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COYOTE RIDGE PRESERVE
YEARS 2-3 (2008-2009) MONITORING REPORT

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EXECUTIVE SUMMARY

The Coyote Ridge Preserve is a 548-acre site located on Coyote Ridge south of San Jose in Santa Clara County. This property was purchased by the Santa Clara Valley Transportation Authority (VTA) as compensation for known and predicted impacts to serpentine communities. The VTA prepared a Resource Management Plan (RMP) to describe the natural resource management program that will be implemented on the Coyote Ridge Property by the Santa Clara County Open Space Authority (SCCOSA), which will provide long-term management of this site. Managed grazing is the primary management tool on the site. The RMP includes a description of the monitoring activities that will be performed to ensure that grazing management is maintaining suitable serpentine grassland communities without adversely affecting the wetland and riparian habitats used by species such as the California red-legged frog. In coordination with the VTA and SCCOSA, H. T. Harvey & Associates and the Creekside Center for Earth Observation performed the second annual monitoring on the Coyote Ridge Property in 2008 and the third annual monitoring in 2009. This document describes the results of monitoring of the Coyote Ridge site during both 2008 and 2009, thus summarizing monitoring results through the third full year of management under the RMP.

Residual Dry Matter (RDM) provides a quantitative measure of the dry, above-ground plant material left standing or on the ground at the beginning of a new growing season. High RDM values are associated with poor serpentine habitat quality. Five of 16 RDM monitoring transects on and immediately adjacent to the Coyote Ridge Property in 2009 were in the RMP's initial target range of 500-750 pounds/acre for ideal bay checkerspot butterfly habitat, with the remaining plots having higher RDM values than desired.

In 2008 and 2009, livestock stocking rates continued as they have in the past, at approximately one cow-calf pair per 10 acres. As per the RMP, the majority of the property was grazed in winter and spring in those years. Many areas on the west side of Coyote Ridge were poorly grazed, being grazed only for a brief period during the winter, if at all. Rather, cattle spent most of their time on the ridgeline or on the east side of the ridge near Anderson Reservoir. In general, RDM values along the ridgeline were consistent with those seen in 2007, but RDM levels on much of the west slope were higher than in 2007 and higher than target levels. If grazing on the western slope of the property does not reduce RDM values to target values, the locations of grazing infrastructure such as salt licks may have to be modified (e.g., moving them downslope to the west), stocking rates may be increased, or temporary fencing may have to be installed to ensure that grazing intensity is high enough on western slopes to achieve suitable RDM values and habitat conditions. Installation of temporary fencing may be cost-prohibitive, and additional monitoring is needed before this option is considered for implementation.

Data on plant species composition and cover were collected along 15 transects on the Coyote Ridge Property. These transects capture different grazing regimes, elevations,

and topoclimates throughout the property, allowing managers to make inferences to various portions of the Coyote Ridge Property, and to detect changes over time. Bay checkerspot host and nectar plant cover remained fairly low across sites in 2008 and 2009. Many of these species show low cover in most years, and some, such as goldfields and owl's clover, appear to have declined due to low precipitation in 2007-2009. The habitat continues to support larval hostplants and nectar sources, and is being maintained as high-quality bay checkerspot butterfly habitat by the current grazing regimes. While the spring-fall regime has resulted in greater grass and thatch cover in recent years, the paddock overall continues to support healthy populations of bay checkerspot butterflies outside of the VTA Property.

Bay checkerspot butterfly populations were estimated on the Coyote Ridge Property based on larval surveys, and were compared with earlier results to provide a temporal context, since populations of this species can show dramatic fluctuations. In 2008, numbers appeared to have increased substantially along the ridgetop, presumably marking a recovery from steep declines caused by defoliation of *Plantago* by high densities of larvae during 2002-2004. These numbers appeared stable in 2009. Sections of the lower ridge showed population increases in 2008, but within much smaller confidence levels. Numbers then dropped in 2009. The continued occupation of the lower slopes following the dry years of 2007 and 2008 is encouraging, and the patchy nature of larval concentrations is typical of these areas.

Five monitoring plots established in Year 1 were surveyed in Year 3 for each of three special-status plant species (Santa Clara Valley dudleya, most beautiful jewelflower, and Mt. Hamilton thistle), and the following densities were determined within the monitoring plots: 5.5 plants/m^2 for Santa Clara valley dudleya, 4.3 plants/m^2 for most beautiful jewelflower, and 14.3 plants/m^2 for Mt. Hamilton thistle. These monitoring results indicate that populations have been relatively stable between Years 1 and 3, and no significant damage or threats to these species were noted. Two other rare plant species were monitored by recording incidental observations made during other monitoring. The smooth lessingia is likely present throughout most of the lower (at least western) slopes of the Coyote Ridge Property, although 2009 monitoring surveys were conducted too early to allow this species to be distinguished from the more common slender-stemmed lessingia (which dominates higher slopes on the site) and hybrids between the two species. No individuals of the San Francisco wallflower were observed during monitoring.

Surveys for California red-legged frogs were conducted within a 98-acre portion of the property that had been acquired for red-legged frog habitat mitigation by a previous owner. Although these surveys did not detect red-legged frogs, single individuals were recorded incidentally on three occasions in 2009 in the southwestern part of the site. The presence of these individuals indicates that drainages in this part of the site are being used as non-breeding habitat by frogs associated with the Kirby Canyon Landfill's wetlands and red-legged frog pond, where the species breeds. No bullfrogs were observed on the site in 2008 or 2009.

No major erosional problems were noted on the Preserve in 2008 or 2009. Minor erosional issues associated with use of the ridgetop road by ranchers and adjoining property owners were noted, and will be addressed by education of those parties by SCCOSA staff. Although feral pigs and tule elk have potential to adversely affect sensitive habitats on the Preserve, problems to date have been very localized and limited; monitoring of on-site abundance of these species, and potential damage to sensitive habitats and species caused by pigs and tule elk, will continue.

Measures to control invasive plants in 2008 and 2009 were focused on barbed goatgrass. The graminicide Envoy was used in 2007 and 2008 to decrease the infestations along the ridgetop road on VTA property. Those areas that had been sprayed twice were not sprayed in 2009, and densities remained very low. Monitoring of the population will continue, and hand pulling will be the preferred treatment method should remaining individuals be detected. It could possibly take at least 3 years of careful follow-up to eradicate the population, as its seedbank continues to germinate and as hard-to-find individuals escape detection and are allowed to reproduce.

A reduction in percent cover by invasives in general has been noted on the Preserve as greater control is attained, and a reduction in the effort needed to control invasives is anticipated in 2010. Monitoring for occurrences of other invasives, and application of integrated pest management as needed, will continue on the Preserve.

In general, monitoring activities in 2008 and 2009 documented that management of the Coyote Ridge Preserve continued to maintain suitable conditions for the sensitive species and habitats for which this property is being managed, and continued to maintain healthy populations of those species.

In addition to routine monitoring activities to be performed in 2010 according to the schedule in the RMP, the following recommendations and action items are noted for 2010:

- Grazing
    - Annual grass and thatch cover are higher on the lower, western slopes in the spring-fall grazed paddock than at the summit or in the winter-spring grazed paddock. Rancher Justin Fields has suggested adding a few more cattle and moving salt licks at his discretion to increase grazing pressure on the lower slopes. Increased grazing pressure should reduce nonnative annual grass and thatch, increasing cover of bay checkerspot hostplant and nectar sources. If monitoring in Year 4 indicates that RDM values on the western slopes are still higher than target levels, additional options for increasing grazing intensity on those slopes should be considered.
- Invasive Plants

- Continue visual monitoring for invasives on the Preserve and quantitative monitoring on neighboring property, and apply integrated pest management as needed.

- Continue to work with adjoining landowners to assist them in their management of invasive plants.

- Erosion/Animal Damage

  - Work with adjoining property owners to educate them on the detrimental effects of driving roads when they are muddy, and will work with Waste Management staff to resolve erosion issues off-site on North Canyon Road.

  - Monitor use of the site by tule elk (in addition to feral pigs, which are addressed in the RMP), and in particular, monitor damage to sensitive habitats by elk.

- General

  - Change permanent plot marking systems to allow permanent plots to be more easily located. The SCCOSA has begun to change markers on these plots and will continue the replacement process in 2010.

  - Continue to monitor human activities by the golf course as they relate to the management of local wildlife populations.

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INTRODUCTION

COYOTE RIDGE PRESERVE OVERVIEW

The Coyote Ridge Preserve is a 548-acre site located on Coyote Ridge south of San Jose in Santa Clara County (Figure 1). This property was purchased by the Santa Clara Valley Transportation Authority (VTA) from Castle & Cooke as compensation for known and predicted impacts to serpentine communities resulting from VTA-proposed transportation projects. The site consists predominantly of areas dominated by serpentine-derived soils, but the eastern and western site boundaries extend slightly beyond the serpentine-derived soils to include small amounts of adjacent non-serpentine grassland included in the original Critical Habitat designation for the bay checkerspot butterfly (*Euphydryas editha bayensis*) by the U.S. Fish and Wildlife Service (USFWS 2001). The Coyote Ridge Preserve also includes a ± 98-acre site, located east/northeast of the U.S. 101/Coyote Creek Golf Drive intersection, that had been preserved by Castle & Cooke as mitigation for impacts to the California red-legged frog (*Rana draytonii*) from expansion of the Coyote Creek Golf Course (BonTerra Consulting 1999).

Coyote Ridge comprises the westernmost foothills of the Diablo Range of California's Inner South Coast Range. The western boundary is located immediately upslope from the Coyote Valley floor, being bounded on the southwestern side by U.S. 101 and the Signature Course East of the Coyote Creek Golf Club. From here, the Preserve extends upslope to the crest of Coyote Ridge, then eastward downslope toward San Felipe Creek and Anderson Reservoir. The Preserve is bounded on the north side by property owned by United Technologies Corporation (UTC), on the east side by property owned by Castle & Cooke, and on the south/southeast side by property owned by Waste Management, Inc., including the Kirby Canyon Landfill and associated mitigation lands (Figure 2).

Two out-parcels within the boundaries of the Coyote Ridge Preserve, a ± 90-acre parcel owned by William Lyon Homes and a ± 15-acre parcel owned by the Silicon Valley Land Conservancy, serve as mitigation for impacts to serpentine habitat from projects by William Lyon Homes and Calpine, respectively. Other mitigation lands adjacent to the Coyote Ridge Preserve include the 267-acre Kirby Canyon bay checkerspot butterfly preserve (which serves as mitigation for serpentine impacts from the landfill), a ± 8-acre Santa Clara Valley dudleya (*Dudleya setchellii*) mitigation area owned by Castle & Cooke, and another ± 100-acre mitigation area located along U.S. 101 northwest of the Preserve (Figure 2).

The majority of the Coyote Ridge site is dominated by California annual grassland and serpentine grassland studded with small rock outcrops and patches of chaparral, coastal sage scrub, and oak woodland. These grasslands are interrupted by several drainages, some of which contain streams, seepage wetlands, and in the case of

deeper drainages, riparian scrub/woodland. Figure 2 provides a map depicting the biotic habitats on this site.

Greater detail on the geological, hydrological, and biological conditions of the Coyote Ridge site is provided in the site's Resource Management Plan (RMP; VTA 2006). The VTA prepared the RMP to describe the natural resource management program that will be implemented on the Coyote Ridge Preserve by the Santa Clara County Open Space Authority (SCCOSA), which will provide long-term management of this site. The primary management goal is to preserve, monitor, and, if necessary in the future, enhance habitat on the Preserve for serpentine-endemic flora and fauna, and to preserve existing habitat for the California red-legged frog. Non-native grass management through cattle grazing, while protecting sensitive aquatic resources from damage by livestock, is the key objective. The USFWS approved the RMP in 2006.

Figure 1: Coyote Ridge Preserve Vicinity Map

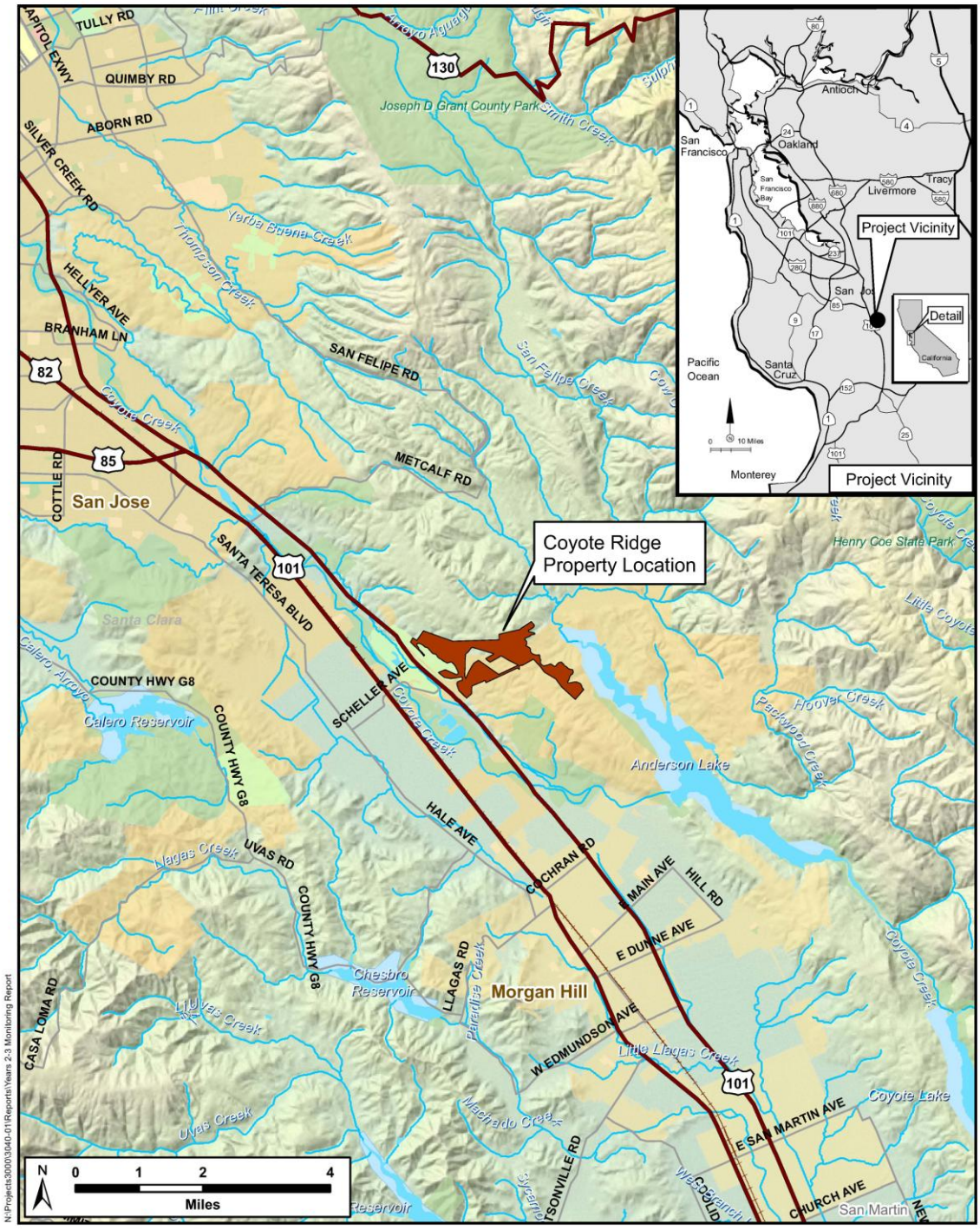

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Figure 1: Vicinity Map
VTA - Coyote Ridge Years 2-3 Monitoring Report (3040-01)
May 2010

Figure 2: Biotic Habitats Map

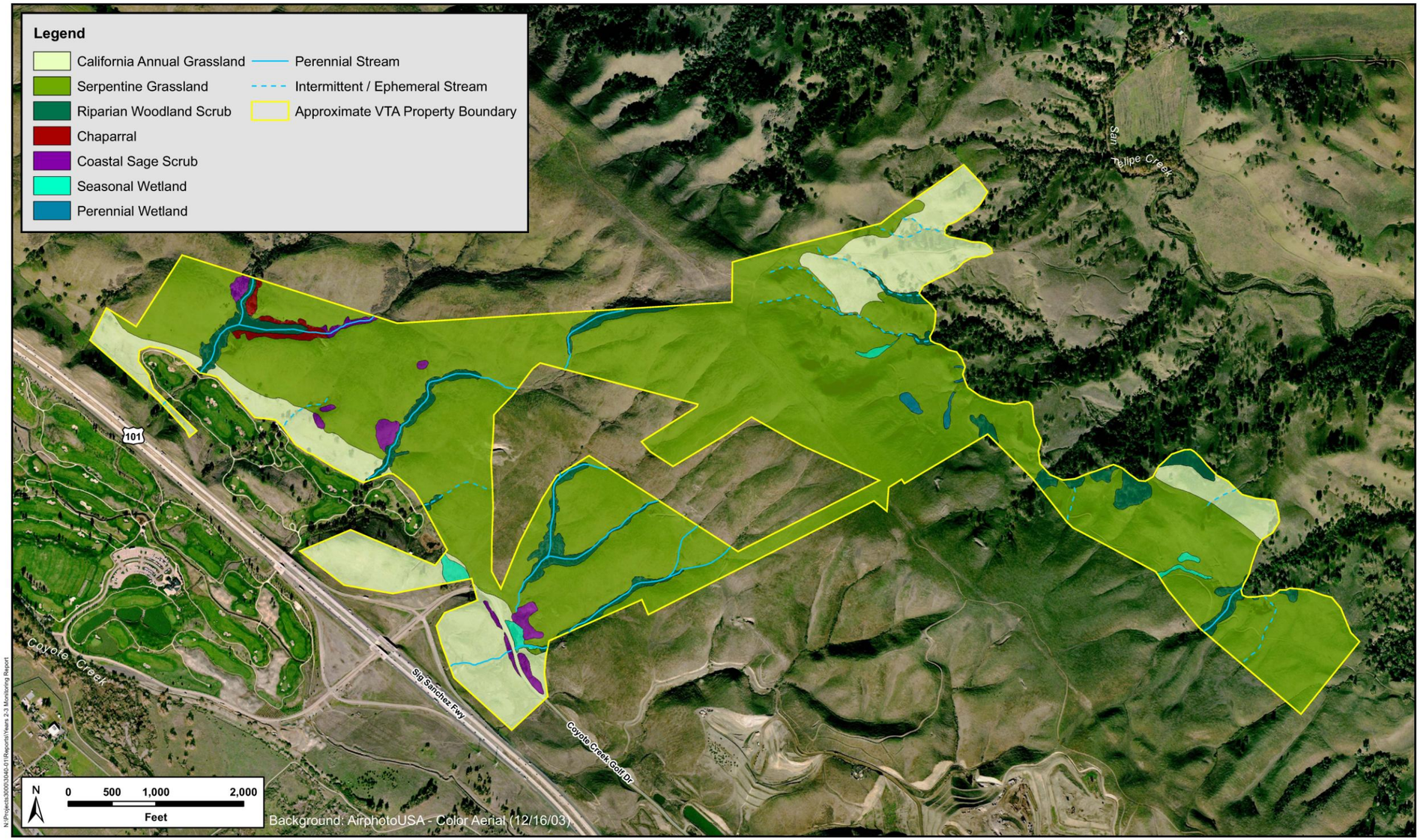

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Figure 2: Biotic Habitats Map
VTA - Coyote Ridge Years 2-3 Monitoring Report (3040-01)
May 2010

MONITORING REQUIREMENTS

The RMP includes a description of the monitoring activities that will be performed to ensure that grazing management is maintaining suitable serpentine grassland communities without adversely affecting the wetland and riparian habitats used by species such as the California red-legged frog. A monitoring report will be prepared to summarize the results of all monitoring activities during the previous calendar year. Results for monitoring of Residual Dry Matter (RDM), grazing period/season forage availability, permanent vegetation transects (including bay checkerspot butterfly larval food plants and adult nectar sources), bay checkerspot larvae and adults, special-status plants, California red-legged frogs, wetland and riparian habitats, erosion problems, and invasive species will be included in the report as appropriate, based on the monitoring procedures and frequency described in the RMP. Information on grazing intensity will also be incorporated in this report. The annual report will also include any recommended changes to the management plan or monitoring regime, any remedial actions taken, and an analysis of relationships between monitoring results and grazing management.

Table 1 summarizes the monitoring efforts that will be implemented on the Coyote Ridge Preserve, based on the RMP, and that are to be summarized in the annual monitoring report. Collectively, the Coyote Ridge dataset captures different grazing regimes, elevations, and topoclimates throughout the Preserve, allowing managers to make inferences to various portions of the Coyote Ridge Preserve.

Table 1: Coyote Ridge Preserve Monitoring Summary

Parameter	Monitoring Period	Monitoring Protocol
Residual Dry Matter (RDM)	Late fall (October and November)	Prior to the first significant rain in fall, RDM will be measured at each of 10 key monitoring locations, the locations of which will be stratified according to slope, aspect, and grazing regime (spring and fall vs. winter/spring grazing). RDM is most commonly measured through a combination of clipping plots and estimation, although an experienced land manager may be able to accurately estimate RDM visually. The initial target range for RDM is 500-750 lbs/acre. Target RDM values may be adjusted by SCCOSA staff in consultation with the current grazing lessee, as necessary, depending on correlations between RDM and parameters related to sensitive resources.

Parameter	Monitoring Period	Monitoring Protocol
Grazing Period/season Standing Forage	Throughout grazing period (winter/spring or spring and fall depending on grazing regime)	Immediately adjacent to each of the 10 key monitoring locations described above for RDM monitoring, standing herbage biomass plots will be established in grazed areas, and small fenced exclosures will be established to provide ungrazed reference areas. During the grazing period, all plants on the biomass plots and associated reference plots will be clipped and weighed monthly. Percent utilization will be estimated by comparing measurements taken from the grazed and ungrazed areas. When available biomass drops below an established threshold, to be determined during the first 2-5 years of vegetation monitoring, livestock will be removed as directed by staff of SCCOSA.
Plant Species Composition/cover	Spring (late March to early May)	One permanent transect will be established adjacent to each of the 10 key monitoring locations described above for RDM monitoring. Transects will be 50 m in length. Species percent cover will be measured using the quadrat method. A 50-m tape will be stretched along the transect, and a 0.5 x 0.5 m (0.25 m^2) quadrat will be placed at 10, 20, 30, 40, and 50 m along the right side of the tape, and at 5, 15, 25, 35, and 45 m along the left side of the tape. The percent cover (on a cover class scale of 1, 2, 5, 10, 20, 30…100%) of each plant species within the quadrat will be recorded. Percent cover of bare ground, rock, and litter will be included in the cover total. Monitoring will be conducted during peak spring flowering season (typically late March-early May). Timing of monitoring is expected to vary with transect location due to differences in phenology among areas with different topoclimates, and may vary among years.
Grazing Infrastructure	Ongoing	The ranching lessee will continuously monitor fence lines and other infrastructure (e.g., troughs) and maintain and repair such features as necessary. When on the Preserve, SCCOSA staff and docents will note and report to the rancher any grazing infrastructure problems or maintenance needs observed.

Parameter	Monitoring Period	Monitoring Protocol
Bay Checkerspot Butterfly	February/March (larvae), March/April (adults)	Post-diapause larvae will be counted annually on permanent plots. The number and location of plots will be stratified according to topoclimate and upper vs. lower slope, and will include plots monitored in past years by Dr. Weiss. Timing of larval surveys may be modified based on extremes in temperature or precipitation, as determined by a qualified biologist. More qualitative, reconnaissance-level surveys of other areas will be conducted annually during the peak of the flight season to determine the presence and relative abundance of adult bay checkerspots.
Santa Clara Valley Dudleya	May	Focused surveys will be conducted on 5 permanent plots in Years 1, 5, and every 5th year thereafter (10, 15, etc.). The locations of the 5 plots will be stratified by grazing intensity (accessibility to livestock may be used as a proxy for different levels of grazing pressures). On each plot, the number of plants will be counted, age classes will be determined, and evidence of reproduction will be noted. Plots will be photographed, and any evidence of grazing or trampling impacts will be noted. Any necessary remedial measures (e.g., fencing around localized areas) will be identified.
Mt. Hamilton Thistle	February to May	Focused surveys will be conducted on 5 permanent plots in Years 1, 5, and every 5th year thereafter (10, 15, etc.). The locations of the 5 plots will be stratified by grazing intensity (accessibility to livestock may be used as a proxy for different levels of grazing pressures). The number of plants within each plot will be counted or estimated, and density estimates from these counts will be used to estimate population size on the Preserve. Plots will be photographed, and any evidence of grazing or trampling impacts will be noted. Monitoring results will be correlated with livestock activity to determine the effects of grazing and trampling on freshwater resources and to identify any necessary remedial measures (e.g., fencing around localized areas).

Parameter	Monitoring Period	Monitoring Protocol
Most Beautiful Jewelflower	May	Focused surveys will be conducted on 5 permanent plots in Years 1, 5, and every 5th year thereafter (10, 15, etc.). The 5 plots will be located randomly in serpentine grassland habitat, stratified by slope and aspect. The number of plants within each plot will be counted or estimated, and density estimates from these counts will be used to estimate population size on the Preserve. Plots will be photographed.
Smooth Lessingia	Late summer	Incidental observations made during other monitoring efforts will be compiled. Evidence of declines in abundance or threats from grazing or invasive species will be noted. If numbers appear to be declining, more focused surveys could be conducted and/or remedial measures identified.
San Francisco Wallflower	Spring	Incidental observations made during other monitoring efforts will be compiled. Evidence of declines in abundance or threats from grazing or invasive species will be noted. If numbers appear to be declining, more focused surveys could be conducted and/or remedial measures identified.
Riparian/wetland Habitats	Late summer/fall	Permanent stations in representative seepage wetlands, low-gradient vs. high-gradient streams, and dense vs. relatively open riparian habitats on both the eastern and western slopes will be monitored annually for dominant species composition, percent cover by plants in the ground layer (0-1 m), understory layer (1-2 m), and canopy layer (>2 m), and any obvious detrimental effects of livestock activity. Monitoring results will be correlated with livestock activity to determine the effects of grazing and trampling on freshwater resources and to identify any necessary remedial measures (e.g., fencing around localized areas). If no adverse effects of livestock activity (or lack thereof) are noted, monitoring frequency can be reduced (e.g., once every 2 or 3 years).

Parameter	Monitoring Period	Monitoring Protocol
Erosion Problems	Spring	A reconnaissance survey to qualitatively assess potential erosion problems will be conducted annually in spring along all drainages. Any necessary remedial measures (e.g., fencing around localized areas) will be identified and recommended. If no adverse effects of livestock activity are noted, monitoring frequency can be reduced in known areas of low livestock use (e.g., once every 2 or 3 years).
California Red-legged Frog	Late spring/ summer	Focused surveys, including both daytime and nighttime surveys, will be conducted every 2 years, focusing on seeps, springs, and drainages. The locations and numbers of red-legged frogs will be recorded and any evidence of breeding will be noted. Any adverse effects of livestock on red-legged frogs or on particularly important habitat areas (e.g., breeding pools, if present) will be noted. Any bullfrogs detected will be captured and removed from the Preserve.
Invasive Plants	March/early April	A reconnaissance survey for barb goatgrass, purple star-thistle, and other invasives will be conducted annually in spring. SCCOSA staff, docents, and ranchers will be on the lookout for invasives during all activities on the Preserve, year-round. Infestations of noxious weeds will be eradicated immediately.
Feral Pigs	Year-round	SCCOSA staff, docents, and ranchers will be on the lookout for evidence of feral pig damage, especially in riparian areas, during all activities on the Preserve, year-round. Substantial pig damage in sensitive areas will be addressed by removal of pigs and/or the construction of localized fencing around the affected areas.

This document describes the results of monitoring of the Coyote Ridge site during 2008 and 2009, the second and third years of management under the RMP.

YEARS 2-3 (2008-2009) MONITORING METHODS, RESULTS, AND DISCUSSION

Staff of the SCCOSA, H. T. Harvey & Associates, and the Creekside Center for Earth Observation performed annual monitoring for Years 2 and 3 on the Coyote Ridge Preserve in 2008 and 2009. Below, the monitoring methodology and results are described separately for each monitoring parameter.

In conjunction with the RMP, data collected in Years 2-3 are compared with the Year 1 monitoring data, which provided a baseline for all future monitoring reports, as appropriate. For some monitoring parameters, such as monitoring of populations of individual special-status plants, optional monitoring was conducted even though such monitoring is not required again until Year 5. For these parameters, results of Years 2-3 monitoring are reported simply, and discussion is limited.

In general, the Year 1 (2007) monitoring report provided more detailed discussion, and provided more detail than would be expected in future monitoring reports, to provide an appropriate context for the results of baseline (Year 1) monitoring. This is particularly true for monitoring parameters such as residual dry matter (RDM), bay checkerspot butterfly abundance, plant species composition/cover, and invasive plants, for which monitoring on the Coyote Ridge Preserve has been ongoing for years. Data collected in Years 2-3 on these parameters are compared briefly to the 2007 data to provide a temporal context and comparison of conditions at the site. Additional transect clusters elsewhere on Coyote Ridge are monitored each year for the Annual Monitoring Report for the Metcalf Energy Center (MEC) Ecological Preserve (Weiss and CH2MHill 2009). The VTA-Coyote Ridge Preserve Year 1 (2007) Monitoring Report included comparisons to these neighboring transect clusters to provide a regional context to the baseline data. The report for Years 2-3 and future reports, however, will only contain data collected on VTA's Coyote Ridge Property. Regional comparisons can be made by accessing the MEC report, prepared annually for the Silicon Valley Land Conservancy.

RESIDUAL DRY MATTER (RDM)

RDM provides a quantitative measure of the dry, above-ground plant material left standing or on the ground at the beginning of a new growing season. The amount of RDM remaining in a pasture at the time of the first germinating rain in fall influences soil protection and the microclimate for the coming year's herbaceous plant community. Properly managed RDM protects soil from erosion and nutrient loss and increases organic matter content in clay soils (Bartolome et al. 2006, Wildland Solutions 2001). In serpentine communities, where sensitive native plants may be outcompeted by invasives if grazing intensity is not sufficiently high, the amount of RDM remaining also provides a measure of the success of grazing management over the prior year in reducing invasive grasses, thus informing the management regime for the following year. Thus, RDM analysis provides a measure of range condition and a forecast for

future utilization, and facilitates rapid monitoring by providing data that can be extrapolated over an entire pasture.

Methods

The Coyote Ridge Property covers different grazing pastures and regimes, topoclimates, and elevations. On 4 and 5 October 2009, the SCCOSA collected RDM data at 16 sites representative of different grazing regimes, topoclimates, and elevations within and adjacent to the Coyote Ridge Preserve (Figure 3). The SCCOSA selected new RDM monitoring sites that are different from those surveyed in 2007 to better represent the pastures, elevations, and topoclimates within the grazed areas of the Coyote Ridge Preserve. Twelve of the 2009 RDM monitoring sites are located within the Coyote Ridge Preserve. The other four sites are located outside of the Coyote Ridge Preserve boundary to allow for sampling of a greater diversity of topoclimates and elevations (Table 2, Figure 3).

The majority of the RDM monitoring sites are located in paddocks that are grazed by cattle in winter and spring, which is the predominant grazing regime on the Coyote Ridge Preserve. Due to the continuing drought in 2009, many areas on the west side of the Preserve were either not grazed in 2009 or were only grazed for a brief period in the winter. The cattle preferentially grazed areas near Anderson Reservoir.

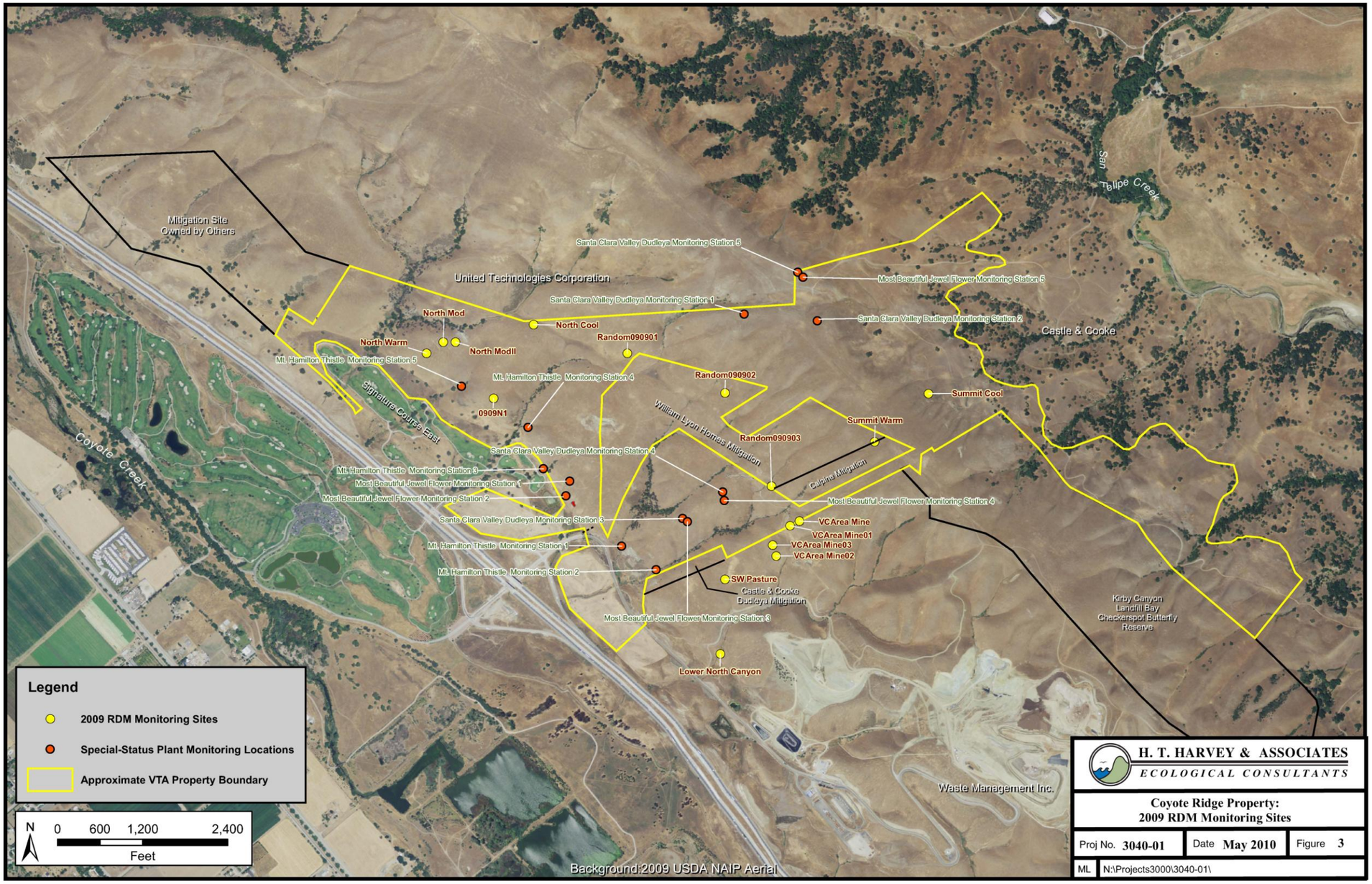
Table 2: Properties of 2009 RDM Sites

Transect Name	Elevation	Grazing Regime
North Mod	Mid	Spring, Fall
North ModII	Mid	Spring, Fall
North Warm	Mid	Spring, Fall
North Cool	Mid	Winter, Spring
Summit Cool	High	Winter, Spring
Summit Warm	High	Winter, Spring
0909N1	Mid	Winter, Spring
VCArea Mine	Mid	Winter, Spring

Transect Name	Elevation	Grazing Regime
VCArea Mine01	Mid	Winter, Spring
VCArea Mine02	Mid	Winter, Spring
VCArea Mine03	Mid	Winter, Spring
SW Pasture	Mid	Winter, Spring
Lower North Canyon	Mid	Winter, Spring
Random090901	Mid	Winter, Spring
Random090902	Mid	Winter, Spring
Random090903	Mid	Winter, Spring

A photo guide was used to estimate the mean RDM (pounds/acre) at each of the 16 sites. Photos were taken at each of the sites from distances of 10 and 20 feet, including a Robel pole with subdivisions every 5 centimeters and colored golf balls (Wildland Solutions 2008). At three of the sites (Summit Cool, Summit Warm, and 0909N1), vegetation was clipped and weighed to verify the visually estimated RDM values.

Figure 3. Coyote Ridge Property: RDM Monitoring Sites



Results

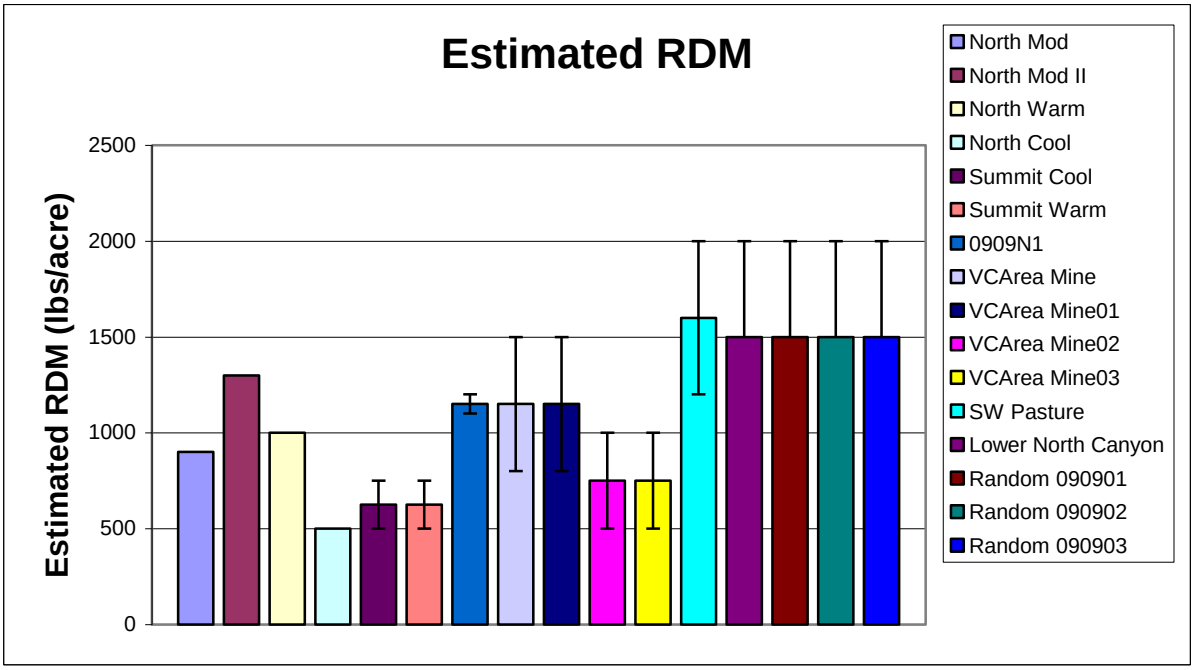
RDM estimates from the 16 monitoring sites indicate that some areas of the Coyote Ridge Preserve met the RMP's objective of 500-750 lbs/acre in 2009, but that the majority of the pastures had higher RDM values than were desired. Estimated RDM values at the 16 RDM monitoring sites ranged from 500 to 2000 lbs/acre (Table 3, Figure 4). Five of the 16 RDM monitoring sites met the RMP's objective of 500-750 lbs/acre. Two of the sites had RDM values in the range of 751-1000 lbs/acre, four were estimated between 500 and 1500, two between 1100 and 2000, and four at 1500+.

Table 3: Mean RDM (lbs/acre) on Coyote Ridge Preserve RDM Monitoring Sites in 2009

Site	Estimated RDM	Meets Objective of 500 – 750 lbs/acre?	Grazing
North Mod	900	High	Area grazed in Spring 2009; cattle present during survey
North ModII	1300	High	Area grazed in Spring 2009; cattle present during survey
North Warm	1000	High	Area appeared not to have been grazed in Spring 2009
North Cool	500	Yes	Area appeared not to have been grazed in Spring 2009
Summit Cool	500 - 750	Yes	Dung remains from 2008 and Spring 2009 were observed
Summit Warm	500 – 750	Yes	Dung remains from 2008 and Spring 2009 were observed
0909N1	1100 – 1200	High	Area appeared to have been grazed very little in 2009
VCArea Mine	800 – 1500	High	Area appeared not to have been grazed in Spring 2009
VCArea Mine01	800 - 1500	High	Area appeared not to have been grazed in Spring 2009

Site	Estimated RDM	Meets Objective of 500 – 750 lbs/acre?	Grazing
VCArea Mine02	500 – 1000	Yes	Area appeared not to have been grazed in Spring 2009
VCArea Mine03	500 – 1000	Yes	Area appeared not to have been grazed in Spring 2009
SW Pasture	1200 – 2000	High	Area appeared not to have been grazed in many years
Lower North Canyon	1500 +	High	Area appeared not to have been grazed in Spring 2009
VTA – Random 090901	1500 +	High	No signs of grazing observed
VTA – Random 090902	1500 +	High	No signs of grazing observed
VTA – Random 090903	1500 +	High	No signs of grazing observed

Figure 4: 2009 RDM Results on Coyote Ridge Preserve



* The range of estimates at each site is shown using error bars.

Data sheets and photographs for each RDM monitoring site are provided in Appendix A.

Discussion

In 2009, a second year of drought seemed to change forage preference by cattle. As a result, many areas on the west side of Coyote Ridge were poorly grazed, being grazed only for a brief period during the winter, if at all. Rather, cattle spent most of their time on the ridgeline or on the east side of the ridge near Anderson Reservoir. In general, RDM values along the ridgeline were consistent with those seen in 2007, but RDM levels on much of the west slope were higher than in 2007 and higher than target levels.

Although the grazing regime as described by overall stocking rate and timing is technically the same between the VTA Summit-WS and the Mid-WS and North-WS sites, grazing pressure is higher at the summit. The cattle often congregate near the top, possibly because it is flatter and slightly cooler. Rancher Justin Fields, however, does not know why the cattle regularly feed from the top first. They have water, salt sources, and cool breezes throughout the ridge. His main tool in increasing grazing pressure lower on the slopes is to add more cattle, which pushes them downslope as feed diminishes on the summit.

If grazing on the western slope of the property does not reduce RDM values to target values, the locations of grazing infrastructure such as salt licks may have to be modified (e.g., moving them downslope to the west), stocking rates may be increased, or temporary fencing may have to be installed to ensure that grazing intensity is high enough on western slopes to achieve suitable RDM values and habitat conditions. Installation of temporary fencing may be cost-prohibitive, and additional monitoring is needed before this option is considered for implementation.

After a 5-year period of monitoring, the number of RDM monitoring stations should be evaluated. Given the effort required to monitor RDM, there may not be sufficient variability over the grazing area on the site to warrant the number of plots that have been established.

PLANT SPECIES COMPOSITION/COVER

The purpose of monitoring the overall composition of the serpentine grassland is to provide a reliable system for detecting major changes in grassland composition in response to climate, topography, and management. A standard methodology, the same one described for this purpose in the RMP, is being used at multiple sites in the region. The system is designed to monitor large changes in composition from year to year (interannual) and across topographic and edaphic (soil) gradients, while at the same time being efficient for data collection and interpretation.

This information can be used to gauge changes or monitor range trend over time in response to changes in grazing pressure and as a means to correlate the RDM target

levels to key plant species (e.g., dwarf plantain [*Plantago erecta*], owl's clover [*Castilleja* spp.], and adult nectar sources for the bay checkerspot butterfly).

Methods

Six transects (comprising the cluster VTA_Mid_WS; Figure 5) were established on the Coyote Ridge Preserve in spring 2006 for the purpose of plant species composition/cover monitoring and resampled annually thereafter. This site was selected on the western midslope to complement existing vegetation transect clusters located on other Coyote Ridge properties. This cluster of transects is located in the winter-spring grazed paddock, and captures the variability of midslope topoclimates (very warm, warm, moderate, cool, and very cool). Two additional transect clusters were sampled in 2008: VTA_Summit_WS and VTA-North_SF. The transect VTA_North_WS was added in 2009, for a total of four transect clusters and 15 total transects (Figure 5).

Transects are 50 meters long and permanently marked at each end with rebar. During sampling, a 50-m tape was stretched along the transect, and a 0.5 x 0.5 m (0.25 m^2) quadrat was placed at 10, 20, 30, 40, and 50 m along the right side of the tape, and at 5, 15, 25, 35, and 45 m along the left side of the tape. The percent relative cover (on a cover class scale of 1, 2, 5, 10, 20, 30, 40 . . . 100%) of each plant species within the quadrat was recorded. Percent cover of bare ground, rock, and litter were included in the cover total. This method has been used regionally to measure serpentine grassland composition, and was described in the RMP.

Monitoring is typically conducted during peak spring flowering season (typically late March-early May). Timing of monitoring varies with transect location due to differences in phenology among areas with different topoclimates, and will vary among years.

Results

Results are compiled in Tables 4-8 (2008) and Tables 9-13 (2009) for specific plant species and functional groups that are used as indicators of bay checkerspot and serpentine grassland habitat quality. Data are averaged for each transect cluster.

Figure 5: Coyote Ridge Property: Plant Species Composition/Cover Monitoring Sites

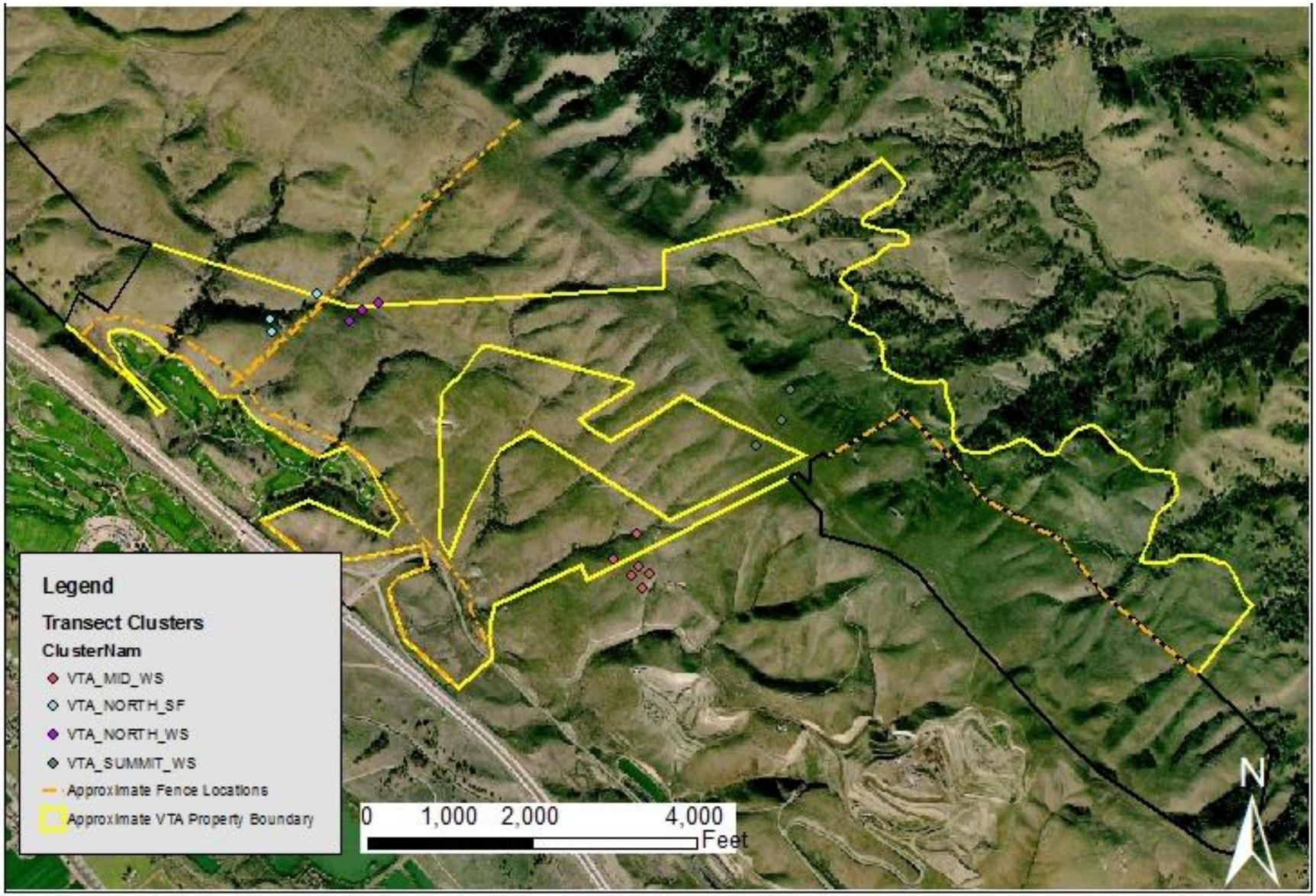


Table 4: 2008 Vegetation Composition Results – Mean ± Standard Error for Checkerspot Host and Nectar Plants

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-SF
Dwarf plantain (*Plantago erecta*)	7.20 ± 1.07	3.03 ± 0.84	1.33 ± 0.35
Owl's clover (*Castilleja* spp.)	0.15 ± 0.05	0.17 ± 0.07	0.10 ± 0.06
Goldfields (*Lasthenia californica*)	1.60 ± 0.43	2.67 ± 0.66	0.03 ± 0.03
Tidy tips (*Layia gaillardioides*)	0.0 ± 0.0	0.47 ± 0.19	0.23 ± 0.08
Jeweled onion (*Allium serra*)	0.02 ± 0.02	0.23 ± 0.09	0.13 ± 0.06
Seaside maritima (*Muilla maritima*)	0.62 ± 0.21	0.80 ± 0.13	0.27 ± 0.10

Table 5: 2008 Vegetation Composition Results – Mean ± Standard Error for Key Nonnative Grasses

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-SF
Italian ryegrass (Lolium multiflorum)	9.93 ± 1.42	10.07 ± 1.51	10.77 ± 1.38
Soft chess (Bromus hordeaceus)	1.43 ± 0.49	3.93 ± 1.24	3.10 ± 0.97

Table 6: 2008 Vegetation Composition Results – Mean ± Standard Error for Functional Guilds

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-SF
Native perennial grasses	0.78 ± 0.17	2.27 ± 0.56	0.67 ± 0.20
Nonnative annual grasses	11.90 ± 1.48	14.03 ± 1.83	17.60 ± 2.28

Geophytes	2.28 ± 0.33	3.40 ± 0.38	3.17 ± 0.57
Perennial forbs	3.23 ± 0.53	3.53 ± 0.85	5.63 ± 1.19
Annual forbs	14.28 ± 1.27	19.27 ± 2.02	5.23 ± 0.72
Legumes	1.78 ± 0.20	2.17 ± 0.16	1.10 ± 0.19

Table 7: 2008 Vegetation Composition Results – Mean ± Standard Error for Native Richness and Cover

Native Richness and Cover	VTA-Mid-WS	VTA-Summit-WS	VTA-North-SF
Average number of native species per quadrat	10.68 ± 0.35	12.60 ± 0.64	8.80 ± 0.69
Native cover	22.38 ±1.35	30.87 ± 2.05	16.93 ± 1.62

Table 8: Vegetation Composition Totals for 2008 - Mean ± Standard Error

Totals	VTA-Mid-WS	VTA-Summit-WS	VTA-North-SF
Total plant cover	34.57 ± 1.83	44.97 ± 2.25	34.57 ± 2.08
Thatch	3.12 ± 0.51	3.97 ± 1.20	17.2 ± 2.75
Bare	50.00 ± 2.10	43.33 ± 3.23	41.50 ± 3.95
Rock	9.30 ± 1.86	6.10 ± 1.91	5.37 ± 1.45

Table 9: 2009 Vegetation Composition Results – Mean ± Standard Error for Checkerspot Host and Nectar Plants

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-WS	VTA-North-SF
Dwarf plantain (*Plantago erecta*)	3.63 ± 0.57	4.70 ± 1.48	6.87 ± 1.44	0.87 ± 0.18
Owl's clover (*Castilleja* spp.)	0.20 ± 0.05	0.30 ± 0.09	0.20 ± 0.09	0.07 ± 0.05
Goldfields (*Lasthenia californica*)	2.48 ± 0.69	5.07 ± 1.51	5.30 ± 1.63	0.03 ± 0.03
Tidy tips (*Layia gaillardioides*)	0.02 ± 0.02	0.33 ± 0.09	0.0 ± 0.0	0.43 ± 0.11
Jeweled onion (*Allium serra*)	0.02 ± 0.02	0.13 ± 0.06	0.33 ± 0.11	0.07 ± 0.05
Seaside maritima (*Muilla maritima*)	0.87 ± 0.28	1.30 ± 0.38	1.80 ± 0.38	0.10 ± 0.06

Table 10: 2009 Vegetation Composition Results – Mean ± Standard Error for Key nonnative grasses

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-WS	VTA-North-SF
Italian ryegrass (*Lolium multiflorum*)	13.12 ± 1.86	6.33 ± 1.35	17.70 ± 2.76	18.73 ± 3.02
Soft chess (*Bromus hordeaceus*)	1.88 ± 0.73	4.0 ± 1.71	0.63 ± 0.34	2.53 ± 1.21

Table 11: 2009 Vegetation Composition Results – Mean ± Standard Error for Functional guilds

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-WS	VTA-North-SF
Native perennial grasses	0.87 ± 0.22	1.40 ± 2.52	1.57 ± 0.38	2.13 ± 1.04
Nonnative annual grasses	15.93 ± 2.12	10.37 ± 2.20	18.33 ± 2.83	26.67 ± 3.49
Geophytes	3.0 ± 0.46	3.57 ± 0.45	4.77 ± 0.67	3.10 ± 1.13
Perennial forbs	5.97 ± 0.98	4.43 ± 0.93	2.07 ± 0.58	5.10 ± 1.45
Annual forbs	15.55 ± 1.27	33.60 ± 3.39	19.60 ± 2.48	6.20 ± 0.69
Legumes	3.87 ± 0.92	3.90 ± 0.72	1.87 ± 0.19	1.47 ± 0.30

Table 12: 2009 Vegetation Composition Results – Mean ± Standard Error for Native richness and cover

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-WS	VTA-North-SF
Average number of native species per quadrat	11.7 ± 0.37	14.77 ± 0.73	12.73 ± 0.60	9.43 ± 0.93
Native cover	28.73 ± 1.72	47.07 ± 3.23	29.93 ± 2.62	25.60 ± 4.04

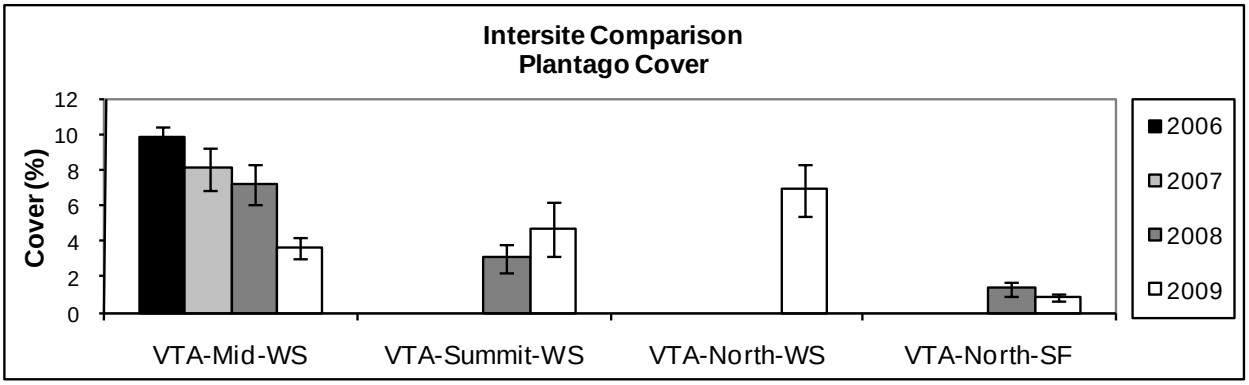
Table 13: Vegetation Composition Totals for 2009 – Mean ± Standard Error

Species	VTA-Mid-WS	VTA-Summit-WS	VTA-North-WS	VTA-North-SF
Total plant cover	45.43 ± 2.78	57.53 ± 2.68	48.30 ± 2.80	52.50 ± 3.13
Thatch	3.72 ± 0.66	1.23 ± 0.25	1.50 ± 0.29	12.63 ± 2.68
Bare	38.87 ± 2.90	36.50 ± 2.48	41.33 ± 2.95	27.70 ± 3.69
Rock	11.28 ± 2.00	4.57 ± 1.51	8.07 ± 2.02	5.47 ± 1.72

The Coyote Ridge Preserve covers different grazing regimes, topoclimates, and elevations. A brief table listing each cluster's grazing regime, elevation class, and approximate nitrogen deposition is given in the VTA-Coyote Ridge Preserve Year 1 (2007) Monitoring Report. As a brief summary, the three WS sites are in the winter-spring grazing paddock. The North-SF site is grazed spring-fall, and is directly across the fence from the North-WS site. Differences in the two North sites should therefore reflect different management effects related to the different timing of grazing regimes. The Summit site has high elevation and lower nitrogen deposition (~11 kg-N/ha/year), while the Mid and both North sites are mid elevation with higher nitrogen deposition rates (~15 kg-N/ha/year). This range of deposition is well beyond the level (~5 kg-N/ha/year) at which effects become apparent in ungrazed serpentine grassland.

Bay Checkerspot Host Plants. The North-WS transect cluster had the highest cover of dwarf plantain in 2009. Dwarf plantain cover at the Mid-WS transect cluster has been decreasing since 2006, with the biggest drop in 2009. The North-SF transect cluster exhibited the lowest cover values of among all clusters in both 2008 and 2009 (Figure 6).[1]

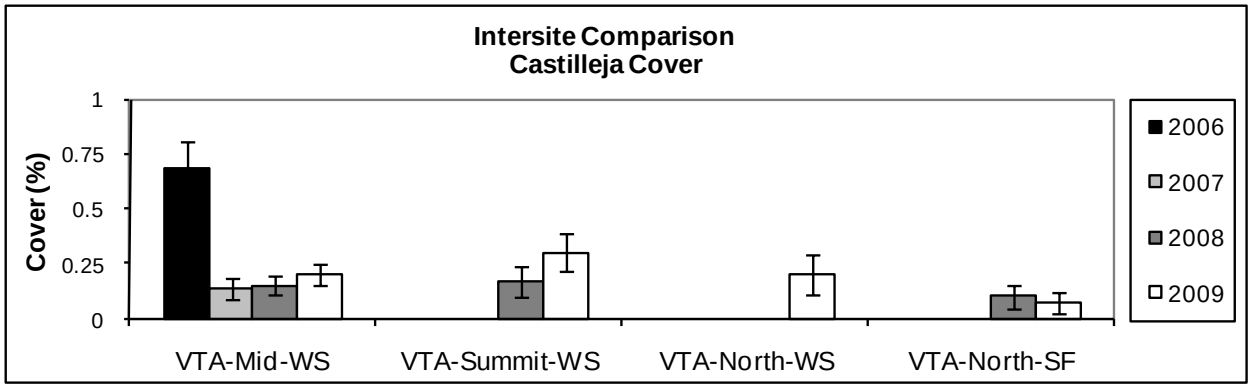
Figure 6: Average Cover of Dwarf Plantain (Plantago erecta), ± SE:



Owl's clover cover at the Mid-WS cluster showed a sharp decline from 2006 to 2007, and remained low thru 2009. Cover was similarly low at all transect sites in 2008 and 2009 (Figure 7).

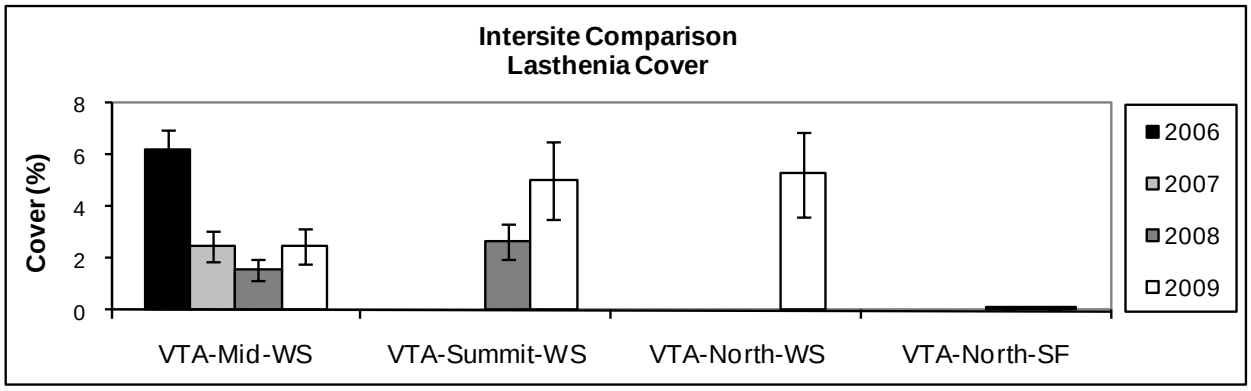
Figure 7: Average Cover of Owl's Clover (*Castilleja* spp.), ± SE

[1] Note Figures 10-24 reflect different years of data collection for each cluster. For example, data were not collected in 2006-2008 at VTA-North-WS.



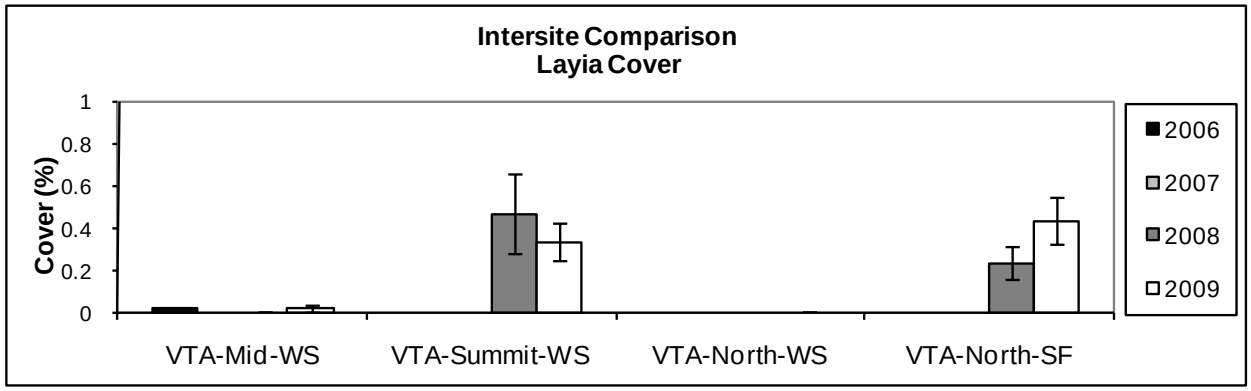
Bay Checkerspot Nectar Plants. Similar to owl clover, goldfields (*Lasthenia californica*) cover at the Mid-WS transects dropped from 2006 to 2007, and remained steady through 2009. Cover increased at the Summit-WS cluster in 2009, and it and the North-WS transect cluster exhibited the greatest goldfields cover among the sampled sites. The North-SF had very few goldfields in either 2008 or 2009 (Figure 8).

Figure 8: Average Cover of Goldfields (*Lasthenia californica*), ± SE



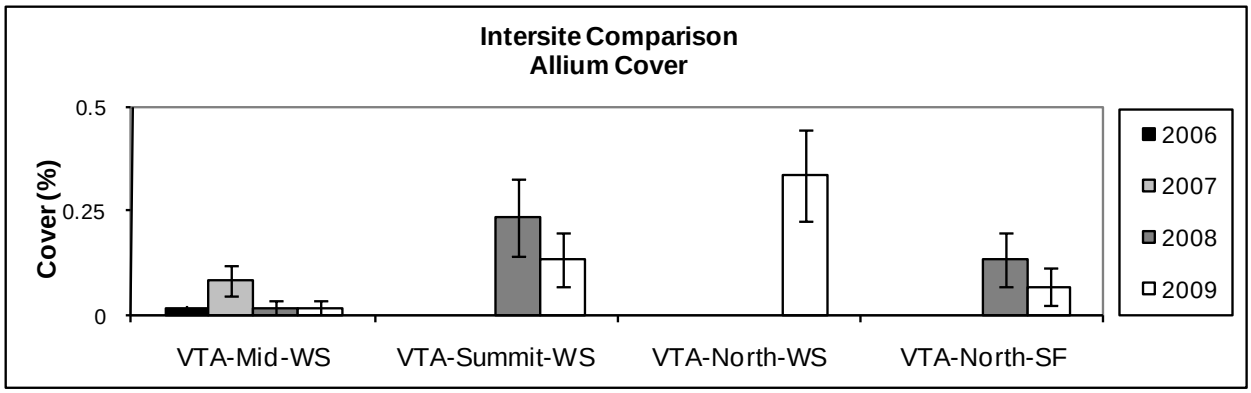
Tidy tips (*Layia gaillardioides*) cover values remained very low at all sites, which is typical of sites in the South Bay (see Year 1 Monitoring Report). The greatest cover values were detected at the Summit-WS cluster in 2008 and the North-SF cluster in 2009. Tidy tips have been hardly detectable in the Mid-WS cluster over 4 years of monitoring, and were not present at the North-WS site (Figure 9).

Figure 9: Average Cover of Tidy Tips (*Layia gaillardioides*), ± SE



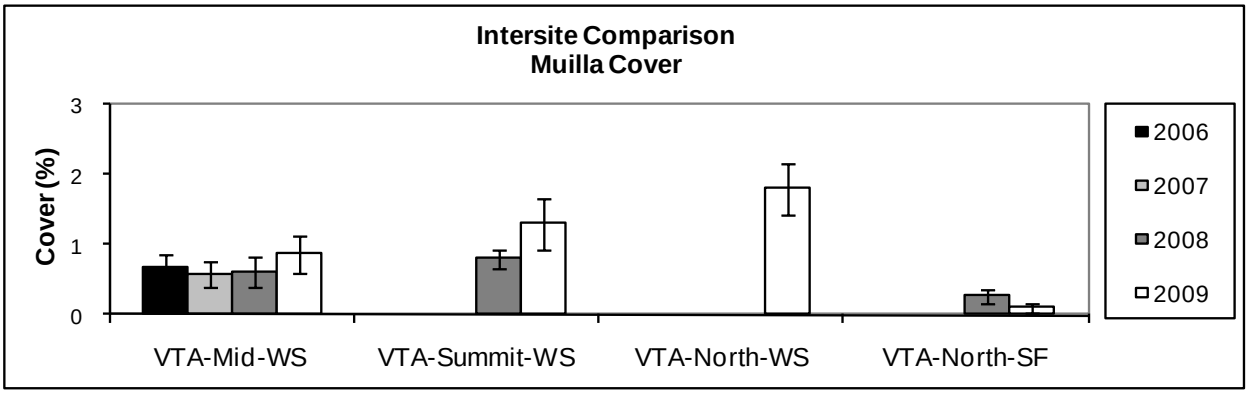
Jeweled onion (*Allium serra*) continued to show very low cover values across all transect sites, with insignificant spatial and temporal changes (Figure 10).

Figure 10: Average Cover of Jeweled Onion (*Allium serra*), ± SE



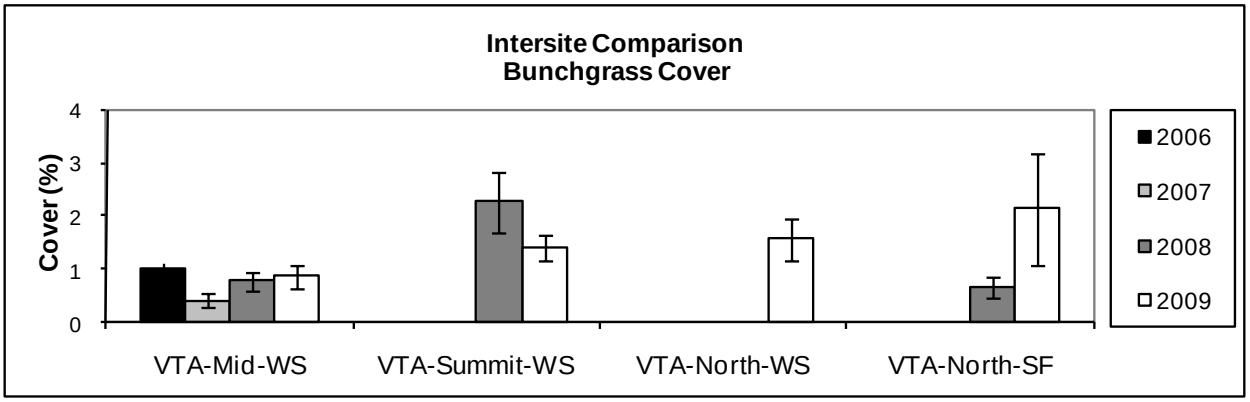
Seaside muilla (*Muilla maritima*) also had low cover values at all sites, with the Summit-WS and North-WS transect clusters having the highest cover in 2009 (Figure 11). However, there did not appear to be a clear trend based on grazing regime, given the steady, low cover values observed across all years at the Mid-WS site.

Figure 11: Average Cover of Seaside Muilla (*Muilla maritima*), ± SE



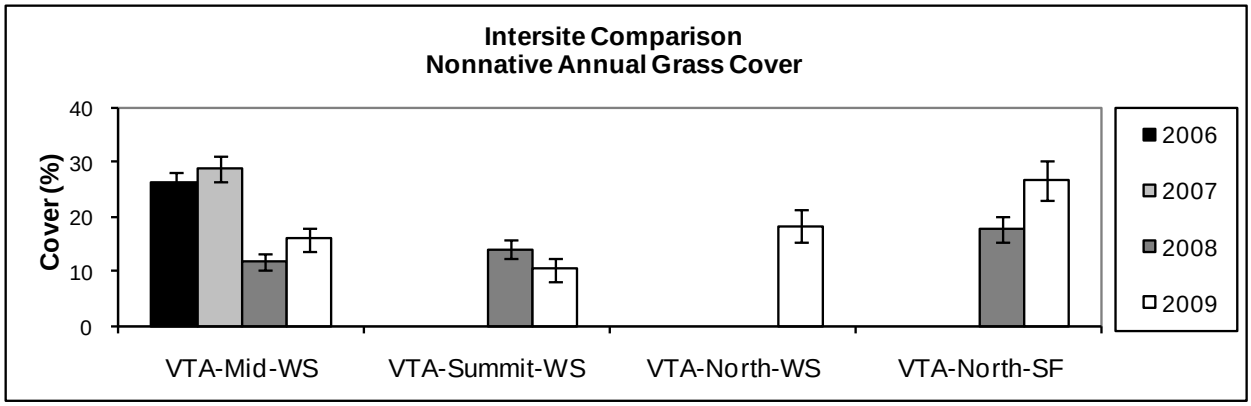
Grasses. Bunchgrass cover at the North-SF transect site increased significantly in 2009. The lowest cover values of all sites in 2009 were observed at the Mid-WS site, which remained static compared to 2008 values (Figure 12). All recorded perennial grasses were native, and cover values of approximately 1-2% were observed across the VTA-Coyote Ridge Preserve.

Figure 12: Average Cover of Perennial Grasses, ± SE



Total annual grass cover dropped significantly at the Mid-WS transect cluster in 2008 and remained steady in 2009. Cover values for non-native annual grasses tend to be lowest at the Mid-WS or Summit-WS sites. The highest cover in 2008 and 2009 was at North-SF, where cover of annual grasses increased significantly from 2008 to 2009 (Figure 13). Annual grass cover is much higher than native perennial bunchgrass cover across the VTA-Coyote Ridge Preserve, with values from about 12-30%. Dominance by annual grasses is typical for grasslands in the South Bay. See Tables 4 and 5 for the relative contributions of two key non-native annual grasses in this functional group, Italian ryegrass (*Lolium multiflorum*) and soft chess (*Bromus hordeaceus*).

Figure 13: Average Cover of Non-native Annual Grasses, ± SE

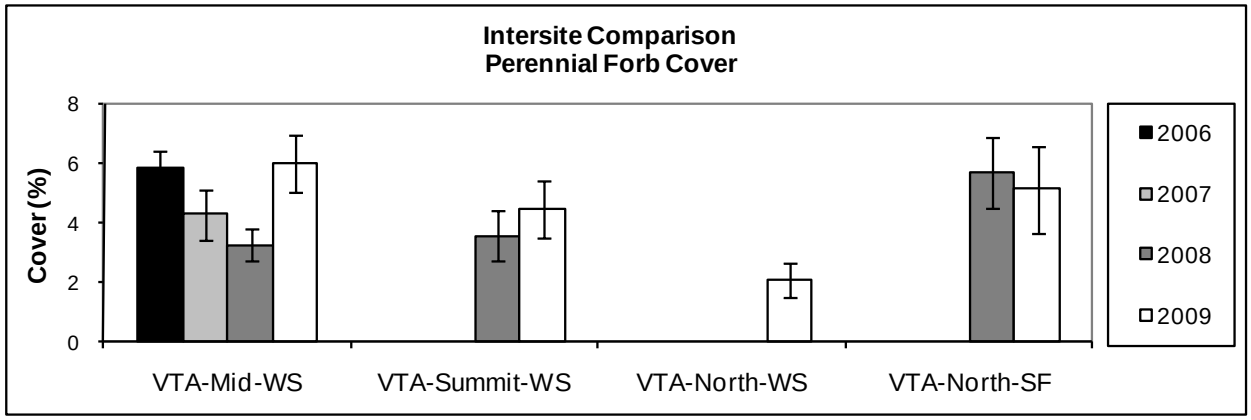


Other Functional Groups. A geophyte is a plant that has bulbs, corms, tubers, or similar underground structures. The California poppy (*Eschscholzia californica*) and blue-eyed grass (*Sisyrinchium bellum*) are two common examples. While technically a type of perennial forb, here geophytes are calculated separately from that category. Legumes are members of the pea family, which are biologically important because they have nitrogen-fixing bacteria in their root nodules. The legumes found on these sites are all technically annual forbs, but again are not double counted in that category. See Tables 6 and 11 for cover values of geophytes and legumes in across the VTA transect clusters in 2008 and 2009.

Forbs. Forbs are herbaceous (non-woody) plants that are not grasses, sedges, or rushes. The perennial forbs are all natives, and the annual forbs are almost entirely native.

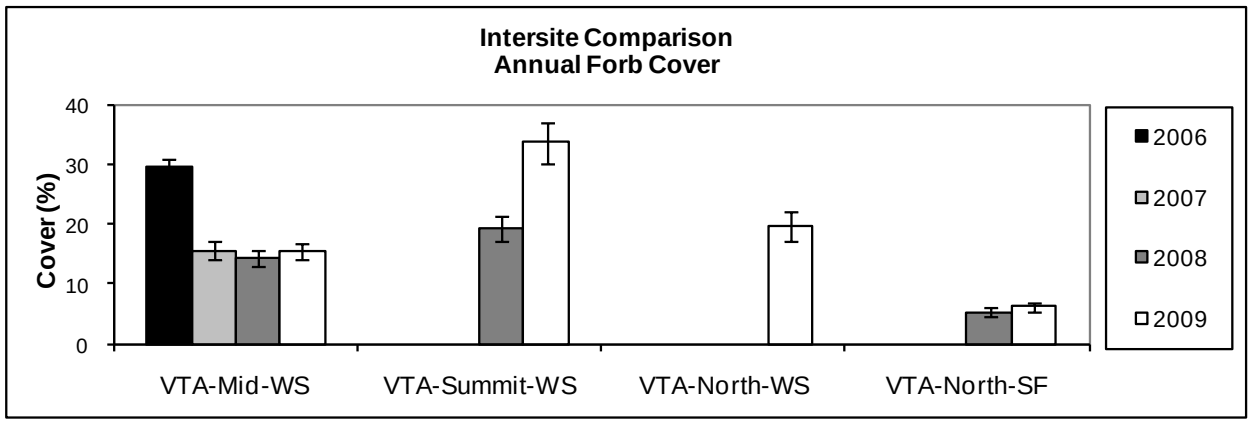
Perennial forb cover decreased at the Mid-WS site from 2006 through 2008, but rebounded in 2009. This was unlike other sites, which had similar perennial forb cover values in 2008 and 2009. The North-WS transect cluster had the lowest cover, with significantly higher cover observed across the fenceline in the North-SF site (Figure 14).

Figure 14: Average Cover of Perennial Forbs, ± SE



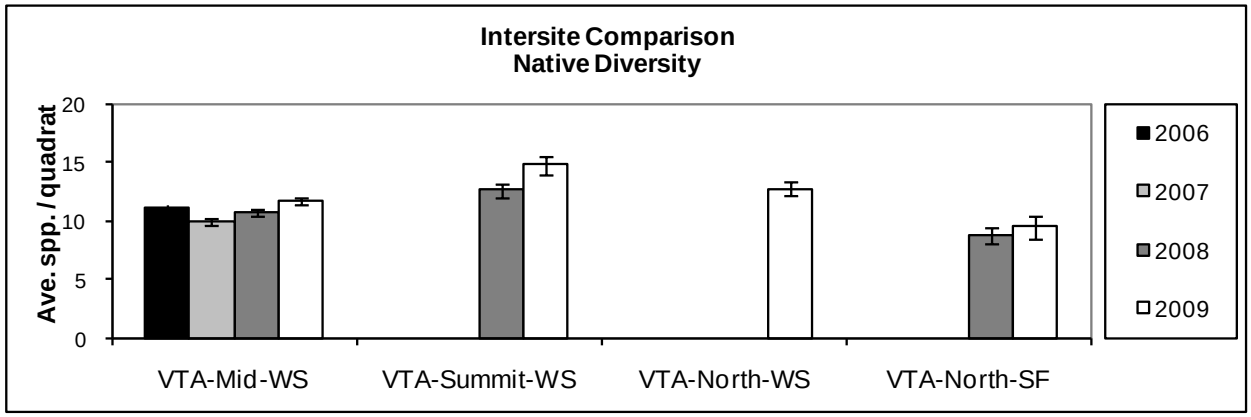
Annual forb cover at the Mid-WS site in 2007 through 2009 was about half that of 2006. Annual forbs increased considerably at the Summit-WS site in 2009 compared to 2008, and this site had the greatest annual forb cover in 2009 of all sites by a significant margin. The North-WS site also had high cover values for annual forbs, and again very low cover values were observed across the fence at the North-SF site (Figure 15).

Figure 15: Average Cover of Annual Forbs, ± SE



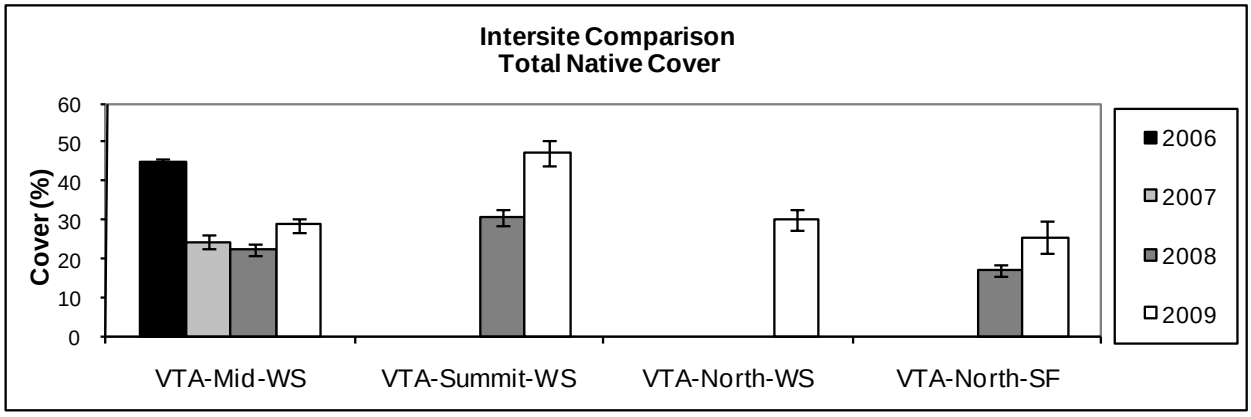
Species Richness and Plant Cover. Native species richness increased slightly at the Summit-WS site in 2009, and this site had the highest native species richness in both 2008 and 2009. The lowest values were observed at the North-SF site, where native species richness was significantly lower than that observed at the North-WS transect cluster directly across the fenceline (Figure 16).

Figure 16: Average Number of Native Species, ± SE



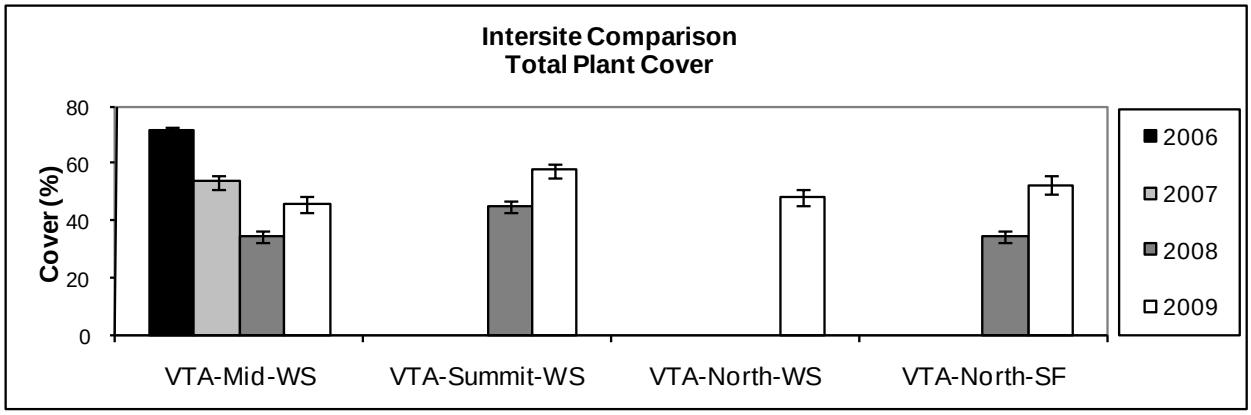
While native species richness at the Mid-WS site remained steady from 2006-2009 (Figure 17), native species cover dropped by approximately 50% from 2006 to 2007, and remained at that low level through 2009. In contrast, native cover increased significantly at both the Summit-WS and North-SF sites in 2009. Native cover was similar across the three mid-elevation sites, and significantly higher at the Summit-WS site, particularly in 2009 (Figure 17).

Figure 17: Average Cover of Native Species, ± SE



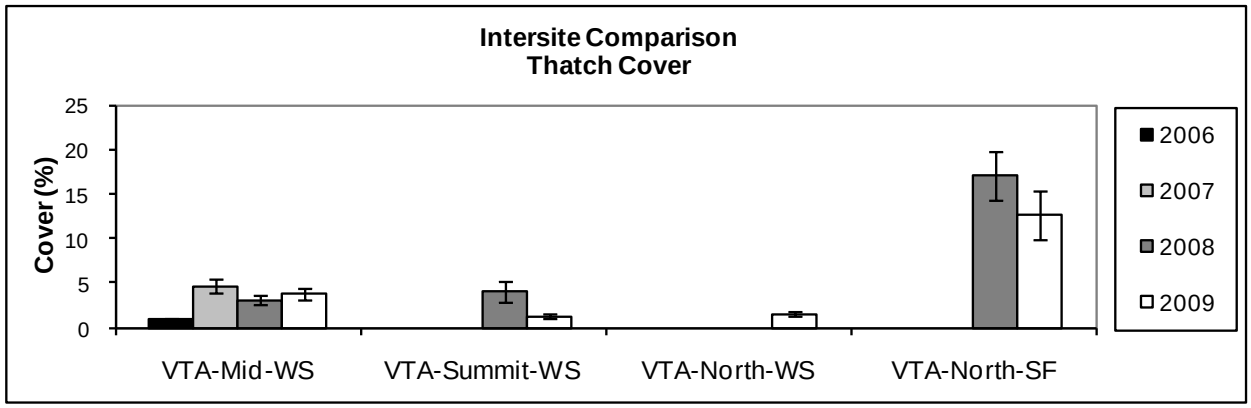
Total plant cover increased across sites and grazing regimes in 2009 compared to 2008 (Figure 18). Native cover and total plant cover were relatively similar across the northern fenceline between the North-WS and North-SF sites. This is one of the few measured parameters that did not show obvious differences between management regimes, even under different annual weather patterns. This apparent "equilibrium" may be ascribed to the competitive tradeoff between native species and non-natives — predominantly annual grasses.

Figure 18: Average Total Plant Cover, ± SE



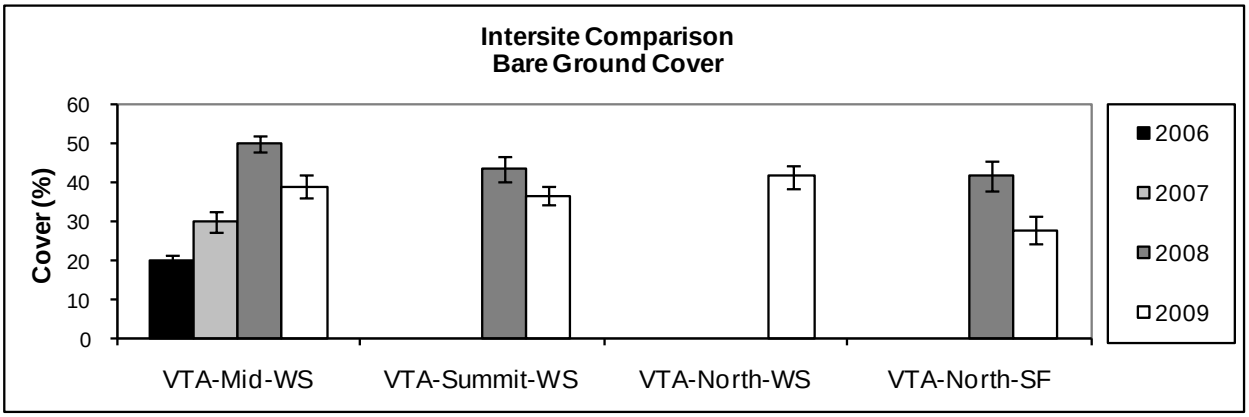
Abiotic. Thatch cover was much higher and bare ground lower at the North-SF site than at other sites (Figure 19). An elevational gradient that was observed during the Year 1 Monitoring was not observed over the VTA sites in 2008 and 2009.

Figure 19: Average Cover of Thatch, ± SE



Bare ground cover showed decreases across three of the VTA sites in 2009 compared to 2008 (Figure 20).

Figure 20: Average Bare Ground Cover, ± SE



Discussion

Bay checkerspot host and nectar plant cover remained low across sites in 2008 and 2009. Many of these species, such as jeweled onion and seaside muilla, show low cover in most years. Others, such as goldfields and owl's clover, appear to have declined across sites due to low precipitation in 2007 through 2009.

The two northern VTA sites (North-WS and North-SF) offer an interesting comparison because they are located across the fenceline from each other. The North-WS (grazed in winter-spring) site boasted excellent bay checkerspot host and nectar sources, having the highest cover values for dwarf plantain and goldfields of all VTA sites in 2009. This site also had low thatch and high bare ground cover values, and moderate cover of annual forbs and native plants. The North-SF site (grazed intermittently spring-fall) had the lowest cover of checkerspot host plants. Most of the plant species providing Bay checkerspot nectar sources had low cover values, although the North-SF site did have the highest cover value for tidytips in 2009, and was similar to the Summit-WS site in 2008. The North-SF site had the highest cover values for annual grass andthatch (ecological indicators that tend to decrease in high-quality serpentine habitats), and the lowest cover values for annual forbs and bare ground (indicators that tend to be positively associated with high-quality serpentine habitats). However, the greatest cover of native perennial forbs occurred at the North-SF site in 2009, and total native species exhibited a moderate cover value.

A more thorough comparison of the winter-spring and spring-fall grazing regimes involves examining data from transect clusters off VTA property that are located in the same spring-fall grazing paddock (Table 14). For example, the UTC-SF transect cluster, which represents high-elevation areas grazed in spring and fall (a combination not occurring on the VTA Property), had excellent bay checkerspot habitat. This transect cluster is located on the summit, just north of the fenceline that divides the two winter-spring and spring-fall grazed paddocks. It had low dwarf plantain, but the highest owl's clover and tidy tip cover values of all the regional sites. Goldfields exhibited a moderate cover at the UTC-SF site. Nonnative annual grasses, total nonnative cover, and thatch were very low at this site. Native species richness and cover were very high.

At the UTC site, the spring-fall grazing regime has produced much better results near the summit than on the lower VTA property. In contrast, the Los Esteros transects, which are representative of areas of Coyote Ridge Property low on the western side of the ridge, in the spring and fall paddock just north/northwest of the VTA Coyote Ridge Property, had much lower cover values for checkerspot host and nectar plants in 2009 than the VTA-North-WS or UTC-SF transects, but were similar to the VTA-North-SF transect.

Table 14: Comparison of 2009 VTA-Coyote Ridge North Site Vegetation Composition Results (Mean Cover ± Standard Error) with Two Off-site Reference Locations near VTA Property

Species	VTA-North-WS	VTA-North-SF	UTC-SF	LESVP-SF
Dwarf plantain (*Plantago erecta*)	6.87 ± 1.44	0.87 ± 0.18	2.53 ± 0.55	2.00 ± 0.60
Owl's clover (*Castilleja* spp.)	0.20 ± 0.09	0.07 ± 0.05	1.78 ± 0.58	0
Goldfields (*Lasthenia californica*)	5.30 ± 1.63	0.03 ± 0.03	2.72 ± 0.74	0.51 ± 021
Tidy tips (*Layia gaillardioides*)	0	0.43 ± 0.11	1.13 ± 0.48	0.29 ± 0.13
Jeweled onion (*Allium serra*)	0.33 ± 0.11	0.07 ± 0.05	0.08 ± 0.04	0.03 ± 0.02
Seaside maritima (*Muilla maritima*)	1.80 ± 0.38	0.10 ± 0.06	0.18 ± 0.06	0.87 ± 0.20
Nonnative annual grasses	18.33 ± 2.83	26.67 ± 3.49	9.55 ± 1.18	32.34 ± 2.09
Native species richness – average number of native species per quadrant	12.73 ± 0.60	9.43 ± 0.93	13.35 ± 0.56	9.04 ± 0.51
Native cover	29.93 ± 2.62	25.60 ± 4.04	43.22 ± 1.85	23.67 ± 2.19

Species	VTA-North-WS	VTA-North-SF	UTC-SF	LESVP-SF
Thatch	1.50 ± 0.29	12.63 ± 2.68	1.12 ± 0.26	5.30 ± 0.91

Higher elevation serpentine sites elsewhere in the region often have more annual and perennial forbs, and less thatch. In addition to reflecting changes in grazing pressure, this elevational gradient could also be a nitrogen deposition gradient, since most nitrogen source pollution is at lower elevations in the San Jose and the Santa Clara Valley – or a temperature/rainfall gradient, as temperature decreases and precipitation generally increases with elevation.

The VTA-North-SF cluster was biologically more similar to the LESVP (Los Esteros/Silicon Valley Power mitigation sites) transect cluster (Table 14). This cluster is located farther north at a similar elevation to the VTA-North-SF site. Dwarf plantain cover at the LESVP site was low, but greater than at the VTA-North-SF site. Nectar sources were similar, with more goldfields and seaside Muilla at the LESVP site, but more tidy tips and jeweled onion at the VTA-North-SF site. The LESVP site had slightly greater cover of annual grasses, but much less thatch. Native species richness and cover, nonnative cover, and bare ground were very similar between the two sites. Overall, Bay checkerspot habitat quality between these two spring-fall grazed areas was similar, although quality at the LESVP site was somewhat higher.

The similarities between the VTA-North-SF and LESVP sites (Table 14) are explained by grazing regime and elevation. The higher grass and thatch cover observed at the North-SF transect cluster may be explained by access issues. This portion of the ridge is surrounded by deep ravines and steep slopes, and is somewhat difficult to access (the biologists enter from the south and then cross the fence, an option the cattle don't have unless a fence is down). While there are signs of cattle presence, the remoteness of this portion of the paddock limits the amount of time cattle spend there. Rancher Justin Fields intends to bring additional salt licks to the area, but the difficult access may not be easily remedied by management changes.

The trend of habitat quality correlating positively with elevation held up loosely on VTA property, with the Summit-WS having the greatest native cover, native richness, annual forb cover in 2008 and 2009. In 2009 the Summit-WS site exhibited increases in dwarf plantain, high nectar cover, and lower annual grass and thatch cover. It stood out in 2008 with the highest goldfields and lowest annual grass cover values.

The Mid-WS site had moderate values boarding nearly all measured parameters in 2008 and 2009. It stood out with the highest dwarf plantain cover values in 2008.

While the VTA sites encompass different grazing regimes, elevations, and amounts of nitrogen deposition, the 2008 data show largely similar vegetation composition. There were no significant differences among sites in owl's clover and most of the nectar sources (even where differences are discernible, the average cover values are not statistically different). The sites were also similar in cover of nonnative grasses, geophytes, legumes, and bare ground in 2008.

The transect clusters showed more obvious differences in 2009, especially across the different grazing regimes. The winter-spring and spring-fall grazed paddocks are each more than 1000 ac. The cattle do not graze each portion of either paddock evenly. This is generally considered acceptable, as grazing pressure at specific locations shifts from year to year, favoring different species during different annual rainfall patterns.

The habitat continues to support larval hostplants and nectar sources in abundance, and is being maintained as high-quality bay checkerspot butterfly habitat by the current grazing regimes. While the summer-fall regime has resulted in greater grass and thatch cover in recent years, the paddock grazed in the spring-fall regime continues to support healthy populations of bay checkerspot butterflies.

GRAZING AND GRAZING INFRASTRUCTURE

Tracking cattle stocking rates on the Coyote Ridge Preserve allows the correlation of grazing intensity with habitat characteristics. In addition, the maintenance of grazing infrastructure is important both for the cattle and the ranching operation and to ensure adequate grazing management for habitat purposes.

The ranching lessee tracks the livestock stocking rate (*i.e.*, the number of cattle/acre) on the Coyote Ridge Preserve. The rancher continuously monitors fencelines and other infrastructure (*e.g.*, troughs) and maintains and repairs such features as necessary. When on the Preserve, staff of the SCCOSA, H. T. Harvey & Associates, and the Creekside Center for Earth Observation also note and report to the rancher any grazing infrastructure problems or maintenance needs observed.

In 2008 and 2009, livestock stocking rates continued as they have in the past, at approximately one cow-calf pair per 10 acres. As discussed in the RDM monitoring section, grazing on the ridgeline and on the east side of the property was generally higher than at lower elevations on the western slopes, and grazing intensity on those western slopes needs to be increased. It is possible that temporary fencing may eventually be needed to ensure heavier grazing in areas that were undergrazed in 2008 and 2009. However, a determination as to whether this costly step is necessary will be made only after additional years of monitoring. In the meantime, moving salt licks lower on the western slopes could facilitate adequate grazing of those slopes. Otherwise, grazing infrastructure on the site is currently adequate. Fences and other infrastructure on the Preserve are repaired as needed, and no change to the way in which such infrastructure is maintained is needed at this time.

BAY CHECKERSPOT BUTTERFLY

The bay checkerspot butterfly is a federally threatened subspecies closely associated with serpentine grasslands, which support its larval food plants and adult nectar sources. The grazing program at the VTA Coyote Ridge Preserve is intended to manage the serpentine grasslands on the Preserve specifically for the benefit of this species and for rare, serpentine-associated plants. The RMP requires monitoring of bay checkerspot populations on the site to ensure that long-term stewardship of the Preserve continues to benefit special-status serpentine-associated species, and to identify the nature of (and need for) any modifications to the management program that become necessary to protect these species.

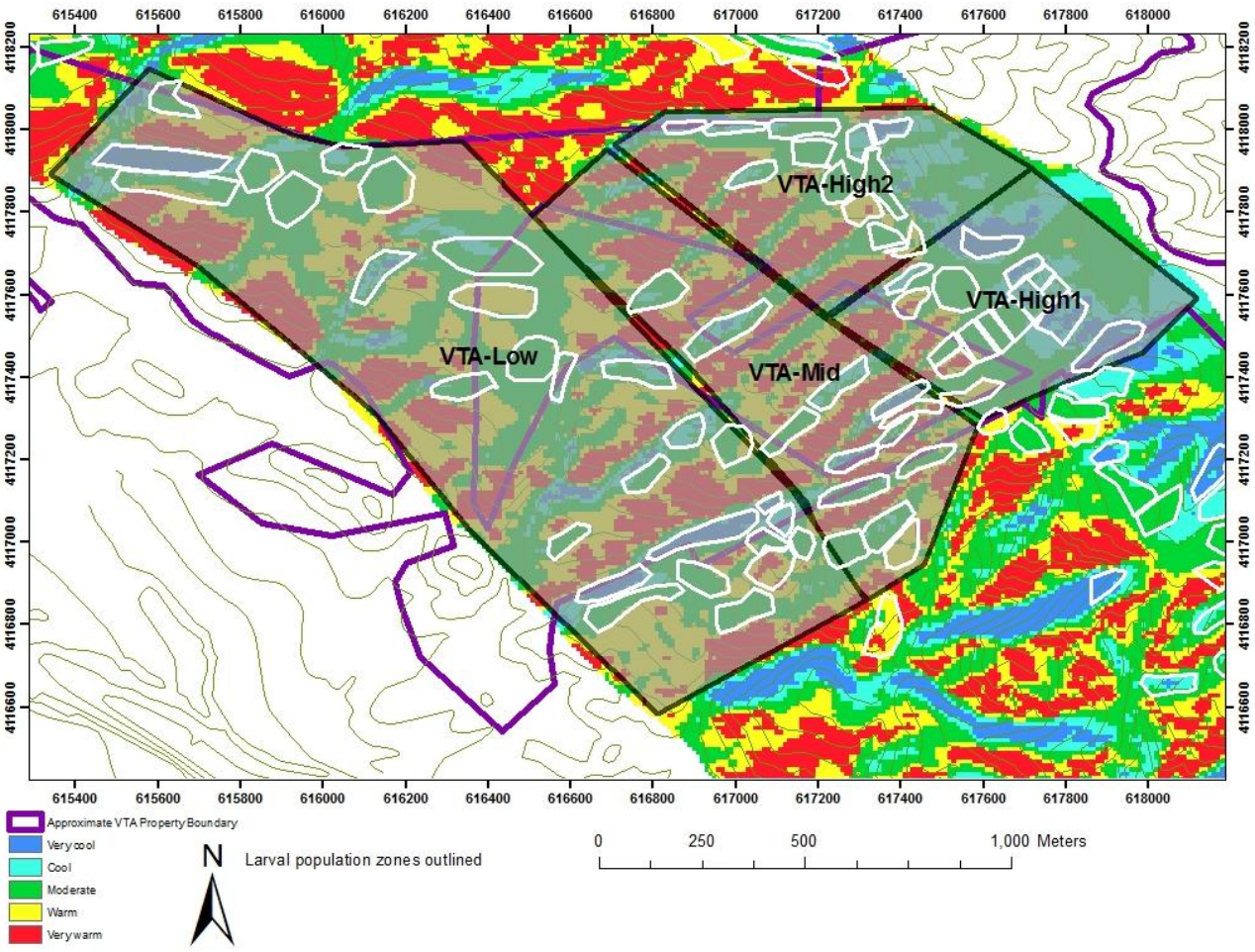
This section provides current (2008 and 2009) bay checkerspot butterfly population estimates. See the Year 1 Monitoring Report for a discussion and background on population dynamics on the Coyote Ridge Preserve and adjacent areas of Coyote Ridge, which allows observed population fluctuations to be placed in the context of spatial and temporal variability.

Methods

The basic method of population estimation is timed counts of larvae in a stratified sampling design (Murphy and Weiss 1988). The methods are described fully in the Year 1 Monitoring Report.

The VTA property is divided into four larval population zones (Figure 21). A total of 40 sites were sampled among the 4 population zones in 2008, with an increase to 69 sites in 2009. Per the RMP, if no larvae are found in an area, then reconnaissance-level surveys for adults are conducted to establish presence-absence. Because larvae were found in each of the four larval population zones within the Coyote Ridge Property in 2008 and 2009, no explicit adult surveys were conducted. Adult butterflies were regularly encountered across the sites during other activities.

Figure 21: Bay Checkerspot Larval Population Zones on Coyote Ridge Property



Results

The number of larvae found per 10-minute search in 2008 is shown on Figure 22. Results from 2009 are shown on Figure 23.

Figure 22: Bay Checkerspot Larval Densities in 2008

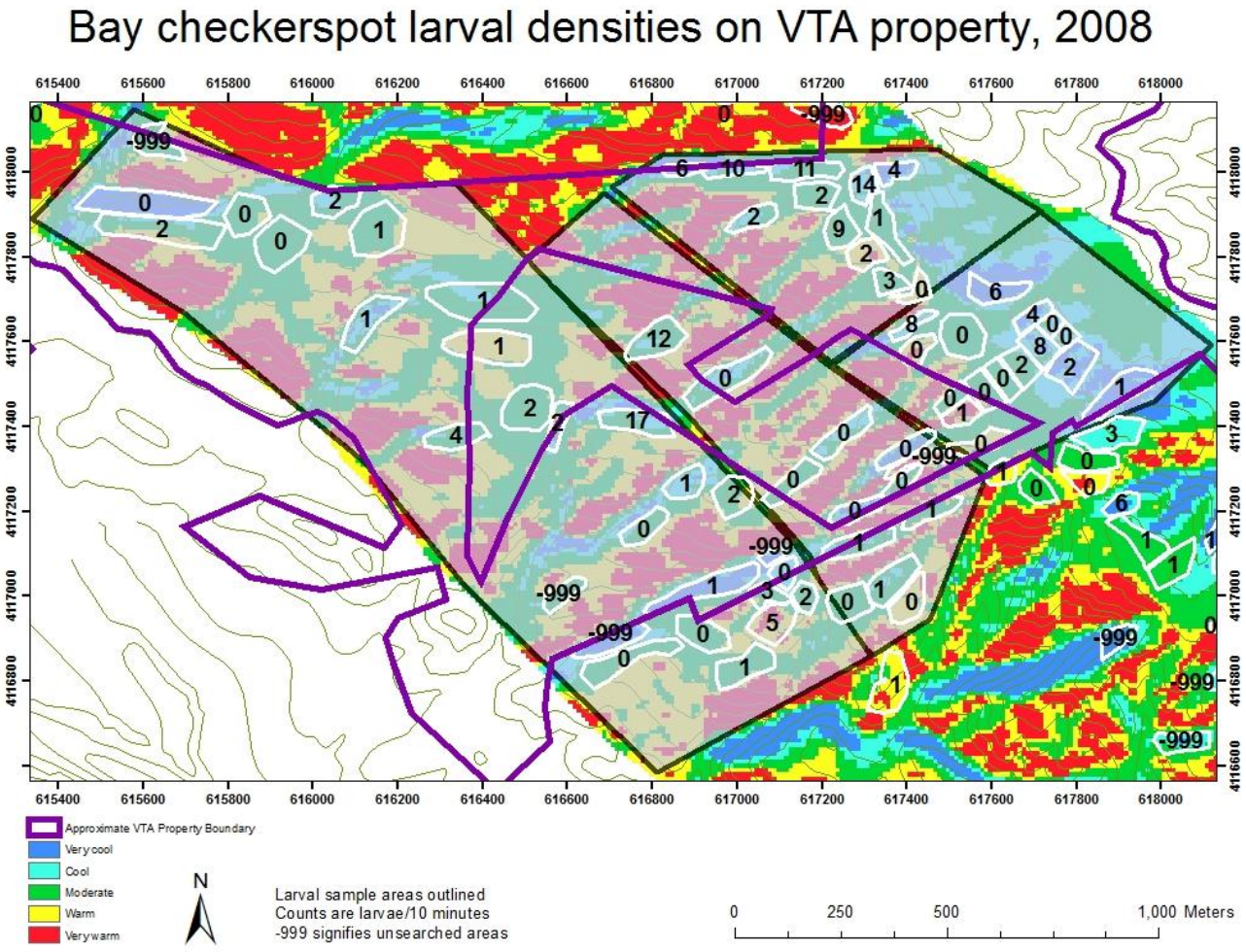
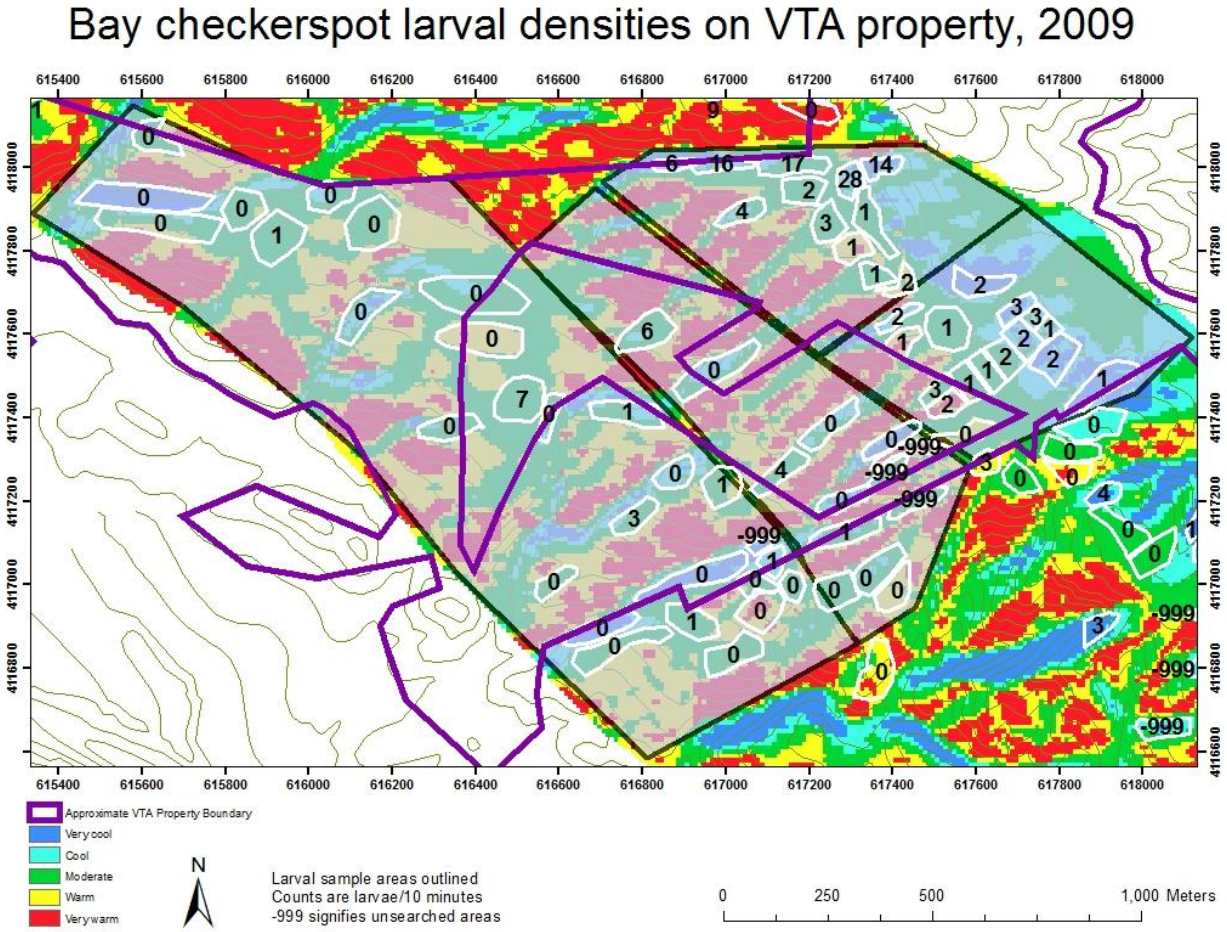


Figure 23: Bay Checkerspot Larval Densities in 2009



In 2008, numbers appeared to have increased substantially in the VTA-High1 and VTA-High2 sampling areas, and to a lesser extent in the VTA-Low1 area, compared to 2006 and 2007 (Figures 24, 25, and 26). We observed one especially dense concentration of larvae (17) on the cool slope near the center of the VTA-Low area (Figure 26). Additionally, one dense pocket of larvae (12) was found in VTA-Mid but most of the overall sampling area was devoid of larvae. Thus, it is not possible to give a reliable estimate of numbers in the VTA-Mid area for 2008 given the patchy nature of the larval distribution in that year, and no figure showing the population history in the VTA-Mid zone is presented. Adult butterflies were observed in low numbers in the VTA-Mid area in 2008.

In 2009, the population at VTA-High1 and VTA-High2 appeared stable. The highest densities of larvae were found on cooler slopes at the northern end of VTA-High2. Populations dropped in the VTA-Low area compared to 2008, and populations remained low at the VTA-Mid area. Dense local concentrations of larvae were detected in the same pockets of cooler slopes as in 2008.

Figure 24: Bay Checkerspot Population History in VTA Population Zone VTA-High1, ± 95% CI

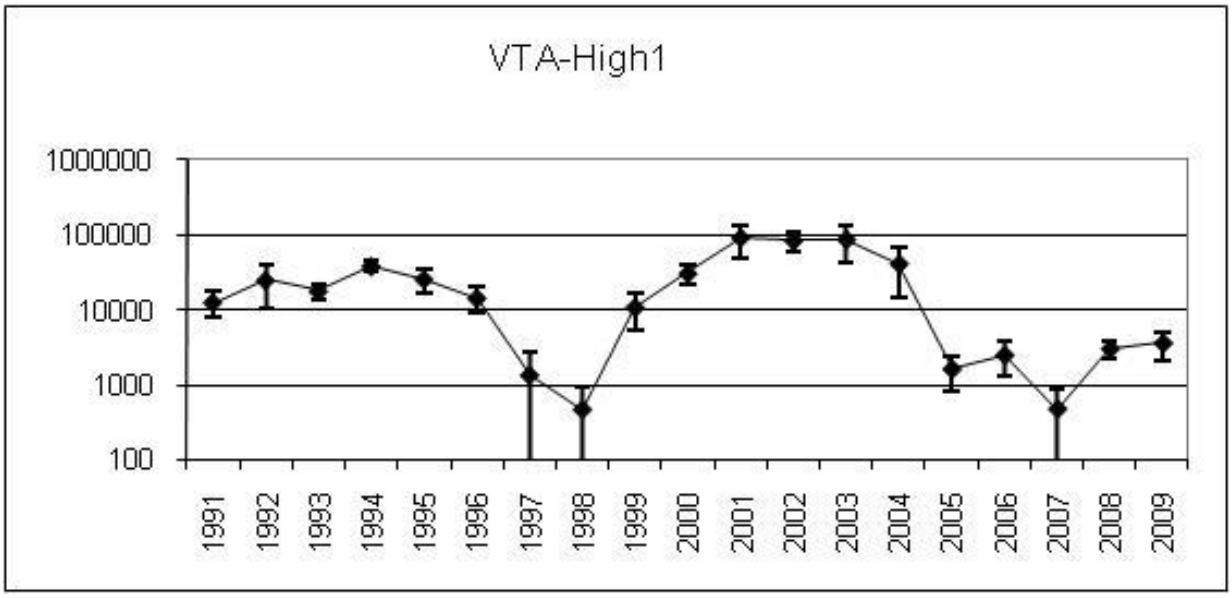


Figure 25: Bay Checkerspot Population History in VTA Population Zone VTA-High2, ± 95% CI

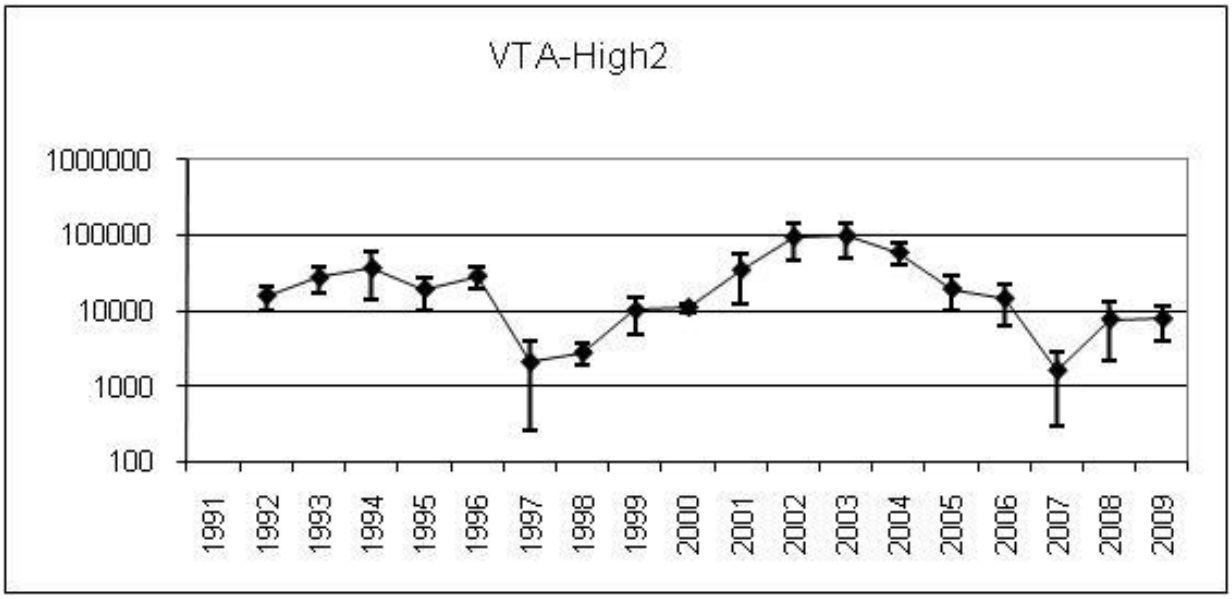
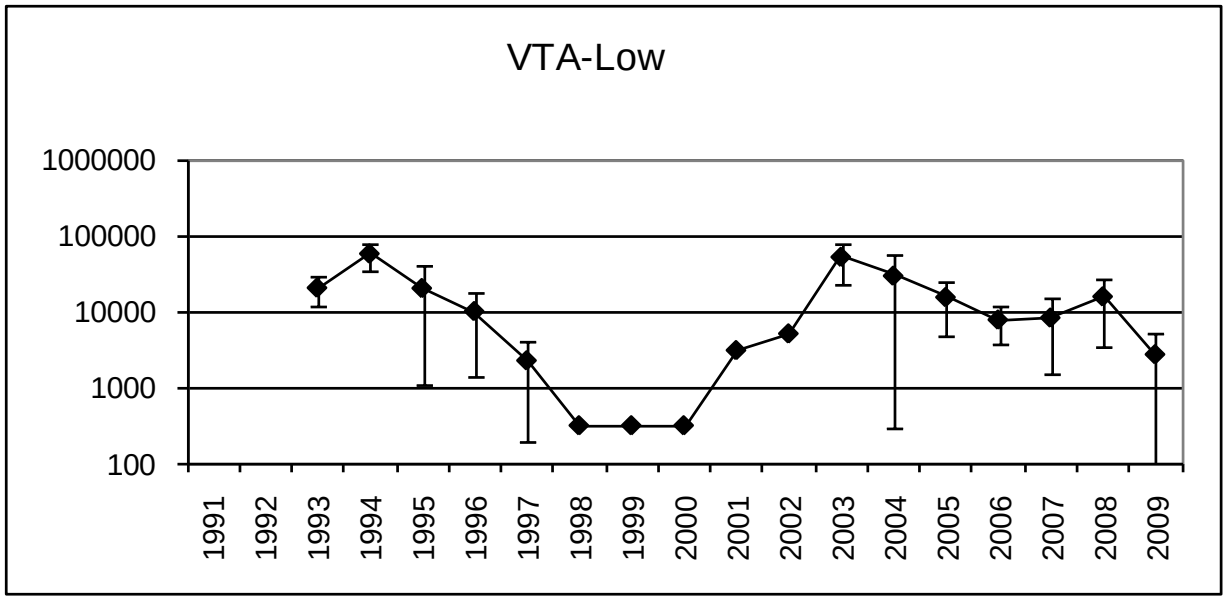


Figure 26: Bay Checkerspot Population History in VTA Population Zone VTA-Low, ± 95% CI



Discussion

The Bay checkerspot butterfly continues to occupy the entire property, with a total population on the order of 15,000 larvae, down from peaks of more than 250,000 in 2002-2004. All populations on Coyote Ridge have experienced similar declines from that population peak, and the changes of larval densities in recent years are within normal fluctuations (historical context and comparisons with other populations can be found in the RMP and the Year 1 Monitoring Report).

The populations along the ridgetop appear to be recovering from steep declines caused by defoliation of dwarf plantain by high densities of larvae during 2002-2004. Dwarf plantain cover was clearly limiting checkerspot survival following the declines and cover on these areas has been increasing since defoliation (S. Weiss, pers. obs). Dwarf plantain cover is now at approximately 5%, and is capable of supporting much higher densities of larvae if favorable weather allows for population increases.

The continued occupation of the lower and mid slopes following the dry years of 2007 and 2008 is encouraging, and the patchy nature of larval concentrations is typical of these areas. The highest densities of larvae below the ridgetop were in small pockets of cooler slopes in the mid-elevation slopes.

SANTA CLARA VALLEY DUDLEYA

The Santa Clara Valley dudleya is a federally endangered, perennial, succulent herb endemic to the ultramafic formations (serpentinite and peridotite) of the Santa Clara Valley. On the Coyote Ridge Preserve, Santa Clara Valley dudleya is concentrated on areas of serpentine bedrock that were exposed or fractured relatively recently. This type of substrate is found along recent roadcuts, on the eroded banks of drainages, and

on scree piles associated with several old mine trenches. Plants also occur on "islands" of exposed bedrock within the larger matrix of serpentine grassland along the ridgeline. The grazing program at the Coyote Ridge Preserve is intended to manage the serpentine grasslands on the property specifically for the benefit of rare, serpentine-associated plants such as the dudleya without leading to excessive grazing that might adversely affect dudleya populations. The RMP requires monitoring of dudleya populations on the site to ensure that long-term stewardship of the Preserve continues to benefit special-status serpentine-associated species, and to identify the nature of (and need for) any modifications to the management program that become necessary to protect these species.

Methods

Five permanent Santa Clara Valley dudleya monitoring plots were established in areas supporting dudleya stands on the Coyote Ridge Property during Year 1 monitoring. These locations are appropriate for long-term monitoring of this species on the Coyote Ridge Preserve, representing a diversity of slopes, aspects, and elevations. Each station is located in a different physiographic position, and the plots represent a diversity of slopes and aspects. Metal rebar stakes were installed in the corners of the monitoring plots and a GPS unit was used to map each plot location; these locations are shown on Figure 3.

H. T. Harvey & Associates plant ecologist Brian Cleary performed sampling in these plots on 1 and 2 June 2009. For each plot, a 1-m^2 quadrat constructed of PVC material was placed on the ground, four consecutive times and in an orientation to form a 4-m^2 square plot. Within this plot, the number of Santa Clara Valley dudleya plants was counted.

Results

Results of the Year 3 Santa Clara Valley dudleya monitoring effort are shown in Table 15.

Table 15: Total Numbers of Santa Clara Valley Dudleya by Plot for 2009 Monitoring

Plot Number	Total Plants
1	9
2	18
3	27

4	43
5	14
Total	**111**

The mean density of dudleya plants was approximately 22.2 plants/plot, or 5.5 plants/m^2.

No grazing damage to individual dudleya plants was noted at these monitoring stations. Photos of dudleya monitoring plots are provided in Appendix B.

Discussion

The count of 111 plants on the five monitoring plots, compared to the 113 plants recorded on these plots during Year 1 monitoring in 2007, indicates a stable population. At this time, cattle grazing does not appear to be adversely affecting dudleya populations on the Preserve.

MT. HAMILTON THISTLE

Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*) is a perennial herbaceous moisture-loving plant restricted to seeps and creek channels on serpentine soils in Santa Clara, Alameda and Stanislaus counties. On Coyote Ridge, this species occurs within drainages that are recharged by seeps or on sedimentary soils that are influenced by adjacent serpentine seeps. Mt. Hamilton thistle is listed as a CNPS List 1B (plants rare, threatened or endangered in California and elsewhere) special-status plant species by the California Native Plant Society. On the Coyote Ridge Preserve, large occurrences of Mt. Hamilton thistle are present in nearly all the creeks and seeps that drain the southwest-facing serpentine slopes. Management of Mt. Hamilton thistle on the Coyote Ridge Preserve is focused on conserving and protecting existing populations.

Methods

Five permanent Mt. Hamilton thistle monitoring plots were established in several seeps and drainages within the study area during Year 1 monitoring. These locations are appropriate for long-term monitoring of this species on the Coyote Ridge Preserve. Each station is located in a different drainage, and the plots represent a diversity of slopes and aspects. Metal rebar stakes were installed in the corners of the monitoring plots and a GPS unit was used to map each plot location; these locations are shown on Figure 3.

H. T. Harvey & Associates plant ecologist Brian Cleary performed sampling of these plots on 1 and 2 June 2009. For each plot, a 1-m^2 quadrat constructed of PVC material was placed on the ground, 4 consecutive times and in an orientation to form a 4-m^2 square plot. Within this plot, the number of Mt. Hamilton thistle plants was counted.

Results

Results of the Year 3 Mt. Hamilton thistle monitoring effort are shown in Table 16.

Table 16: Total Numbers of Mt. Hamilton Thistles by Plot for 2009 Monitoring

Plot Number	Total Plants
1	37
2	35
3	142
4	51
5	24
Total	**289**

The mean density of thistle plants was approximately 57.8 plants/plot, or 14.4 plants/m^2. Based on the linear distance of drainages supporting this species on the site, the large/broad stands present in some areas, and the mean density of 14.4 plants/m^2 on the monitoring plots, the population of Mt. Hamilton thistle on the Coyote Ridge Preserve likely exceeds 50,000 individuals.

Very little grazing damage to individual thistle plants was noted on these monitoring stations. Photos of the Mt. Hamilton thistle monitoring plots are provided in Appendix B.

Discussion

The count of 289 plants on the five monitoring plots, as compared to the count of 276 plants on these plots during Year 1 monitoring in 2007, indicates a relatively stable (or possibly even increasing) population. At this time, cattle grazing does not appear to be adversely affecting dudleya populations on the Preserve. Wooly, spiny mature plants are unpalatable to livestock. However, this species can be consumed by goats, which

were used in grazing management for lower portions of the Property, close to U.S. 101, in 2009. During those grazing efforts, goats were restricted by temporary fencing from grazing along drainages containing Mt. Hamilton thistle, and no goat grazing damage to this species was noted.

MOST BEAUTIFUL JEWELFLOWER

Most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*) is an annual herbaceous plant that occurs primarily on serpentine soil formations around the San Francisco Bay Area including the Diablo Range and in Monterey County. Although not a state or federally listed plant, most beautiful jewelflower is listed as a CNPS List 1B plant species (i.e., a plant that is rare, threatened or endangered in California and elsewhere) by the California Native Plant Society. On the Coyote Ridge Preserve, most beautiful jewelflower is extremely abundant within serpentine grassland on the ridge and southwestern slopes, along roadcuts and drainage channels, and within coastal sage scrub habitat. Fewer plants are present northeast of Coyote Ridge where serpentine intergrades with clay soils and the cooler, moisture microclimate favors the growth of non-native grasses. The grazing program at the Coyote Ridge Preserve is intended to manage the serpentine grasslands on the property specifically for the benefit of rare, serpentine-associated plants such as the most beautiful jewelflower without leading to excessive grazing that might adversely affect jewelflower populations. The RMP requires monitoring of most beautiful jewelflower populations on the site to ensure that long-term stewardship of the Preserve continues to benefit special-status serpentine-associated species, and to identify the nature of (and need for) any modifications to the management program that become necessary to protect these species.

Methods

Five permanent monitoring plots were established in select locations on serpentine soils within the study area. An effort was made to stratify the plots by slope and aspect, but otherwise plot locations were determined randomly. Metal rebar stakes were installed in the corners of the monitoring plots and a GPS unit was used to map each plot location; these locations are shown on Figure 3.

H. T. Harvey & Associates plant ecologist Brian Cleary performed sampling in these plots on 1 and 2 June 2009. Metal rebar stakes were installed in the corners of the monitoring plots and a GPS unit was used to map each plot location. For each plot, a 1-m^2 quadrat constructed of PVC material was placed on the ground, 4 consecutive times and in an orientation to form a 4-m^2 square plot. Within this plot, individual most beautiful jewelflower plants were counted.

Results

Results of the Year 3 most beautiful jewelflower monitoring effort are shown in Table 17.

Table 17: Total Numbers of Most Beautiful Jewelflower by Plot for 2009 Monitoring

Plot Number	Total Plants
1	32
2	16
3	11
4	18
5	9
Total	**86**

The mean density of most beautiful jewelflower plants was approximately 17.2 plants/plot, or 4.3 plants/m^2. Photos of the most beautiful jewelflower monitoring plots are provided in Appendix B. Unlike Mt. Hamilton thistle, which principally occurs in discrete populations within drainages, most beautiful jewelflower is widely scattered throughout the upland serpentine areas on-site, making it difficult to estimate population size over the entire site.

Although the most beautiful jewelflower occurs throughout much of the Coyote Ridge Preserve, areas of new occurrence are still notable. SCCOSA staff observed 25 most beautiful jewelflowers at the California red-legged frog mitigation site near the powerline tower on 9 May 2009, on exposed serpentine rock in California annual grassland habitat.

Discussion

The count of 86 plants on the five monitoring plots, as compared to the count of 80 plants on these plots during Year 1 monitoring in 2007, indicates a relatively stable (or possibly even increasing) population. As noted above, a larger sample size (in terms of number of plots) would be needed to accurately estimate the total population size within the Coyote Ridge Preserve. The habitats supporting the plants appeared to be grazed appropriately, and we observed neither a chocking non-native grass layer nor extensive grazing damage to the individual jewelflower plants.

SMOOTH LESSINGIA

Smooth lessingia (*Lessingia micradenia* var. *glabrata*) is an erect annual herbaceous plant endemic to serpentine soils in Santa Clara County. It is a delicate, many-

branched plant with thread-like leaves along the stem and small, white-to-lavender flowers that are produced in late summer (July through September). Smooth lessingia is listed as a CNPS List 1B plant species (i.e., a plant that is rare, threatened or endangered in California and elsewhere) by the California Native Plant Society. On the Coyote Ridge Preserve, smooth lessingia occurs within grassland along the toe of the southwestern slopes, and presumably within areas of coastal sage scrub and chaparral. Farther upslope, the population grades into the common slender-stemmed lessingia (*Lessingia nemaclada*; Don Mayall, pers. comm. 2005). The RMP specifies that incidental observations of smooth lessingia made during other special-status plant monitoring efforts will be compiled and that evidence of declines in abundance or threats from grazing or invasive species will be noted. If numbers appear to be declining, more focused surveys could be conducted and/or remedial measures identified.

Results of a taxonomic analysis for lessingia voucher specimens collected along the lower western shoulder of Coyote Ridge in 2007 revealed that some of these plants were approaching the phenotype of smooth lessingia while some were more obvious hybrids between smooth lessingia and slender-stemmed lessingia (Stacy Marcos, pers. comm. 2007). None of the specimens appeared to be "pure" smooth lessingia. However, observations by H. T. Harvey staff in 2007 documented the presence of what are likely to be primarily smooth lessingia throughout much of the lower elevations of the Coyote Ridge Property.

Methods

While conducting Year 3 special-status plant monitoring on 1-2 June 2009, H. T. Harvey & Associates plant ecologist Brian Cleary made incidental observations in an attempt to identify general locations of lessingia that could be of this species. Because smooth lessingia blooms from July through November, and given the extreme difficulty in distinguishing this species from the closely related slender-stemmed lessingia (as well as the presence of apparent hybrids), no attempt was made to distinguish these two species in 2009.

Results

Plants observed on-site in Year 3 exhibited similar intermediate morphology as seen in Year 1. In general, the distribution of lessingia on the site was similar in Year 3 to that observed in Year 1, and it was the opinion of Mr. Cleary that individuals present in the lower elevations of the Coyote Ridge Preserve in 2009 were likely predominantly smooth lessingia or F1 hybrids (though conclusive identification was not possible).

Discussion

Because smooth lessingia blooms from July through November, the June 2009 surveys were not conducted during the appropriate time of year to document the overall presence and distribution of this plant on site. However, no obvious differences in distribution of lessingia were noted between Year 1 and Year 3. At this time, site

management, including grazing, does not appear to be adversely affecting this species, and rather, the species appears to be responding well to managed grazing. Therefore, no further focused surveys are absolutely necessary at this time. However, due to hybridization between smooth lessingia and slender-stemmed lessingia on this site, more focused surveys and further taxonomic studies to more clearly differentiate the geographic extent and distribution of these two species of lessingia on the site are recommended if population estimates or more refined distributional information on smooth lessingia is desired.

SAN FRANCISCO WALLFLOWER

San Francisco wallflower (*Erysimum franciscanum*) is a biennial herb/subshrub associated with serpentine or granitic substrates within a variety of plant communities. The range of San Francisco wallflower includes Marin, Santa Clara, Santa Cruz, San Francisco, San Mateo, and Sonoma counties. San Francisco wallflower is listed as a CNPS List 4 plant species (i.e., a plant of limited distribution) by the California Native Plant Society. Populations are typically associated with exposed areas of little soil development, including serpentine outcrops and granitic cliffs. San Francisco wallfower reportedly occurs on the Coyote Ridge Preserve (Don Mayall, pers. comm. 2005), and elsewhere on Coyote Ridge, San Francisco wallflower has been observed within the California sagebrush/California poppy association and various serpentine grassland associations (Evans and San 2004). The RMP specifies that incidental observations of San Francisco wallflower made during other special-status plant monitoring efforts will be compiled and that evidence of declines in abundance or threats from grazing or invasive species will be noted. If numbers appear to be declining, more focused surveys could be conducted and/or remedial measures identified.

Methods

The Year 3 special-status plant monitoring effort did not include a targeted attempt to observe San Francisco wallflower, as H. T. Harvey & Associates' Year 1 surveys indicated this species to be too uncommon to accurately census without considerable sampling effort.

Results

No individuals of the San Francisco wallflower were noted during Year 3 special-status species monitoring efforts.

Discussion

The distribution of the San Francisco wallflower on Coyote Ridge is patchy, and the lack of observations of this species during Year 3 monitoring efforts does not necessarily indicate that it is absent from the Coyote Ridge Preserve or that activities on the property are having an adverse effect on the species. Personnel should continue to look for this species on the site while conducting other monitoring efforts. If it is not

observed by the end of Year 4 (i.e., the 2010 monitoring season), the SCCOSA should consider conducting a focused survey to determine the species' status on the site.

EROSION PROBLEMS AND FERAL PIGS

The degradation of habitat quality resulting from erosion and rooting by feral pigs could potentially have adverse effects on biological resources at the Coyote Ridge Preserve. Erosion could also damage on-site roads. As a result, problems resulting from erosion and feral pigs are noted during monitoring so that they can be addressed as needed. Staff of the SCCOSA, H. T. Harvey & Associates, and the Creekside Center for Earth Observation were on the lookout during 2008 and 2009 monitoring for erosion issues, damage caused by feral pigs, and damage by grazing animals to sensitive habitat.

The only areas where erosion problems have been noted are on the ridge top, both on and off the VTA Property. Roads are being driven when they are too wet, which alters the drainage structure of the road, leading to ponding. This issue seems to derive primarily or entirely from ranchers and adjoining property owners, and thus this issue is not under SCCOSA's control. However, SCCOSA staff are working with adjoining property owners to educate them about the detrimental effects of driving roads with they are muddy. No erosion problems were noted during 2008-2009 monitoring in the interior of the VTA Property.

Feral pigs continued to be seen occasionally on the Preserve during 2008-2009 monitoring, though in low numbers. No problems associated with rooting by feral pigs, grazing, or other activities damaging seeps, springs, wetlands, or riparian habitats were noted in 2008 or 2009. One incident of poaching occurred in 2009, in which the poachers accessed the properties from the golf course; the individuals involved were cited by the CDFG. SCCOSA staff will continue to monitor activities near the golf course as they relate to the management of wildlife on the Preserve, and continue to monitor feral pig activity, especially in areas containing springs, seeps, and sensitive plants.

The tule elk (*Cervus canadensis nannodes*) population on Coyote Ridge appears to be expanding. Although this is good for elk populations, elk mud wallows were noted by SCCOSA staff in spring areas on the southeast side of the ridge. The RMP addresses potential pig damage to sensitive habitat but does not include measures to be implemented to address elk damage. Removal or fencing out of elk may be cost prohibitive, and further monitoring of elk impacts on these sensitive resources is necessary before such measures are considered.

CALIFORNIA RED-LEGGED FROG

The Coyote Ridge Preserve includes a ± 98-acre site, located east/northeast of the U.S. 101/Coyote Creek Golf Drive intersection, that had been preserved by Castle & Cooke as mitigation for impacts to the California red-legged frog from expansion of the Coyote Creek Golf Course (BonTerra Consulting 1999). This parcel includes two perennial stream systems and associated wetlands that provide potential red-legged frog habitat.

Red-legged frogs are known to breed in wetlands along the Kirby Canyon Landfill entrance road south of the Coyote Ridge Preserve, and red-legged frogs are expected to use drainages on the Coyote Ridge Preserve as summer aquatic refugia, foraging and dispersal habitat, and possibly as breeding habitat. To ensure that management of the property maintains suitable habitat for red-legged frogs within this 98-acre area, focused surveys for red-legged frogs will be conducted every 2 years in this area, both to detect frogs and to determine whether conditions remain suitable for the species' use.

Methods

H. T. Harvey & Associates herpetologist Steve Carpenter conducted a daytime survey of the 98-acre red-legged frog mitigation area on 26 May 2009 and a nighttime survey on 28 May 2009. During both site visits, he thoroughly surveyed all the drainages within the red-legged frog mitigation area, paying particular attention to pools, and looking in vegetation and under debris for frogs. He also looked for bullfrogs (*Rana catesbeiana*), a non-native predator and competitor of the California red-legged frog. Staff of the SCCOSA were also on the lookout for California red-legged frogs during 2008-2009 monitoring.

Results

No California red-legged frogs or bullfrogs were observed during H. T. Harvey & Associates' surveys. However, three California red-legged frogs were observed incidentally by SCCOSA staff during 2009 monitoring. A single subadult was observed at a creek crossing adjacent to the William Lyons Homes mitigation site on 4 April. A second subadult was observed in a creek crossing near U.S. 101 and the landfill entrance on 19 April 2009. A third single subadult was observed in a storm drain near the entrance to the landfill on 27 August 2009. No bullfrogs were observed on the Preserve in 2008 or 2009.

Discussion

The drainages on the Coyote Ridge Preserve, including those within the red-legged frog mitigation area, do not appear to provide breeding habitat for this species. Although some pools are present, and many reaches of the streams in these drainages are perennial (and thus hold water long enough for use by breeding frogs), these pools are shallow, being mostly 6-12 inches deep at most. Most of these pools also lack emergent vegetation due to shading by the brushy canopy. The habitats that contain the highest densities of red-legged frogs are typically associated with deep-water pools more than 2 feet deep with stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha* spp.), tules (*Scirpus* spp.), or sedges (*Carex* sp.) (Hayes and Jennings 1988). Mt. Hamilton thistle grows throughout the drainages and provides some of the same cover values as these more common wetland species.

The sightings of red-legged frogs by SCCOSA staff indicate that this species is present on the Preserve. These individuals are likely dispersants from the Kirby Canyon Landfill wetlands and red-legged frog pond. Such individuals are expected to occur in low

numbers on the Preserve, using drainages as non-breeding aquatic habitat. During the wet season in particular, red-legged frogs likely disperse overland among these drainages, crossing the grasslands along the southwestern slope of the Coyote Ridge Preserve. Thus, the lower slopes on the southwestern side of the Coyote Ridge Preserve, including the red-legged frog mitigation area, serve as dispersal habitat for the species.

It is possible that the 3-year drought during the period from 2007-2009 has adversely affected the hydrology in the pools on the Coyote Ridge Preserve, and that red-legged frogs would be more likely to be found on the site after a year of average or above-average rainfall. Monitoring will continue to assess this species' use of the site and to ensure that management continues to maintain some areas of at suitable red-legged frog habitat.

INVASIVE PLANTS

Invasive annual grasses represent the greatest threat to the diversity of native serpentine plant communities and the persistence of populations of special-status serpentine-associated species on the Coyote Ridge Preserve. Most such grasses can be managed through grazing, as described previously. However, some invasive plants, including yellow star-thistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*), purple star-thistle (*Centaurea calcitrapa*), and barbed goatgrass (*Aegilops triuncialis*), are less palatable to livestock. These species present a serious invasion risk to sensitive native grasslands, and infestations of these species may need to be controlled by means other than grazing. Among these four species, barbed goatgrass represents the greatest threat on the Preserve, given the extent of infestations observed elsewhere on Coyote Ridge. As a result, a comprehensive goatgrass management plan for Coyote Ridge was designed and implemented by the CCEO and SCCOSA. This U.S. Fish and Wildlife Service-approved plan uses a combination of spraying graminicide, burning, handpulling, and string cutting. Tarping and flaming may also be considered in the future. The predicted effects of treatment on bay checkerspots, their host and nectar plants, and other sensitive species have been taken into consideration and are detailed in the management plan (Weiss and Niederer 2007).

Methods

Barbed goatgrass control methods implemented in 2006 and 2007 were described in the Year 1 Monitoring Report but are repeated here to provide temporal context for the treatment efforts and monitoring results in 2008 and 2009.

In 2006, treatment on Coyote Ridge Property consisted of spraying the graminicide Envoy, which is approved for wildland and rangeland use. Spraying was conducted on 5 May, after plants had flowered. Spraying was done at half strength, from a boom-mounted ATV. A limited amount of handpulling was also conducted at small infestations or on the leading edges of larger ones. Handpulled plants were bagged.

In 2007, Envoy was used again, once on 16 March, before the plants had bolted, and on 13 May, after plants had flowered. The product was delivered at full strength from handheld wands attached to a tank pulled by an ATV. Spraying was again conducted by SCCOSA staff. Glyphosate was considered for resprouts and spot spraying but was not used, although it may be appropriate in the future. Shelterbelt Builders followed up in early June with string cutting. Mowers were instructed to trim the plant as low as possible, preferably hitting the soil surface. Cutting the plants low was intended to minimize resprouting and to ensure decumbent individuals were treated.

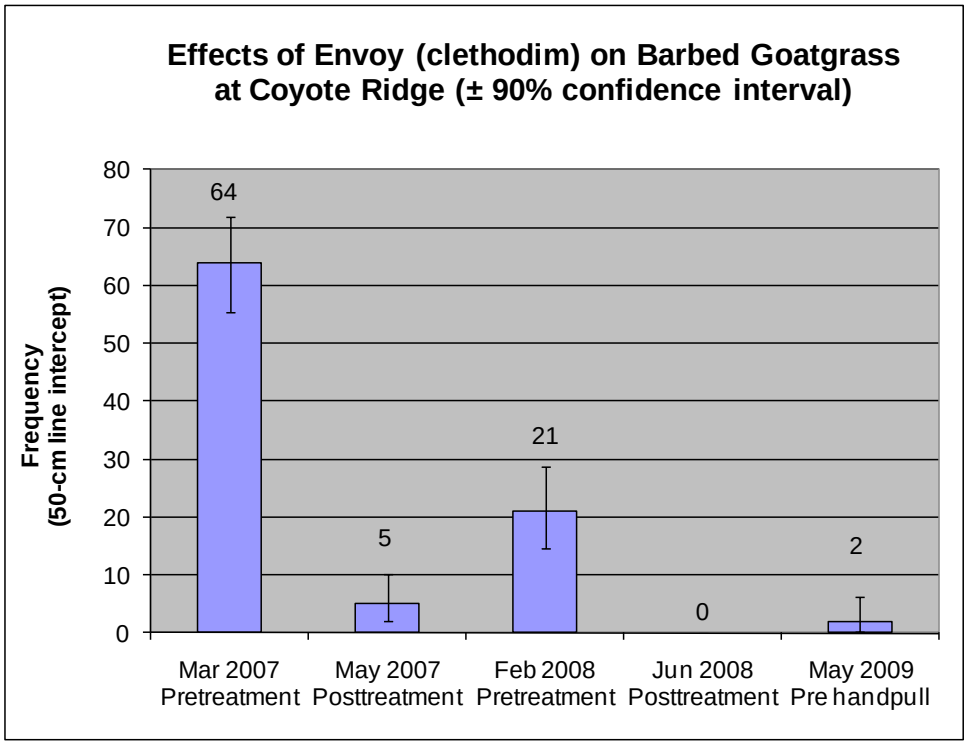
In February 2008, Envoy was again applied before the plants had bolted. Follow-up visits showed very low densities, so plans to string-cut the area were canceled. Hand pulling was sufficient for removing resprouts (Niederer 2008).

In 2009, the areas that had been sprayed the previous years were hand pulled only. An infestation of less than an acre was located on the ridgetop road at the VTA/UTC border. This infestation, which was located on UTC property, was treated with string cutting and herbicide applications.

Results

The 2006 spraying was not successful, probably because it was done too late in the season. The next two years of spraying with Envoy, plus a year of string cutting, have successfully reduced the density of individuals on the VTA property to the point where handpulling will be the preferred method. Goatgrass showed a slight but statistically insignificant increase in the sprayed areas in 2009 (Figure 27).

Figure 27: Results of Envoy on Barbed Goatgrass



Populations of purple star-thistle, yellow star-thistle, and Italian thistle were hand pulled, mowed, and treated with herbicide where needed in 2008 and 2009.

Discussion

The barbed goatgrass infestations along the ridgetop road on VTA property are significantly decreasing due to treatment efforts. The infestation of this species remains at such a low density that additional spraying seems unnecessary in this area. Monitoring of the population will continue, and hand pulling will be the preferred treatment method should remaining individuals be detected. It could possibly take at least 3 years of careful follow-up to eradicate the population, as its seedbank continues to germinate and as hard-to-find individuals escape detection and are allowed to reproduce. Constant vigilance will be required to identify and promptly treat new infestations that are introduced by vehicles and animals.

Larger infestations on adjoining UTC and other properties threaten VTA property if they are not controlled. The ridgetop road has been identified as an important vector in the spread of this weed, and spraying along this corridor is a priority. Spraying occurred along the road north of VTA property in 2009, and should continue in 2010.

String cutting is also being used on larger infestations on UTC and Silicon Valley Land Conservancy properties. This has been less effective than spraying, but significant decreases have been detected (CCEO unpublished data).

Due to the state's budget issues, it is unclear at this point whether funding earmarked for treating barbed goatgrass at Coyote Ridge will be available from the California Department of Food and Agriculture.

A reduction in percent cover by invasives in general has been noted on the Preserve as greater control is attained, and a reduction in the effort needed to control invasives is anticipated in 2010. Monitoring for occurrences of other invasives, and application of integrated pest management as needed, will continue on the Preserve. Because adjoining properties to the northwest, east, and south, where minimal control of invasive plants occurs, still present problems for the Preserve, monitoring will include particular attention to the property boundaries in those areas.

SUMMARY AND RECOMMENDATIONS

MONITORING SUMMARY

The managed grazing that has occurred for years on VTA's Coyote Ridge Preserve has been effective at maintaining suitable habitat for serpentine-associated plants and animals, including the bay checkerspot butterfly, while maintaining the integrity of aquatic, wetland, and riparian communities. Monitoring during the second and third years of management according to the Coyote Ridge RMP generally documented that suitable conditions for these resources continued to be maintained in 2008 and 2009. Management in 2008 and 2009 continued to provide quality habitat for checkerspots, sensitive plants and animals, and serpentine vegetation. Management should continue with the two different grazing regimes currently being implemented, which favor different species in different years.

Baseline data on plant species composition and cover were collected along 12 transects at three transect clusters on the Coyote Ridge Preserve in 2008, and 15 transects at four transect clusters in 2009. This protocol allows various habitat parameters to be compared among different management regimes and elevations on the property. One of the transect clusters has plant composition data for 2006 and 2007, illustrating the effects of interannual climate variation. Comparisons of sites in this spatial and temporal context provide a reliable system for detecting major changes in grassland composition in response to climate, topography, and management.

Monitoring in 2008 showed generally similar habitat quality across the different transect clusters. Monitoring in 2009 showed less preferable habitat in the spring-fall grazing regime. While monitoring data in this same paddock in areas outside VTA property show higher habitat quality with the same management, the addition of more cattle and relocation of salt blocks is expected to increase grazing pressure in the targeted areas. Increased grazing pressure should reduce nonnative annual grass and thatch, increasing cover of bay checkerspot hostplant and nectar sources.

In 2008 and 2009, livestock stocking rates continued as they have in the past, at approximately one cow-calf pair per 10 acres. As per the RMP, the majority of the property was grazed in winter and spring in 2008 and 2009. The paddock in the northwestern portion of the site is grazed intermittently between spring and fall, with the rancher moving cattle when conditions warrant (i.e., not under- or overgrazing). This flexibility is appreciated and prevents degradation of bay checkerspot butterfly and serpentine habitat.

Bay checkerspot butterfly populations were estimated on the Coyote Ridge Preserve based on larval surveys, and compared with results from 2006 and 2007 (and earlier, where such data were available) to provide a temporal context for 2008 and 2009 results, since populations of this species can show dramatic fluctuations. In 2008, larval densities increased along the ridgetop, and held steady on the lower slopes. In 2009,

densities were stable on the ridgetop, and dropped on the lower slopes. Populations were well within a normal range of fluctuations both years.

Rare plant monitoring demonstrated stable populations between 2007 monitoring and that performed in 2009, and no indication of problems with populations of these species on the site were noted. Although feral pigs and tule elk have potential to adversely affect sensitive habitats on the Preserve, problems to date have been very localized and limited; monitoring of on-site abundance of these species, and potential damage to sensitive habitats and species caused by pigs and tule elk, will continue.

California red-legged frogs were detected for the first time on the Preserve in 2009, with three individuals detected in the southwestern part of the site. The presence of these individuals indicates that drainages in this part of the site are being used as non-breeding habitat by frogs associated with the Kirby Canyon Landfill's wetlands and red-legged frog pond, where the species breeds.

Measures to control invasive plants in 2008 and 2009 were focused on barbed goatgrass. In February 2008, the graminicide Envoy was again applied to known goatgrass infestations on the Coyote Ridge Preserve. Densities after treatment were so low that follow-up string cutting was cancelled. Hand follow-up was conducted in 2008 and 2009, and will be necessary for several more years. Continued monitoring and treatment of this highly invasive species will be necessary, especially on neighboring properties whose infestations will continue to pose threats. Occurrences of other invasive species were treated as well, and significant control over these invasives has been attained on the site.

RECOMMENDATIONS AND ACTION ITEMS

In addition to routine monitoring activities to be performed in 2010 according to the schedule in the RMP, the following recommendations and action items are noted for 2010:

- **Grazing**
    - Annual grass and thatch cover are higher on the lower, western slopes in the spring-fall grazed paddock than at the summit or in the winter-spring grazed paddock. Rancher Justin Fields has suggested adding a few more cattle and moving salt licks at his discretion to increase grazing pressure on the lower slopes. Increased grazing pressure should reduce nonnative annual grass and thatch, increasing cover of bay checkerspot hostplant and nectar sources. If monitoring in Year 4 indicates that RDM values on the western slopes are still higher than target levels, additional options for increasing grazing intensity on those slopes should be considered.
- **Invasive Plants**

- Continue visual monitoring for invasives on the Preserve and quantitative monitoring on neighboring property, and apply integrated pest management as needed.

- Continue to work with adjoining landowners to assist them in their management of invasive plants.

- **Erosion/Animal Damage**

  - Work with adjoining property owners to educate them on the detrimental effects of driving roads when they are muddy, and will work with Waste Management staff to resolve erosion issues off-site on North Canyon Road.

  - Monitor use of the site by tule elk (in addition to feral pigs, which are addressed in the RMP), and in particular, monitor damage to sensitive habitats by elk.

- **General**

  - Change permanent plot marking systems to allow permanent plots to be more easily located. The SCCOSA has begun to change markers on these plots and will continue the replacement process in 2010.

  - Continue to monitor human activities by the golf course as they relate to the management of local wildlife populations.

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APPENDIX A
RDM DATA SHEETS AND PHOTOS

SANTA CLARA COUNTY OPEN SPACE AUTHORITY -- RDM MONITORING

Preserve/Site Name: VTA Coyote Ridge **Date/Time**: 10/04/09 1255

Observer: Congdon **Pasture Name**: Southwest

Site ID Number: LowerNorthCanyon **UTM Coordinates**: 4116530/616880

Grazing Animal Type (Goat/Sheep/Cattle/Horse/Other): Cattle

Date Animals On-Site: Unknown **Date Animals Off-Site**: Unknown

Number of Animals: Unknown

Site Information:

Slope: 3 to 15% **Aspect**: S **Compass Heading**: 60 Degrees

RDM Pounds Per Acre: 1500 plus **Clip/Weighed (Yes or No)**: No

Photo Number 10 Foot: LowerNorthCanyon01 **Photo Number 20 Foot**: LowerNorthCanyon02

Rangeland Indicators:

1) **Bare Ground (Amount and size of bare areas)**: None noted

2) **Erosion (Evidence of wind or water erosion):** None noted

3) **Dung Breakdown**: No signs of grazing this year.

4) **Plants Observed (Grass, forbs, rare, threatened, and endangered):** Bromus, Avena, Lolium.

Percent Annuals: 85%

Percent Perennials: 15%

5) **Non-native Invasive Plants:** None noted

6) **Insects/Birds/Small & Large Animals:** None noted.

7) **General Comments:** Site is east of the North Canyon gate fence line.

Lower North Canyon – 10 Feet – 1500+ lbs

Lower North Canyon – 20 Feet – 1500+ lbs

Lower North Canyon – 1500+ lbs

SANTA CLARA COUNTY OPEN SPACE AUTHORITY

RDM MONITORING

Preserve/Site Name: VTA Coyote Ridge **Date/Time**: 10/04/09 1230

Observer: Congdon **Pasture Name**: Southwest

Site ID Number: SWPasture **UTM Coordinates**: 4116850/616900

Grazing Animal Type (Goat/Sheep/Cattle/Horse/Other): Cattle

Date Animals On-Site: Unknown **Date Animals Off-Site**: Unknown

Number of Animals: Unknown

Site Information:

Slope: 2 to 10% **Aspect:** S **Compass Heading**: 170 Degrees

RDM Pounds Per Acre: 1200 - 2000 **Clip/Weighed (Yes or No)**: No

Photo Number 10 Foot: SWPasture01 **Photo Number 20 Foot**: SWPasture02

Rangeland Indicators:

1) **Bare Ground (Amount and size of bare areas)**: None

2) **Erosion (Evidence of wind or water erosion):** None.

3) **Dung Breakdown**: None.

4) **Plants Observed (Grass, forbs, rare, threatened, and endangered):** Bromus, Lolium Hemizonia.

Percent Annuals: 85%

Percent Perennials: 15%

5) **Non-native Invasive Plants:** None.

6) **Insects/Birds/Small & Large Animals:** None noted.

7) **General Comments:** Area appears to not have been grazed in many years.

SW Pasture – 10 Feet – 1200 – 2000 lbs

SW Pasture – 20 Feet – 1200 – 2000 lbs

RM-01-09-RDM Monitoring-090409

SW Pasture – Hoop – 1200 – 2000 lbs

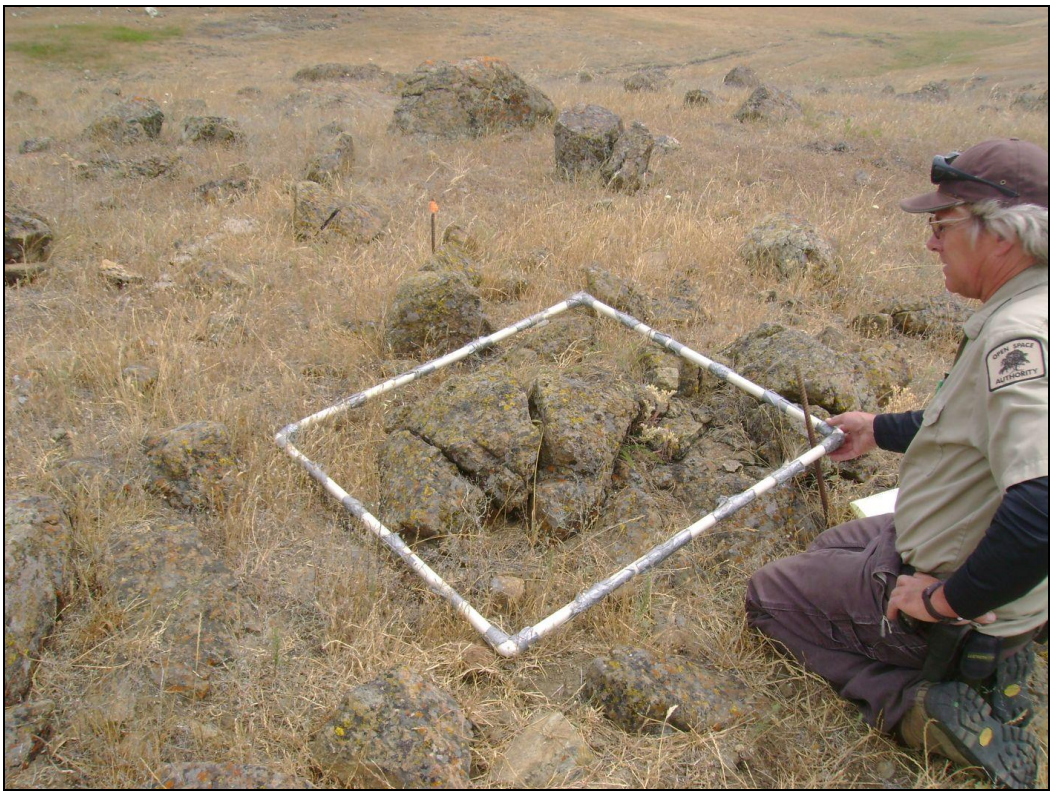
Photo SWPasture03

RM-01-09-RDM Monitoring-090409

RM-01-09-RDM Monitoring-090409

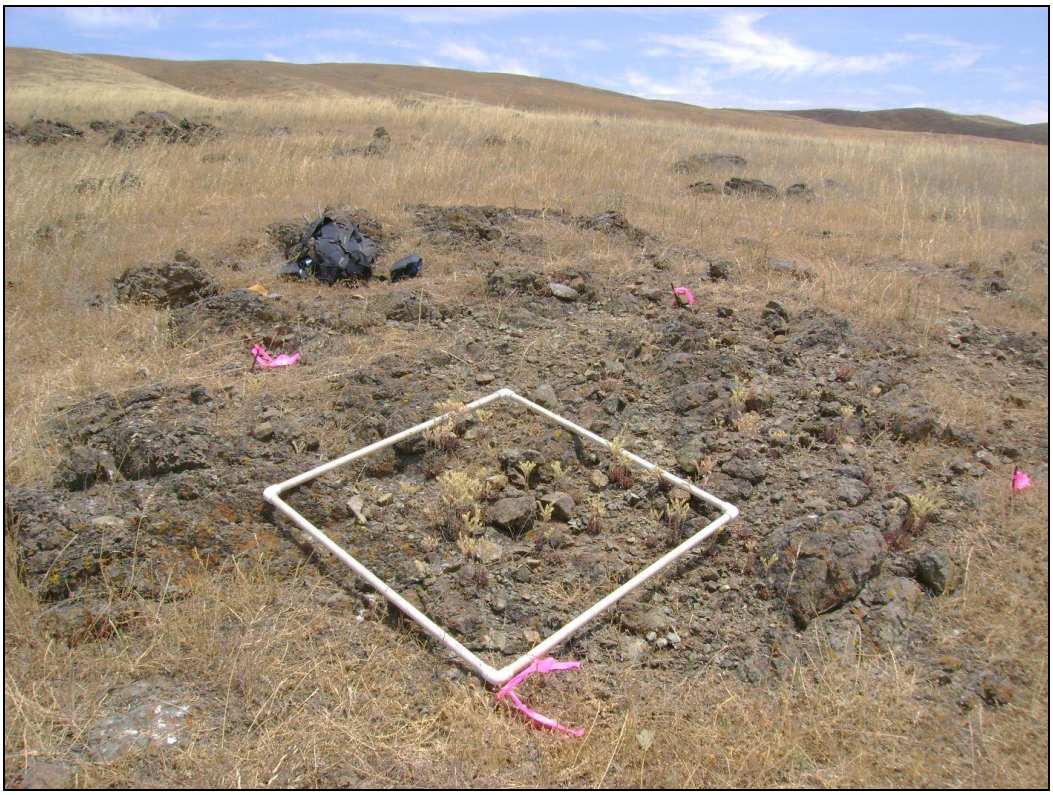
APPENDIX B
PHOTOS OF SPECIAL-STATUS PLANT
MONITORING PLOTS

Santa Clara Valley Dudleya Monitoring Station 1

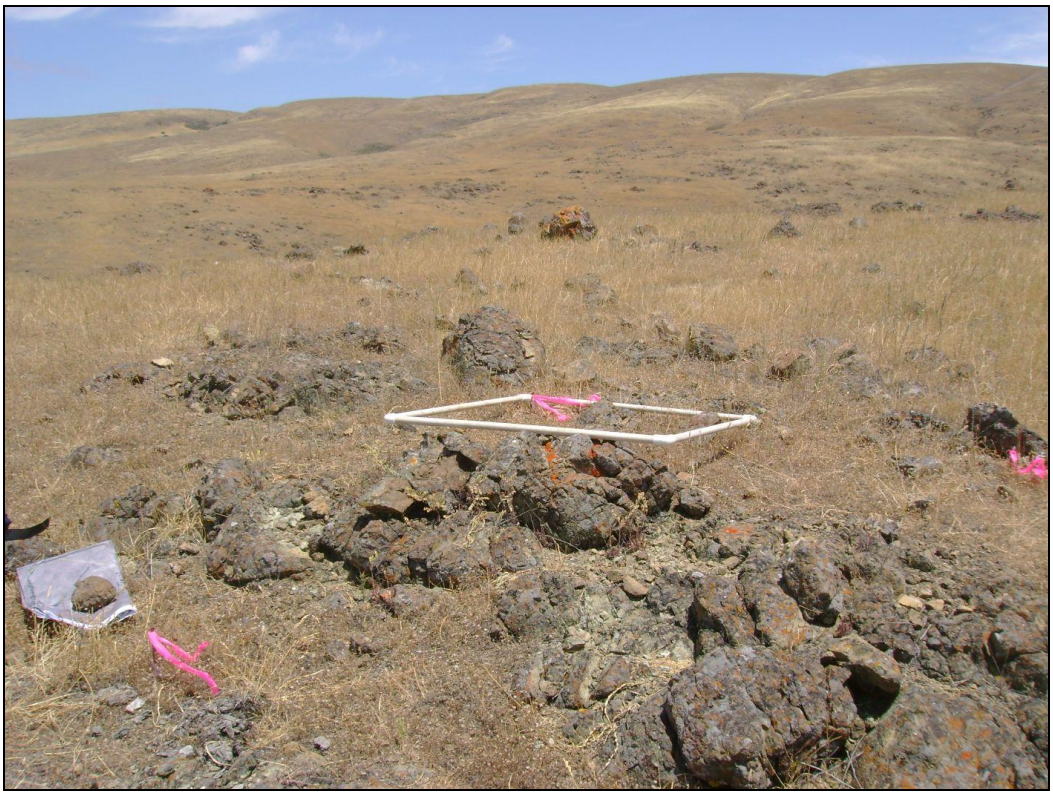


Santa Clara Valley Dudleya Monitoring Station 2

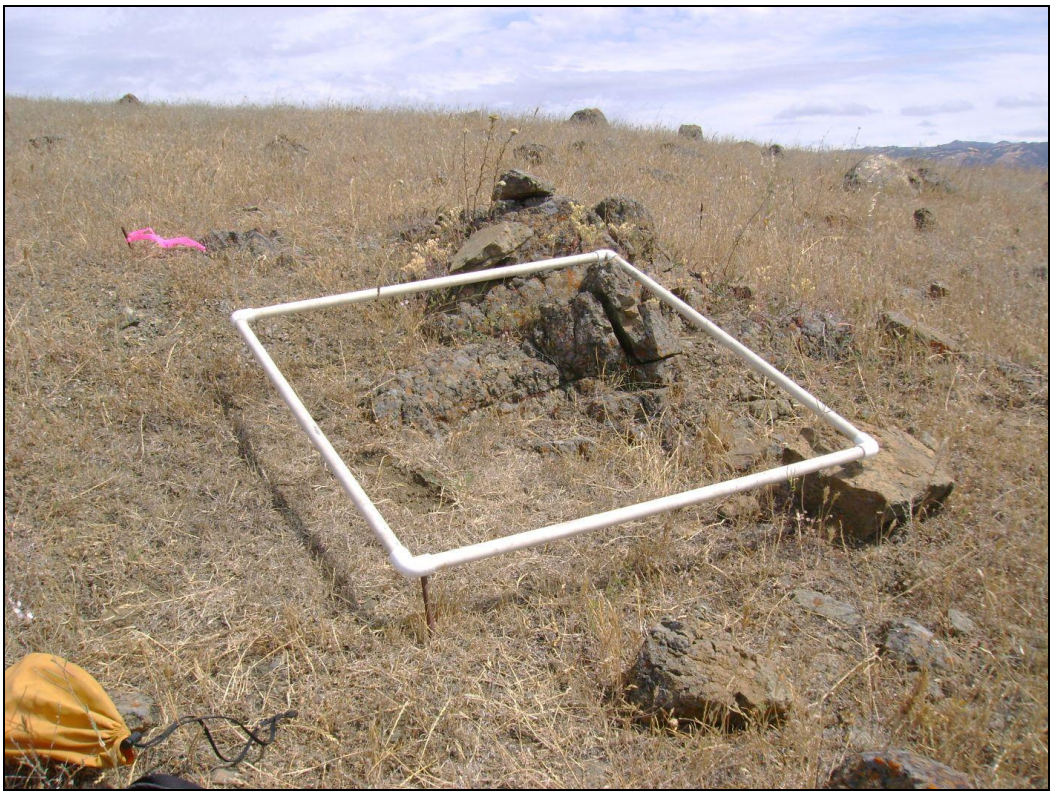
Santa Clara Valley Dudleya Monitoring Station 3



Santa Clara Valley Dudleya Monitoring Station 4



Santa Clara Valley Dudleya Monitoring Station 5



Mt. Hamilton Thistle Monitoring Station 1

Mt. Hamilton Thistle Monitoring Station 2

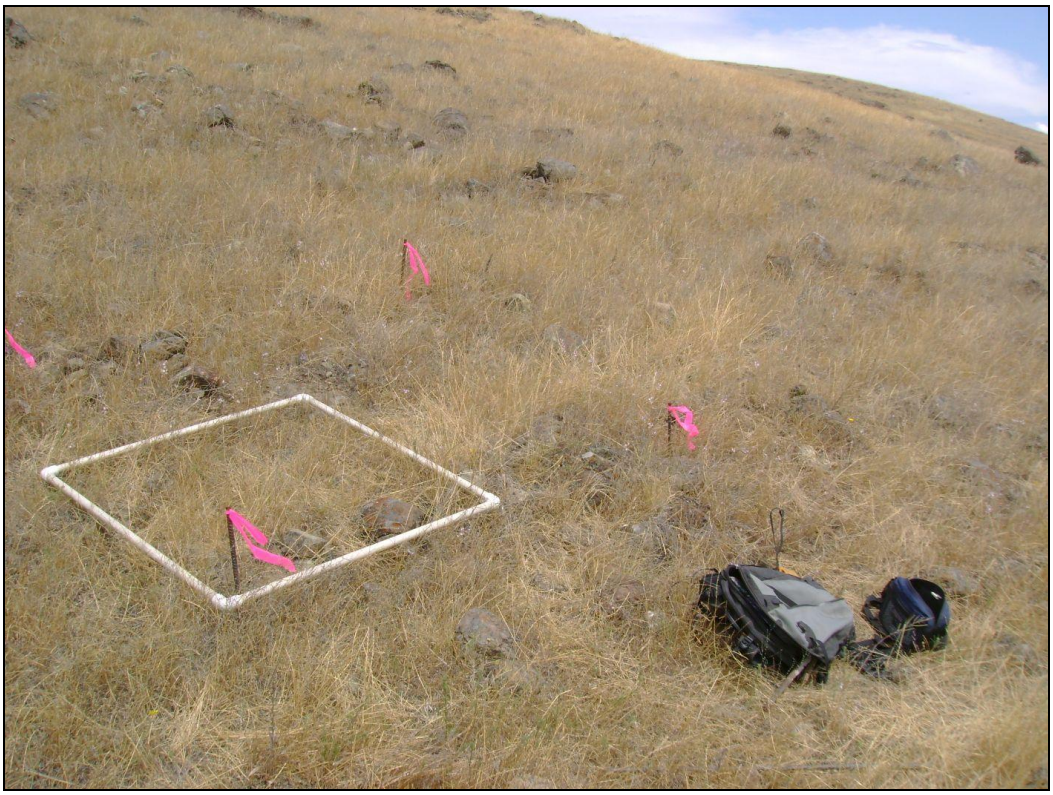
Mt. Hamilton Thistle Monitoring Station 3

Mt. Hamilton Thistle Monitoring Station 4

Mt. Hamilton Thistle Monitoring Station 5

Most Beautiful Jewelflower Monitoring Station 1

Most Beautiful Jewelflower Monitoring Station 2



Most Beautiful Jewelflower Monitoring Station 3

Most Beautiful Jewelflower Monitoring Station 4

Most Beautiful Jewelflower Monitoring Station 5