round as they are fed by perennial springs (Biosearch 2008).

Aquatic plants associated with the ponds include mosquito fern (*Azolla filiculoides*) and cattail (*Typha* spp.). Around pond margins, freshwater wetland species include rushes and sedges as well as the Mount Hamilton fountain thistle). Emergent and wetland vegetation in and round the ponds varies depending on a variety of factors, including hydrology (seasonal vs. perennial), location with respect to the drainage, and intensity of use by cattle, as well as native animals (Section 2.5.2).

The ponds provide breed habitat for California red-legged frog (*Rana draytonii*) and California tiger salamander (*Ambystoma californiense*). One or both of these two federally-threatened species have been observed breeding in the seven ponds that have been surveyed (Table 1, Figure 6). The ponds feature the appropriate hydroperiod, suitable upland habitat, and lack American bullfrogs (*Lithobates catesbeianus*) and fish, which predate upon the listed amphibians (Biosearch 2008). Two additional ponds (Ponds A and B), have not been previously surveyed (Biosearch 2008).

*Pond surrounded by valley oaks*
*Photograph by Jodi McGraw*

Ponds within the Preserve also provide breeding habitat for Pacific tree frog (*Pseudacris regilla*), also known as the Pacific chorus frog, as well as other herpetofauna including Diablo Range garter snake (*Thamnophis atratus zaxanthus*) (Biosearch 2008). Ponds also provide a source of free water for terrestrial species, including tule elk and wild pig, which can degrade habitat through wallowing (Section 2.6.2).

## 2.4 Plant Communities

The Preserve features a mosaic of grassland, chaparral, oak woodland and forest, wetland, and riparian communities (Table 2, Figure 7). The following sections describe these communities based on their distributions as mapped for the Valley Habitat Plan (SCVHA 2012), and adjusted based on reconnaissance-level site assessments used to prepare this plan, which were also used to generally characterize their structure and species composition. The site visits focused on assessing the serpentine communities, with less time allocated to evaluating the woodlands which are described more generally.

More detailed field analysis could be used to refine the regional map and provide more detailed descriptions of the communities within the site, based upon the associations classified from prior floristic analysis of the Coyote Ridge (Evens and San 2004). Notably, field assessment can be used to accurately delimit serpentine communities not fully represented, including serpentine seeps and serpentine outcrops, which are more widespread that indicated in the relatively coarse-scale map.

### 2.4.1 Grasslands

Over 90% of the Preserve (1,634 acres) supports grasslands—upland herbaceous communities dominated by grasses and forbs (i.e. wildflowers), and featuring other graminoids (grass-like plants) such as rushes and sedges. The grasslands include scattered shrubs and trees as well as small patches of shrublands and woodlands, particularly in the drainages and around rock outcrops. The grasslands occur throughout the Preserve, except in drainages which are lined with shrublands and woodlands that innervate the grasslands (Figure 7).

The grasslands differ in their plant species composition due to a variety of factors, including most notably, edaphic (soil related) conditions.

**Table 1: Ponds within the Coyote Ridge Preserve**

| Pond # | Hydrology | Approximate Size | | Max. Depth (In.) | Breeding by Species[2] | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | Dimensions | Area (sf) | | CTS | CRLF | PTF | |
| 1 | Seasonal | 45' x 105' | 3,711 | 72 | Yes | No | Yes | Dam breached; drains quickly. Mature willows (*Salix spp.),* California buckeye (*Aesculus californica),* and California bay (*Umbellularia californica*) as well as artichoke thistle on the perimeter. |
| 2 | Perennial | 35' x 35' | 962 | 10 | No | Yes | Yes | Heavily silted; features Mt. Hamilton thistle and dense irisleaf rush (*Juncus xiphiodes*) on the edge. |
| 3 | Perennial | 60' x 60' | 2,827 | 8 | No | Yes | Yes | Deep silt layer. 75% of surface covered by emergent vegetation. |
| 4 | Seasonal | 50' x 60' | 2,356 | 72 | Yes | Yes | Yes | 10% of surface covered by emergent vegetation; no edge vegetation. Berm eroded at outlet. |
| 5 | Perennial | 30' x 60' | 1,413 | 60 | Yes | Yes | Yes | 2% coverage of emergent vegetation, with 50% floating vegetation in spring. Deep silt plume at outlet. |
| 6 | Perennial | 30' x 40' | 942 | 60 | N | Yes | Yes | 15% of perimeter covered by coffee berry (*Frangula californica)* |
| 7 | Perennial | 75' x 50' | 2,945 | 48 | Yes | Yes | Yes | 35% of surface area covered with emergent vegetation. Use by tule elk. |
| 8 | Seasonal | 50' diameter | 1,963 | 18 | No Survey | No Survey | No Survey | Heavily silted; berm eroded at outlet. |
| 9 | Unknown | Unknown | | | No Survey | No Survey | No Survey | Not examined as part of the prior survey or the assessment to prepare this plan. |

[1] Ponds are labeled on Figure 6

[2] Indicates whether species was observed breeding in the pond during any one of four survey years: 2005-2008 (Biosearch 2008).

CTS=California tiger salamander, CRLF=California red-legged frog, and PTF=Pacific tree frog

**Table 2: Plant communities of the Preserve noting preliminary list of common native and exotic species based on limited field reconnaissance during winter.**

| Plant Community | Acres | Percent of Total | Common or Indicative Plant Species | |
|---|---|---|---|---|
| | | | Native | Exotic |
| **Grasslands (and associated wetlands)** | | | | |
| California Annual Grassland | 264.7 | 14.7% | *Viola pedunculata, Ranunculus californicus, Lupinus* sp.*, Amsinckia menziesii* var. *intermedia* | *Erodium cicutarium, Avena barbata, A. fatua, Bromus diandrus, B. hordeaceous, Festuca perennis, Hordeum murinum, Brassica spp., Silybum marianum, Aegilops triuncialis* |
| Serpentine Bunchgrass Grassland | 1,369.5 | 76.0% | *Muilla maritima, Chlorogalum pomeridianum, Escholzia californica, Lasthenia californica, Calystegia collina, Stipa pulchra* | *Bromus hordeaceous, Festuca perennis, Erodium cicutarium* |
| Serpentine Rock Outcrop / Barrens[1] | 0.2 | 0.0% | *Plantago erecta, Allium serra, Lomatium utriculatum, Sanicula bipinnatifida, Hesperevax sparsiflora, Erysimum franciscanum, Toxicodendron diversilobum, Cryptantha flaccida* | *Erodium cicutarium, Festuca perennis* |
| Serpentine Seep[1] | 0.4 | 0.0% | *Cirsium fontinale* var. *campylon, Mimulus guttatus, Stachys pychnantha, Juncus xiphioides* | *Polypogon monspeliensis* |
| Mixed Serpentine Chaparral | 43.2 | 2.4% | *Salvia mellifera, Artemisia californica, Arctostaphylos glauca, Adenotstoma fasiculatum, Heteromeles arbutifolia* | |

**Table 2: Plant communities of the Preserve noting preliminary list of common native and exotic species based on limited field reconnaissance during winter.**

| Plant Community | Acres | Percent of Total | Common or Indicative Plant Species | |
|---|---|---|---|---|
| | | | Native | Exotic |
| **Oak Woodlands**[1] | | | | |
| Coast Live Oak Forest and Woodland | 94.4 | 5.2% | *Quercus agrifolia, Umbellularia californica, Claytonia perfoliata, Stachys ajugoides, Ranunculus californicus, Sambucus Mexicana, Toxicodendron diversilobum* | |
| Mixed Oak Woodland and Forest | 14.5 | 0.8% | *Quercus agrifolia, Q. lobata* | |
| Valley Oak Woodland[2] | 10.5 | 0.6% | *Quercus lobata* | |
| Seasonal Wetland | 1.9 | 0.1% | Not examined | |
| Willow Riparian Forest and Scrub | 2.8 | 0.2% | *Platanus racemosa, Salix laevigata, Populus fremontii, Quercus agrifolia* | |
| Urban – Suburban | 0.1 | 0.0% | NA | |
| **Total** | **1,802.1** | **100.0%** | | |

[1] Field-based mapping will likely reveal the actual acreage is likely higher, as many features were not mapped in the regional database used for this assessment (SCVHA 2012)

[2] Includes a 9.3-acre area in the southeastern corner of the Preserve classified as Foothill Pine-Oak Woodland, but which lacks foothill pine and instead is dominated by valley oak.

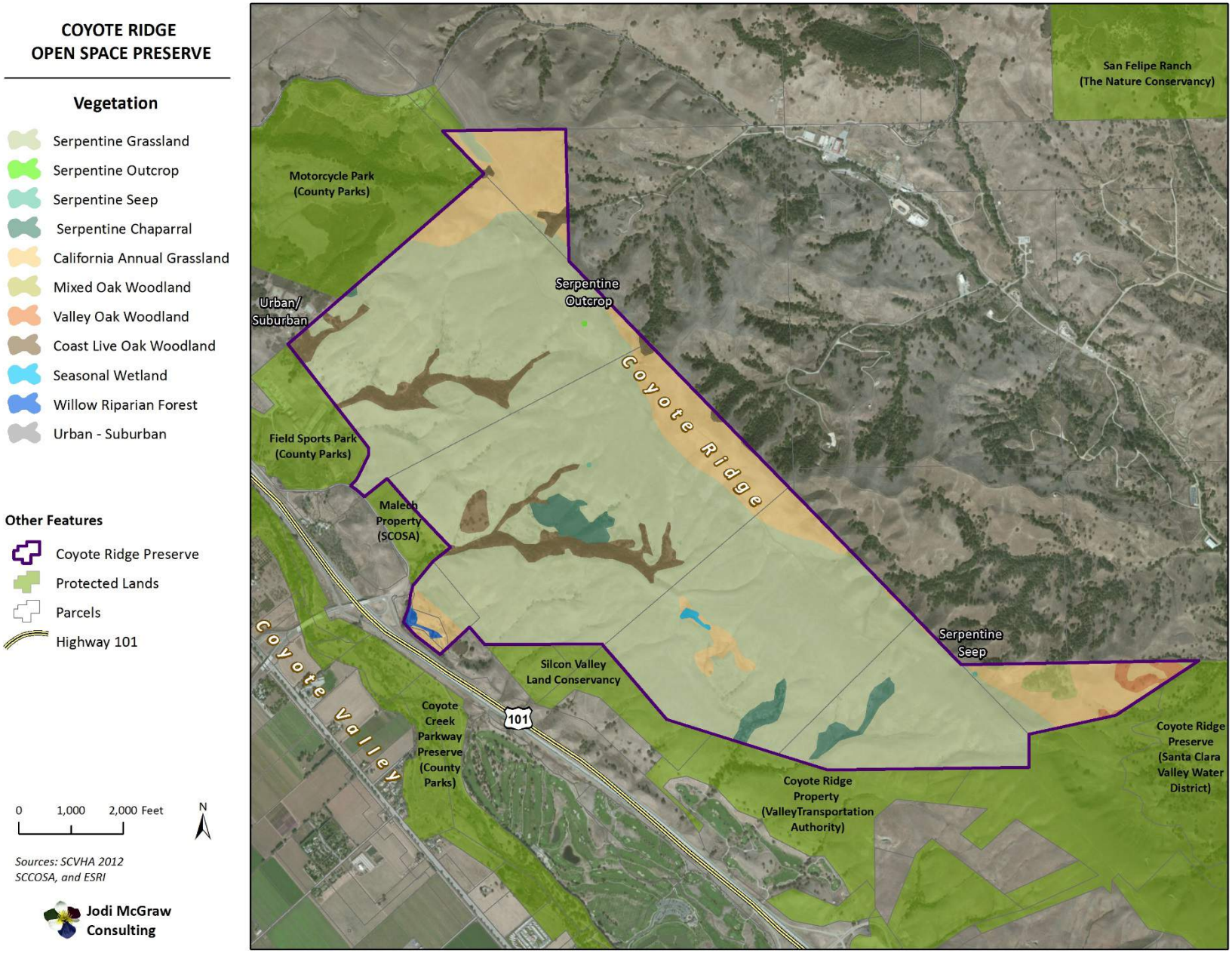


**Figure 7: Vegetation**

#### 2.4.1.1 Serpentine Bunchgrass Grassland

Of the 1,635 acres of grassland, 1,370 acres (84%) have been characterized as serpentine bunchgrass grassland—a forb-dominated community that occurs on serpentine soils, which are infertile and can even be toxic to growth of plants that are not adapted to their unique chemistry (Section 2.2.2). These grasslands support diverse assemblages of native herbaceous plants, including plants found only on serpentine soils (serpentine endemics), including the following special-status species: Metcalf Canyon jewelflower (*Streptanthus glandulosus* ssp. *albidus*), most beautiful jewel-flower (*S. glandulosus* ssp. *glandulosus*), Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *setchellii*) and smooth lessingia (*Lessingia micradenia* var. *glabrata*).

The grasslands also support plants species founds on non-serpentine soils, but which occur at higher abundance on serpentine soils, such as dwarf plantain (*Plantago erecta*) and erect evax (*Hesperevax sparsiflora*).

*Serpentine grassland in spring*
*Photograph by Jodi McGraw*

Bunchgrasses that lend this community its name include primarily purple needle grass (*Stipa pulchra*). Though conspicuous, perennial grasses are only patchily abundant; this community is instead dominated by native forbs such as California goldfields (*Lasthenia californica*), dwarf plantain, California poppy (*Eschscholzia californica*), and weakstem cryptantha (*Cryptantha flaccida*). Small fescue (*Vulpia microstachys*), a native annual grass, may also occurs in this community. Where conspicuous grass cover is lacking, these communities are referred to as wildflower fields by Holland (1986).

Exotic plant species, which occur at much lower density in this community than in the California annual grassland, include rye grass (*Festuca perennis*), soft chess (*Bromus hordeaceus*), hare barley (*Hordeum murinum subsp. leporinum*), redstem filaree (*Erodium cicutarium*), and barb goatgrass (*Aegilops triuncialis*)—an invasive species that has invaded this area relatively recently, and has been a focus of vegetation management (Weiss et al. 2007).

#### 2.4.1.2 Serpentine Rock Outcrop/Barrens

A small area (0.2 acres) of the serpentine grassland has been mapped as featuring aboveground serpentine bedrock with limited soil and only sparse plant cover (serpentine outcrops) or areas of exposed serpentine soil that support little vegetation (serpentine barrens). Mapped primarily based on aerial image analysis, this community is far more extensive within the Preserve and indeed dominates the mid- and upper-elevation portions of the western slope (Figure 7).

Native plants in serpentine outcrops include purple sanicle (*Sanicula bipinnatifida*), jeweled onion (*Allium serra*), and poison oak (*Toxicodendron diversilobum*); these areas also support several rare species including Metcalf Canyon jewelflower, most beautiful jewel-flower, smooth lessingia, and Santa Clara Valley dudleya.

Due to the thin soil, this community features low richness and cover of exotic plants such as redstem filaree and rye grass.

#### 2.4.1.3 Serpentine Seeps

The Preserve features two small areas totaling 0.4 acres where a known seep occurs within serpentine grassland (Figure 7). As with the serpentine rock outcrops and barrens, the aerial image analysis underestimates the extent of this community type, which is present near most of the troughs and ponds located in the grasslands.

The serpentine seeps support plants adapted to the moist soil conditions, including Mount Hamilton fountain thistle, irisleaf rush (*Juncus xiphioides*), and seep spring monkey flower (*Mimulus guttatus*); they may also support meadow barley (*Hordeum brachyantherum*). Exotic plants that may occur in this community include rabbit's foot (*Polypogon monspeliensis*) and narrow-leaved wild lettuce (*Lactuca saligna*).

#### 2.4.1.4 California Annual Grassland

California annual grassland covers an estimated 265 acres (15%) of the eastern portion of the Preserve where it occurs on non-serpentine soils (Figures 4 and 7). When compared with serpentine grassland, this grassland on higher fertility soils is more productive, and features denser and often taller plant growth. It is also dominated in terms of cover by exotic annual grasses and forbs, including wild oats (*Avena barbata* and *A. fatua*), soft brome, hare barley, Italian rye grass, ripgut brome (*Bromus diandrus*), as well as patches of barb goat grass; redstem filaree occurs on warmer south and west-facing slopes. Invasive plants in these grasslands include mustard (*Brassica* spp. and perhaps also *Hirschfeldia incana*) and milk thistle (*Silybum marinum*).

Native species include California buttercup (*Ranunculus californicus*), Johnny jump-up (*Viola pedunculata*), common fiddleneck (*Amsinckia menziesii* var. *intermedia*), and lupines (*Lupinus* spp.).

### 2.4.2 Mixed Serpentine Chaparral

An estimated 43.2 acres (2.4%) of the Preserve features serpentine chaparral, which is dominated by schlerophyllous (thick-leaved) shrubs, with some soft woody shrubs; tree cover is limited except at the ecotone with the oak woodlands, and herbaceous plants occur primarily in the shrub canopy gaps.

Within the Preserve, this community occurs on the upper portions of the largely south-facing slopes of the drainages that innervate the serpentine soils on the western hillside (Figure 7). There, mixed serpentine chaparral intergrades with the coast live oak woodland, which occurs deeper in the canyon, and serpentine grasslands, which occur on the rounded ridges and less eroded slopes.

Dominant species in serpentine chaparral include bigberry manzanita (*Arctostaphylos glauca*), chamise (*Adenostoma fasciculatum*), black sage (*Salvia mellifera*), and toyon (*Heteromeles arbutifolia*). Soft woody shrubs include California sagebrush (*Artemesia californica*) and sticky monkeyflower (*Mimulus californicus*). Gaps in the shrub canopies support primarily native, herbaceous plants adapted to thin, low-nutrient soils; on the north-facing slope, these including white globe lily (Calochortus albus), bedstraw (*Galium* sp.), and common yarrow (*Achillea millefolium*).

*Serpentine chaparral and oak woodland*
*Photograph by Jodi McGraw*

### 2.4.3 Oak Woodlands

Approximately 119 acres (6.6%) of the Preserve supports oak woodlands, which are dominated by hardwoods including primarily coast live oak (*Quercus agrifolia*) but also valley oak (*Q. lobata*), California buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*). Coast live oak woodlands, which cover 94.4 acres and constitute most of this community type, dominate the deeper and narrower drainages, particularly those on the western hillside; these drainages feature cooler, moister microclimates and deeper soils than the adjacent slopes and ridges (Figure 7). With these drainages, coast live oak woodlands extend further up the north-facing slopes, which receive less direct sunlight than the south-facing slopes, where mixed serpentine chaparral and grassland predominate on the upper slopes.

The southeastern tip of the Preserve also features a patch of mixed oak forest and woodlands (14.5 acres), which features a mix of coast live oak and valley oak as well as other hardwoods including California buckeye, on the rounded ridges (Figure 7). Valley oak dominates the canopy on 9.3 acres in the far southeastern corner, in an area regionally mapped as foothill pine-oak woodland (SCVHA 2012), but where no foothill pine (*Pinus sabiniana*) were observed during this assessment (Figure 7).

Understory species include shrubs and herbs, with the structure and species composition in the oak woodlands varies depending on their topographic position and the density of trees. Where trees are sparse, as in the woodlands, the herbaceous understory features relatively dense grasses and forbs including many species found in the grasslands. The denser woodlands and forests have understories of shade-tolerant shrubs and herbs.

### 2.4.4 Willow Riparian Forests and Scrub

Approximately 2.8 acres located along an intermittent drainage on the far western border of the Preserve (Figure 7) features a relatively open canopy of riparian species including California sycamore (*Platenus racemosa*), red willow (*Salix laevigata*), and Fremont cottonwood (*Populus fremontii*), mixed with coast live oak.

### 2.4.5 Seasonal Wetland

In addition to the 0.4 acres of mapped serpentine seeps (Section 2.4.1.3), 1.9 acres (0.1%) of the Preserve features seasonal wetlands which feature hydrophytes including rushes and sedges.

### 2.4.6 Urban

A small area (0.1 acre) on the far northwestern corner of the Preserve has been mapped as urban or developed (Figure 7). This likely represents mapping error/imprecision, as the facilities are likely actually located north of the Preserve boundary.

## 2.5 Sensitive Species

As a result of its serpentine soils, diverse aquatic systems, and low-intensity land use, the Preserve provides habitat for a diverse suite of native plants and animals. The Preserve is known to support eight plant and six animal species that are rare, threatened, or endangered (Table 3, Figures 8 and 9). It may support an additional 17 sensitive species, eight plants and nine animals, which are found in similar habitat within the region. More comprehensive surveys of the Preserve may reveal occurrences of these and perhaps other rare species.

The Preserve contains habitat that is important for recovery of the rare serpentine species, and deemed essential to recovery of Bay Checkerspot butterfly (USFWS 1998). Coyote Ridge features some of the most extensive serpentine grassland habitat in the range of the listed serpentine species (USFWS 1998). Due to its large size and variable microtopography, the Preserve provides diverse microhabitat conditions that may enable these and other species to persist, by adjusting their distributions to stay within their climatic tolerance envelope as the climate changes and presumably warms.

The following sections provide brief overviews of the main guilds of species. More detailed information about these species is provided in the Valley Habitat Plan (SCVHA 2012).

### 2.5.1 Plants

The Preserve features known occurrences of eight rare and endangered plants and provides suitable habitat for an additional eight species (Table 3, Figure 8). All but one species, chaparral mallow (*Malacothamnus arcuatus*) are endemic to, or have an affinity for, serpentine soils (Table 3). Owing to their limited distributions and narrow habitat specificity, all except one plant, San Francisco wallflower (*Erysimum franciscanum*), which also occurs off serpentine, are on the California Native Plant Society (now California Rare Plant Rank) List 1B—plants that are rare, threatened, or endangered throughout California and elsewhere (CNPS 2015).

Metcalf Canyon jewelflower has the most narrow distribution, as it is found on the Coyote Ridge near Metcalf Canyon Road and on Tulare Hill on the west side of Coyote Valley. Owing to their extreme rarity and threats, Metcalf Canyon jewerlflower and Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *setchellii*) have been listed as federally endangered (USFWS 1998).

**Table 3: Rare and special-status species known, or with potential, to occur within the Preserve. Species in bold are known to occur on the site. Scientific names for plants are from Baldwin et al. 2012, with those brackets from Hickman 1993. (Arcadis 2011, OSA 2014, CDFW 2015)**

| Species | Status[1] | Habitat Preference | Known Occurrences in Preserve and Nearby Areas |
|---|---|---|---|
| **Plants** | | | |
| Chaparral mallow (*Malacothamnus arcuatus*) | LIST 1B.2 | Chaparral | West of the Preserve, east of Malech Road, northeast of Bailey Road exit. |
| Coyote ceanothus (*Ceanothus ferrisiae*) | LIST 1B.1 | Serpentine chaparral and grassland | Known from the Kirby Canyon Landfill 2.25 mi south of the Preserve |
| **Fragrant fritillary (*Fritillaria liliacea*)** | **LIST 1B.2** | **Grassland, coastal scrub, and woodland, especially serpentine** | **Present in serpentine grasslands in northern the northeast portion of Rock Field 1, along Ridge Road** |
| **Hall's bushmallow (*Malacothamnus hallii*)** | **LIST 1B.2** | **Serpentine chaparral and coastal scrub** | **Present on edges of serpentine chaparral in center of Preserve** |
| Leather oak (*Quercus durata* var. *durata*) | | Serpentine chaparral and woodland | Occurs east of Rancho Cañada del Oro Open Space Preserve in the Santa Cruz Mountains |
| Loma Prieta Hoita (*Hoita strobilina*) | LIST 1B.1 | Chaparral and mixed evergreen forests, primarily on serpentine soils | Occurs in the oak woodland along the drainage of the Malech Property, adjacent to the Preserve, and in the Silicon Valley Land Conservancy Property to the west (also on SCVWD) |
| **Metcalf Canyon jeweflower (*Streptanthus glandulosus* ssp. *albidus*) [*S. albidus ssp. albidus]*** | **FE, List 1B.1** | **Outcroppings and bare slopes on serpentine** | **Occurs in serpentine outcrops in the northern half of the Preserve.** |
| **most beautiful jewelflower (*S. glandulosus* ssp. *glandulosus*) [*S. albidus s*sp. *peramoenus*]** | **LIST 1B.1** | **Serpentine grassland and rock outcroppings** | **Occurs in serpentine grasslands in the southern portion of the Preserve (West Ridge Pasture)** |
| **Mt. Hamilton fountain thistle (*Cirsium fontinale* var. *campylon*)** | **LIST 1B.2** | **Serpentine grassland, especially wet areas such as seeps** | **Occurs in the drainages in seven mapped locations within the Preserve** |
| Pink cream sacs (*Castilleja rubicundula ssp. rubicundula*) | LIST 1B.2 | Serpentine grassland, chaparral openings, woodlands, and seeps | Known from Uvas Road area in the Santa Cruz Mountains |
| Robust coyote mint (*Monardella villosa* ssp. *globose*) | LIST 1B.2 | Openings within chaparral and woodlands | Known from Uvas Creek Canyon in Upper Uvas Creek properties, in the Santa Cruz Mountains |
| **San Francisco wallflower (*Erysimum franciscanum*)** | List 4.2 | **Serpentine outcrops, coastal scrub, sand dunes, and granitic hillsides** | **Scattered throughout much of the serpentine grassland within the Preserve** |
| **Santa Clara Valley dudleya** | **FE, LIST 1B. 1** | **Serpentine rock outcroppings** | **Scattered throughout much of the serpentine grassland in the Preserve** |

**Table 3: Rare and special-status species known, or with potential, to occur within the Preserve. Species in bold are known to occur on the site. Scientific names for plants are from Baldwin et al. 2012, with those brackets from Hickman 1993. (Arcadis 2011, OSA 2014, CDFW 2015)**

| Species | Status[1] | Habitat Preference | Known Occurrences in Preserve and Nearby Areas |
|---|---|---|---|
| **(*Dudleya abramsii* ssp. *setchellii*)**<br>**[*D. setchellii*]** | | | |
| **Smooth lessingia (*Lessingia micradenia* var. *glabrata)*** | **LIST 1B.2** | **Serpentine grassland and rock outcroppings** | **Scattered throughout much of the serpentine grassland in the Preserve** |
| Tiburon Indian paintbrush (*Castilleja affinis* ssp. *neglecta*) | LIST 1B.2 | Serpentine grassland | Known from serpentine grasslands south of the Preserve, in the Waste Management site as well as SCVWD Coyote Ridge Preserve |
| Woodland woollythreads (*Monolopia gracilens*) | LIST 1B.2 | Serpentine grassland, open chaparral, and oak woodland | Known from Santa Teresa County Park, across Coyote Valley. |
| **Animals** | | | |
| **Bay checkerspot butterfly (*Euphydryas editha bayensis*)** | **FT** | **Serpentine grasslands and rock outcroppings** | **Occurs throughout the serpentine grasslands of the Preserve** |
| **Opler's longhorn moth (*Adela oplerella*)** | | **Grasslands including coastal prairie and serpentine** | **Known from one location in serpentine grassland in the southern portion of the Preserve (West Ridge Pasture)** |
| Hom's micro-blind harvestman *(Microcina homi)* | | Serpentine grasslands | Known from three locations in the western slope of the Diablo Mountains north of Metcalf Road, as well as west of Santa Teresa Co. Park in the Santa Cruz Mountains |
| Jung's (Silver Creek) micro-blind harvestman (*Microcina jungi*) | | Serpentine rocks in grasslands | Known from Silver Creek serpentine habitat 2.5 miles northwest of the Preserve. |
| **California tiger salamander (*Ambystoma californiense*)** | **FT, ST** | **Ponds and adjacent grasslands and savannas** | **Breeds in the four ponds on the eastern slope of the ridge within the Preserve, as well as numerous ponds on the adjacent UTC property.** |
| **California red-legged frog (*Rana draytonii*)** | **FT** | **Ponds, streams with pools, and adjacent uplands** | **Breeds in the four ponds on the eastern slope of the ridge, as well as Ponds 9 and 10 on the toe of the western slope in the Preserve.** |
| Western pond turtle (*Actinemys marmorata*) | SSC | Ponds, streams, and adjacent uplands | Known from a pond in the UTC property to the east, Coyote Creek to the west, and Anderson Lake to the south of the Preserve |
| **Burrowing owl (*Athene cunicularia*)** | **SSC** | **Short-statured grasslands** | **Has been observed wintering and may breed on the Preserve** |

**Table 3: Rare and special-status species known, or with potential, to occur within the Preserve. Species in bold are known to occur on the site. Scientific names for plants are from Baldwin et al. 2012, with those brackets from Hickman 1993. (Arcadis 2011, OSA 2014, CDFW 2015)**

| Species | Status[1] | Habitat Preference | Known Occurrences in Preserve and Nearby Areas |
|---|---|---|---|
| **golden eagle (*Aquila chrysaetos*)** | **FP** | **Grasslands, shrublands, and woodlands** | **Has been observed in the Preserve** |
| **white-tailed kite (*Elanus leucurus*)** | **FP** | **Tall-statured grasslands, meadows, and fields** | **Observed foraging on the Preserve during assessment for this plan.** |
| tricolored blackbird (*Agelaius tricolor*) | SSC | Breeds in wetlands; forages in grasslands and agricultural fields | Known from Calero County Park in Santa Cruz Mountains |
| San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) | SSC | Shrublands, woodlands, and forests | Known from several locations in the UTC property to the east. |
| American badger (*Taxidea taxus*) | SSC | Grasslands and sparse shrublands on friable soils | Known from the Silicon Valley Land Conservancy site, and Tulare Hill. |
| Pallid bat (*Antrozous pallidus*) | SSC | Rocky open areas near water | Known from UTC Property to the east |
| Yuma myotis (*Myotis yumanensis*) | | Various including riparian and woodlands | Known from Calero County Park in Santa Cruz Mountains |

[1] Federal Status Designations:

FE = Federally Endangered. Species in danger of extinction throughout all or significant portions of its range.

FT = Federally Threatened. Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

State Status Designations:

SE = State Endangered. Species whose continued existence in California is jeopardized.

ST = State Threatened. Species, although not presently threatened with extinction, may become endangered in the foreseeable future.

SSC = California species of special concern. Animal species with California breeding populations that may face extinction in the near future.

FP = Fully protected by the State of California under Sections 3511 and 4700 of the Fish and Game Code.

WL= Department of Fish and Wildlife Watch List

California Rare Plant Rank Designations:

List 1A = Plants presumed extinct in California

List 1B = Most plants in this category are endemic to California and have experienced significant declines over several decades; these plants are rare, threatened, or endangered throughout California and elsewhere.

List 4 = "Watch List" plants with limited distribution or infrequent presence throughout California. Populations of these species may exist along the perimeter of the species' range, may have declined significantly in specific locations within its range, may exhibit unique morphology, or occur on uncommon substrates.

Decimals after the Status categories represent the Threat rank (e.g., "List 1B.1"):

0.1 = Seriously threatened populations in California, where over 80% of occurrences are threatened

0.2 = Marginally threatened populations in California, where between 20% and 80% of occurrences are threatened

0.3 = Populations with limited threats; fewer than 20% of occurrences are threatened or no known current threats

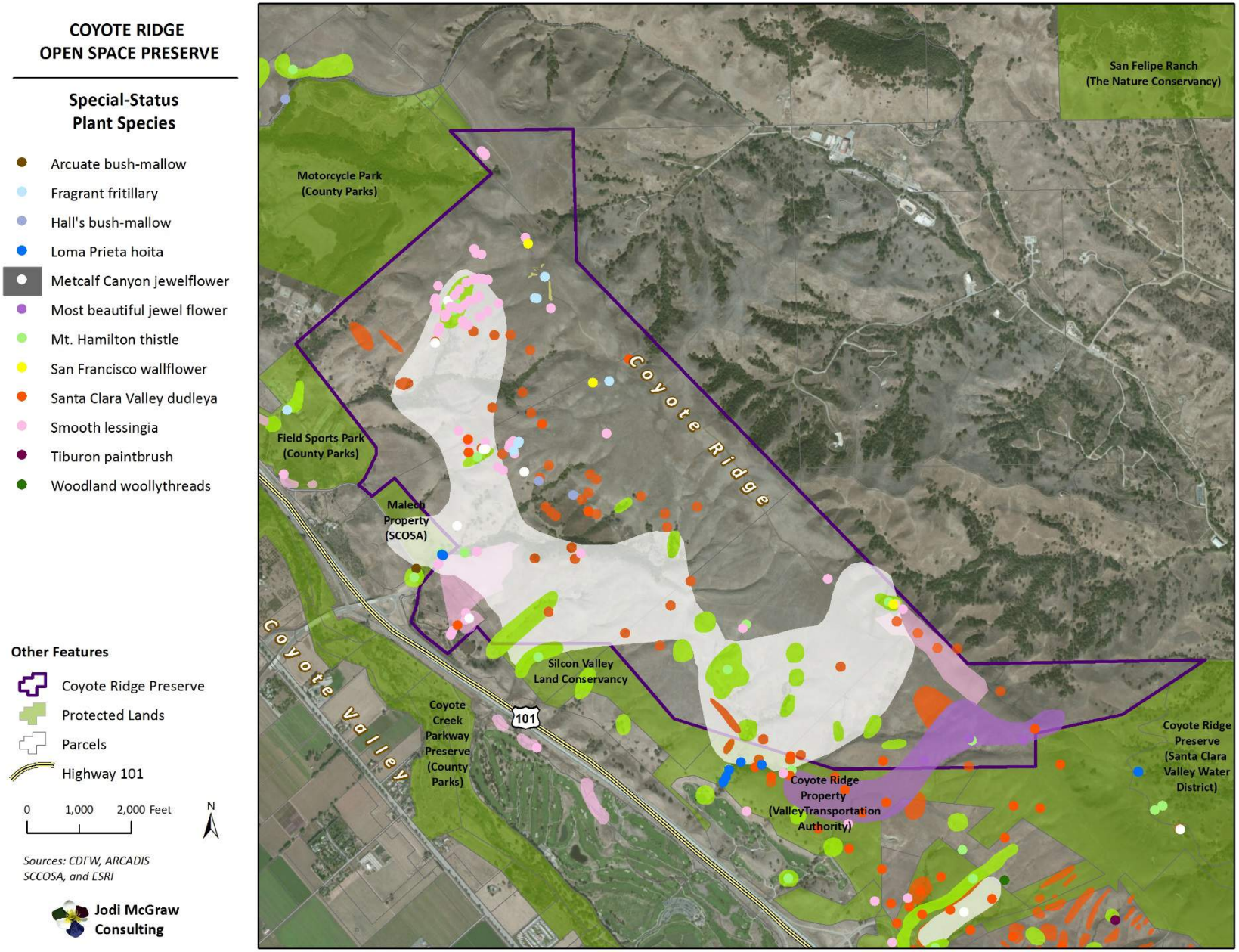


**Figure 8: Special-status plant species**

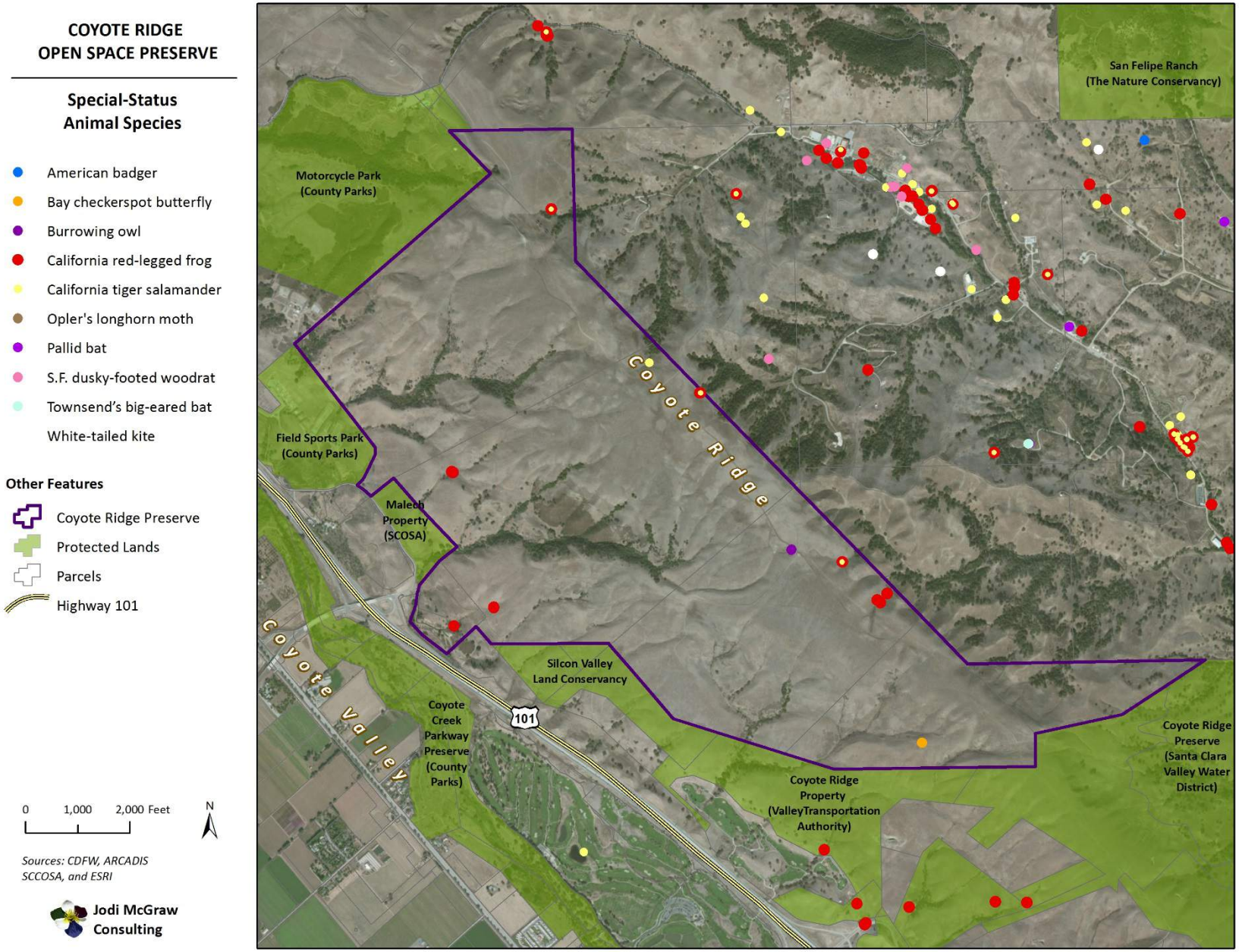


**Figure 9: Special-status animal species**

*Bay checkerspot butterfly on fragrant fritillary*
*Photograph by Jodi McGraw*

### 2.5.2 Invertebrates

The Preserve provides habitat for two rare lepidopterans (moths and butterflies) and may also provide suitable habitat for two species of phalangids (harvestman), which are a type of arachnid (Table 3, Figure 9).

Most notably, the Preserve supports the federally-threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*), which inhabits serpentine grasslands and serpentine outcrop communities ringing the San Francisco Bay. The Coyote Ridge has been identified as one of the key areas for long-term persistence of this species (USFWS 1998). The thin, often rocky soils combined with cattle grazing create short-statured, low-thatch conditions that give rise to the butterfly's primary larval host plant, dwarf plantain. The serpentine grasslands also feature large populations of the Bay checkerspot butterfly's nectar plants including bladder parsnip (*L. utriculatum*), California goldfields, and tidy-tips (*Layia platyglossa*). The serpentine grasslands within the Preserve feature variable microclimates, including a variety of slope aspects, which can help Bay checkerspot butterflies develop within the 'phenologic window' amidst the interannual variability in weather (Weiss 1996 *in* USFWS 1998).

The serpentine grasslands of the Preserve also provide habitat for Opler's long-horned moth (*Adela oplerella*), a diurnal moth which inhabits grasslands on serpentine and non-serpentine soil. This species was previously recorded in the southern portion of the Preserve (Figure 8). It is often found in association with cream cups (*Platystemon californicus*), which along with gold fields, tidy tips, and *Leptosiphon* species, supply the moth with nectar (USFWS 1998). These wildflowers can occur off serpentine soils, but do well on serpentine owing to reduced competition from dense exotic grasses.

The Preserve may support Hom's micro-blind harvestman (*Microcina homi*) and/or Jung's micro-blind harvestman (*Microcina jungi*)—two nearly microscopic arachnids with long, thin legs that are endemic serpentine outcrops in Santa Clara County. They are often observed on the underside of rocks, in moist conditions within rock outcroppings (USFWS 1998). The Preserve features abundant outcroppings of serpentine rock which are not known to have been previously surveyed for these species.

### 2.5.3 Aquatic Species

The Preserve provide suitable habitat for two federally-threatened amphibians, California red-legged frog and California tiger salamander. California tiger salamander has been observed in four ponds on the eastern slope of Coyote Ridge (Table 1, Figures 6 and 9). The grasslands feature burrows created by California ground squirrel (*Otospermophilus beecheyi*) that provide upland habitat for California tiger salamander, which has been observed throughout the UTC property to the east (Figure 9).

California red-legged frog has been observed breeding in four ponds on this east slope of the Preserve, as well as two ponds near the toe of the western slope (Table 1, Figures 6 and 9). California red-legged frog may also breed in pools within the drainages (WRA 2004), which were not subject to prior breeding surveys (Biosearch 2008).

The Preserve ponds may also support western pond turtle (*Actinemys marmorata*), which has been observed in ponds on the UTC property to the east.

As noted previously, the drainages on the Preserve flow to Coyote Creek, which is a steelhead stream. Though stream reaches on the property are intermittent and lack suitable habitat, their flows may be important for steelhead rearing and migration downstream (Figure 6).

### 2.5.4 Birds

The Preserve may provide suitable breeding habitat for western burrowing owl (*Athene cunicularia*)—a California species of special concern. This species has been observed during the breeding season (March to August), suggesting it may breed on the Preserve (J. Fields, pers. comm. 2015). Burrowing owls nests in burrows often created by California ground squirrel, in short-statured grasslands with sparse plant cover, similar to those maintained through grazing within the Preserve (Shuford and Gardali 2008).

The Preserve may provide foraging and also nesting habitat for white tailed-kite (*Elanus leucurus*), a California Fully Protected species that typically forages in tall grasslands, such as the California annual grassland on the eastern edge of the Preserve. Such grasslands support populations of California voles (*Microtus californicus*), which are the species' preferred prey. White-tailed kites nest in trees and may use the oak woodlands in the drainages or on the southeastern portion of the Preserve for breeding.

Golden eagle (*Aquila chrysaetos*), another California Fully Protected Species, may forage for ground squirrels and other prey within the Preserve. This species primarily nests in cliffs though occasionally uses transmission line towers, such as occur in the Preserve.

### 2.5.5 Mammals

The Preserve may provide suitable habitat for American badger (*Taxidea taxus*)—a California Species of Special Concern, which inhabits open habitats including grasslands and open shrublands. The species has been observed on Coyote Reserve south of the Preserve, as well as in Tulare Hill and the Bailey Road overpass just west of the Preserve (T. Diamond, pers. comm. 2011). Because it burrows and hunts largely belowground, it is typically associated with friable soils; the clayey, and often rocky and thin, serpentine soils that predominate the Preserve may limit use by this species.

The Preserve may provide suitable foraging habitat for pallid bat (*Antrozous pallidus*), a California Species of Special Concern that occurs in a wide variety of habitats but generally forages over open ground. Known from the UTC property to the east, pallid bats may roost in trees within the oak woodland of the Preserve. The Preserve's woodlands may also support Yuma myotis (*Myotis yumanensis*), which occurs within a range of habitats but is often associated with woodlands including riparian areas. This species forages over water sources, including ponds and troughs as well as streams and reservoirs, and is often found in association with water bodies.

## 2.6 Exotic Species

### 2.6.1 Exotic Plants

Though habitat within the Preserve is largely intact as a result of its limited, low intensity land use, like elsewhere in the region, it has been degraded by the invasion and spread of exotic plants—species that are not native to California, and instead, were either deliberately or accidentally introduced by humans. These primarily include species from the Mediterranean region, which like central coastal California, features a climate characterized by cool, wet winters and hot, dry summers. The success of such Mediterranean species was further facilitated by the tolerance of many to oligotrophic (infertile) soils present there and in California, which rendered them 'pre-adapted' to conditions in California.

Many exotic plants require high-light conditions, such that overall exotic plant cover tends to be lower in the closed-canopy oak woodlands that line the drainages; similarly, the mixed serpentine chaparral has not burned in more than 15 years and features relatively dense woody plant cover that deters many exotic plants.

*Artichoke thistle in the California annual grassland*
*Photograph by Jodi McGraw*

Conversely, exotic plants are relatively abundant in grasslands, which predominate within the Preserve, particularly the California annual grasslands on non-serpentine soils. The low nutrient serpentine soils confer some abiotic resistance to invasion (Kruckeberg 1984, Huenneke et al. 1990). However, several exotic plants including rye grass, soft chess, and barb goat grass, can achieve high abundance on the serpentine grasslands, particularly where soils are deeper. Additionally, the California annual grasslands have been invaded by invasive species including Artichoke thistle (*Cynara cardunculus*), mustards (*Brassica nigra* and *B. rapa*, as well as perhaps *Hirschfeldia incana*), milk thistle, purple star-thistle (*Centaurea calcitrapa*), and yellow star-thistle (*Centaurea solstitialis*).

Several factors may promote increased cover of exotic plants in the serpentine grasslands (Harrison and Viers 2007):

1. **Nitrogen Deposition**: deposition of atmospheric nitrogen from automobile exhaust on Highway 101 and urban areas in San Jose, which are upwind of the Preserve, can fertilize the serpentine soils over time, thus rendering them more suitable for exotic plants (Huenneke et al. 1990, Weiss 1999);
2. **Cessation of Grazing:** If cattle grazing were to be discontinued, exotic herbaceous plants would increase in cover and competitive effects on native plants (Weiss 2003, Weiss et al. 2007);
3. **Adaptation:** Over time, exotic species may adapt to serpentine soil conditions, evolving serpentine-tolerant ecotypes;

4. **Dispersal:** lower prevalence of exotic plants in serpentine grasslands may be due to lower rates of spread, than inability of exotic plant species to grow in serpentine soils, such that their cover and richness will increase over time; and
5. **New Invasions:** the continued arrival of new exotic plant species may bring additional species that are serpentine tolerant, as occurred when barb goat grass invaded.

Exotic plants cause a range of negative impacts on native plants and animals and the natural communities within the Preserve. Direct mechanisms by which exotic plants negatively impact native species include:

- **Compete with Native Plants:** Exotic plants compete with native plants for light and scarce soil resources (nutrients and water), as well as space. Exotic plants also produce litter or thatch which inhibits native plant germination and seedling establishment (Heady 1956). These impacts can be acute for serpentine endemics, which like other edaphic endemic species are poor competitors.
- **Degrade Habitat for Native Animals:** Exotic plants can degrade habitat for native animals by competing with native plants that provide food and by altering plant community structure. In serpentine grasslands, which are dominated by annual forbs rather than grass, exotic annual grasses reduce the abundance of dwarf plantain and other forbs that serve as host plants for Bay checkerspot butterfly and Opler's longhorn moth (Section 2.5.2). Dense thatch and taller swards of grass may degrade habitat for these and other native animals, such as western burrowing owl, which are adapted to the shorter-structure conditions created by serpentine forbs.

Exotic plants can also negatively impact native species through a variety of indirect mechanisms, including:

- **Promote Fire**: Exotic annual grasses create dense biomass which can accumulate, creating fine fuels that are highly combustible in the dry season (summer and fall) and can promote fire. Too-frequent-fire can negatively impact native plants and animals adapted to longer fire return intervals. If too frequent, fire can convert shrublands to grasslands through a process known as the grass-fire cycle (D'Antonio and Vitousek 1992).
- **Facilitate Invasion:** Exotic plants add organic matter to the soil over time, and, in the case of legumes such as exotic covers (*Trifolium* spp.), can fix nitrogen; these inputs can ameliorate inimical soil conditions and promote further invasion by specie otherwise intolerant of the serpentine soil conditions.
- **Impeding Grazing Management:** Exotic plants that are unpalatable or even noxious for cattle, such as milk thistle and purple star-thistle, can reduce the effectiveness of cattle grazing as a management tool to promote native plants, and maintain short-structure conditions required by many native animals.

Given the natural rarity of serpentine endemics, which results from their narrow geographic range and habitat specificity, and the loss of habitat in the region due to prior development, habitat degradation from exotic plants can threaten the persistence of serpentine endemic species (USFWS 1998). Accordingly, their control will be important to achieving biodiversity goals for the Preserve (Sections 3.1 and 4.3).

### 2.6.2 Exotic Animals

The Preserve also features populations of non-native animal species, which can degrade habitat for native plants and animals. Most notably, the southern Diablo Range Mountains and adjacent Coyote Valley support populations of wild pig, which are native to Europe and Asia but have become cosmopolitan as a result of their deliberate introduction as a food source. Wild pigs occur at relatively high abundance in the Coyote Ridge area, due in part to the Kirby Canyon landfill which attracts them (CCEO 2014).

Due to their large size and high fecundity (birth rates), this species can have large impacts through a variety of mechanisms including (Rouhe and Sytsma 2007):

- Tilling the soil while foraging (rooting), which can promote invasion of exotic plants into native grasslands (Kotanen 1997);
- Wallowing in springs and ponds, which can trample aquatic and freshwater wetland plants, which could degrade habitat for pond-breeding amphibians;
- Consumption of acorns in oak woodlands, which can reduce food supplies for native species including black-tailed deer, acorn woodpecker (*Melanerpes formicivorus),* and band-tailed pigeon (*Patagioenas fasciata*); and
- Transmitting diseases such as pseudorabies, swine brucellosis, and classical swine fever to wildlife.

Wild pigs can impact humans by transmitting disease to livestock and potentially humans, and in some cases, can exhibit aggression toward humans; however, most are wary.

Native to eastern North American, wild turkey (*Meleagris gallopavo*) was deliberately introduced to California as early as 1877 for food and hunting. These opportunistic omnivores eat a variety of plant materials, including grasses, seeds, and acorns, as well as some animals, particularly invertebrates (CDFW 2004). In doing so, they may reduce plant and animal populations directly; they may also impact native species through disturbances created by scratching.

## 2.7 Habitat Connectivity

Habitat within the Preserve has been identified as critical for maintaining regional landscape through a series of state and regional analyses. The statewide assessment of critical linkages revealed that (Spencer et al. 2010):

1. The Preserve is located on the western edge of a natural landscape block, or area of largely unfragmented habitat, that includes much of the southern portion of the Diablo Range; and
2. The Preserve is also within the area of most suitable habitat within a linkage connecting this landscape block to another one on the southern portion of the Santa Cruz Mountains, across the southern Santa Clara Valley.

A more focused analysis of connectivity in the Bay Area similarly found that (Penrod et al. 2013; Figure 10):

1. Land within the Preserve is on the western edge of a more than 700,000-acre large landscape block centered on the Diablo Range; and that

2. The Preserve is also located within the landscape linkage connecting the southern Santa Cruz and Diablo Range mountains, which this analysis placed across Coyote Valley—a constriction in the southern Santa Clara Valley where habitat in the two ranges is in close proximity.

*Coyote Valley and the Santa Cruz Mountains beyond*
*Photograph by Jodi McGraw*

An analysis conducted to identify and prioritize land protection and infrastructure improvements to maintain or enhance connectivity in the Santa Cruz Mountains linkages revealed that (McGraw 2012):

1. Coyote Valley is a choke point— a narrow, impacted or otherwise tenuous portion of the overall linkage between the Santa Cruz and Diablo range mountains; and
2. Habitat within the Preserve is critical to creating the linkage across the northern portion of the Coyote Valley—a portion of the choke point that features relatively large, and predominantly undeveloped parcels and is therefore is most suitable for habitat connectivity projects.

Importantly, the assessment of infrastructure that may present opportunities to facilitate wildlife movement across Highway 101, a six-lane freeway that presents a barrier to east-west movement through this choke point, revealed that the Preserve is near two infrastructure features of connectivity value (McGraw 2012):

1. **Culvert:** A five-foot diameter concrete culvert under the highway connects serpentine grassland in the westernmost portion of the Preserve (parcel 729-54-004) to the Coyote Creek Parkway—a narrow Santa Clara County Park which contains Coyote Creek and adjacent riparian and grassland habitat, which facilities north-south animal movement within Coyote Valley. At the time of the assessment (2011), the culvert was in need of maintenance to remove soil and debris. The culvert was also characterized as featuring perennial water, and thus may not be suitable as currently constructed for movement of species deterred by walking through water.
2. **Bailey Overpass:** Like the culvert, this four-lane concrete bridge over Highway 101, which is approximately 80 feet wide and 820 feet long, connects serpentine grasslands within the Preserve as well as the Authority's adjacent Malech Property, to riparian vegetation along Coyote Creek. The bridge was deemed highly suitable for addition of vegetated lanes which could facilitate its use by a land bridge.

Beyond the Coyote Creek Parkway lies relatively large parcels in agricultural use, which abut largely intact habitat within the southern foothills on the eastern slope of the Santa Cruz Mountains. Efforts to secure and where feasible, enhance habitat within the agricultural lands, in conjunction with infrastructure projects to promote connectivity across Highway 101, present the greatest opportunities to promote habitat connectivity between the Santa Cruz and Diablo Range mountains (McGraw 2012).

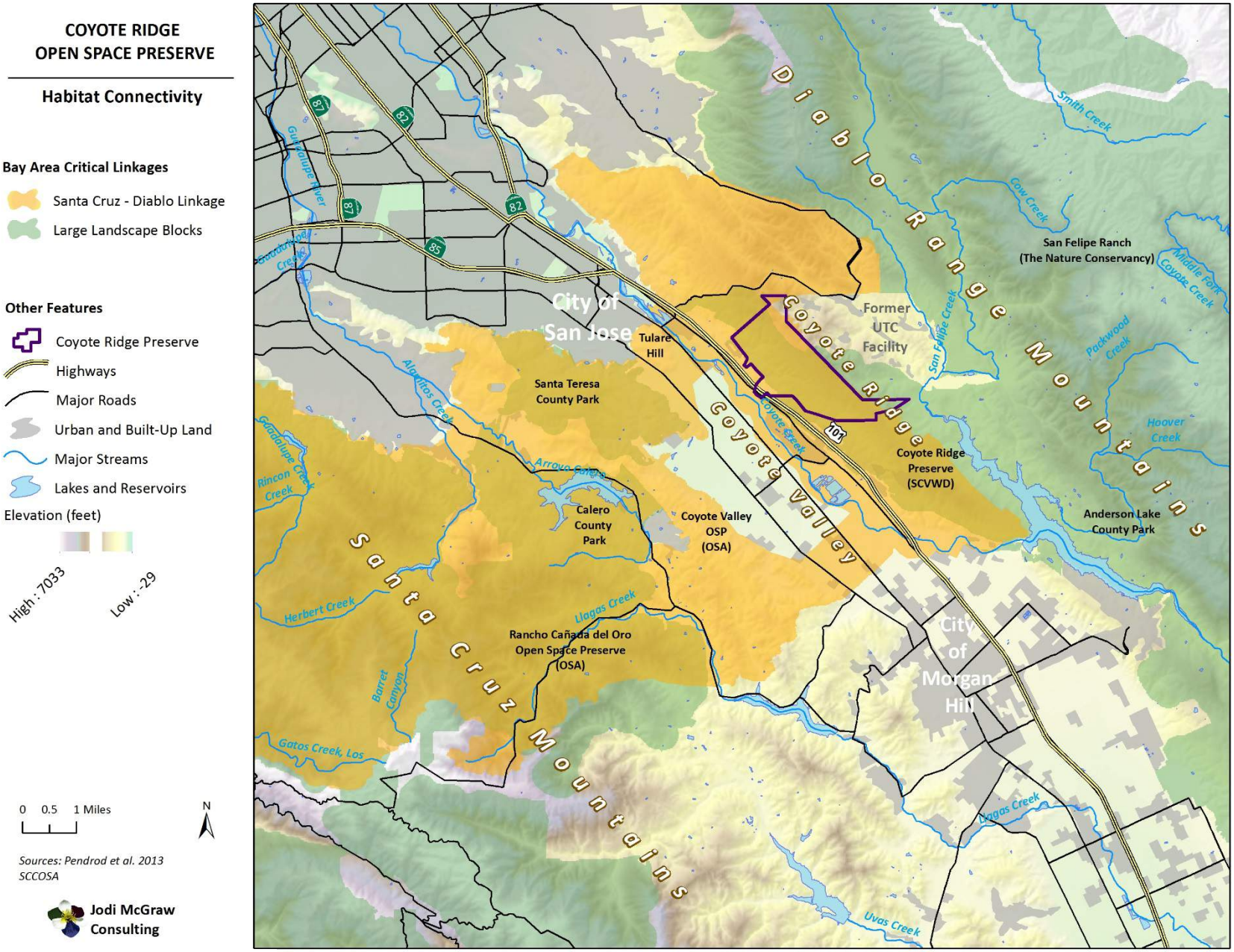


**Figure 10: Habitat connectivity**

To summarize, state, regional, and local connectivity analyses indicate that protection and management of the more than 1,800 acres of habitat in the Preserve will:

1. connect, buffer, and expand protected habitat in the southern portion of the Diablo Range, where more than 325,000 acres of protected habitat stretches for almost 70 miles from the southern edge of Pleasanton and the Livermore Valley to Pacheco Pass near California's Great Central Valley;
2. help safeguard connectivity between the Santa Cruz and Diablo Range mountains across Coyote Valley, a critical choke point in the regional landscape linkage (Figure 10); and
3. enable infrastructure enhancement or development projects (e.g. land bridges or culverts) that can facilitate animal movement across this six-lane highway which presents a major barrier to wildlife movement through the area.

## 2.8 Climate Change Resiliency

By protecting these important habitat linkages, the Preserve can facilitate species' movements in response a changing climate. By the end of the century, the average annual temperature in California is predicted to increase by up to 8.1$^{o}$ F. Though the change in California's precipitation is expected to be less than 10% (Cayan et al. 2008), the increase in temperature will promote water loss due to evaporation and transpiration, creating a climatic water deficit for plants (Flint and Flint, unpublished data).

Habitat within the Preserve can facilitate plant and animal movement necessary to stay within their 'climatic envelope' or tolerance. Specifically, it can promote movement:

- **Along the elevational gradient:** the moderately steep slopes in the Preserve enable species to migrate from just 280 feet above mean sea level on the western edge of the Preserve, to 1,450 feet above MSL in the northeast, in a distance of less than two miles (Figure 1). From its eastern edge, habitat in the Preserve is connected (via remaining, intact habitat) to the more than 4,200-foot above MSL Mount Hamilton Ridge, which is just nine miles northeast. This connectivity can help plants and animals move to cooler temperatures at higher elevations in responses to temperature increases (Breshears et al. 2008).
- **Along the latitudinal gradient:** the more than three-mile long preserve can facilitate movement of species along the north-south trending Coyote Ridge, which, as noted previously, is part of an almost 70-mile stretch of intact habitat extending from the southern edge of Pleasanton and the Livermore Valley to Pacheco Pass.
- **Between areas of varying microclimate:** The topopgraphic variation within the Preserve, including slopes of varying aspects, and drainages, hillslopes, and rounded ridges, create a range of microclimatic conditions, including cooler, moister, drainages and north-facing slopes, and hotter, drier, south-facing slopes and ridgetops, in close proximity, so that species can migrate to stay within their climatic envelopes.

The Preserve features additional features that can confer resiliency to climate change. Notably, its seeps, springs, streams, ponds, and wetlands (Figures 6 and 7) feature cooler microclimates, provide sources of free water, and may indicate areas of greater ground water that may be resilient in the face of climate change (Howard and Merrifield 2010).

*Mount Hamilton with the Lick Observatory east of the Preserve*
*Photograph by Jodi McGraw*

# 3 Management Goals

This section outlines goals for management of the Preserve. They were developed based on the Authority's Mission and Vision (inset box), adopted policies, including the grazing management policy (SCOSA 2013), and goals and strategies as outlined in the Santa Clara Valley Greenprint (SCOSA 2014). The goals reflect the conditions and management needs of the Preserve (Section 2) as well as the purpose of the property's acquisition, as outlined in funding requests with agencies and organizations with which the Authority is partnering to protect the Preserve.

Given the importance of the Preserve for persistence of rare species, the goals also reflect elements of the endangered species recovery plans (USFWS 1998, 2002). To facilitate efforts to enroll the Preserve in the Valley Habitat Plan Reserve System and ultimate development of a Reserve Unit Management Plan, the goals were also developed in consideration of the Valley Habitat Plan's Management and Monitoring Plan (SCVHA 2014).

Goals are identified for five management elements (inset box). The primary goal of management of the Preserve is to conserve biodiversity, by managing, restoring, and enhancing habitat for rare species and maintaining or promoting habitat connectivity, while protecting watersheds and water quality. Complementary goals are to provide opportunities for compatible recreation and education, safeguard cultural resources, protect and enhance scenic and aesthetic values, and promote agricultural viability in the region. This overall goal will be used to prioritize management and address conflicts that may emerge between management strategies in these elements (Section 4).

**Management Goals**

- Biodiversity
- Working Lands
- Cultural Resources
- Recreation and Education
- Facilities Management.

## 3.1 Biodiversity

Goals for conservation of biodiversity reflect the Authority's goal to protect and manage an interconnected system of wildlands and natural areas to support native habitats and species and to ensure resilience to a changing environment. Biodiversity goals follow an ecological hierarchy—landscape, communities, and species—to create a unified, coordinated strategy for habitat-based management of the various communities within the Preserve.

Goals of the Valley Habitat Plan (SCVHA 2012) that are similar to those of this Plan are noted in parentheses; the language here reflects management of a site, rather than regional conservation, and management of species' habitat rather than their populations.

### 3.1.1 Landscape

L-1: Protect and maintain natural and semi-natural landscapes and the ecological processes that sustain them (VHP Goal 1).

L-2: Maintain or improve opportunities for movement of native species and genetic exchange within the Preserve and with areas outside of the Preserve (VHP Goal 2).

L-3: Enhance or restore representative natural and semi-natural landscapes to maintain or increase native biological diversity (VHP Goal 3).

### 3.1.2 Communities

C-1: Maintain or enhance the structure and native species composition of grasslands, including serpentine grasslands, which benefit sensitive species and promote native biodiversity (VHP Goal 4).

C-2: Maintain or enhance the structure and native species composition of chaparral to benefit sensitive species and promote native biodiversity (VHP Goal 5).

C-3: Maintain or enhance the structure and native species composition of oak woodlands to promote sensitive species and promote native biodiversity (VHP Goal 6).

C-4: Maintain or improve stream habitat quality and the hydrologic and geomorphic processes that maintain streams, to benefit sensitive species and promote native biodiversity in aquatic and riparian communities (VHP Goal 8).

C-5: Maintain or enhance the structure and native species composition of riparian forests and scrub at a variety of successional stages and improve these communities to benefit sensitive species and promote native biodiversity (VHP Goal 9).

C-6: Maintain, enhance, create or restore ponds, freshwater perennial wetlands, and seasonal wetlands that benefit sensitive species and promote native biodiversity (VHP Goal 10).

### 3.1.3 Species

S-1: Maintain or improve habitat for the Bay checkerspot butterfly to promote viability of the population on Coyote Ridge and help ensure the long-term persistence of the species (VHC Goal 12).

S-2: Maintain or improve habitat for western burrowing owl, to increase the size and sustainability of the breeding and wintering populations in the region (VHC Goal 13).

S-3: Maintain or improve habitat for California red-legged frog, California tiger salamander, and western pond turtle, to maintain viable populations and contribute to the regional recovery of these species (VHC Goal 17).

S-4: Maintain or improve habitat for rare serpentine plant species that occur on or near the preserve, including Coyote ceanothus, Santa Clara Valley dudleya, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, fragrant fritillary, Mt. Hamilton thistle, Loma Prieta hoita, San Francisco wallflower, and Tiburon Indian paintbrush, to promote viability of populations of these species (VHC Goal 17).

S-5: Maintain or improve habitat for other sensitive species with potential to occur within the Preserve.

## 3.2 Working Lands

The following goal reflects the Authority's desire to conserve farms, ranches, and other working landscapes to sustain the economic and environmental viability of agriculture in the County.

W-1. Contribute to regional efforts to preserve the agricultural heritage of the region, by utilizing grazing as a vegetation management tool, where appropriate to achieve the biodiversity goals for the Preserve.

## 3.3 Cultural Resources

These goals are designed to protect cultural resources on the Preserve during the course of other aspects of management, including for biodiversity and access.

CR-1. Protect and preserve cultural resources within the Preserve while conducting necessary land management and providing low-intensity public access.

CR-2. Educate the community and interpret important cultural resources and landscapes to increase public knowledge, understanding and appreciation of past life ways and local history.

## 3.4 Recreation and Education

These goals are designed to advance the Authority's work to provide opportunities for nature-based recreation and education for all residents. They guide access to the Preserve for outreach, interpretation, and recreation, as well as research, in a manner that will limit impacts on the biological systems and rare species.

A-1: Provide access for interpretive programs that expand the public's understanding and appreciation of nature and conservation, including wildlife connectivity, serpentine communities and species, and the effects of global change including nitrogen deposition.

A-2: Establish and maintain an appropriate trail network within the Preserve, to allow public enjoyment of the Coyote Ridge, promote healthy, active lifestyles, and facilitate completion of the Bay Ridge Trail.

A-3: Provide access for scientific research, to increase understanding of the natural systems and inform their effective conservation and management.

## 3.5 Facilities Management

These goals are designed to guide maintenance of facilities in ways that promote the other goals and also overall sustainability of management efforts within the Preserve.

FM-1. Develop, improve, and maintain the infrastructure necessary to support habitat management, including grazing and public access, using best management practices and other techniques that limit impacts to biodiversity, cultural resources, and the scenic values of the Preserve, including by coordinating their establishment with adjacent properties.

FM-2. Remove unnecessary infrastructure, including roads and fences, to promote the natural, cultural, and scenic resources of the Preserve.

*Northern Coyote Valley and the City of San Jose from Coyote Ridge*
*Photograph by Jodi McGraw*

# 4 Management Approaches and Strategies

This section outlines specific objectives for management, and the strategies and techniques that will be implemented to achieve the goals and objectives. They were developed to achieve the plan goals (Section 3), in consideration of the Preserve conditions (Section 2).

Developed during the Authority's efforts to acquire the property, these preliminary management strategies are based largely of existing information and the site and system. In many cases, additional assessments and planning will be needed to inform development of management strategies as well as design of specific projects.

Management approaches and strategies were identified for grazing, exotic plant control, stream, pond, and spring management, public access, and facilities maintenance. These reflect areas of anticipated management emphasis. The Authority may conduct additional management projects to enhance habitat for focal species, such as western burrowing owl, among other types of management not outlined in this section.

The management strategies can be modified over time, as part of an adaptive management framework designed to promote long-term attainment of the goals and objectives. Objectives can similarly be refined over time, to better meet the goals, which should remain constant unless they are found to somehow be inappropriate (Section 5).

## 4.1 Grazing Management

### 4.1.1 Background

Research in the upland systems found on the Preserve has demonstrated that well-managed cattle grazing is necessary to achieve the biodiversity goals for the species and communities within the Preserve. Specifically, cattle grazing has been shown to reduce thatch and promote native plant species richness by reducing competition from non-native annual grasses (D'Antonio et al. 2001, Hayes and Holl 2003, Huntsinger et al. 2007). These beneficial effects of grazing are regarded as essential to maintaining habitat for serpentine endemic species including Bay checkerspot butterfly, the host plants of which are suppressed by dense annual grasses (Weiss 1999, Weiss et al. 2007).

When not effectively managed, cattle grazing can negatively impact a variety of natural systems, with the most sensitive including riparian and riverine areas, wetlands, and plant species that are highly susceptible to impacts of direct herbivory (Fleischner 1994, Painter 1995, and Belsky et al. 1999). Additional impacts of cattle grazing can include soil loss and erosion, and degradation of water quality.

Recognizing the value of well-managed cattle grazing as a landscape-level management tool to maintain and enhance the structure and species composition of many upland habitats in the region, as well as reduce the threat of fire and conserve working lands in the region, the Authority has developed a grazing management policy (SCOSA 2013). This policy guides grazing management on the Authority's open space preserves that feature extensive grassland, including serpentine grassland, as well as oak savannas. The policy has guided development of grazing management plans for Rancho Cañada del Oro, Sierra Vista, and Coyote Valley open space preserves (McGraw 2012, 2013a, 2013b).

*Cattle grazing on Coyote Ridge*
*Photograph by Jodi McGraw*

Cattle grazing is also a principal vegetation management tool on the other preserves on Coyote Ridge that the Authority manages: the 548-acre VTA-Coyote Ridge Property (VTA 2006, Guenther 2013) and the 688-acre Santa Clara Valley Water District Coyote Ridge Preserve (SCVWD 2014). These properties share a common pasture, known as the West Ridge Management Unit, and similar biological systems as well as conservation goals; as a result, their grazing management is currently coordinated (SCVWD 2014). Within the VTA-Coyote Ridge Property, grazing is intensively monitored through a series of coordinated protocols designed to evaluate grazing implementation and effects of grazing on rare species and identified modifications over time (CCEO 2014).

Based on its demonstrated effectiveness, the Authority will manage cattle grazing using approaches and strategies that are similar to that within the other Coyote Ridge preserves. The Authority will leverage the insights revealed through extensive monitoring on the VTA preserve, by integrating its results with implementation monitoring within the Preserve, to identify adjustments to monitoring over time (Section 5.2).

### 4.1.2 Grazing Management Objectives

The following are initial objectives for grazing management within the Preserve, which were developed to achieve the plan goals (Section 3).

GM-1: Maintain the areal extent of grassland, including serpentine grassland, within the Preserve.

GM-2: Maintain or enhance habitat for sensitive species within the serpentine grasslands of the preserve.

GM-3: Create and maintain a diversity of grassland habitat structure, including short and tall-structured grasslands, to promote the total richness of native plant and animal species, which include populations of several sensitive species.

GM-4: Promote the relative abundance and species richness of native plants within the grasslands, by reducing the competitive effects of exotic annual grasses.

GM-5: Promote recruitment of oaks within the oak woodland, to maintain persisting populations of this keystone species.

GM-6: Prevent or limit impacts to natural biological systems caused by the use of grazing as a management tool, including by:

i. Protecting populations of grazing-sensitive plants;

ii. Preventing the invasion and spread of invasive plants;

iii. Maintaining wildlife-friendly infrastructure including fences and troughs; and

iv. Protecting native animals that may be regarded as a nuisance or harm to livestock, such as California ground squirrel, American badger, coyote (*Canis latrans*), mountain lion.

GM-7: Reduce the risk of wildfire by reducing the amount of fine fuels.

GM-8: Protect cultural resources from damage caused by cattle and other aspects of grazing management.

GM-9: Prevent or limit conflicts between grazing management and public enjoyment of the Preserve, including use of trails and enjoyment of scenic vistas.

### 4.1.3 Grazing Management Strategies

Grazing is recommended to control exotic plants, particularly annual grasses, within the grasslands and the more open canopy oak woodlands on the southeastern portion of the Preserve. Cattle use will be incidental within the mixed serpentine chaparral and coast live oak woodland, which feature relatively dense canopy cover and have limited exotic plant cover. As needed, cattle can be excluded from grazing-sensitive communities, including freshwater wetlands, and occurrences of grazing-sensitive plants, such as Santa Clara Valley dudleya, as well as other areas where grazing could impede efforts to achieve goals for the Preserve, including sensitive cultural resource areas. The Authority will evaluate the need and best methods for excluding cattle from grazing-sensitive resources as part of the adaptive management and monitoring process through which it will implement conservation grazing (Section 5).

### 4.1.4 Grazing Prescription

The following grazing prescription is anticipated to maximize the benefits of cattle grazing, while limiting its direct and indirect negative consequences. As part of the adaptive management process, adjustments should be made to promote effectiveness while also ensuring practicability.

#### 4.1.4.1 Animal Class and Type

Cattle are recommended for annual grazing management of the Preserve. Unlike other livestock including sheep, goats, and horses, cattle preferentially feed on grasses, which are the most widespread and abundant guild of exotic plants within the Preserve. Either cows and calves or yearlings (i.e. stockers or steers) can be used to attain the management goals identified. Yearlings tend to forage further from water and may enhance utilization of the site, when compared with cows with calves. Because they tend to wander more, yearlings require well-kept fences (Guenther 2001).

Goats or other livestock might also be used, where and when appropriate, to control invasive plant species, such as dense infestations of mustard (*Brassica* spp.). Separate management prescriptions should be developed for such focused, invasive species control projects during which temporary electric fences may be needed to confine cattle to treatment areas.

#### 4.1.4.2 Seasonality of Use

Seasonally-timed grazing is recommended to achieve specific management goals, as well as reduce soil disturbance and provide plants with an opportunity to recover from grazing. The following describes the recommended season of use and its rationale. The Authority may modify the timing of grazing to achieve the goals and objectives for the Preserve (Section 3).

Grazing during the early growth period (November to March) is recommended to promote native plants by reducing the abundance and competitive effects of exotic annual grasses. During the early season, cattle are expected to disproportionately negatively affect exotic annual grasses, which feature new, green growth and are their preferred forage during this time. By reducing overall biomass and thus residual dry matter (RDM), early-season grazing will also reduce litter accumulation; in doing so, it will promote germination of native annual forbs during the following year as well as reduce the fine fuels that can promote wildfire.

Early season is also designed to minimize the negative impacts of cattle herbivory and trampling on the natural systems. Waiting to turn out cattle until at least on inch of new growth has been produced will limit cattle herbivory of perennial herbs, shrubs, and trees, which could reduce their growth and survival. Removal of cattle in early spring is also anticipated to achieve the following (UCANR 2011):

- Reduce cattle herbivory on the rare native plants, which are most susceptible to impacts during their flowering and seed production which generally occur between April and October (CNPS 2013):
    - Metcalf Canyon jewelflower: March - July
    - most beautiful jewelflower: March - October
    - Santa Clara Valley dudleya: April - October
    - smooth lessingia*:* July – November
    - Tiburon paintbrush: April - August

  Populations of fragrant fritillary and San Francisco wallflower, which flower beginning in February, will be monitored to evaluate cattle herbivory; fences (including temporary fences) will be erected to exclude cattle if herbivory is having negative impacts on these rare plants.

- Reduce cattle herbivory on native perennial bunchgrasses, including purple needlegrass, which has peak growth from April to May, and flowers in the late spring and early summer (May - July).
- Reduce cattle herbivory of woody vegetation and acorns, which cattle eat during summer and fall (July - October), thus reducing availability of these important food sources used by mule deer, band-tailed pigeons, and acorn woodpeckers, among other species.
- Prevent trampling of ground-nesting grassland birds, which generally nest between April and August (CPIF 2000).
- Reduce cattle use of oak woodlands, which would provide shade and thus relief from the hotter temperatures of late spring, summer, and early fall.
- Reduce susceptibility of native shrubs and trees, including oak seedlings and saplings, to damage during winter than spring and summer (Hall 1992); these species are otherwise promoted by grazing which reduces competition with non-native annual grasses (Swiecki et al. 1997).

- Increase the area of the Preserve utilized by cattle, by increasing the range of cattle movement away from water, relative to grazing in the warmer, drier seasons (May - October) when cattle use can be concentrated near water.

In early-season grazing, cattle are turned out when one inch of new grass has been produced; cattle should then be removed prior to onset of flowering of native herbaceous plants in early spring. April 1 can serve as a target data for removing cattle; however, the precise timing of cattle removal can be based on the annual progression of the plant life stages (i.e. phenology), which varies depending on annual weather. Specifically, the removal date can be moved up if flowering of native herbs is initiated earlier, as can occur in unseasonably warm and/or dry years (e.g. March 15), or pushed back if flowering is delayed (e.g. April 15) as can occur in cooler, wetter seasons.

Early season grazing is recommended for the entire Preserve, and will be most beneficial for pastures that feature significant serpentine grassland. In years with significant late spring rainfall, these pastures may need to be grazed into April and May (i.e. the late season) to further control growth of exotic annual grasses; however, monitoring should be conducted to ensure cattle are not utilizing native herbaceous plants flowering during this period. In years of high productivity or as otherwise needed to reduce residual dry matter and thus promote plant establishment and growth, cattle may be turned out prior to green up during the fall (e.g. October - November). Monitoring should be used to ensure there is ample annual grass biomass, so that cattle do not utilize woody vegetation and rare perennial species including Santa Clara Valley dudleya.

#### 4.1.4.3 Intensity

The intensity of grazing can influence its effects. In this plan, grazing intensity is measured based on the amount of residual dry matter (RDM) present at the end of the grazing year in October. Residual dry matter is a better measure of grazing intensity than stocking rates (e.g. animal unit months) for the following interrelated reasons:

1. RDM has been found to directly influence the composition and structure of herb-dominated communities, and thus directly relates to several biological goals (e.g. maintain or enhance native plant abundance and richness; Heady 1956);
2. RDM protects soil from erosion and nutrient loss, such that intensity thresholds based on RDM can be used to protect ecosystem functions (Bartolome et al. 1980);
3. RDM can be readily measured as part of monitoring to evaluate successful implementation of the intensity component of a grazing prescription (Guenther 1998);
4. RDM can be quantified and used to evaluate effectiveness of the grazing prescription at attaining the biological goals of grazing; and
5. RDM explicitly incorporates variation in annual productivity due to interannual variability in weather (i.e. precipitation). In contrast, using set stocking rates would result in interannual variability in grazing intensity and cause variable impacts to plant species.

Table 4 lists RDM targets for the two types of grassland, which are the primarily community types that are anticipated to be used by cattle, in the pastures covered by these recommendations (Figure 11). Use of chaparral and oak woodlands and forests, which are located primarily in the drainages, is likely to be limited due to low amount of preferred forage (grass) in these communities, particularly during the

**Table 4: Estimated stocking rate to achieve the residual dry matter targets based on mean annual productivity estimates for the land cover types in the Rock Field 1 and Rock Field 2.**

| | | pounds per acre | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Annual Productivity[1] | | | Target Residual Dry Matter[2] | | | Pounds to be Grazed[3] | |
| Community | Acres | Low | High | Mean | Low | High | Mean | Per Acre | Total |
| California annual grassland | 146.0 | 1,600 | 2,200 | 1,900 | 1,000 | 1,500 | 1,250 | 650 | 94,900 |
| serpentine grassland | 1334.0 | 800 | 1,600 | 1,200 | 500 | 1,000 | 750 | 450 | 600,300 |
| oak forest and woodland | 111.0 | | | | incidental use º | | | | |
| chaparral (incl. serpentine) | 50.0 | | | | incidental use º | | | | |
| wetland | 2.0 | | | | No use† | | | | |
| **Total** | **1643.0** | | | | | | | | **695,200** |
| | | | | | | | | **Months of Grazing** | 5 |
| | | | | | | | | **Pounds of forage consumed per animal unit month** | 800 |
| | | | | | | | | **Pounds of Forage consumed per animal unit during the five-month season** | 4,000 |
| | | | | | | | | **Estimated number of animal units to attain target RDM** | 174 |

[1] Estimated annual biomass production based on community type and microsite conditions

[2] Target amount of RDM to be remain at the end of the season (October)

[3] Biomass to be removed per acre and overall in each community type.

* Stocking rate estimated by dividing the total AUMs by the months of use

º Cattle use limited to temporary movement and occasional use for forage

† No cattle use, except as needed for occasional vegetation management

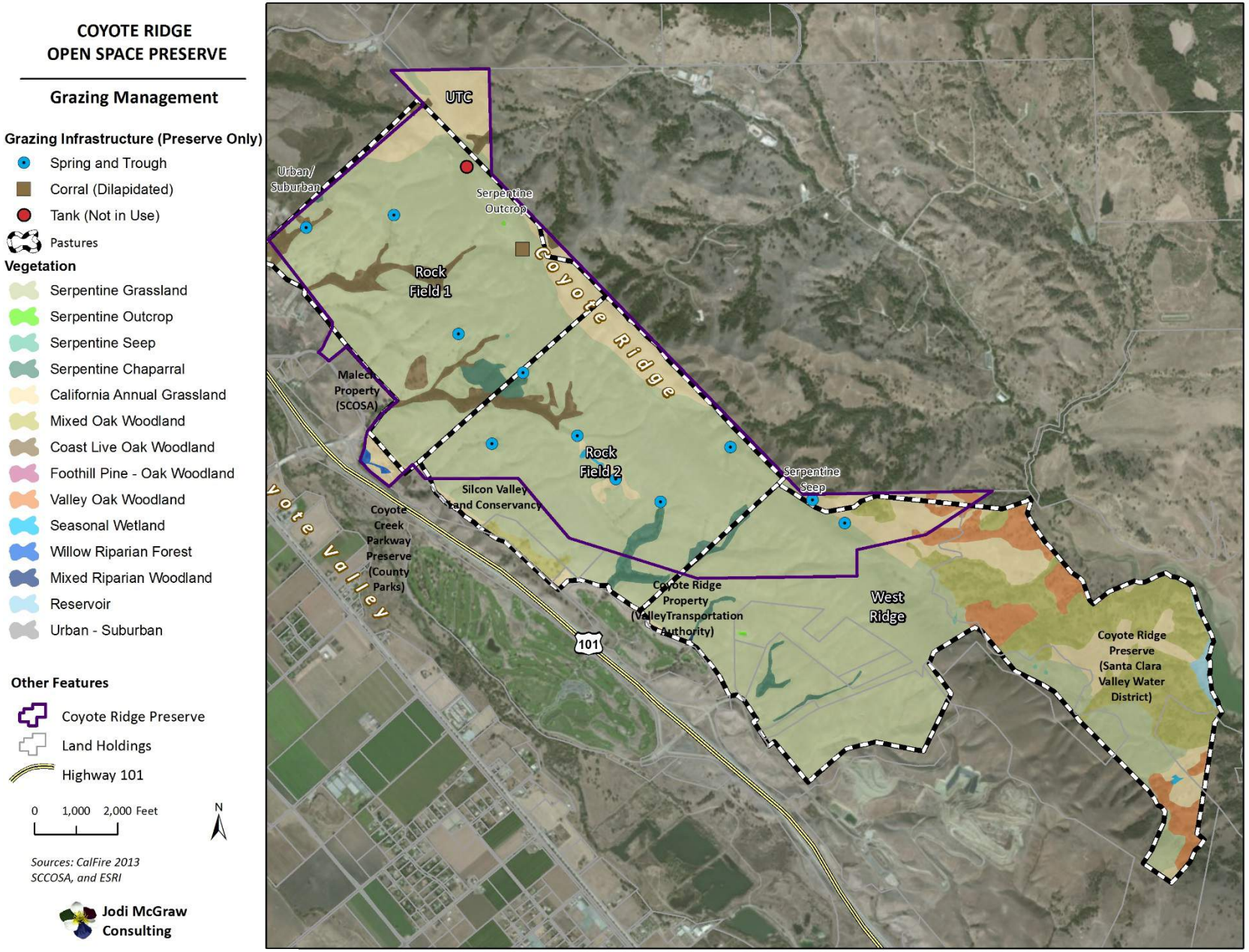


**Figure 11: Grazing management**

winter and early spring when cattle preferentially use sunlit areas with abundant herbaceous plant growth. Lack of preferred forage and the barrier created by dense shrubs will also greatly limit cattle grazing in mixed serpentine chaparral. Monitoring should be used to evaluate cattle utilization of these communities and make adjustments including install exclusionary fences, as needed.

The RDM targets reflect conservative utilization, in which no more than 50% of the forage would be removed within each community in each year. These rates are designed to promote cattle use of the exotic annual grasses while limiting herbivory of native plants associated with higher utilization rates.

The RDM targets were developed based upon three considerations:

1. Empirical research examining grazing effects on native plant structure and composition (Weiss et al. 2007);
2. Assessment of the anticipated impacts of various stocking levels (light, conservative, moderate, and heavy) on various biological systems ('indicators') within the Preserve including oak generation and native wildflowers (UCANR et al. 2011); and
3. The grazing prescription and its observed effectiveness at achieving the desired biological conditions at the adjacent VTA preserve, where grazing management has been carefully monitored (Guenther2013, CCEO 2014).

The different target RDM values reflect their different productivity; California annual grasslands are far more productive than serpentine grasslands, particularly those on thin soils (Section 2.2.2). Within each grassland type, productivity varies spatially due to microsite conditions including slope, aspect, soils, and disturbance, and temporally, as a result of interannual variability in climate. Notably, grasslands on the thinner and often rockier soils on the upper slope of the ridge are less productive than those on the lower slopes. Recognizing this variability, the productivity values and RDM targets are expressed in terms of ranges (low and high) anticipated across areas and years.

Spatial variability in productivity and utilization will result in variable levels of RDM within each community. To a certain extent, this is desirable as creating a mosaic of herbaceous vegetation height will promote diversity within the Preserve. Short-statured areas will promote native plants that are highly susceptible to competition by native grasses, including many diminutive annual forbs (e.g. wildflowers) as well as native plants that are not preferred forage for cattle but are important for native animals, such as dwarf plantain—the larval host plant for Bay checkerspot butterfly (Section 2.5.2). Other native animals that prefer or require short-statured grasslands, such as western burrowing owl, may also be promoted in areas of greater utilization. Likewise, areas of limited or no utilization by cattle can support greater densities of grazing-sensitive plants, as well as animals adapted to taller structure and greater thatch, such as California vole, and its predators including white-tailed kite and perhaps also northern harrier (*Circus cyaneus*) (CPIF 2000, Shuford and Gardali 2008).

#### 4.1.4.4 Estimated Stocking Rates

Based on the average productivity and average target RDM for the two communities to be grazed, the number of animal units needed to achieve the RDM targets through cattle grazing during a five-month period (November – March) is estimated to be 174 (Table 4). An animal unit is 1,000 lbs of grazing animal, which equates to a cow/calf pair, a bull, or two yearlings; each animal unit requires 800 lbs of forage per month.

The analysis was limited to the three pastures in the northern portion of the Preserve: UTC, Rock Field #1 and Rock Field #2—which comprise 88% of the Preserve area (Figure 11). The 191 acres in the southern portion of the Preserve will be stocked per the recommendations of the VTA property to the south, which address the entire 1,416-acre West Ridge Pasture (Guenther 2013). For the two Rock Field Pastures, the current pasture configuration (i.e. fences) was used to assess all habitat within each pasture, not just the land within the Preserve (Figure 11).

Importantly, the estimated stocking rate may need to be reduced if the entire grazing area is not used by cattle. Areas that are not utilized and should be deducted from the calculations may include:

1. Areas within any grazing exclosures created for grazing-sensitive systems (e.g. freshwater wetlands or species; and
2. Areas that are not used by cattle, because they are too far from water, too steep, or feature dense infestations of noxious species.

The stocking rate may also need to be adjusted each year based on annual productivity, which varies based upon the timing and amount of precipitation, and temperature, among other factors. In years of abundant early rainfall (September to early November), which promotes grass establishment and growth, higher stocking rates may be needed to reduce biomass by March 31 to a level that will result in the target RDM by October. Likewise, if low precipitation limits grass growth, the stocking rate may need to be reduced to avoid cattle herbivory of perennial herbs and woody species.

Finally, the stocking rate will need to be adjusted if the season of use is constricted or expanded to adjust for the number of months of utilization (Table 4).

#### 4.1.4.5 Estimated Spring Biomass to Attain Target Residual Dry Matter

To determine the amount of spring biomass to be left standing following cessation of grazing in order to meet the target fall RDM levels, the following factors were considered:

1. the monthly rate of biomass production following cessation of grazing during early spring (April-June), which is estimated here to be 10-15%;
2. the monthly rate of biomass loss due to native animal herbivory, natural disturbances (e.g. animal diggings), and decay, which is estimated to be 10-15% (Bartolome et al. 2002);
3. the onset of the germinating rains in fall, which is assumed to be by the end of October.

Based on the assumptions above, biomass in the California annual grassland should be 1,500 to 1,900 pounds per acre when cattle are removed following early season grazing, while that in serpentine grassland should have 875 to 1,100 pounds per acre when cattle are removed. Spring biomass and fall RDM monitoring should be used to refine these targets over time. Lower spring productivity and/or higher rates of biomass loss following cessation of grazing will require leaving more standing biomass in spring and thus a lower stocking rate, while high productivity and/or lower rates of loss will necessitate greater utilization and thus stocking during the winter and early spring to achieve the target RDM.

### 4.1.5 Potential Adjustments to the Pastures

The following steps may be taken to adjust the perimeter and interior fencing of the Preserve to more effectively manage grazing.

#### 4.1.5.1 Fence the Perimeter of the Property

The Authority may wish to realign the perimeter fence of the Preserve so that it is coterminous with the property boundary (i.e. create a true perimeter fence). This could aid implementation of grazing management on the Preserve, though would come at high expense and may not be necessary to achieve the grazing management goals, given that the Authority also directs management of grazing within the West Ridge Pasture which includes other lands.

Currently, the property lacks a perimeter fence in the following locations (Figure 5):

1. Southwestern Boundary, where it abuts land held by the Silicon Valley Land Conservancy and the VTA; and
2. Northeastern boundary, where it abuts land to be retained by UTC.

Additionally, the existing fence is located inside the property boundary in two locations (Figure 5):

1. The southeastern corner of the Preserve;
2. The central, western edge of the Preserve, just south of the Malech Property.

#### 4.1.5.2 Subdivide Pastures

Rock Field #2 could be split in approximately half by installing a fence running northwest to southeast across the middle of the slope (Figure 11). Doing so could enhance the evenness of use in this area, which currently is large and features some areas further from water that are not frequently utilized. It might also aid control of exotic plants including black mustard, which are dense in the California annual grassland on the ridgetop. To provide water to future northern subunit, a solar pump installed on the spring associated within the southernmost trough could be used to fill a tank in the upper (eastern) subunit, which otherwise lacks good water (J. Fields, pers. comm. 2015).

Splitting Rock Field #1 might similarly facilitate efforts to enhance utilization in the area and control exotic forbs; however, unlike in Rock Field #2, which features a very productive spring, this strategy may be limited by lack of good sources of water in Rock Field #1.

### 4.1.6 Methods to Limit Negative Impacts of Grazing

#### 4.1.6.1 Regulate Cattle Access to Riparian Areas and Wetlands

The Authority will evaluate habitat conditions in streams, ponds, and springs within the Preserve to determine the need to fence them, in order to regulate cattle access. This may be desirable in order to:

1. Promote growth of riparian and wetland vegetation, which supports numerous species including breeding birds, provides aquatic habitat, including pools with necessary emergent vegetation for pond-breeding amphibians, and maintains water quality by stabilizing banks and filtering sediment;
2. Prevent trampling of wetland and riparian habitat and species; and
3. Protect the water quality for native animals and to comply with state and federal regulations.

Occasional cattle grazing within ponds may be desirable to achieve the goals of the Preserve, including:

1. Maintain open water habitat in ponds, which is critical for pond-breeding amphibians including California red-legged frog and California tiger salamander;
2. Prevent freshwater emergent vegetation (e.g. cattails and tules) from becoming too thick, such that they no longer provide suitable breeding habitat for species such as tricolored blackbird; and
3. Control invasive plants populations or otherwise manage vegetation to attain desired structure and species composition.

Cattle use in the drainages is anticipated to be limited during early season-grazing, when temperatures are cool and cattle prefer the warmer slopes and ridges (Section 4.1.4.2). Therefore, constructing permanent fences along the drainages will likely be unnecessary. Such fences would be costly to install and maintain and could limit access to streams by native animals including deer and tule elk.

If the Authority determines it is necessary to regulate cattle access to streams, ponds, and springs and their outflows, fences will be erected within appropriate buffer distances of the features (e.g. 50 feet). Fences will be temporary (i.e. electric fences) or wildlife-friendly (Section 4.1.6.4.1). Gates that enable access to or through the riparian, pond, and wetland exclosures should be installed in areas that are least likely to impact the natural systems, such as gently sloped areas, where streams feature cobble or boulder substrate, or where the growth of riparian and wetland vegetation is natural limited by other factors.

#### 4.1.6.2 Create New Water Sources

Where fences are erected to protect streams, ponds, and springs that currently provide water for cattle, alternative livestock water sources will be located away from the fenced features and other sensitive resources as outlined below. Solar pumps can be used to supply new troughs with water from the existing feature (i.e. stream, pond, or spring), or from a well should one be developed on the site.

The following are a series of guidelines for siting new troughs in order to limit impacts of concentrated cattle use:

1. Troughs should be well-dispersed within the grazing area to distribute cattle use within the grasslands;
2. Troughs should be located at least 50 feet away from sensitive biological systems, including streams, ponds, and wetlands, serpentine communities, and rare plant populations;
3. Troughs should be sited in areas of low native plant abundance and richness, such as invasive plant infestations.
4. Troughs should be located away from cultural resource areas;
5. Troughs should be sited to avoid areas of public visitation (e.g. along trails) or areas of prominent public view (e.g. ridgelines).

As an alternative to troughs, new ponds can be created with the Preserve, in order to provide additional breeding habitat for California tiger salamander and California red-legged frog, as well as potentially western pond turtle and other aquatic species. Ponds could be created to feature the conditions that support breading habitat for the aquatic amphibians and be coordinated with the local, state, and federal agencies (Section 4.3.3.3).

#### 4.1.6.3 Prevent Exotic Plant Invasions

While cattle grazing can be used as a management tool to control many non-native plant species (Bossard et al. 2000, Tu et al. 2001), it can also promote the invasion and spread of non-native plants if not well managed. The following guidelines are provided to prevent the introduction and spread of invasive plants during implementation of grazing management.

1. Quarantine cattle in a corral on-site for at least 24 hours prior to allowing them to enter the Preserve. This can help confine invasive plant species seed in their fur or feces to the corral area, which can be more easily monitored and treated.
2. Avoid supplemental feeding, which concentrates soil disturbance and can introduce invasive plants that often contaminate hay (e.g. yellow star-thistle).
3. Use early detection-rapid response techniques to identify and eradicate new occurrences of non-native plant species (e.g. monitor areas of likely introduction, including corrals and high-intensity use areas such as troughs).
4. Use integrated pest management to control populations of invasive plants. Cattle grazing can be used, where appropriate, to control infestation by:
    - erecting temporary fences (e.g. electric fences) to focus grazing in areas featuring palatable species; and
    - grazing cattle when invasive plant species are susceptible to their impacts (e.g. during spring and summer flowering), where doing so will not greatly impact native species.

#### 4.1.6.4 Maintain or Enhance Infrastructure

To promote effective use of cattle grazing as a management tool within the Preserve, infrastructure improvements will be necessary. Infrastructure should be designed and maintained to promote public safety and cattle husbandry, and to avoid impacts to, and where possible benefit, native species.

Infrastructure improvement projects can be conducted by the Authority and the grazing operator, in conjunction with the Natural Resources Conservation Service (NRCS) which provides technical assistance as well as funding through the Environmental Quality Incentives Program (EQIP).

##### 4.1.6.4.1 Fences

Current fences within the Preserve are in poor condition, due to relatively frequent fires (Section 2.1.3) and breeches caused by tule elk as well as perhaps cattle (J. Fields, pers. comm. 2015; Section 2.2.3.2). Effective perimeter fences are needed to prevent cattle trespass onto the highway right of way, or onto adjacent properties that are not being grazed in conjunction with the Preserve, including the County Parks. Similarly, effective interior fences are needed to keep cattle within appropriate areas for grazing management. Fences may also be needed to regulate cattle access to riparian areas, ponds, and springs (Section 4.1.6.1).

The Preserve is located within a critical portion of the landscape linkage or corridor between the Santa Cruz and Diablo Range mountains (Penrod et al. 2013; Figure 10).To avoid mortality and harm to animals and limit the extent to which fences impede their movement while safely containing cattle in the

Preserve, new fences and fence repairs should be constructed to be wildlife friendly, following the Authority's fencing standards.

Temporary electrical fences might also be effective for short-term confinement of cattle (e.g. in areas of black mustard or other invasive plant infestations) or to exclude cattle from temporarily sensitive areas (e.g. rare plant occurrences during flowering). The fences should be clearly signed to avoid unintended impacts to the public and monitored to maintain the condition of the electrical line.

#### 4.1.6.4.2 Gates

Secure gates are needed along roads to regulate cattle movement into or through grazing exclosures (Section 4.1.6.1). Gates on roads should be locked at all times and used only by authorized personnel. Trail gates should be installed where public access routes cross fences. Where the roads are used as trails, separate trail gates should be installed adjacent to the gate. Trail gates should be spring loaded to close automatically, where feasible, and feature signs notifying users to keep the gates closed when cattle are present.

#### 4.1.6.4.3 Corrals

The Preserve currently lacks a functional corral (Section 2.2.3.3; Figure 5). In coordination with grazing partners, including the grazing lessee and owners of other preserves on the Coyote Ridge that the Authority manages, the Authority will work to site a new permanent and/or temporary corral. The corral will enable operators to bring and remove animals to the Preserve in accordance with the seasonal use prescription (Section 4.1.4.2) and quarantine animals to prevent exotic plant invasions (Section 4.1.6.3). Corrals can also house animals for observation or under other special circumstances (e.g. young calves or sick animals).

Because high-intensity cattle use in corrals removes most vegetation, any future corrals that might be needed should be sited away from sensitive habitat and species as well as cultural resources. Locating corrals away from trails and public staging areas can also promote a more enjoyable visitor experience. To avoid severe trampling, corrals should only be used to house animals for observation, during initial turn out, or under other special circumstances (e.g. young calves or sick animals).

#### 4.1.6.4.4 Troughs

The Preserve currently features 13 troughs (Section 2.2.3.4; Figure 5). Additional troughs may be needed to provide alternative sources of cattle water where streams and ponds are fenced to promote their restoration (Section 4.1.6.1) or if one more pastures are subdivided to promote effective and even utilization (Section 4.1.5.2).

New and replacement troughs should be designed and maintained to:

1. Restore the hydrologic function of the streams, ponds, and springs, so that water not diverted to troughs can support wetland and riparian vegetation;
2. Incorporate float valves and any other water conservation features to minimize the amount of water that is collected from springs;

3. Include ramps, emergent rock piles, or other mechanisms that allow animals to escape troughs (Taylor and Tuttle 2007);
4. Provide 10 to 15 gallons of water per day per animal unit, while providing a source of water for native animals, including tule elk and bats, when designed and sited appropriately (Taylor and Tuttle 2007); and
5. Be cleaned, as needed, during the summer and early fall to avoid impacts to amphibians such as Pacific tree frogs that would result from cleaning the troughs during the breeding season (March to August).

*Spring fed trough within the Preserve*
*Photograph by Jodi McGraw*

#### 4.1.6.4.5 Salt and Supplements

Range cattle are provided salt and mineral supplements to enhance their health and facilitate foraging and thus attainment of the Preserve grazing management objectives and biodiversity goals. As with troughs, the location of salt and mineral supplements within the Preserve can influence forage utilization and thus effectiveness of cattle as a management tool. Unlike troughs, salt licks and vitamin supplement stations can be readily installed and moved. Areas that should be considered for salt and mineral supplement locations include:

1. Areas where cattle utilization is lower than desirable to achieve the vegetation management goals and objectives, including areas of relatively high exotic plant abundance or far from water;
2. Flat areas and moderately-sloped areas (<20°), thus avoiding erosion that would result on steep slopes;
3. Areas located away from water sources, including streams, ponds, troughs, and springs (>100 yards); and
4. Areas located away from known rare plant species occurrences, cultural resource areas, other grazing-sensitive resources (>100 yards).

### 4.1.6.5 Native Animal Protection

The Preserve provides habitat for several species of animals that may be perceived as a nuisance or threat to livestock, including California ground squirrel, coyote, and mountain lion. These species play important roles in the ecosystem that the Preserve was established to protect. California ground squirrels are prey for golden eagle and create burrows used by estivating California tiger salamanders and nesting western burrowing owls. Their burrows create small-scale soil disturbances that can promote establishment of native plants. Mountain lions and coyotes are top predators, and their removal can have consequences for populations of herbivores and, as a consequence, plants (Terborgh and Estes 2010).

Given the role of the Preserve in maintaining biodiversity in the region, native animals should not be killed (shot or poisoned) or otherwise harmed or harassed. Dead cattle should be left in place for use by scavengers such as turkey vultures and California condors, where doing so will not threaten livestock, native animals, or public health, or impair public enjoyment of the Preserve.

#### 4.1.6.6 Cultural Resources Protection

The Preserve features a history of Native American use, and one known cultural resources: a lithic scatter. Due to its location with respect to rivers and oak woodlands, which are associated with Native American occupation, the Preserve is likely to feature additional cultural resources (NWIC 2013) (Section 2.1.2.1).

The extensive history (>200 years) of livestock grazing on land within the Preserve may limit the impacts of ongoing grazing on such resources. To protect cultural resources from degradation, corrals, troughs, salt and mineral feeders, fences, and other infrastructure that could concentrate cattle use should be located away from known or potential cultural resources areas.

#### 4.1.6.7 Public Enjoyment

To achieve the recreation and outdoor education goals for the Preserve, the Authority will eventually open it for limited visitor use that is designed to be compatible with the biodiversity goals. The conceptual use plan developed for the Preserve includes opening three existing roads for use by hikers, equestrians, and cyclists, and creating two new short trails from a staging area and picnic area that will be located on the Authority's Malech Property (Figure 12). These facilities will be used by Authority staff and docents to offer education and interpretive programs, including interpretive hikes (Section 4.4).

The following management approaches will be used to promote goals related to public enjoyment of the Preserve during grazing management.

1. Locate grazing infrastructure that promotes higher-intensity cattle use, including troughs, corrals, and supplement feeders, away from recreation facilities, including trails and overlooks on the Preserve, as well as the staging area and picnic areas to be established on the Malech Property.
2. Provide visitor information about grazing management and guidelines for public safety around cattle on a variety of media, including interpretive signs, kiosks, Preserve brochures, and the Authority's website. Visitors unaccustomed to cattle grazing in parks and protected open space areas will benefit from information about how the Authority is using cattle grazing as a management tool to attain Preserve goals. Public safety will also be enhanced by guidelines for safe recreation around cattle.
3. Incorporate information about the multiple benefits of the conservation grazing program in docent or staff-led tours on the Preserve.

## 4.2 Exotic Species Management

Exotic species are one of the chief causes of habitat degradation within the serpentine grassland and other native communities in the Preserve. Controlling populations of existing plants and animals, and

taking steps to prevent establishment of new species, can greatly assist with the recovery of the listed species and help maintain other native plant and animal populations (Section 2.6).

Grazing management will be used to reduce competition from exotic annual grasses (Section 4.1), which are the most widespread and abundant guild of non-native plants within the grasslands. Additional, focused management will be needed to reduce populations of other exotic plants that are not controlled by grazing because they are unpalatable or because cattle avoid their dense occurrences.

Based on the initial assessment of Preserve conditions conducted to prepare this plan, targeted control is recommended for six species or groups of species, in the case of mustards (Table 5). Integrated pest management strategies will be necessary to control mustard, artichoke thistle, and milk thistle, which occur at relatively high density in the California annual grassland and its ecotone with the serpentine grassland along the ridge. Focused management will also be needed to control the invasion and spread of yellow star-thistle and purple star-thistle, which also currently occur along the Ridge Road where they were likely introduced by road maintenance equipment. Finally, control efforts will be used to control and eradicate, as feasible barb goat grass, which can rapidly come to dominate moister grasslands, such as clayey serpentine grasslands, and is not palatable by cattle so could impede effective grazing management.

Because these and other exotic plants as well as animals can disperse within the region, coordinated, regional strategies for their control will be needed for efforts on the Preserve to have long-term benefits. Given the Authority's role in managing several properties on Coyote Ridge, the agency is in a good position to lead development and implementation of such strategies.

### 4.2.1 Exotic Species Management Objectives

The following are initial objectives for exotic species management within the Preserve, which were developed to achieve the plan goals (Section 3) and in consideration of exotic species and their impacts (Section 2.6).

EM-1: Reduce the abundance and competitive effects of exotic annual grasses and forbs on the native plants within the grasslands using grazing and other vegetation management techniques, where appropriate.

EM-2: Use integrated pest management strategies to conduct targeted control of invasive plant species that will not be controlled with grazing along, including barb goat grass, artichoke thistle, mustard, milk thistle, yellow star-thistle, and purple star-thistle.

EM-3: Prevent establishment of new exotic plants within the Preserve, through implementation of an early detection-rapid response program.

EM-4: Implement measures to limit impacts of wild pigs and other non-native animals, including bull frogs.

**Table 5: Goals and techniques for initial list of invasive plants in serpentine grasslands within the Preserve**

| Species | CalIPC Rating[1] | Life History | Goal | Technique(s) to Evaluate | Comments |
|---|---|---|---|---|---|
| artichoke thistle (*Cynara cardunculus*) | Moderate | Winter-Spring Perennial Forb (flowers Apr-Jul) | Eradicate/ control | • Pull or dig plants out, being sure to remove most of the taproot to prevent resprouting.<br>• Cut and remove inflorescences before seed production if plants cannot be removed.<br>• Cut plant and treat cut stem immediately with herbicide, to prevent resprouting | This species does well in disturbed areas, including open soil conditions following intense grazing. It has dormant seed that can survive 5 years in the field. Plants can reproduce in their first year and survive for many years creating sufficient seed to attain densities of 20,000 plants per acre. |
| barb goat grass (*Aegilops triuncialis*) | High | Winter annual (flowers May-Aug) | Eradicate/ control | • Burn in late spring for 2 consecutive years when sufficient fuel available but before seeds shatter.<br>• Spray in winter or spring (may require 2 years) | This species can rapidly come to dominate grasslands, particularly those with soil moisture (e.g. likely clayey soils), in part aided by dispersal from small mammals. It is generally unpalatable to livestock, which can hasten its spread by reducing competition from palatable grasses (Davy et al. 2008). |
| Mustard (*Brassica nigra* and *B. rapa*) | Moderate | Annual herb (flowers Apr-Jul) | Control | • Pull or cut individuals plants<br>• Apply foliar herbicide prior to flowering.<br>• Graze during the growing season | Several acres of the Preserve are densely infested with mustard. Cattle may avoid these areas if not confined to them. |
| milk thistle (*Silybum marianum*) | Limited | Annual or biennial herb (flowers Apr-Jul) | Control | • Till dense monocultures early in the season.<br>• Foliar spray in spring prior to bolting and flowering. | This species establishes following disturbance and produces seed that is viable for at least 9 years. Plants are generally too spiny to be used by grazing animals. |

**Table 5: Goals and techniques for initial list of invasive plants in serpentine grasslands within the Preserve**

| Species | CalIPC Rating[1] | Life History | Goal | Technique(s) to Evaluate | Comments |
|---|---|---|---|---|---|
| purple star-thistle (*Centaurea calcitrapa*) | Moderate | Annual perennial herb (flowers July-Oct) | Eradicate | • Hoe rosettes of individual plants and small infestations<br>• Foliar spray of herbicide on rosettes (January to February) | Currently found primarily on Ridge Road; perhaps introduced with road maintenance/use. |
| yellow star-thistle (*Centaurea solstitialis*) | High | Annual herb (flowers Apr-Sept) | Eradicate | • Pull or dig individual plants by hand (May-June)<br>• Mow when plants begin to flower<br>• Intensely graze May to June<br>• Foliar spray plants when they bolt | Livestock may need to be confined to the area to get the desired impact; sheep and goats may be more effective than cattle. |

### 4.2.2 Exotic Species Management Strategies

#### 4.2.2.1 Exotic Plant Management Approaches

Exotic plants within the Preserve should be controlled and, where possible, eradicated, using integrated pest management approaches. Complete elimination of an exotic species from the Preserve will be the goal of management where doing so is feasible and where control on adjacent lands is also being implemented. Species that should be considered for eradication include:

1. recently invaded exotic plant species;
2. narrowly distributed exotic species; and
3. exotic species that occur at low density.

Exotic plants that have strong impacts yet cannot feasibly be eradicated will be the subject of targeted control efforts, which will be designed to reduce their current negative impacts and potential for future impacts on communities and covered species by: preventing their spread, reducing their abundance (e.g. density), reducing their distribution, and reducing their vigor.

The following guidelines will be followed to enhance effectiveness of exotic plant control projects:

1. Remove individuals or isolated patches of plants which are geographically isolated from larger patches;
2. Remove exotic plants along roads and trails, which can act as corridors for invasion to intact habitat;
3. Prevent the spread of populations by controlling patches at their perimeters, then working inward;
4. Prevent the spread of wind-dispersed species including grasses and Asters, among others, by working from upwind (where the sources is) to downwind (where seeds are landing).

Depending on the species and community, exotic plant control will proceed via one or more approaches:

1. **Ecosystem-Level Approaches:** In these approaches, management efforts focus on controlling exotic plant species by addressing ecological processes that influence their distribution, abundance, and population performance. Such approaches may be the most cost-effective for controlling widespread and abundant exotic species over large spatial and temporal scales. Fire management, which includes both prescription burning and wildfire suppression, and grazing are two common ecosystem approaches.
2. **Functional Group Approaches:** Exotic plant species with similar ecologies can be targeted with similar methods, perhaps increasing efficiency over single species efforts.
3. **Single-species approaches:** A single species approach will be used in cases where a species has large impacts and/or a unique ecology which requires specialized treatment, including in the case of barb goat grass or artichoke thistle. Single-species control can also be effective in targeting invasive plant occurrences in areas supporting sensitive species that could be negatively impacted by broader-scale control efforts

Techniques to control exotic plants include the following, which can be used in combination as part of an integrated pest management strategy:

1. **Physical control**: Cutting, pulling, and in the case of trees, girdling, can be used to kill plants or limit their reproduction, as in the case of cutting artichoke thistle inflorescences.
2. **Fire:** Flaming can be used to blanch seedlings, causing their cells to lyse, while prescribed burning can be used to incinerate plants. The latter strategy may not be feasible within the Preserve given much of it is visible from Highway 101, where fire can present a safety hazard.
3. **Biological Control:** These techniques can include planting native plants that outcompete native species, measure to reduce soil nutrient availability (e.g. nitrogen), and grazing, which is also often thought of as a cultural practice.
4. **Chemical control:** Herbicides can provide a highly effective method to control invasive plants independently or in conjunction with other techniques (e.g. topical application of herbicide following cutting).

Potential negative impacts of herbicide use to control exotic plants include:

1. collateral damage to native species, including sensitive plants and animals;
2. facilitation of additional exotic plant invasions, due to disturbance and/or increase nutrient availability associated with the die-off and herbicides themselves; and
3. contamination of surface water, including springs, ponds, and streams.

The herbicide will be reduced through one or more of the following precautions (Hoshovsky and Randall 2000):

1. selecting chemicals that are selective (kill only one or a few species), are non-toxic to animals, degrade rapidly under environmental conditions of the region, are immobilized on soil particles and therefore unlikely to reach groundwater, and are not easily volatilized; and
2. applying the herbicide so as to minimize inadvertent spread, including by spot treating the narrowest area possible, using a dye to determine where the application is going, and applying only in appropriate weather conditions (no rain, low wind).

Herbicide use in aquatic habitats will be minimized by following the Herbicide Use BMPs (USEPA 2015):

1. within a 60-foot buffer zone adjacent to a wetted channel, only aquatic-safe herbicides will be used (*e.g.*, Garlon 3A). Herbicides not safe for aquatic applications or that may be harmful to California red-legged frogs (*e.g.*, Garlon 4 Ultra) will not be used.
2. not applying herbicides within 24 hours of predicted rain events (40% chance or greater).
3. not using foliar application of herbicides or other spray application methods when wind speeds exceed 10 miles per hour.
4. In areas where herbicides will be applied within 60 feet of the Ordinary High Water Mark of areas determined to be suitable California red-legged frog breeding habitat, herbicides use in these areas will be limited to September 1 to October 31. No foliar application of herbicides will occur within 60 feet or in areas subject to potential drift.

The precise techniques used to control exotic plants will be determined based on a variety of factors including:

1. The target species (i.e. the species to be controlled);
2. The density and/or areal extent of the occurrence;
3. The location of the occurrence with respect to sensitive habitat, including aquatic systems (springs, ponds, and streams) and rare plants and animals; and
4. Effectiveness of treatments in ecologically similar situations.

#### 4.2.2.2 Initial Exotic Plant Management Techniques

Table 5 outlines management techniques that will be used to control, and where feasible, eradicate, six invasive plants within the Preserve. This initial list of target species will be adjusted following an inventory of exotic plants within the site conducted after the Authority acquires the property; the subsequent assessment will be used to prioritize species and occurrences for control. Treatment methods will be revised as part of the adaptive management framework which will be used to enhance effectiveness and limit impacts over time.

#### 4.2.2.3 Early Detection and Rapid Response

Early detection and rapid response will enable the Authority to eradicate new exotic plant species that invade the Preserve before they have a chance to spread and establish a seed bank. To implement this strategy, the Preserve will be examined annually as well as part of ongoing management and maintenance activities, to detect occurrences of new exotic species. Heightened vigilance will prevent establishment following events known to promote invasion including:

1. disturbances, such as fire, road or trail work, landslides, or restoration projects;
2. very wet years (e.g. El Niño years); and
3. soil amendment and fertilization, including application of herbicides.

Any new exotic plant species detected within the Preserve will be eradicated during the first year following initial detection if feasible.

## 4.3 Spring, Streams, and Pond Management

### 4.3.1 Background

The serpentine geology of the Preserve gives rise to abundant springs, which provide important sources of water for animals and create freshwater wetland habitat that supports species such as the Mt. Hamilton thistle (Section 2.3; Figure 6). The springs create aquatic habitat and help support vegetation within the drainages, which flow to Coyote Creek (Figure 7). Improvements to the troughs that supply cattle and native animals with water from springs can improve water use efficiency, and ensure that as much water can remain in the springs and streams as possible.

Though created to provide water for livestock, the ponds within the Preserve provide important habitat for several special-status species, including Mt. Hamilton thistle, California red-legged frog, and California tiger salamander (Figure 6). Owing to their location within the seasonal drainages, many of the ponds have had their dams breached as a result of high flows, and/or have become filled with sediment. As a result, they lack the depth and the period of inundation (hydroperiod) necessary to

provide breeding habitat for the listed amphibians in certain years. Active management of the ponds can be used to enhance the habitat and promote populations of these and other pond-breeding species.

### 4.3.2 Spring, Stream, and Pond Management Objectives

This section will outline objectives for pond management. The following are draft objectives, which will be refined during the course of planning.

PM-1: Maintain or enhance the natural community structure and species composition of springs, ponds, and streams, and associated wetland and riparian communities within the Preserve, by managing cattle access, including by fencing these systems and providing alternative sources of water (e.g. troughs) where appropriate.

PM-2: Restore hydrologic conditions to springs, streams, and ponds, to increase growth of wetland species, including by installing float valves in troughs and other necessary infrastructure to prevent unnecessary water diversion from springs.

PM-3: Protect and enhance water quality within streams, ponds, and springs, by limiting inputs of sediment, nutrients, and other pollutants.

PM-4: Where appropriate, create new ponds that can provide suitable breeding habitat for California red-legged frog, California tiger salamander, and western pond turtle.

PM-5: Maintain or increase the diversity of native plants and animals supported by streams, ponds, and the adjacent wetland communities, by creating and maintaining a mosaic of abiotic and biotic conditions (e.g. hydroperiod, vegetation cover, etc.).

PM-6: Prevent degradation of streams, ponds, and wetlands by controlling invasive animals, including wild pigs and bullfrogs, as necessary.

### 4.3.3 Stream and Pond Management Strategies

Following acquisition of the Preserve, the Authority will conduct a comprehensive and detailed assessment of the springs, ponds, and streams, to identify specific techniques to promote the goals for the conservation of aquatic biodiversity within the Preserve. This assessment will update information provided in a prior surveys of the ponds (Biosystems 2008) and provide information about the streams and springs as well. The following is an initial list of strategies that will be evaluated and applied, as appropriate.

Many of these strategies can have short-term negative impacts during construction to listed species, including those in serpentine grasslands adjacent to the ponds as well as the pond-breeding amphibians (Figures 8 and 9).. The Authority will coordinate with local, state, and federal agencies, including the California Department of Fish and Wildlife and the United States Fish and Wildlife Service, which can provide guidance on design and permitting and potential funding for projects that recover threatened or endangered species (e.g. Section 6 funds).

#### 4.3.3.1 Restore Ponds

Ponds that have become laden with deep sediment or have had their dams breached by storm flows will be restored, to recreate hydrologic conditions desired by California red-legged frog and California tiger salamander, which include (Ford et al. 2013):

- Create a mix of shallow (approximate 8" deep) and deep areas (1 m deep);
- Appropriate hydroperiod (wet until July); and
- Appropriate vegetation (10-35% edge and emergent vegetation).

Desilting projects will be implemented following methods to avoid negative impacts, including by (Ford et al. 2013):

- Removing sediment to prevent its release downstream;
- Retaining at least some emergent vegetation (e.g. along one edge of the pond) for habitat and recolonization;
- Cleaning equipment to prevent spread of amphibian diseases (e.g. chytrid fungus).

#### 4.3.3.2 Regulate Cattle Access

Ongoing cattle use of ponds can maintain habitat for listed species, by maintaining open water (limited vegetation) conditions and increasing the hydroperiod (by reducing evapotranspiration from plants) (Marty 2005). Cattle may also reduce the period of pond inundation through drinking, and can degrade water quality sedimentation and nutrient inputs, though these factors may not negatively impact listed amphibians (Ford et al. 2013).

Fencing ponds to enable exclusion of cattle can enable annual management to maximize the beneficial effects of cattle while limiting their negative impacts. For example, cattle can be provided periodic access to prevent excessive growth of aquatic or riparian vegetation. Cattle can be excluded during the dry season, to prevent trampling of vegetation associated with excessive loafing in the water.

Where ponds provide an important source of water, troughs will need to be provided outside of the exclosures to provide an alternative source of water. Troughs should be cited and installed following measures to limit their impacts (Section 4.1.6.4.4).

#### 4.3.3.3 Create New Ponds

New ponds could also be created within the Preserve, in order to provide additional breeding habitat for California tiger salamander and California red-legged frog, and other pond-breeding native species. The Authority will explore the feasibility of creating new ponds in order to site them in areas where their creation would limit impacts to other listed serpentine species, as well the springs and drainages.

#### 4.3.3.4 Control Non-Native Animals

Bullfrogs are currently not known to occur within the Preserve, which generally lack the appropriate conditions for the invasive species: the ponds are ephemeral at least in most years. However, bullfrogs are known to occur in a single perennial pond located on the UTC property to the east, and may also occur in the Coyote Creek drainage to the west. The Authority will manage the ponds to ensure their

conditions do not support bullfrogs, as well as hybrid California tiger salamander, including by draining ponds after the end of the breeding season when needed (Ford et al. 2013).

## 4.4 Public Access Management

### 4.4.1 Background

The Preserve provides excellent opportunities for outdoor education and interpretation of the region's unique natural and cultural history. School programs, docent-led hikes, and self-guided interpretive trails, can increase community awareness of conservation issues and support for conservation efforts, including land protection, restoration, and stewardship.

The Preserve's abundant wildflower displays, tule elk herd, and sweeping vistas of Coyote Valley and the South Bay also render it an exceptional venue for low-intensity recreation. Though the Coyote Ridge features a string of conservation lands, the only publicly accessible land is within Motorcycle County Park and Field Sports Park, which are both used for high-intensity recreation (Figure 1). Moreover, the Preserve will help fill a critical gap in the Bay Area Ridge Trail—a multiuse trail designed to encircle the San Francisco Bay—by helping complete the segment between Anderson Lake and Joseph D. Grant county parks (Section 2.1.2.3.2). Providing public access to open space lands does increase support for government programs that fund its protection, as was the case within the Preserve.

Finally, the Preserve will provide important opportunities for scientific research. Its intact serpentine communities supporting known occurrences of 14 special-status species, can host important research to inform their recovery, conservation, and management, including adaptation to climate change. Examining use of the Preserve lands by native animals can also help examine its role in promoting habitat connectivity across the Coyote Valley.

*Educational program provided by the Authority*
*Photograph by the Authority*

Much of the area of the Preserve supports sensitive aquatic and terrestrial habitat; most notably, serpentine grasslands that are important to the recovery of Bay checkerspot butterfly, Metcalf jewelflower, and other rare and endangered species (USFWS 1998; Sections 2.4 and 2.5, Figures 7-9). If not well-managed, public access can impact these species directly, via trampling and removal of vegetation, and indirectly, by promoting erosion, fire, or the invasion and spread of exotic plants. Public access can also impact cultural resources and landscapes, if not well-managed. As a result, access within the Preserve will need to be carefully designed and managed to ensure it is compatible with the goals for natural and cultural resource protection.

### 4.4.2 Public Access Management Objectives

The following are initial objectives for management of access to the Preserve, which were developed to achieve the plan goals (Section 3) in consideration of the Preserve's conditions (Section 2).

AM-1: Interpret the serpentine and pond communities, and their sensitive species, and the role of the Preserve in maintaining habitat connectivity, through interpretive signage and programs designed to increase understanding of and support for their uniqueness and conservation and management needs.

AM-2: Provide recreation opportunities that are compatible with the biological goals, including by minimizing impacts to sensitive communities and species, and limiting conflicts with other aspects of management, including grazing management.

AM-3: Manage access consistent with the guidelines outlined in Condition 9 of the Santa Clara Valley Habitat Plan, to limit impacts and enable enrollment of the Preserve in the Reserve System.

AM-4: Establish a trail network for low-intensity recreation, including a loop trail on the western slope of the ridge, and a ridge trail between Metcalf Road and the VTA Mitigation Property, which will serve as a segment of the Bay Area Ridge Trail. Work with the Bay Area Ridge Trail Council, Santa Clara County Parks, and other partners to ensure that the trail system facilitates connections to existing and proposed parks and open spaces.

AM-5: Provide public opportunities for community service and hands-on learning about the unique resources of the site, through volunteer restoration and stewardship programs and citizen science programs.

AM-6: Manage access for scientific research to maximize the information gained to inform conservation and management, while limiting impacts to sensitive communities and species.

### 4.4.3 Public Access Management Strategies

Public access will be managed to ensure that access achieves the multiple goals for management, including for conservation of biodiversity and protection of cultural resources. In order to site facilities away from sensitive areas, while providing opportunities to interpret them, existing roads are utilized to the greatest extent feasible and new infrastructure is limited in scope. The recreation plan also satisfies Condition 9 for enrolling public lands into the Reserve System for the Santa Clara Valley Habitat Plan (SCVHA 2012).

#### 4.4.3.1 Types of Use

Initial public access to the Preserve will include the following low-intensity uses which are consistent with Condition 9 of the Santa Clara Valley Habitat Plan (SCVHA 2012):

- Passive trail use, including walking or hiking, horseback riding, and mountain biking;
- Education and interpretive programs, including school programs and docent-led activities;

- Volunteer stewardship projects led by Authority staff, and similar programs to provide hands-on learning opportunities for students;
- An active science and research program to use the Preserve as an outdoor lab, with an emphasis on research projects that inform Preserve management; and
- Up to two permit-based hike-in camping sites that can accommodate groups of up to ten individuals, accessible via the Bay Area Ridge Trail.

*Scenery on the Preserve*
*Photograph by Derek Neumann*

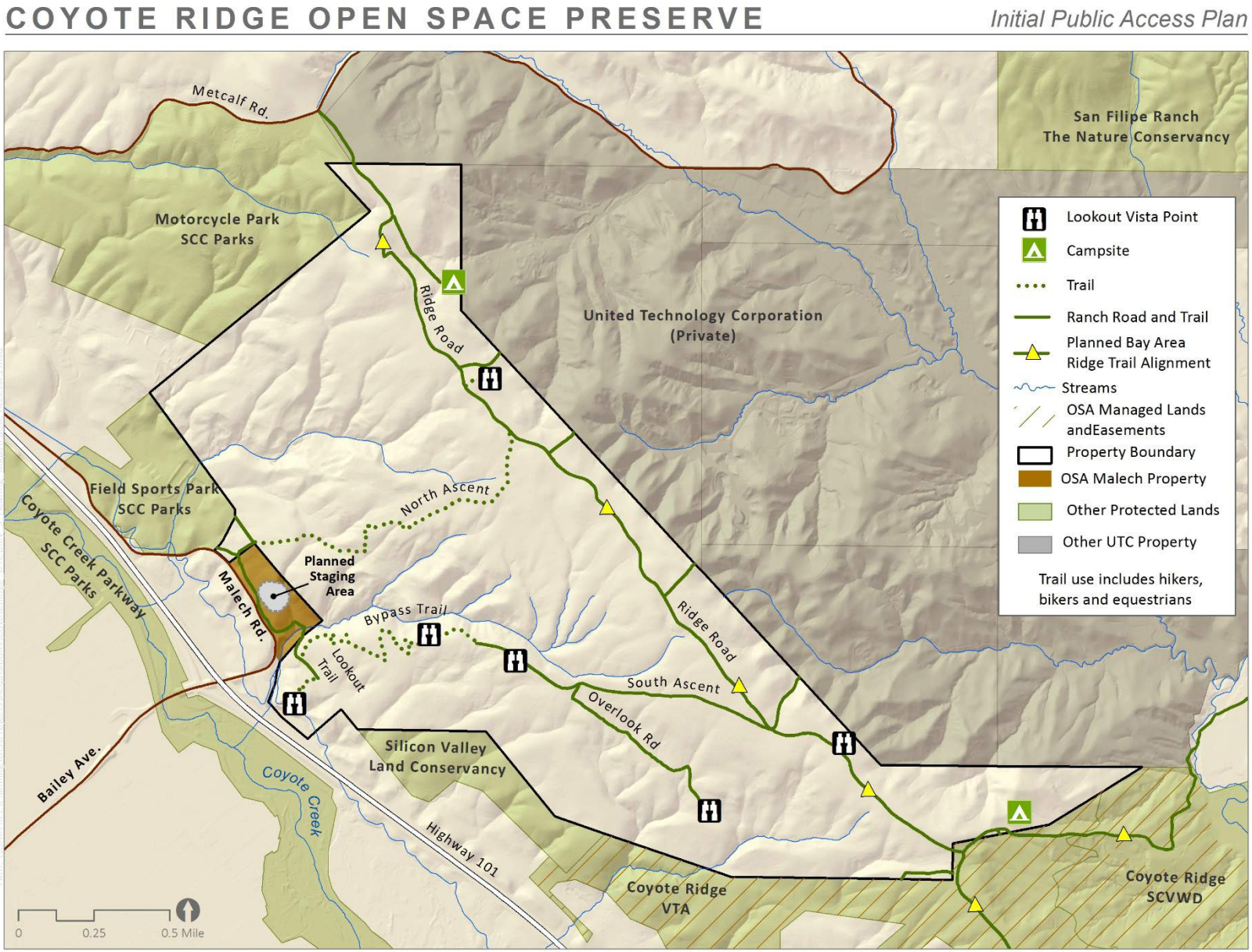


**Figure 12: Initial recreation plan**

Public access will be confined to designated use facilities, which will include trails, roads, designated campsites and overlooks, except by permit or for special events led by Authority staff or docents. The Authority will use signage, patrols, boardwalks, and fences (symbolic or actual) to deter off-trail use, which could trample sensitive species. The Authority has adopted Access and Use Regulations (2002) to regulate and enforce recreational restrictions. Since public use is restricted to a limited network of roads and trails that are mostly existing and that avoid the largest areas of serpentine habitat on the Preserve, it is not anticipated that seasonal closures will be necessary to protect covered species. The Authority already administers a permit system on its other preserves and will incorporate permit requests for off-trail or scientific use on Coyote Ridge Open Space Preserve into this process.

Use will generally be limited to daylight hours. The Authority will potentially construct two primitive campsites (Figure 12), with a raised pad for tent, pit toilet, picnic table, hitching post, and designated area for a cook stove; no campfires will be allowed. These sites are designed to facilitate implementation of the Bay Area Ridge Trail council's vision of a system of overnight huts along the Ridge Trail. Use of the campsites would be regulated by a permit system administered by the Authority.

Authority staff will patrol the preserve on a weekly basis at minimum throughout the year, and daily during anticipated periods of high use (such as wildflower season and weekends), to ensure compliance with access and use regulations and campsite guidelines. While on patrol, Authority staff will monitor for signs of trail use impacts and off-trail travel. During patrol, Authority staff will engage with visitors to address issues as they arise. If needed, the Authority may also install wildlife cameras to monitor public use. Any off-trail travel will be eliminated with additional signage and/or temporary fencing, with the exact strategy developed based on the specific problem and location. If problems persist despite these efforts, Authority staff will investigate the cause of the problem and may restrict certain uses or user groups on the trail network.

Authority staff will also inspect the Preserve for signs of erosion and sedimentation resulting from recreational use of the Preserve during the rainy season. If a problem section of the trail has been identified, Authority staff will harden the road/trail surface or otherwise modify the road/trail to correct the drainage issue(s). If deemed necessary, the Authority will also consider implementing seasonal trail closure(s). Higher intensity activities as well as those that are more likely to result in off-trail impacts will not be allowed. They include:

- Motorized vehicles, including all-terrain vehicles (or off-highway vehicles), except for use by managers and researchers;
- Pets including dogs;
- Remote operated aircraft, such as craft airplanes and drones except by permit for scientific purposes; and
- Smoking and fires.

During routine daily or weekly patrol, Authority staff will also inspect the Preserve for uses not allowed and will be responsible for enforcing Preserve rules and guidelines. Authority staff will maintain a log of trail use violations, including any steps taken to address unpermitted use by Preserve visitors. Additionally, the Authority anticipates participating in site visits and other easement monitoring activities performed by the Valley Habitat Agency and Wildlife Agencies. During these visits, Authority staff can highlight any problem areas and the corrective actions that were taken.

#### 4.4.3.2 Initial Public Use Facilities

Facilities to support public use will be designed, constructed, and maintained to limit impacts to sensitive biological and cultural resources. In the short term, the Authority anticipates developing a staging area and picnic area in the adjacent Malech Property (Figure 12). The staging area would be located in a flat area that features deeper soils and consequently, greater cover by exotic plants and lower diversity and abundance of native species (Section 2.2.2). The staging area is envisioned to be up to 3 acres in area and provide parking for 25 to 50 passenger vehicles and four horse trailers. It would feature restrooms as well as an interpretive kiosk (outdoor sign) that provides information about the Preserve including its access policies, trail network, sensitive resources, and conservation grazing program.

The picnic area would be located in the coast live oak forest and woodland along an intermittent drainage to Coyote Creek so the south (Figure 12), which provides shade during the summer and fall when temperatures can be hot; it would feature four picnic tables. Additional solitary picnic tables and benches will be located throughout the Preserve along the trails. Shade structures will be included to keep visitors on the trail so they do not have to search for shade.

The staging area and adjacent picnic area will be the primary points of entry for access to the Coyote Ridge Open Space Preserve, which will primarily occur on the 8.3 miles of existing ranch roads that the Authority will maintain for access as well as management of the site (Section 4.6.3.1; Figure 12). When combined with a nearly 1.5-mile segment of the Ridge Road that is between them, the North Ascent and South Ascent Roads can create a scenic 6.0-mile long loop trail on the western slope and ridge of Coyote Ridge. Access to the Bay Area Ridge Trail will also occur from Metcalf Road via an easement across the portion of the UTC property that will be retained by UTC and potentially from the VTA property to the south (Figure 12).

To complement the network of existing roads that will be maintained for use, the Authority envisions creating four new, short trails, each of which will be approximately 3-4 feet wide feet wide (Figure 12). Trail standards for the Preserve will be narrower than the Authority's usual 5' wide multi-use trail width, in consideration of the serpentine resources of the Preserve (Figure 12).

1. **Lookout Trail:** A short (approximately 0.72-mile) trail will provide access to a low hill that provides a view of Coyote Valley. The first approximately 0.33 miles of the trail will following the existing South Ascent Road on the Malech Property and the next 0.26 miles follows the road on the Preserve. The last approximately 0.11-mile trail will be a new trail that ascends a knoll that supports serpentine grassland with scattered mature coast live oaks.

   Much of the new trail alignment will be on habitat that has dense cover of exotic annual grasses and forbs, due to its lack of grazing (much is west of the western perimeter fence) and also perhaps nitrogen inputs from the adjacent Highway 101. As feasible, this trail will be designed to facilitate access by individuals with limited mobility.

2. **Bypass Trail:** An approximately 1-mile trail will provide access to the South Ascent Road—a ranch road that will be retained for use as a trail as well as by the Authority for management. The new trail will ascend the western slope with a gentler gradient than the existing road, which is too steep for equestrians and cyclists.

3. **North Ascent Re-route Trail:** A short 0.27-mile trail will be constructed in the middle of the North Ascent Road to bypass an eroded section of the road. A very short segment of this trail

will follow the existing road alignment. The rest of the road will be restored to a trail. The new trail alignment will not have vehicle access.

4. **Overlook Trail:** An approximately 0.6-mile road begins at the South Ascent Road (approximately halfway up the ridge) and follows the mid-ridge south. A 0.1-mile section of this road will be rerouted to avoid a seasonal wetland.
5. **Spur Trails:** Approximately 0.4 miles of trails will be constructed from the main trail network to scenic overlooks.
6. **Additional Trails:** An additional 1.5 miles of existing roads will provide future access from the Preserve to neighboring parcels. These will be opened to public use if needed based on opportunities for future regional trail connections.

To reduce impacts to the serpentine communities and species within the Preserve, trails will be approximately 3-4 feet wide and include several passing locations, rather than five feet wide, which is the Authority's standard for multi-use trails. Mechanical trail construction techniques will be minimized if feasible to do so.

The Authority also anticipates installing six overlooks at scenic vistas from the Preserve: 1) at the end of Lookout Trail, to provide an easily accessible view of Coyote Valley; 2) mid-way up the South Ascent Road, to provide a more elevated view of Coyote Valley; 3) on the south end of the Ridge Road, to provide a vista of the expansive open space east of the Preserve, including Mount Hamilton and the Lick Observatory; 4) on the north end of the Ridge Road, to provide elevated views of Coyote Valley and San Jose to the north; 5) along the Bypass Trail; and 6) at the end of Overlook Road to provide views of Coyote Valley (Figure 12).

At each overlook, the Authority will post one or more interpretive signs featuring a map to orient the visitor to the landscape, and provide information about the importance of the Preserve for regional habitat connectivity and conservation of globally rare species among other aspects of the natural and cultural history. The overlooks will be accessed from short (<50 feet) spur trails from the main trail or road. These spurs will feature low fences, symbolic fences (e.g. a rope), or perhaps a boardwalk, as well as signs designed to keep visitors on the designated path and prevent impacts to surrounding serpentine grassland habitat. Overlooks may also include benches, picnic tables, and shade structures. One or more observation areas may feature a low deck scopes, or other amenities to accommodate events. Lookout #3 will feature an observation deck large enough to accommodate 20 people and is anticipated to be accessed via a boardwalk from the main trail (Figure 12).

*Coyote Valley and San Jose from Overlook #3*
*Photograph by Jodi McGraw*

The Authority will regularly monitor public access to evaluate compliance with the access provisions and to detect and correct negative impacts to sensitive biological and cultural resources (Section 5.1). The Authority will reevaluate the public access plan periodically to explore opportunities for future trail connections, including

connections with adjoining county parks, as surrounding lands are protected or as additional regional trails are established.

## 4.5 Cultural Resources Management

### 4.5.1 Background

The Preserve occurs within an area of prehistoric land use, and one known resource area (a lithic scatter) has been recorded on the site (Section 2.1.2.1). Future surveys would likely reveal additional resources (NWIC 2013), including artifacts or features on or beneath the ground surface. Ground-disturbing activities, as well as other aspects of management, have the potential to impact the integrity of sites as well as landscapes.

During management of the Preserve, the Authority will protect cultural resources from potential impacts associated with management. The Authority will also integrate cultural resources and the broader cultural landscape in programs to interpret the natural and cultural history of the Preserve.

### 4.5.2 Cultural Resources Management Objectives

CRM-1: Conduct surveys to identify and evaluate cultural resources within the Preserve and use this information to facilitate their protection during management.

CRM-2: Protect cultural resources from impacts associated with management of habitat, recreation, and facilities, to ensure their long-term preservation.

CRM-3: Increase awareness and appreciation of cultural resources as well as the broader cultural landscape to promote support for their protection.

### 4.5.3 Cultural Resources Management Strategies

The Authority will implement the following strategies to protect and interpret cultural resources.

1. **Conduct Surveys:** Conduct project-driven surveys or, as resources allow, surveys to inventory cultural resources within the Preserve more broadly, in order to address their protection in the design and implementation of management projects, as well as gain important insight needed to inform interpretive programs.
2. **Build Cultural Resources Database:** Assemble a database containing spatial data as well as documents about cultural resources in the area, including those identified as part of surveys and assessments conducted on the Preserve and on nearby properties.
3. **Consult with Stakeholders:** Consult with Native Americans tribes and individuals, other ethnic groups whose history is tied to cultural resources on the Preserve or Coyote Ridge more broadly, and historical societies. The purpose of the consultation will be to help identify resources including cultural landscapes and other areas of high cultural sensitivity, obtain information to inform development of interpretive programs, and obtain feedback on plans for specific projects or planning efforts.

4. **Interpretation:** The Authority will interpret community heritage and past life ways related to Native American prehistory, as well as ranching activities in the region and the history of the Preserve and its connection to UTC.

## 4.6 Facilities Management

### 4.6.1 Background

Though undeveloped, land within the Preserve currently features infrastructure associated with cattle grazing including fences, gates, troughs, water pipelines, and a single tank (Section 2.2.3; Figure 5). A network of 15 miles of unpaved roads traverse the property, and have been used to facilitate livestock grazing as well as maintain utility transmission lines maintained by the operators (PG&E and SCVWD), which hold easements across the property (Section 2.2.3.5; Figure 5)

Where feasible, the Authority will eliminate unnecessary facilities, including roads, and where needed, actively restored affected habitat. The Authority will also work to upgrade infrastructure where doing so can limit its impacts, such as replacing the existing chain link fence, as well as sections of barbed- wired fence with wildlife-friendly fences.

The Authority will use best management practices to maintain roads and other facilities in good condition, and work with easement holders to encourage similar management, in order to limit impacts to sensitive species and communities in the Preserve. Based on the design and condition of the existing roads, the Authority may realign them as necessary to ensure positive drainage and to reduce the potential for erosion and sediment delivery to waterways.

### 4.6.2 Facilities Management Objectives

FM-1: Eliminate unnecessary roads and reroute or realign misaligned roads, to reduce habitat impacts and costs associated with their maintenance.

FM-2: Improve roads that are identified as causing erosion and sediment delivery to waterways, or that otherwise require improvements.

FM-3: Maintain roads and trails using methods that reduce their impacts on habitat and long-term maintenance costs.

FM-4: Eliminate unnecessary fences and use wildlife-friendly fence designs when installing new fences or conducting repairs and upgrades, in order to promote animal movement.

FM-5: Maintain or improve infrastructure needed to promote effective grazing management, including corrals, fences, gates, and troughs, to enhance grassland communities while reducing impacts on streams, ponds, and wetlands.

### 4.6.3 Facilities Management Strategies

The Authority will take measures to maintain facilities using best management practices that reduce their impacts on the natural and cultural resources within the site, reduce their costs, and also promote

compatibility with public access. Section 4.1.6.4 describes measures that will be taken to maintain and improve facilities for grazing; the following sections describe measures for roads and trails, fences, and utilities.

#### 4.6.3.1 Roads and Trails

The Preserve features 15 miles of unpaved roads which were established primarily to facilitate grazing management and to install and maintain utility transmission lines (Section 2.2.3.1). To reduce habitat impacts including vegetation removal and sedimentation associated with roads, the Authority will eliminate unnecessary roads and realign and actively manage roads as well as trails that it will retain for access. The roads management strategies will be identified following a more comprehensive assessment of the roads within the Preserve following its acquisition. The following describes general approaches and anticipated road closures and improvements based on initial planning.

##### 4.6.3.1.1 Eliminate and Restore Unnecessary Roads

If no longer needed for access, the Authority will discontinue routine use of approximately 5.2 miles of unpaved roads that were primarily created to provide access to grazing facilities including ponds and troughs, as well as the perimeter fence (Figure 13). Future access to the facilities will occur infrequently, if at all, and will occur on foot, via ATV, or less frequently, other vehicles.

Road alignments on gentle terrain and with proper drainage will be allowed to be naturally recolonized by plants. Owing to the thinner soil in these areas, they are anticipated to support reduced density of exotic plants relative to the adjacent habitat; however, the Authority will monitor the recolonization to detect and control any invasive plants where feasible, as well as correct other issues that will impede natural restoration, including improper drainage.

Roads that are steep or lack appropriate drainage (e.g. have inboard ditches or are incised) will require active restoration. The Authority will work to secure funding to implement such active restoration projects.

During the course of restoring the roads on the Preserve, the Authority will evaluate different restoration approaches for restoring roads in serpentine soil, such as using serpentine soil from the neighboring Kirby Canyon landfill to restore the topsoil. The Authority will also explore partnership opportunities with universities to evaluate road restoration methods on serpentine soil. Any new knowledge gained regarding restoration of roads on serpentine soils will be shared with other land managers and interested agencies.

##### 4.6.3.1.2 Re-Align and Actively Manage Roads and Trails

The Authority will initially retain 10.5 miles of roads within the Preserve for use in management as well as public access (Figure 13). These roads, along with the new trail segments that are anticipated to total up to 1.5 miles (Section 4.4.3.3; Figure 12), will be maintained following best management practices developed for roads and trails in natural lands. For roads, the Authority uses Keller and Sherar 2003 while it develops and maintains trails as outlined in IMBA 2004. As feasible, the Authority will work with easement holders to ensure that they similarly implement these BMPs.

Sections of the roads to be retained that are excessively steep or feature drainage issues that cannot be corrected in their current alignment, will be rerouted to arrest sedimentation and correct other issues which degrade habitat and necessitate extensive maintenance. The following outlines the main routes (Figure 13), and provides information about their proposed future use.

**Ridge Road**

This 3.2 mile long road is largely situated atop Coyote Ridge on the eastern portion of the Preserve. In the north, it is accessed from the Metcalf Road, via a 0.21-mile long stretch of dirt road through a UTC-retained parcel, over which the Authority will be granted an easement for access and utilities (Section 2.1.4.2). To the south, the road provides access to the VTA-Coyote Ridge property and the SCVWD Coyote Ridge Preserve beyond, both of which the Authority manages. This road is used by PG&E to maintain the gas line that also traverses Coyote Ridge (Section 2.1.4.1). The easement granted to PG&E allows for annual maintenance, though in recent history, the grazing operator has performed this work (J. Fields, pers. comm. 2015). If feasible, the Authority intends to realign a section of the Ridge Road near Metcalf Road and restore the existing road.

**North Ascent**

This 1.2-mile road provides access to the Ridge Road from the northeastern corner of the Authority's Malech Property, by generally following a ridgeline on the west-facing slope. There is a section in the middle of the road that is not suitable for long-term vehicle access and has eroded to bedrock. A new trail alignment will be developed to bypass this section of road, and the remainder of the road will be restored to trail width of 3 to 4 feet wide; vehicles will not be permitted to access this road after it has been restored.

**South Ascent**

This 1.9-mile road connects the southern border of the Malech Property to the Ridge Road via a second, more southerly ridgeline on the west-facing slope. It was developed to install the water line that historically supplied the UTC property to the east with water from a well on the western portion of the Preserve. The road features a steep section that is eroding and will need to be rerouted to arrest sedimentation. A southern 0.16-mile spur of this road can be used to access the Silicon Valley Land Conservancy property to the south.

The Authority anticipates initially keeping the alignment as a service road from the Malech Property, and having trail users bypass this steep section with a new trail alignment. Future opportunities to realign this section of road will be assessed to make this section of road more sustainable. The Authority will also work with Preserve neighbors to explore future road access easements. If a new access road through neighboring parcels becomes feasible, the Authority would restore sections of road not needed.

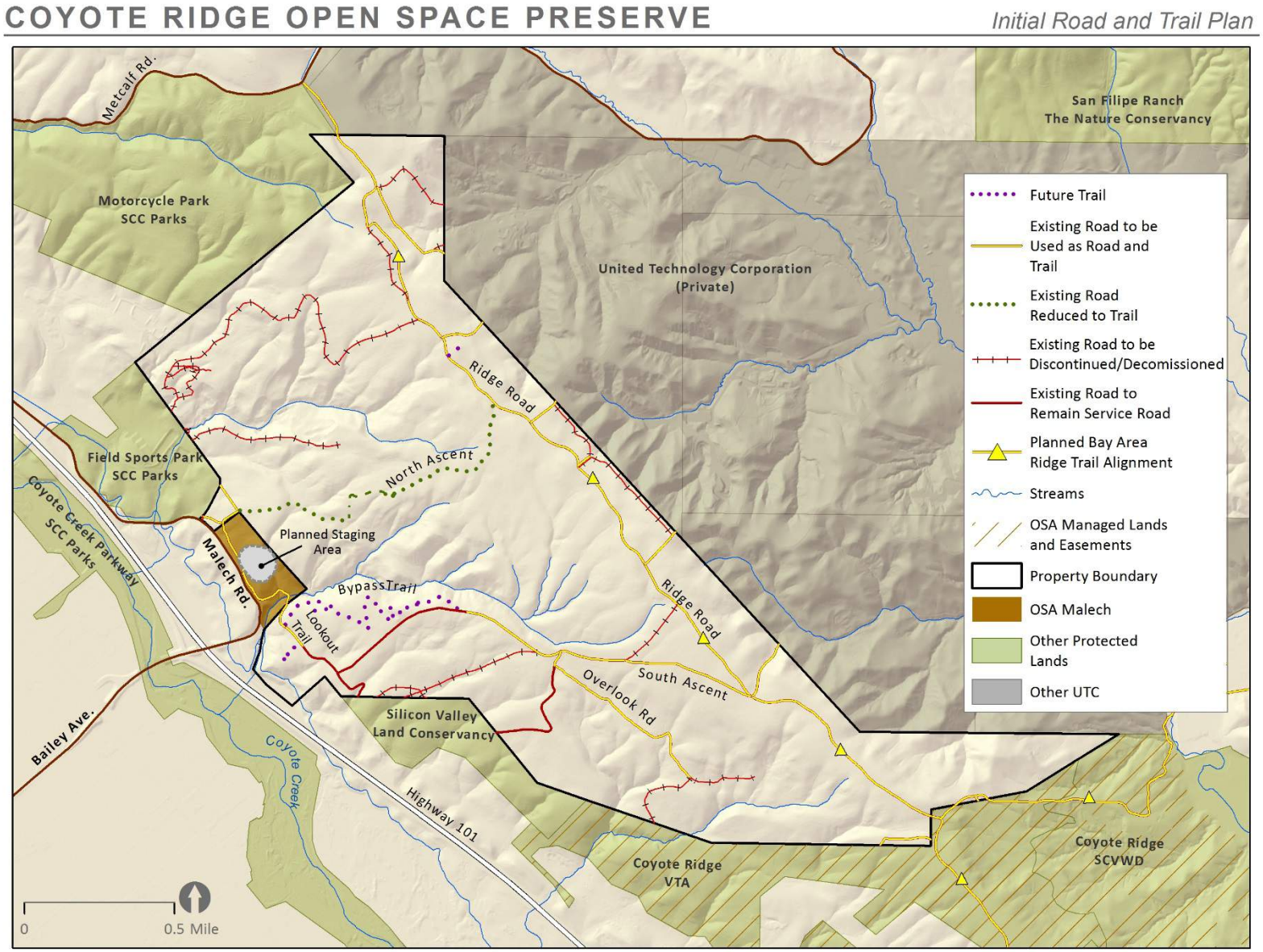


**Figure 13: Initial road and trail plan**

#### 4.6.3.2 Fences

The Authority will work to replace the existing fences with wildlife-friendly fence design when feasible, in order to limit the barriers to animal movement (Section 4.1.6.4.1). The Authority's current fence standards provide different specifications for perimeter fences, which are designed to prevent cattle leaving the property and getting on roads, and interior fences, which are less robust given reduced threat of cattle movement.

The Authority will upgrade existing fences to wildlife-friendly designs, as infrastructure repairs occur. The Authority will also work to secure funding to replace the fences in advance of needed repairs, with emphasis on removing the chain link fence located on a portion of the eastern Preserve boundary (Section 2.2.3.2.1; Figure 5), with the exception of other fences needed for security or resource protection.

#### 4.6.3.3 Utilities

The Authority will work with operators of the utilities that traverse portions of the Preserve to limit impacts of their maintenance on habitat and special-status species. The Authority will also work with utility providers to identify strategies to reduce the public safety threat presented by aboveground utilities, including transmission towers and the elevated gas pipeline, to ensure the public stays off of this infrastructure (Section 2.2.3.5; Figure 5).

*Views from Coyote Ridge*
*Photograph by Derek Neumann*

# 5 Adaptive Management and Monitoring

The Authority will implement management in the Preserve following an adaptive management framework that will promote achievement of the goals for the property (Section 3). Monitoring will be used to identify adjustments to management strategies to enhance their effectiveness at achieving the goals (Nyberg 1998, Walters and Holling 1990). Adaptive management will also be used to:

1. Evaluate and refine the management techniques, based on observations of their effectiveness relative to the predicted effects and desired outcomes outlined in these recommendations;
2. Adapt to changes in conditions that could alter effectiveness, including the invasion and spread of invasive plants, an extensive drought or period of high rainfall, fire, or global change; and
3. Integrate new information, including results of research or other monitoring studies examining management effects on similar systems or species, or new information about the habitat requirements of special-status species.

This section outlines elements of an adaptive management process designed to promote effectiveness of management within the Preserve. The process including monitoring approaches should themselves be updated, over time, to maximize effective use of Authority resources for management of the site.

## 5.1 Preserve Condition Monitoring

Following acquisition of the Preserve, the Authority will implement a suite of coordinated monitoring protocols (Table 6). These focused assessments will be supplemented by observations from Authority staff during routine management and maintenance of the site. Collectively, these observations will be used to refine management strategies for grazing, exotic species, access, cultural resources, aquatic systems, and facilities (Section 4), to better meet the Preserve goals (Section 3).

Additionally, the Authority may use signage at the staging area, and outreach on the website, to encourage the public to report their observations that could affect management, including rare or invasive species, or issues that could degrade habitat (e.g. non-compliance with recreation restrictions).The Authority will also solicit and review applications for researchers seeking to conduct studies which may inform management within the site.

Monitoring for sensitive habitats and special-status species will be phased in when/if the Preserve is enrolled in the Valley Habitat Plan Reserve System (SCVHA 2012). Until that time, the Authority will review annual reports for monitoring studies of rare species and communities elsewhere, including the VTA and SCVWD properties that it manages, and use results of those studies that are applicable to the Preserve to help inform its management.

The following sections outline protocols for monitoring of the grazing program, the effective management of which is essential to persistence of many of the rare species supported by the Preserve.

**Table 6: Preserve monitoring studies**

| Monitoring Element | Objective | Frequency and Timing[1] | Description |
|---|---|---|---|
| Grazing | | | |
| Implementation | Assess whether grazing is being implemented per the lease agreement, including the prescription developed to manage habitat. | Monthly | Maintain a log of the number of animal units in each pasture during each month or portion thereof. |
| Residual Dry Matter (RDM) | Evaluate RDM to assess whether grazing intensity is meeting the prescription developed to manage habitat and protect soil | Twice Annually: in spring (at pull off) in early fall (before green up) | Estimate RDM in reference sites and map RDM by pasture, or portion thereof as practicable. |
| Invasive Plants | Evaluate effectiveness of grazing management and targeted control efforts at liming the distribution and abundance of exotic plants; detect and eradicate new invasive plant species or occurrences. | Annually in spring/summer | • Map invasive plant populations subject to control, and assess abundance using cover classes.<br>• Visually examine Preserve, with an emphasis on areas where invasion are likely to occur (e.g. along roads, areas where livestock congregate, etc). |
| Streams and Ponds | Assess stream and pond geomorphology and qualitatively assess habitat for pond-breeding amphibians | Annually in late winter | • Assess pond dams and spillways to ensure they are intact.<br>• Evaluate pond habitat conditions for threatened amphibians, as resources allow |
| Public Access | Evaluate public compliance with access regulations, and assess impacts of public use. | Daily during high use, weekly other times of the year | Examine Preserve for signs of unauthorized activities (e.g. dogs) and use areas, including *de facto* trails. |

**Table 6: Preserve monitoring studies**

| Monitoring Element | Objective | Frequency and Timing[1] | Description |
|---|---|---|---|
| Facilities | | | |
| Roads and Trails | Detect road and trail conditions that could degrade habitat or necessitate costly repairs. | Annually pre-winter and during or shortly after storms | Examine roads, trails, and culverts, to assess drainage issues as well as invasive plants and signs of unauthorized use; also monitor width at permanent locations to detect widening. |
| Cattle Grazing Infrastructure | Inspect infrastructure to ensure that is operational and to avoid impacts to habitat. | Annually in fall (prior to cattle turn-out) | Examine fences to detect breaches gates to ensure they are operational; evaluate troughs and tanks to ensure efficient use of water. |

[1] Focused monitoring at the designated time will be supplemented by staff observations during the course of route management and maintenance.

## 5.2 Grazing Monitoring

The Authority will conduct two monitoring studies to assess whether grazing is being conducted as prescribed by the plan and subsequent lease agreement, including during the desired season of use (Section 4.1.4.2). The Authority will also use applicable results of the monitoring studies used to evaluate the biological effectiveness of grazing on the VTA lands adjacent to the Preserve to refine grazing management on the Coyote Ridge Open Space Preserve.

### 5.2.1 Seasonality of Use Monitoring

The Authority will work with the grazing operator to maintain a log (e.g. a spreadsheet) to track the following:

1. The number and location of animal units in the Preserve;
2. The monthly and annual rainfall and temperature;
3. The general phenology and productivity of herbaceous plants in the upland systems, such as the onset of the germinating rains, the date when one inch of new growth was produced, and the onset of flowering of native herbs.

*Biologists and range manager on Coyote Ridge*
*Photograph by Jodi McGraw*

The log can also be used to track important changes in the seasonality of grazing, such as early rainfall triggering an early turn out, or cattle being pulled off the property prior to March 31 due to an extended mid-winter drought. This information will also aid efforts to identify factors that influence interannual variability in grazing at the site.

### 5.2.2 Grazing Intensity of Use Monitoring

The Authority will also assess whether grazing management has attained the target residual dry matter (RDM) levels in the grassland communities (Table 4). Two complimentary approaches are recommended to monitor RDM:

1. Detailed examination of RDM at reference sites; and
2. Areal mapping of RDM classes.

#### 5.2.2.1 RDM Reference Monitoring

At the end of the grazing year (late September to mid-October), the Authority will estimate RDM using visual indicators and clipping and weighing, as needed (Guenther 1998). The RDM sites will be distributed within each of the pastures, and within each of the two community types anticipated to receive more than incidental cattle use: California annual grassland and serpentine grassland (Table 4). Within the serpentine grasslands, sites will be located in both the upper portion of the slope, where

productivity is lower, and on the lower slope and base of hill, which feature deeper, more productive soils. An estimated 15 to 20 sites will be needed to capture the variability within the communities and pastures in the Preserve.

The RDM reference monitoring sites will be examined two times each year:

1. During late winter and early spring, to estimate biomass when the cattle are removed (for early-season grazing); and
2. During late summer/early fall, when RDM is measured.

Comparison of the measures each year can be used to calculate the net change in biomass (pounds per acre) resulting from ongoing plant growth following cessation of grazing and loss of biomass due to native herbivores, disturbance, and decay. This can help managers to refine the estimate for the level of biomass that should remain when the cattle are removed, in order to attain the RDM goals in fall (Section 4.1.4.5).

#### 5.2.2.2 RDM Mapping

As resources allow, the Authority will also visually estimate and map RDM levels throughout the Preserve according to six RDM classes:

1. >2,000 lbs/acre
2. 1,501-2,000 lbs/acre
3. 1,001-1,500 lbs/acre
4. 701-1,000 lbs/acre
5. 500-700 lbs/acre
6. <500 lbs/acre

At the end of the grazing season, polygons delineating contiguous areas within each RDM class can be drawn using geographic positioning system (GPS) or on paper maps, then brought into a Geographic information system (GIS). The layer can be intersected with the communities (i.e. vegetation) layer to calculate the area of each community type within each RDM class, evaluate the percent of each community type attaining the target RDM (Table 4), and locate areas that were above or below the target RDM level. The maps along with the reference site data will be reviewed with the operator to identify strategies to better achieve the target RDM.

## 5.3 Adaptive Management

Management of the Preserve will be implemented through an adaptive framework, in which management and monitoring are adjusted, over time, to enhance their long-term effectiveness at achieving the goals (Section 3). The framework is based on an annual cycle in which monitoring results (Section 5.1 and 5.2) are used to assess progress toward achieving the goals and objectives (Section 3). New scientific information and changed conditions or circumstances that emerge will also be evaluated to identify modifications to management strategies (Section 4).

### 5.3.1 Annual Evaluation

Each year, the Authority will evaluate the following elements:

1. **Management Activities:** Review the actions that were taken to manage the Preserve and for each, assess the effects of the management technique and its known or anticipated effectiveness at promoting the goals and objectives;
2. **Monitoring Reports/Results:** Review the results of monitoring studies conducted to evaluate condition of the Preserve and overall effectiveness of management at achieving its biological goals and objectives.
3. **Changes to the Plan:** Recommended changes to the IMMP that were identified as part of the adaptive management process. Changes can be recommended based upon:
    - monitoring results, which can refine management strategies and techniques;
    - new scientific information**,** which can inform effective conservation and management of the rare species and the communities in which they occur; and
    - changes in habitat conditions**,** including threats to the rare species, such as invasion and spread of exotic plants or animals, fire, drought, or global climate change, which may necessitate additional or different management treatments.

### 5.3.2 Work Plans

Based on the annual evaluation, the Authority will include any necessary projects to meet the plans goals and objectives in its annual work plan and budget.

### 5.3.3 Plan Updates and Modifications

Following acquisition of the Property, the Authority will conduct a series of assessments to increase understanding of the site conditions. These results will be used to update the IMMP. If the Preserve is enrolled in the Valley Habitat Plan Reserve System at the close of escrow, as the Authority currently envisions, the Authority will work with the VHA to prepare a Management and Monitoring Plan (MMP) based on the IMMP. The MMP will feature additional and more detailed information to ensure compliance with the reporting requirements of the Valley Habitat Plan. The MMP may also include additional focused plans, such as a pond management plan developed based on a thorough assessment of pond conditions; these more detailed plans will be used to design specific management projects.

In order for the MMP to effectively guide management, the Authority will work with the VHA to update it approximately every 10 years, or as needed. Updates will reflect changes in site conditions and scientific information, as well as the annual evaluation of management effectiveness (Section 5.3.1).

## 5.4 Implementation Phases

Implementation of the IMMP (and successor plans) is envisioned to occur in three main phases. Table 7 highlights key management strategies that are anticipated to be implemented during the short term (1-5 years) and mid-term (6-15 years) for each of the main management elements outlined in Section 4. The nature and schedule of management tasks will be determined by available resources including budget and staff time.

#### 5.4.1.1 Phase 1 (Years 1-5)

During the initial phase, the objective will be to increase understanding of the baseline conditions of the site that is needed to inform effective long-term management while implementing high-priority management actions. As resources allow, inventories of the site will be used to map rare plants and sensitive habitat for listed animals, more comprehensively assess the ponds and drainages, inventory facilities, and map and prioritize exotic plants for control.

To avoid a lapse in grazing, which is essential to maintaining habitat for Bay checkerspot butterfly and some serpentine plants (Section 4.1.1), the Authority will develop a lease agreement and request for proposals to engage the services of a cattle operator to implement conservation grazing, and then work with the selected grazing tenant to begin to improve grazing infrastructure and facilities. The Authority will also implement projects to control invasive plants identified through an inventory of the site. The Authority will also make the Preserve available for public access (Table 7).

The Authority will work with the Valley Habitat Agency to enroll the Preserve into the Reserve System immediately. Following enrollment the VHA will incorporate the IMMP into a more comprehensive Plan (the MMP).

#### 5.4.1.2 Phase 2 (Years 6-15)

The objectives of the second phase of management is to expand efforts to restore and enhance habitat, complete work to meet the public access objectives, integrate results of prior monitoring into a revised MMP to guide future work. Table 7 outlines specific management elements anticipated to occur in the mid-term., which also include updating the pond management plan, and upgrading and realigning roads, as needed, to reduce stream sedimentation.

#### 5.4.1.3 Phase 3 (Years 16 and on)

The objectives of long-term management will be to maintain or enhance the natural and cultural resources, while providing opportunities for compatible public use, using sustainable management strategies. The precise nature of the management activities during this phase will depend on the conditions of the habitat in the future; however, they are anticipated to include tasks similar to those outlined in the mid-term, with less of an emphasis on restoration, and more emphasis on maintenance of habitat conditions once restored.

**Table 7: Anticipated management strategies to be implemented in the first two phases of Preserve management.**

| Management Element | Phase 1 (1-5 years) | Phase 2 (6-15 years) |
|---|---|---|
| Overall Objectives | • Increase understanding of the baseline conditions<br>• Implement high priority management projects to safeguard natural and cultural resources<br>• Coordinate with the Valley Habitat Agency to prioritize annual projects. | • Expand efforts to restore and enhance habitat<br>• Fulfill goals for providing public access<br>• Integrate monitoring results from short-term work into a revised MMP to inform future work. |
| Inventories and Planning | • Map rare plant distributions and special status animals and their habitat.<br>• Update the Interim Management and Monitoring Plan to incorporate inventory results and other assessments outlined below. The MMP will also include a schedule for monitoring sensitive species. | • Conduct additional studies to inform design of habitat management and enhancement project, such as burrowing owl projects.<br>• Update the MMP per results of monitoring and new scientific information. |
| Grazing Management | • Develop lease agreement and request for proposals and implement initial grazing management.<br>• Plan improvements to grazing infrastructure that would promote management.<br>• Initiate grazing monitoring and evaluate biological effectiveness as well as success of implementation. | • Implement infrastructure improvements to enhance effectiveness.<br>• Adjust the grazing prescription, as needed, to increase biological effectiveness based on results of monitoring as well as studies at other sites (e.g. VTA). |
| Exotic Species Management | • Conduct an inventory of invasive plant species and use the results to create a treatment plan.<br>• Establish and implement the early detection and rapid response (EDRR) program.<br>• Implement priority exotic species treatment projects and monitor effectiveness to inform future work.<br>• Initiate outreach to adjacent landowners to coordinate regional control strategies for species such as artichoke thistle, barb goat grass, wild pig, and bullfrog. | • Update the exotic plant inventory and priorities per changes in the site and scientific information about strategies for control.<br>• Continue to implement and refine the EDRR program.<br>• Continue to implement priority exotic plant species control projects.<br>• Coordinate with adjacent landowners to maximize long-term effectiveness of regional control strategies. |

**Table 7: Anticipated management strategies to be implemented in the first two phases of Preserve management.**

| Management Element | Phase 1 (1-5 years) | Phase 2 (6-15 years) |
|---|---|---|
| Spring, Pond, and Stream Management | • Implement infrastructure improvements to provide cattle with water necessary for grazing management, while promoting natural hydrologic conditions to springs, ponds, and streams.<br>• Conduct an assessment of pond restoration and management needs, and use it to prioritize ponds for treatment.<br>• Based on the initial assessment, develop a pond management program (which can be incorporated in the IMMP or MMP) which includes routine monitoring, exotic species eradication (i.e. bullfrog), restoration, and other pond management strategies that enhance habitat for sensitive species.<br>• Fence ponds to regulate cattle access, where appropriate, and monitor effects on aquatic systems and species, as funds allow; establish alternative water sources as needed.<br>• Conduct outreach to agencies to obtain guidance and funding for pond restoration projects.<br>• Implement initial priority pond restoration projects, as resources allow.<br>• If warranted, drain ponds where needed to prevent establishment of bullfrogs.<br>• Assess and upgrade roads causing erosion and sedimentation into streams and creeks and use it to prioritize roads for treatment.<br>• Conduct outreach to partners for funding for road restoration or re-alignment projects | • Maintain grazing infrastructure to limit impacts on aquatic systems.<br>• Use results of cattle exclusion efforts in ponds to inform ongoing pond management for rare species.<br>• Maintain conditions of ponds and continue to phase in restoration of additional ponds, as feasible.<br>• Create new ponds, where doing so can promote habitat for listed amphibians and other aquatic species, without degrading that for listed serpentine species.<br>• Update the pond management plan per the results of monitoring and new scientific information<br>• Continue to monitor and upgrade or realign roads as needed to reduce sedimentation of creeks and streams |
| Access Management | • Develop and implement education and interpretive programs.<br>• Develop a protocol for evaluating and permitting scientific research. | • Continue implementation of the recreation plan to provide safe opportunities for recreation. |

**Table 7: Anticipated management strategies to be implemented in the first two phases of Preserve management.**

| Management Element | Phase 1 (1-5 years) | Phase 2 (6-15 years) |
|---|---|---|
| Access Management (cont.) | • Develop and implement the recreation plan, including by developing new trails that can complement existing roads, to provide safe opportunities for recreation.<br>• Patrol the Preserve for unpermitted off-trail activities and implement solutions to deter such use<br>• Work with collaborators to incorporate the Ridge Road as a segment of the Bay Area Ridge Trail.<br>• Identify other regional trail connections to existing and potential parks and open spaces. | • Eliminate unpermitted use with additional signage and/or temporary fencing. |
| Cultural Resources Management | • Implement assessments to evaluate specific project areas, and inform efforts to safeguard cultural resources from ground disturbing activities and other aspects of management.<br>• Explore opportunities for collaboration with stakeholders including Native Americans to obtain feedback and information about the site for interpretation.<br>• Develop and implement a cultural resource element as part of Preserve interpretation programs. | • Establish a cultural resources database to house spatial data and documents that can be used to interpret and protect cultural resources on the site.<br>• Conduct a cultural resource inventory of the Preserve, as funding and other resources allow. |
| Facilities Management | • Conduct a road assessment and develop a road management plan.<br>• Assess grazing infrastructure and prioritize upgrades and additions<br>• Implement high-priority facilities improvement projects, including regulate water diversion for troughs, restore unnecessary roads, and realign roads with drainage or other maintenance issues.<br>• Replace the chain link fence and address breaches in the perimeter and interior fences, using wildlife-friendly fences where feasible (on-going as resources are available). | • Actively restore roads where drainage or other issues will preclude passive restoration.<br>• Continue to replace existing fences with wildlife-friendly fences.<br>• Work with CalTrans to evaluate feasibility of wildlife crossing emptying into Preserve, including maintenance or upgrade of existing culvert. |

**Table 7: Anticipated management strategies to be implemented in the first two phases of Preserve management.**

| Management Element | Phase 1 (1-5 years) | Phase 2 (6-15 years) |
|---|---|---|
| | • Work with utility operators to coordinate road maintenance on easements, and enhance public safety around aboveground utilities. | |

*Coyote Ridge*
*Photograph by Jodi McGraw*

# References

ARCADIS. 2008. United Technologies-Pratt & Whitney Rocketdyn Facility Survey and Baseline Monitoring of Special Status Plants on Serpentine Habitat. October 2008. 99 pages.

ARCADIS. 2009. Burrowing owl investigation in the Buffer Area of the United Technologies/Pratt & Whitney Rocketdyn (UTC-PWR) San Jose Facility. Memo to Tim Marker, PWR from Nicholas Kautzman. September 16, 2009. 2 pages.

ARCADIS. 2011. Rare species occurrences within the UTC Property. [GIS Data].

Bailey, E. H. and D. Everhart. 1964. Geology and quicksilver deposits of the New Alamaden District, Santa Clara County California. United States Geological Survey Professional Paper 360. Accessed at: http://archive.org/stream/geologyquicksilv00bailrich/geologyquicksilv00bailrich_djvu.txt

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. 2012. The Jepson Manual: Vascular Plants of California, second edition. University of California Press, Berkeley.

Bartolome, J. W., Frost, W. E. McDougald, N. K., and M. Connor. 2002. California guidelines for residual dry matter (RDM) management on coastal and foothills annual rangelands. Publication 8092 University of California Division of Agriculture and Natural Resources.

Bartolome, J. W., Stroud, M.C., and H.F. Heady. 1980. Influence of natural mulch on forage production on differing California annual range sites. Journal of Range Management. 33: 4-8.

Bay Area Open Space Council (BAOSC). 2012. Conservation Lands Network [Report and GIS data]. Accessed at: http://www.bayarealands.org/. Berkeley, CA.

Bay Area Ridge Trail Council. 2015. Bay Area Ridge Trail Website. Access at: http://www.ridgetrail.org/about-us. February 14, 2015.

Belsky, A. J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. Journal of Soil and Water Conservation 54:419-431.

Biosearch. 2008. Aquatic sampling for California red-legged frog and California tiger salamander. Prepared for ARCADIS-BBL Environmental Services and Untied Technologies Corporation-Pratt & Whitney Rocketdyne. October 20, 2008. 30 pages.

Blasland, Bouck, and Lee, Inc. (BBL). 2005. Site-wide biological survey for the United Technologies Corporation/Pratt & Whitney Rocketdyne Facility, San Jose, CA. December 2005. 166 pages.

Bossard, C. C., J. M. Randall, and M. C. Hoschovsky, editors. 2000. Invasive plants of California's wildlands. University of California Press, Berkeley, CA.

Breshears D.B., T.E. Huxman, H.D. Adams, C.B. Zou, J.E. Davidson. 2008. Vegetation synchronously leans upslope as climate warms. Proceedings of the National Academy of Sciences 105: 11591-11592.

California Department of Forestry and Fire Protection (Cal Fire). 2013. Recorded fire history [GIS data]. Fire and Resource Assessment Program. Accessed at: http://frap.cdf.ca.gov/data/frapgisdata/select.asp. Sacramento, CA.

California Department of Fish and Wildlife (Game) (CDFW). 2004. Strategic plan for wild turkey management. State of California, The Resource Agency. Sacramento, CA. November 2004.

California Department of Fish and Wildlife (CDFW). 2013. Rare plant and animal species occurrences [GIS data]. California Natural Diversity Database. Sacramento, CA. Accessed May 2013.

California Native Plant Society (CNPS). 2015. Inventory of Rare, Threatened, and Endangered Plants of California. Online database accessed at: http://www.rareplants.cnps.org.

California Partners in Flight (CPIF). 2000. The draft grassland bird conservation plan: a strategy for protecting and managing grassland habitats and associated birds in California (B. Allen, lead author). Point Reyes Bird Observatory, Stinson Beach, CA. http://www.prbo.org/CPIF/Consplan.html.

Cayan, D. R., A. L. Luers, G. Franco, M. Hanemann, B. Croes, and E. Vine. 2008. Overview of the California climate change scenarios project. Climatic Change 87 (S1) (January): 1-6. doi:10.1007/s10584-007-9352-2.

Corbin, J. C., and C. M. D'Antonio. 2004. Competition between native perennial and exotic annual grasses: implications for historical invasion. Ecology 85:1273-1283.

County of Santa Clara. 1995. Santa Clara County Countywide Trails Master Plan Update. Adopted by the Santa Clara County Board of Supervisors. November 14, 1995.

Creekside Center for Earth Observations (CCEO). 2014. Draft VTA-Coyote Ridge Property 2013 Annual Report: Year 7. Prepared for the Santa Clara County Open Space Authority. March 20, 2014. 91 pages.

D'Antonio, C. M. and P. Vitousek. 1992. Biological invasions by exotic grasses, the grass-fire cycle and global change. Annual Review of Ecology and Systematics 23:63-88.

D'Antonio, C. M., T. L. Dudley, and M. Mack. 1999. Disturbance and biological invasions: correlations, causation, and feedback. In Ecosystems of Disturbed Ground, 413-451. Elsevier Press.

D'Antonio, C. M., S. J. Bainbridge, C. Kennedy, J. W. Bartolome, and S. Reynolds. 2001. Ecology and restoration of California grasslands with special emphasis on the influence of fire and grazing on native grassland species. Unpublished report to the David and Lucille Packard Foundation.

De Anza College Wildlife Corridor Stewardship Team. 2011. Santa Cruz Mountain Connectivity Project. Report prepared by Ryan Phillips for Midpeninsula Regional Open Space District. February 23, 2011. 18 pages.

Diamond, T. 2011. Personal communications with Tanya Diamond, Wildlife Biologist, regarding her observations of American badger in the Coyote Valley region. April 2011.

Entomological Consulting Services, Ltd. (ECS). 1990. Biological study report on rare animals and plants inhabiting the serpentine grassland at the United Technologies Corp. Property near San Jose, California. Entomological Consulting Services Ltd. May 1990. 120 pages.

Evens, J. and S. San. 2004. Vegetation associates of a serpentine area: Coyote Ridge, Santa Clara County, California. California Native Plant Society. Sacramento, CA. 171 pages.

Facelli, J. M., and S. T. A. Pickett. 1991. Plant litter: its dynamics and effects on plant community structure. Botanical Review 57:1-32.

Fields, J. 2015. E-mail correspondence and conversations with Justin Fields, cattler operator on the UTC property. February and March 2015.

Fleischner, T.L., 1994. Ecological costs of livestock grazing in western North America. Conservation Biology, 8, pp.629-644.

Flint, L. and A. Flint. Unpublished data. Climatic water deficit analysis for the Bay Area. Draft results presented at the Redwoods and Climate Change Symposium. March 2011.

Ford, L.D., P.A. Van Hoorn, D.R. Rao, N.J. Scott, P.C. Trenham, and J.W. Bartolome. 2013. Managing Rangelands to Benefit California Red-legged Frogs and California Tiger Salamanders. Livermore, California: Alameda County Resource Conservation District. Accessed at: http://www.rangelandconservation.com/Documents/ManagingRangelandsCRLF_CTS.pdf

Gelbard, J. LO. And S. Harrison. 2003. Roadless habitats as refuges for native grasslands: interactions with soil, aspect, and grazing. Ecological Applications. 13: 404-415.

Guenther, K. 1998. Residual dry matter (RDM) monitoring photo-guide. Wildland Solutions Field Guide Series. Wildland Solutions. Brewster, WA.

Guenther, K. 2001. Santa Clara County Open Space Authority livestock Grazing Guidelines and management practices. Prepared for Santa Clara Open Space Authority by Wildland Solutions. November 2001. 21 pages.

Guenther, K. 2013. 2013 Analysis and Updated Livestock Grazing Plan for the VTA-Coyote Ridge 2006 Resource Management Plan. Wildland Solutions. June 11, 2013. 31 pages.

Hall L. M., George, M .R., McCreary, D. D., and T. E. Adams. 1992. Effects of cattle grazing on blue oak seedling damage and survival. Journal of Range Management 45:503–506.

Harrison, S. and J. H. Viers. 2007. Serpentine Grasslands *in* Stromberg, M.R., Corbin, J.D. & D'Antonio, C.M., 2007. California Grasslands: Ecology and Management 1st ed., University of California Press.

Hayes, G. F., and K. D. Holl. 2003. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. Conservation Biology 17:1694-1702.

Heady, H.F. 1956. Changes in a California Annual Plant Community Induced by Manipulations of Natural Mulch. Ecology 37:798-812.

Hickman, J. C. 1993. The Jepson Manual: higher plants of California. University of California Press. Berkeley, CA.

Hillyard, D. 2008. Personal communications with Deborah Hillyard, Range Ecologist, California Department of Fish and Wildlife. April 2008.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished document, California Department of Fish and Game Natural Heritage Division, Sacramento, California.

Howard, J., and M. Merrifield. 2010. Mapping Groundwater Dependent Ecosystems in California. Ed. Adina Maya Merenlender. PLoS ONE 5 (6) (June): e11249. doi:10.1371/journal.pone.0011249.

Huenneke, L. F., S.P. Hamburg, R. T Koide, H. A. Mooney, and P.M Vitousek. 1990. Effects of soil resources on plant invasion and community structure in California serpentine grassland. Ecology 71: 478-491.

Huntsinger, L., Bartolome, J. and C. D'Antonio. 2007. Grazing management on California's Mediterranean grasslands. In California Grasslands: Ecology and Management. Berkeley, CA: University of California Press.

Huntsinger, L., Bartolome, J. M., and C. M. D'Antonio. 2007. Grazing management on California's Mediterranean grasslands. In Stromberg, M.R., Corbin, J.D. & D'Antonio, C.M., 2007. California Grasslands: Ecology and Management 1st ed., University of California Press.

International Mountain Bicycling Association (IMBA). 2004. Trail Solutions: IMBA's guide to building sweet singletrack. June 2004. 272 pages.

Jennings, C. W. 1977. Geologic map of California [GIS Data]. Departmetn of Conservation. Accsesed at: \\Molib01\GIS_Library\Natural_Resources\Geology\Geologic_Map_of_California.

Keller, G. and J. Sherar. 2003. Low-volume roads engineering: best management practices field guide. Produced for the US Agency for International Development in Cooperation with the USDA Forest Service and Virginia Tech Conservation and Management Institute. July 2003. Accesssed at: http://www.fs.fed.us/global/topic/sfm/low_resolution_roads_bmp_guide.pdf.

Kotanen, P. 1997. Effects of experimental soil disturbance on revegetation by natives and exotics in coastal California meadows. Journal of Applied Ecology. 34: 631-644.

Kruckeberg, A. R. 1984. California Serpentines: Flora, vegetation, geology, soils, and management problems. University of California Press. Berkeley, CA.

Marty, J.T. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. *Conservation Biology* 19(5):1626-1635.

McGraw, J. M. 2012. Coyote Valley Open Space Preserve Grazing Management Recommendations.. Prepared by Jodi McGraw Consulting. Submitted to the Santa Clara County Open Space Authority. March 31, 2012. 45 pages.

McGraw, J. M. 2013a. Rancho Cañada del Oro Open Space Preserve Grazing Management Plan. Prepared by Jodi McGraw Consulting. Submitted to the Santa Clara County Open Space Authority. August 2, 2013. 81 pages.

McGraw, J. M. 2013b. Sierra Vista Open Space Preserve Grazing Management Plan. Prepared by Jodi McGraw Consulting. Submitted to the Santa Clara County Open Space Authority. August 16, 2013. 47 pages.

National Park Service (NPS). 2015. Santa Clara County: California Historic Silicon Valley. Early History. Website accessed at: http://www.nps.gov/nr/travel/santaclara/history.htm

Northwest Information Center (NWIC). 2013. Record search results for the proposed UTC Coyote Ridge Acquisition Project. Letter to the Santa Clara County Open Space Authority. File Number 13-0805. November 22, 2013. 13 pages.

Nyberg, J. B. 1998. Statistics and the practice of adaptive management. Pages 1-7 in V. Sit and B. Taylor, editors. Statistical methods for adaptive management studies. Research Branch, B. C. Ministry of Forests, Victoria, B.C.

Pacific Legacy. 2013a. Cultural Resources Stewardship Guide for the Midpeninsula Regional Open Space District Vision Plan. Report prepared by Hannah Ballard and Elena Reese (Pacific Legacy) and Mark Hylkema, Past Lifeways Archaeological Studies. Draft report submitted to the Midpeninsula Regional Open Space District, Los Altos, CA. June 17, 2013. 8 pages.

Pacific Legacy. 2013b. Cultural Resources Existing Conditions Report for the Midpeninsula Regional Open Space District Vision Plan. Prepared by Hannah Ballard and Elena Reese (Pacific Legacy) and Mark Hylkema, Past Lifeways Archaeological Studies. Draft report submitted to the Midpeninsula Regional Open Space District, Los Altos, CA. August 2013. 121 pages.

Paige, C. 2008. A Landowner's Guide to Wildlife Friendly Fences. Landowner/Wildlife Resource Program, Montana Fish, Wildlife and Parks, Helena, MT. 44 pp. Available at: http://fwpiis.mt.gov/content/getItem.aspx?id=34461.

Painter, E. L. 1995. Threats to the California flora: ungulate grazers and browsers. Madrono 42:180-188.

Penrod, K., P. E. Garding, C. Paulman, P. Beier, S. Weiss, N. Schaefer, R. Branciforte and K. Gaffney. 2013. Critical Linkages: Bay Area & Beyond. Produced by Science & Collaboration for Connected Wildlands, Fair Oaks, CA www.scwildlands.org in collaboration with the Bay Area Open Space Council's Conservation Lands Network www.BayAreaLands.org.

PRISM Climate Group (PRISM). 2011. High resolution spatial climate data (precipitation and temperature) for the United States. 1980-2010. Accessed at: http://www.prism.oregonstate.edu/

Rouhe, A. and M. Sytsma. 2007. Feral swine action plan for Oregon. Prepared for the Oregon Invasive Species Council. Portland State University. January 2007.

San Francisco Estuarine Institute. 2008. South Santa Clara Valley Historical Ecology Study. http://www.sfei.org/sites/default/files/SouthSantaClaraValleyHEStudy_CompleteReport_LowResolution.pdf.

Santa Clara Valley Habitat Agency (SCVHA). 2012. Final Valley Habitat Plan and GIS data for Land Cover. December 2012. Accessed at: http://scv-habitatagency.org/178/Final-Habitat-Plan1

Santa Clara Valley Habitat Agency (SCVHA). 2014. Draft Management and Monitoring Plan Annotated Outline. November 2014.

Santa Clara Valley Open Space Authority (SCOSA). 2002. Access and Use Regulations. Adopted September 2002. San Jose, CA.

Santa Clara Valley Open Space Authority (SCOSA). 2013. Grazing Management Policy. Adopted October 24, 2013. San Jose, CA.

Santa Clara Valley Open Space Authority (SCOSA). 2014. The Santa Clara Valley Greenprint: A guide for protecting open space and livable communities. San Jose, CA.

Santa Clara Valley Water District. 2014. SCVWD Coyote Ridge Preserve Final Long-Term Management Plan. Prepared by the SCVWD, Keith Guenther (Wildland Solutions), and Steve Rottenborn (HT Harvey and Associates), in Consultation with Derek Neumann, the Santa Clara Valley Open Space Authority. July 2014. 122 pages.

Shuford, W.D. and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field Ornithologists and California Department of Fish and Game. Camarillo and Sacramento, California.

Spencer, W.D., P.Beier, K. Penrod, C. Winters, H. Paulman, J. Rustigian-Romsos, M. Strittholt, M. Parsi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

Stromberg, M.R., Corbin, J.D. & D'Antonio, C.M., 2007. California Grasslands: Ecology and Management 1st ed., University of California Press.

Swiecki T J, Bernhardt E A, Drake C. 1997a. Factors affecting blue oak sapling recruitment. Pages 157–168 in Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues, 19– 22 March 1996, San Luis Obispo (CA); technical coordinators N H Pillsbury, J Verner, and W D Tietje. General Technical Report PSW-GTR-160. Albany (CA): Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

Taylor, D.l, and M. Tuttle. 2007. Water for wildlife: A handbook for ranchers and range managers. Bat Conservation International. www.batcon.org.

Terborgh, J., and J. A. Estes. 2010. Trophic Cascades: Predators, Prey, and the Changing Dynamics of Nature. Island Press, April 20.

Tu, M., C. Heard, and J. M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy.

United States Department of Agriculture. 2010. Soil Survey Geographic (SSURGO) database for Western and Eastern Santa Clara Area, California. GIS Data obtained from URL:http://SoilDataMart.nrcs.usda.gov/

United States Department of Agriculture. 2012. National Agricultural Inventory Program. Aerial imagery for Santa Clara County.

United States Environmental Protection Agency. Pesticides: Endangered Species Protection Program. July 13, 2015. Accessed at: http://www.epa.gov/espp/litstatus/redleg-frog/steps-info.htm.

United States Fish and Wildlife Service (USFWS). 2011. California wetlands [GIS data]. Ventura Fish and Wildlife Office, Ventura, CA.

United States Fish and Wildlife Service (USFWS). 1998. Recovery plan for serpentine soil species of the San Francisco Bay Area. Portland, OR. 330 pages.

United States Fish and Wildlife Service (USFWS). 2002. Recovery plan for the California red-legged frog (Rana aurora draytonii). Portland, OR.

United States Fish and Wildlife Service (USFWS). 2005. Designation of critical habitat for the California tiger salamander, central population. Federal Register Volume 70 Number 162. August 23, 2005.

United States Fish and Wildlife Service (USFWS). 2008. Designation of critical habitat for the bay checkerspot butterfly (*Euphydryas editha bayensis*). Federal Register: 73: 166.

United States Fish and Wildlife Service (USFWS). 2010. Designation of critical habitat for the California red-legged frog; final rule. Federal Register Volume 75 Number 51. March 17, 2010.

United States Geologic Survey (USGS). 2005. GIS data for California, including: Hillshade Layer, Digital Elevation Model. National Hydrologic Dataset (GIS coverage of streams, water bodies, and seeps and springs in California), and Geologic Formations of the Western United States. United States Geological Survey.

University of California Division of Agriculture and Natural Resources. 2011. Understanding livestock grazing impacts: strategies for California annual grassland and oak woodland vegetation series. Publication 21626. 108 pages.

Valbridge Property Advisors (Valbridge) 2013. Appraisal Report: UTC Coyote Ridge Property Coyote Creek Watershed 2014 (Case #0051122) Unincorporated Santa Clara County, CA 95037. Report Submitted to the Santa Clara County Open Space Authority. March 13, 2014. 77 pages.

Valley Transportation Authority (Santa Clara) (VTA). 2006. VTA-Coyote Ridge Resource Management Plan. Prepared for the U.S. Fish and Wildlife Service

Walters, C., and C. S. Holling. 1990. Large-scale experiments and learning by doing. Ecology 71:2060-2068.

Weiss, S. B., D. H. Wright, and C. Niederer. 2007. Serpentine Vegetation Management Project. Final Report to the U.S. Fish and Wildlife Service, Grant Agreement No. 814205G240.

Weiss, S. Niederer, C., Quenelle, J., and H.T. Harvey and Assoc. 2011. VTA-Coyote Ridge Property Year 4 (2010) Monitoring Report. Prepared for Santa Clara Open Space Authority. April 2011. 71 pages.

Weiss, S.B. 1996. Weather, landscape structure, and the population ecology of a threatened butterfly, Euphydryas edit/ia bayensis. Ph.D. dissertation, Stanford University, Stanford, California. 119 pp.

Weiss, S.B. 1999. Cars, cows, and checkerspot butterflies: Nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology, 13, pp.1476-1486.

Weiss, S.B. 2003. Serpentine grassland restoration at Edgewood Natural Preserve, San Mateo County. Grasslands 13:7.

Weiss, S.B., Wright, D. H., and C. Niederer. 2007. Serpentine vegetation management project 2007 final report. Creekside Center for Earth Observation. 47 pages.

Wetlands Research Associates (WRA). 2004. Draft Habitat mitigation bank feasibility report. United Technologies Corporation (UTC) West Side Study Area. Prepared for Economic and Planning Systems, Inc. 26 pages.

Young, J. A., and R. A. Evans. 1989. Seed production and germination in California annual grasslands. Pages 39-45 in L. F. Huenneke and H. A. Mooney, editors. Grassland structure and function: California annual grassland. Kluwer Academic Publishers, Dordrecht, NL.

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*Photograph by the Authority*