
Silver Creek Preserve Annual Monitoring Report Year Seven (2007)

SAN JOSE, SANTA CLARA COUNTY
CALIFORNIA

Prepared For:

Kevin Ebrahimi
William Lyon Homes, Inc.
2603 Camino Ramon, Suite 150
San Ramon, CA 94583
(925) 543-5500

Contact:

Tom Fraser
fraser@wra-ca.com

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EXECUTIVE SUMMARY

This Year Seven Annual Monitoring Report describes the management and monitoring activities conducted by WRA biologists during 2007 on the 240-acre Hassler Ranch Preserve ("Preserve") and adjacent off-site preserved open space lands; Yerba Buena Preserve and Hellyer Ridge Preserve. These preserves are located on and adjacent to The Ranch on Silver Creek project site and are collectively known as the Silver Creek Preserve. These preserve lands are managed under the control of **Silver Creek Preserve, a California non-profit public benefit corporation ("SCP")**. An additional 75-acre preserve located 10 miles south (Kirby Slope Preserve) is also managed by **SCP**, and 2007 monitoring there is described in Appendix A. This is the seventh of ten annual reports that are required for these preserve lands as described in the Biological Opinion issued for this project in October 2000 (USFWS 2000a). A copy of this annual report is being provided to the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service (USFWS), City of San Jose Department of City Planning, and California Department of Fish and Game (CDFG) as required in the Biological Opinion, project EIR (City of San Jose, 1993), and CTS mitigation agreement (CDFG 2000) respectively.

Monitoring is conducted according to the guidelines set forth in the final *Restoration and Management Plan* (RMP) for the Preserve (WRA 2005). This Annual Monitoring Report contains a separate monitoring report for each special-status species addressed in the RMP (and Biological Opinion), as well as a discussion of general Preserve management and monitoring. Within each separate report, a discussion of restoration measures that have been undertaken to date, baseline monitoring, and ongoing monitoring are discussed. Below is a summary of the Year Seven monitoring results described in detail in the included separate reports, followed by tables summarizing progress toward the various goals for each species.

Bay checkerspot butterfly and habitat: In 2007, 37 adult bay checkerspot butterflies were observed on the Hassler Ranch Preserve, 15 were observed on the Hellyer Ridge Preserve, and one was observed this year on the Yerba Buena Preserve. A total of 53 adult butterflies was observed on the Silver Creek Preserve compared with 86 adults observed at Kirby. These counts are greater than those observed in 2006 and the butterfly population appears to be recovering from extreme weather conditions in Spring 2006. However, no larvae were observed in 2007. Limited rainfall and an early and brief wildflower bloom may have reduced the amount of available forage material for larvae, resulting in increased larval mortality and earlier emergence of adult bay checkerspot butterflies. Reintroduction of cattle grazing on additional portions of the Preserve in early 2006 is already producing a noticeable decrease in the height and cover of grass species that compete with butterfly host and nectar plants. The number of transects with dwarf plantain present at levels needed to support bay checkerspot butterfly decreased slightly in 2007 but is still greater than that observed in 2001-2005. Increased grazing activity over the past five years is improving butterfly habitat and should lead to further increases in the number of adult butterflies in 2008.

California red-legged frog: No California red-legged frogs were observed on the Preserve during the 2007 field season. No bullfrogs were observed in potential red-legged frog breeding habitat.

California tiger salamander: Annual monitoring conducted in March 2007 found no CTS larvae in the Created CTS Pond or in the small pond located upstream. Due to 2007 being a drought year, the Created CTS Pond only had about two inches of water and the small pond was completely dry

at the time of monitoring. Therefore, the ponds did not provide suitable habitat for CTS breeding in 2007. However, CTS larvae are expected to be observed in future monitoring years when normal rainfall patterns resume.

Santa Clara Valley dudleya: The population of Santa Clara Valley dudleya within the Preserve appears to have decreased since the 2006 monitoring. The calculated number of dudleya in 2007 is 16,081 (15,356 extrapolated, 725 transplants), which is 73 percent of the 1998 baseline (21,947). The 100 percent replacement goal for impacted dudleya stated in the Biological Opinion is not being met this year, but ongoing annual monitoring will track the on-site dudleya population size over the next three years. The current survival rate for dudleya transplants on the Preserve is approximately 18.4 percent. Since 2002, many seedlings have been observed within natural, transplant, and seeded areas. Several new patches of adult dudleya have been found since those originally located in 1998, and these will be counted toward final replacement goals.

Metcalf Canyon jewelflower: The estimated jewelflower population on the Preserve for 2007 is 17,395 individuals. This estimate is less than the 75,000 observed in 1998 but is more than double the estimate in 2006. Due to the wide range of variability in the jewelflower population observed since 1998, the 2007 population can be considered well within the range of normal population fluctuation.

Mt. Hamilton thistle: Thistle number and extent increased noticeably in the Preserve in 2007. The total thistle population on the Preserve in 2007 was approximately 5,623 individuals, which exceeds the 3,000 observed in 1998. Acreage occupied by the thistle in 2007 was 1.08 acres, which is less than the 1.86 acres mapped in 1998. Recovery and expansion of the thistle population is expected to continue, including expanded thistle occupation of the new mitigation wetlands and other restored habitat areas.

Other rare plants: Five fragrant fritillary individuals were observed in 2007, while 15 were observed in 2006. Fritillary population size typically fluctuates from year to year. The Hall's bush mallow population appears to have increased in both number of individuals and occupied area from that observed in 1998.

General preserve management: William Lyon Homes, Inc. (WLH), has arranged for the following lands to be placed under control of **SCP**, which will be responsible for long-term management of these preserve lands: conservation areas on The Ranch on Silver Creek site (Hassler Ranch Preserve or Preserve), the Shea Homes Butterfly Preserve (Hellyer Ridge Preserve), the Ryland/Summerhill open space (Yerba Buena Preserve), and off-site lands at Kirby Canyon for bay checkerspot butterfly habitat preservation (Kirby Slope Preserve). Cattle grazing now occurs on all fenced portions of the Silver Creek Preserve for bay checkerspot butterfly habitat management, and noticeable grazing results have been observed. Annual monitoring for special-status species on the Preserve in 2007 was conducted according to the final RMP (WRA 2005).

Table i. Special-status wildlife species goal status in 2007.

Special-status wildlife species	Goal	Status in 2007
Bay checkerspot butterfly	Protect and manage high quality bay checkerspot butterfly habitat primarily through a grazing program;	Complete. Butterfly Preserve protected and managed grazing continues.
	Develop and implement habitat restoration and management measures that are based on sound scientific knowledge and the advice of established experts in bay checkerspot butterfly restoration and management;	Complete. RMP was developed and management measures are being implemented.
	Coordinate conservation and management programs with adjacent lands that currently support, or may potentially support bay checkerspot butterfly (i.e., Kirby Canyon) to ensure that regional approaches for conservation are coordinated and effective;	Complete. Annual monitoring for the bay checkerspot butterfly and its habitat, Santa Clara Valley dudleya, and Mt. Hamilton thistle was conducted on the Kirby Slope Preserve in 2007.
	Provide community education and awareness about the bay checkerspot butterfly conservation efforts in the Butterfly Preserve and regionally.	Complete. Educational brochures have been prepared and distributed to homeowners and the City, and signage has been posted throughout the development.
	Create at least 17 acres of dwarf plantain in densities of several hundred plants per square meter	Partially complete. Grazing reintroduced on the Preserve in 2001 is showing good results, and dwarf plantain percent coverage has increased to this density over many large areas.
	Stands of dwarf plantain should be established on a variety of slopes, aspects and topographies	Partially complete. Dwarf plantain seed has been distributed on a variety of slopes and aspects and monitoring continues.
	Promote the growth of secondary host plants, such as owl's clover, within stands of dwarf plantain	Partially complete. Managed grazing has limited the cover and height of non-native annual grasses; the restoration of TDBP areas has included seeding with secondary host plants.

Special-status wildlife species	Goal	Status in 2007
	Promote the growth of appropriate nectar sources throughout the Butterfly Preserve	Partially complete. Managed grazing has limited the cover and height of non-native annual grasses; the restoration of TDBP areas has included seeding with secondary host plants.
California red-legged frog	All residential development will be set back from Silver Creek and half of the frontage will be permanent open space	Complete. The project has been designed and implemented accordingly.
	240 acres of the project site will remain permanently in natural condition with connections to natural open space and wetlands	Complete. The project has been designed and implemented accordingly.
	The entire length of Hellyer Creek and all but 0.25 acres of on-site wetlands will remain unfilled and will be preserved	Complete. The project has been designed and implemented accordingly.
	Bullfrogs will be controlled in the Hellyer Canyon pond and golf course water features	Partially complete - ongoing. Bullfrog monitoring is conducted annually and any observed bullfrogs will be dispatched. No bullfrogs have been observed to date.
	A golf course pesticide management program will be prepared and approved by USFWS to ensure minimization of impacts to CRLF	Complete. A CHAMP was submitted to the USFWS and RWQCB in 2001.
California tiger salamander	Any CTS found in the development area during and after construction will be relocated to the on-site created or off-site modified ponds.	Complete. No CTS were found in the development area during site grading and construction or since.
	Grazing will be implemented around the created and modified ponds to promote ground squirrel colonization for CTS estivation burrows.	Complete. Grazing and fencing plans have been prepared and livestock fencing has been installed. Grazing continues on the Hellyer Ridge Preserve and began on the Hassler Ranch Preserve near the Created CTS Pond in early 2006.
	If found, known CTS predators will be controlled.	Partially complete - ongoing. Bullfrog monitoring is conducted annually and any observed bullfrogs will be dispatched.

Special-status wildlife species	Goal	Status in 2007
	The on-site Created CTS Pond will be marked with signs prohibiting entry	Complete. Permanent warning signs are present on the edge of this pond.
	A golf course pesticide management program will be prepared and approved by USFWS to ensure minimization of impacts to CTS	Complete. A CHAMP was submitted and reviewed by the USFWS and RWQCB in 2001.

Table ii. Special-status plant species performance standard status in 2007.

Special-status plant species	Performance Standard	Status in 2007
Santa Clara Valley dudleya	Replacement of the 3,675 plants impacted by construction activities at a replacement ratio which reflects the trend in the preserved population;	Partially complete. 725 transplants surviving; total dudleya on site is 27% less than the 1998 population.
	1:1 replacement of lost dudleya habitat on an acreage basis.	Complete. Approximately 0.91 acres of dudleya habitat has been planted to replace the 0.87 acres of occupied habitat lost through project development.
Metcalf Canyon jewelflower	Attempt to increase the area occupied by jewelflower and enhance and preserve the existing population	Partially complete. Species distribution increased considerably in 2007 but is less than the 1998 baseline in total occupied acreage.
Mt. Hamilton thistle	100 percent replacement of impacted (transplanted) thistle plants;	Complete. Thistle population consisted of approximately 5,623 individuals, an 87.4 percent increase since 1998.
	1:1 replacement of lost thistle habitat on an acreage basis.	Partially complete. Acreage occupied is 1.08 acres, less than the 1.86 acres mapped in 1998. Additional weed control is underway to expand the occupied habitat.
Other rare plants	Populations on the Preserve will be monitored	Complete. Seventh year of annual monitoring occurred in 2007.

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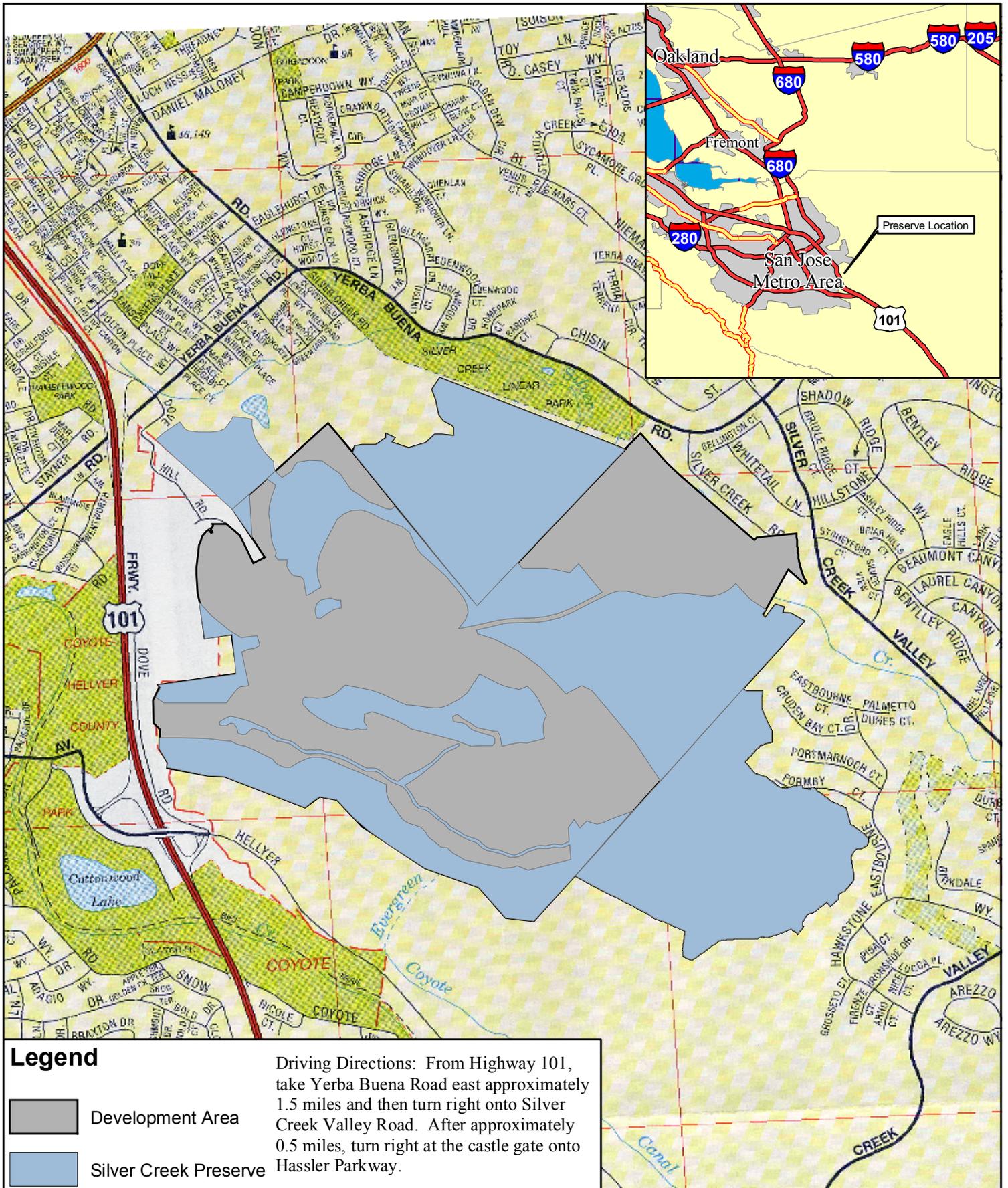
1.0 INTRODUCTION

The Ranch on Silver Creek is a 580-acre master-planned residential community developed by William Lyon Homes, Inc. that includes a public golf course. The open space Preserve was created by William Lyon Homes in conjunction with development of the project. The *Cerro Plata Residential and Golf Course Project Final Environmental Impact Report* (FEIR) (City of San Jose 1993) provides a detailed description of the site and an analysis of the development's impacts. The site is located at the northern end of the Silver Creek Hills in San Jose, California (Figure 1a), and comprises approximately 178 acres of single-family and multi-family homes and infrastructure in several residential neighborhoods, 156 acres of golf course (including clubhouse, parking, and golf course maintenance facilities), six acres of regional and public park facilities, and 240 acres of preserved habitat and open space ("Hassler Ranch Preserve" or "Preserve"). Within the Preserve, 35 Plant Conservation Areas (PCAs) and bay checkerspot butterfly habitat are being restored and managed to protect special-status species present on the site. Approximate Preserve boundaries are shown on Figure 1b. Final precise Preserve boundaries were established and recorded in 2005. The Preserve and two contiguous off-site parcels north (110 acres) and south (123 acres) of the Preserve, are being managed jointly by **Silver Creek Preserve, a California non-profit public benefit corporation** ("**SCP**"). This 473-acre preserve is called "the Silver Creek Preserve". An additional 75-acre preserve located 10 miles south (Kirby Slope Preserve) is also managed by **SCP**, and 2005 monitoring at this site is described in Appendix A. The approximately 548 acres of on-site and off-site preserve lands are being managed by **SCP** in perpetuity.

On October 12, 2000, a Biological Opinion was issued by the U.S. Fish and Wildlife Service for The Ranch on Silver Creek project (USFWS 2000a). The *Restoration and Management Plan* (RMP) for the Preserve (WRA 2005) was produced as a result of a formal Section 7 consultation on Nationwide Permit modification for The Ranch on Silver Creek Development (Corps File No. 23125S). The Biological Opinion includes conservation measures, terms and conditions, and conservation recommendations that are addressed in the RMP. As part of the implementation of the Preserve RMP a comprehensive mitigation and monitoring program is ongoing to ensure that the Preserve performance standards are achieved. The mitigation monitoring for all restored special status species habitat on the Preserve is continuing for a base period of ten years (2001-2010). Habitat management activities are also underway on the off-site preserve parcels. After this initial ten-year restoration and management period, all Silver Creek Preserve management and monitoring activities will be conducted under a long term management regime, in perpetuity (see Section 4.0 of the RMP; WRA 2005).

The overall goal of the RMP is to restore the health of the ecosystem on the Preserve with a long term management program that establishes an active grazing and weed abatement program. The specific objectives of the RMP that are tracked through annual monitoring visits include:

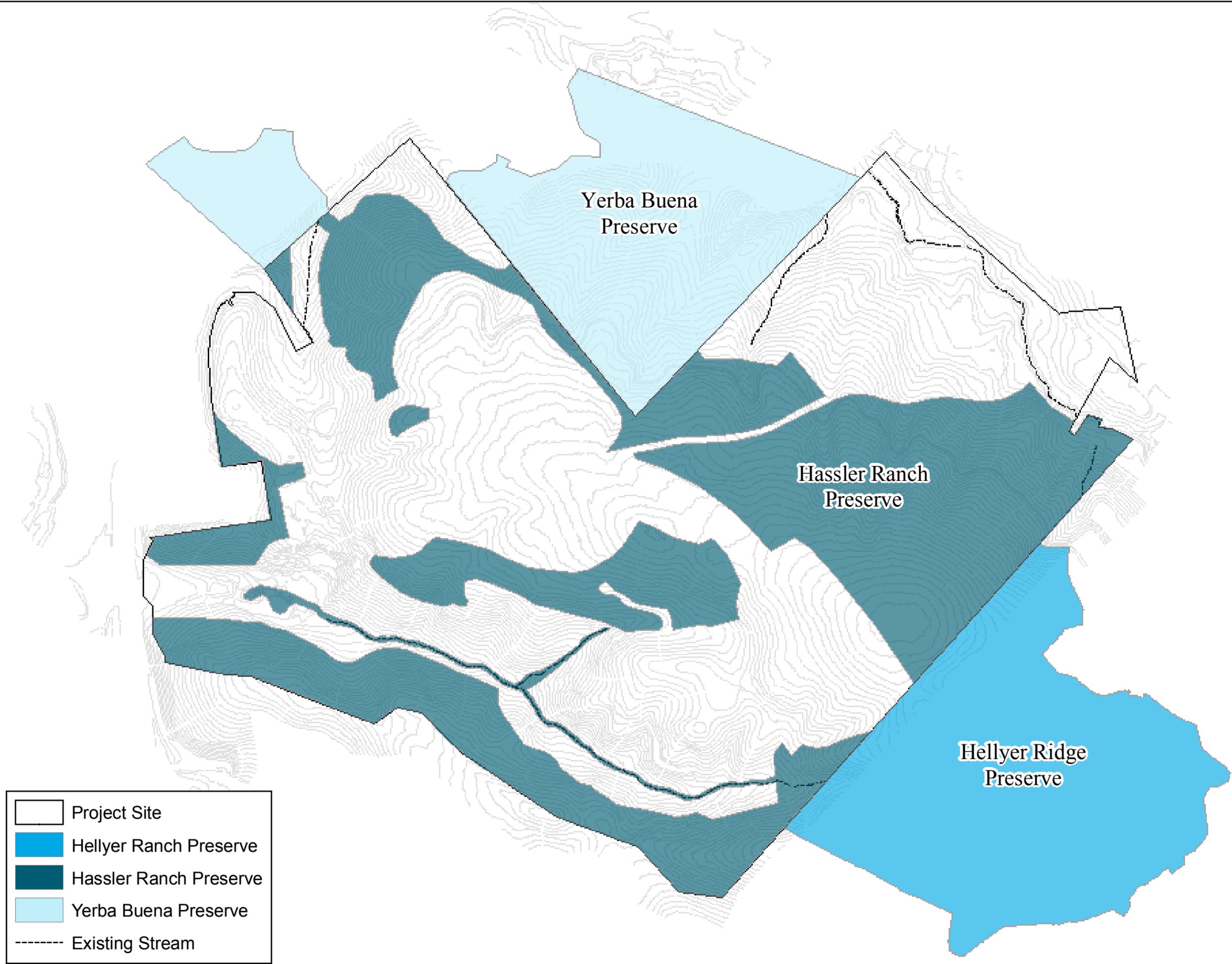
- Restoration, maintenance, and monitoring of habitat for the federal-listed threatened bay checkerspot butterfly (*Euphydryas editha bayensis*) by encouraging growth of the host plant dwarf plantain (*Plantago erecta*) and native food plants, and by controlling competing non-native vegetation through a program of managed grazing;



SILVER CREEK PRESERVE,
SAN JOSE, CALIFORNIA

Figure 1b

Conservation Areas



SCALE: 1" = 700'



- Protection and monitoring of existing special status plant species on the Preserve including the federal-listed endangered Santa Clara Valley dudleya (*Dudleya setchellii*) and Metcalf Canyon jewelflower (*Streptantus albidus* ssp. *albidus*), and a federal species of concern, Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*);
- Implementation of a comprehensive ecosystem monitoring program to continuously evaluate the realization of stated management goals and objectives; and
- Maintenance of all capital improvements that are installed for restoration and management purposes.

A continuous re-evaluation and adaptive management technique is being utilized during the ten-year restoration, management, and monitoring period. Once a proven management regime is determined and established, fewer adjustments will be required. Management changes resulting from Year One through Year Seven monitoring included refining monitoring techniques, relocating fencelines to protect sensitive plants from cattle, installing additional fence sections to reduce human/cattle interactions, mowing and pulling exotic and/or competing weeds, evaluation of the need for rodent control to protect dudleya plants, and repairing erosional features. It is anticipated that other aspects of Preserve management will evolve once the full spectrum of habitat restoration actions are completed on the site.

2.0 WILDLIFE

2.1 Bay Checkerspot Butterfly

Introduction

Bay checkerspot butterfly (*Euphydryas editha bayensis*) is a federal-listed threatened species (October 18, 1987). It resides in grassland habitats on serpentine or rocky soils in Santa Clara and San Mateo counties (USFWS 2000a). The lifecycle of bay checkerspot butterfly is closely tied to its primary host plant, dwarf plantain (*Plantago erecta*), upon which the larvae feed. Secondary host plants, common owl's clover (*Castilleja densiflora*) and purple owl's clover (*C. exserta*), are also important for larval feeding, as they senesce slightly later than dwarf plantain. It is primarily on serpentine soils in the San Francisco Bay Area that dwarf plantain occurs in large enough patches (generally >four acres) and densities (generally >100 plants/m²) to sustain stable populations of bay checkerspot butterfly. Bay checkerspot larvae hatch from eggs in spring, when dwarf plantain is fully grown and in bloom. They feed on these plants until they begin to dry up in the summer, at which time larvae enter into their diapause phase (a type of hibernation). In early winter, dwarf plantain begins to germinate at the onset of winter rains, at which time larvae emerge from diapause and begin feeding. Larvae pupate in early spring. After flying adults emerge from their pupae, they feed on nectar from other plants, including desert-parsley (*Lomatium spp.*), California goldfields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*), and common muilla (*Muilla maritima*); then they mate and lay eggs.

In accordance with the Final EIR (City of San Jose, 1993) and Biological Opinion (USFWS 2000a) for The Ranch on Silver Creek, WRA, Inc. biologists conducted Year Seven of the annual winter and spring monitoring for the federal threatened bay checkerspot butterfly. Surveys for larval and adult bay checkerspot were conducted within all historic butterfly habitat on the Silver Creek Preserve, and on the Kirby Slope Preserve. Butterfly monitoring has taken place sporadically since 1991 on the parcels that comprise the Silver Creek Preserve; including efforts by the Center for Conservation Biology and the U.S. Fish and Wildlife Service. Completion of the Year Seven survey provides a current season survey (2007) for this species on all three portions of the Silver Creek Preserve and the off-site Kirby Slope Preserve, providing up-to-date status information and satisfying conditions of the Biological Opinion for The Ranch on Silver Creek.

Summary of Management Actions, 2007

Butterfly habitat grazing and monitoring continued in 2007. Annual monitoring for bay checkerspot butterfly and its larval host plant, dwarf plantain was conducted in the spring. Managed grazing continued according to the RMP, and grazing was expanded to all fenced portions of the Hassler Ranch and Yerba Buena Preserves in March 2006. Seeding of most of the 30 acres of butterfly habitat temporarily disturbed by project construction was completed in the Fall of 2004 and the final eight acres were seeded in Fall 2005 and Fall 2006. The seeding activities have been deemed successful.

2.1.1 Butterfly monitoring

Introduction

The northern end of the Silver Creek Hills in Santa Clara County, which is the location of the Silver Creek Preserve, has historically supported an abundance of bay checkerspot butterflies. This population apparently went extinct in the 1976-77 drought but was reestablished in 1987 and flourished into the early 1990s (Weiss and Launer, 2000). By 1997 it appeared that the population had once again gone extinct due to a drastic decline in the spatial extent, density, and size of dwarf plantain plants on these parcels (H.T. Harvey & Associates 1997). In recent years, cattle grazing has improved habitat quality for the bay checkerspot butterfly, as five adults were observed in the Hellyer Ridge Preserve parcel in April 1999 (Weiss and Launer, 2000), four adults in 2000 (Weiss and Launer, 2001), 11 adults in 2001 (WRA 2001b), 27 adults in 2002 (WRA 2002b), 34 adults in 2003 (WRA 2003b), 38 adults in 2004 (WRA 2004), 51 adults in 2005 (WRA 2005), and 6 adults were observed in 2006 (WRA 2006).

In this report we present the 2007 survey results for larval and adult bay checkerspot butterfly on the Silver Creek Preserve as required by the October 12, 2000 Biological Opinion issued by the U.S. Fish and Wildlife Service (2000a) for The Ranch on Silver Creek Project.

Methods

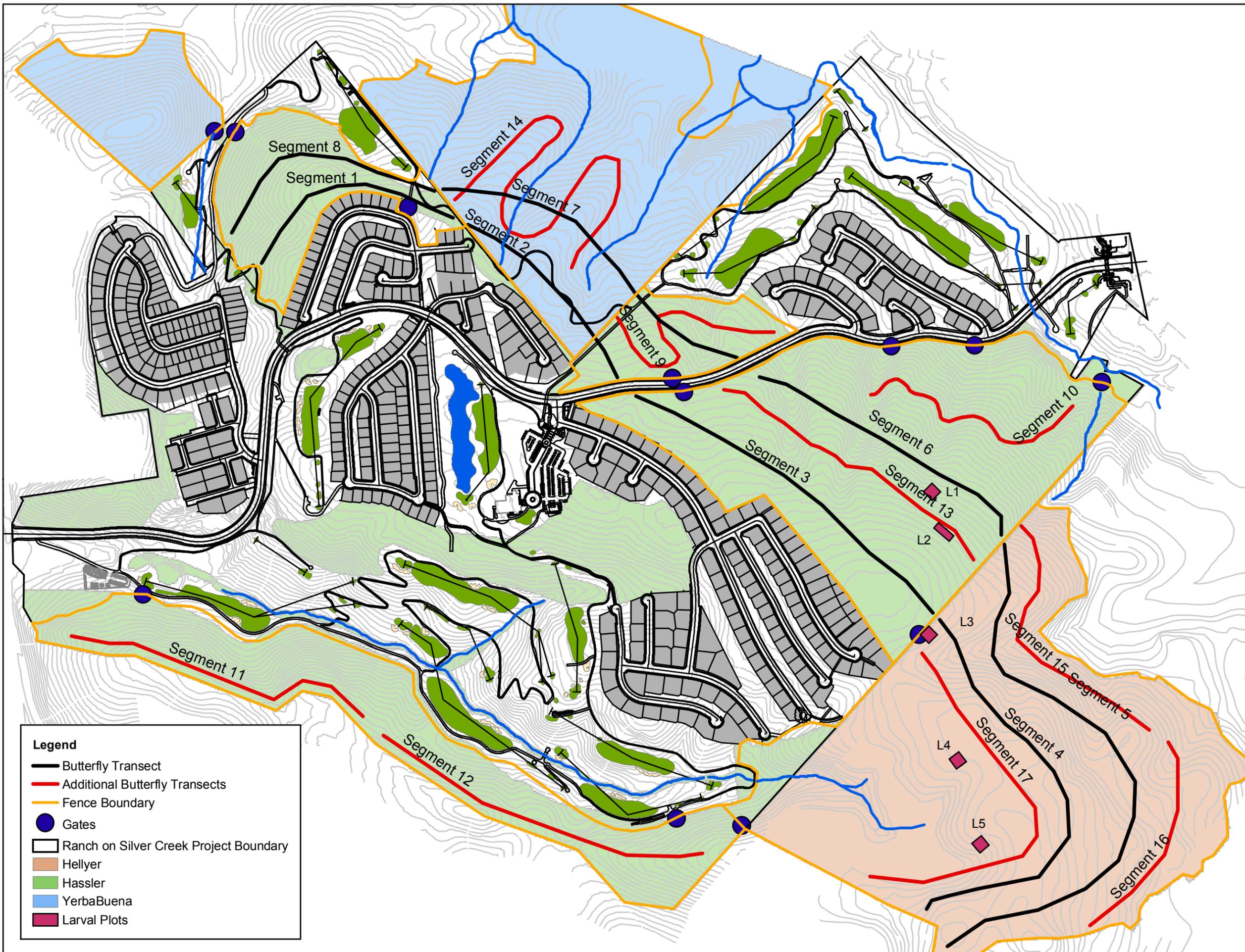
Two methods were used to assess the status and distribution of bay checkerspot butterfly on the Silver Creek Preserve. These included surveys for postdiapause larvae based on previous methods (Harvey and Associates 1997), and transect surveys for adult butterflies. Surveys were conducted on portions of the Hassler Ranch Preserve, Hellyer Ridge Preserve, and Yerba Buena Preserve that have historically supported bay checkerspot butterfly.

Larval Surveys

Prior to conducting larval surveys on the Silver Creek Preserve, biologists surveyed the off-site Kirby Slope Preserve (Kirby). The size and density of the checkerspot population are generally much greater at Kirby, making it easier to determine if the larvae are present. Larval surveys at Silver Creek were conducted in late winter, concurrent with the commencement of larval surveys at Kirby. 2007 surveys for postdiapause larvae of the bay checkerspot were conducted in mid-February.

In accordance with the RMP, the annual larval surveys consisted of timed searches within five 625 square meter plots (25 meters by 25 meters) located within potential bay checkerspot habitat on the Silver Creek Preserve (Figure 2a). A thirty person-minute timed search was initiated within each plot (i.e., two people search for fifteen minutes in each plot or one person searches for thirty minutes). The plots were placed within five areas of high quality habitat (areas with high dwarf plantain densities). These larval monitoring plots were permanently marked with rebar in 2004 and are surveyed every year. Similar plots have been established at Kirby. These plots may change locations within the Preserve if habitat quality within a given monitoring plot decreases, or if another area of higher habitat quality is found. If few or zero larvae are observed within the five permanent plots during surveys, a reconnaissance-level survey is conducted throughout the Preserve to locate larvae and/or areas of higher habitat quality for potential plot relocation.

Silver Creek Preserve
Figure 2a
Bay Checkerspot Butterfly
Adult/Larval Survey Locations



Legend

-  Butterfly Transect
-  Additional Butterfly Transects
-  Fence Boundary
-  Gates
-  Ranch on Silver Creek Project Boundary
-  Hellyer
-  Hassler
-  YerbaBuena
-  Larval Plots



Adult Surveys

Surveys for adult butterflies were conducted from mid-March through mid-April during periods of suitable weather for butterfly flight. These survey dates are consistent with the timing of previous surveys (1992, 1993, 1996, 1997, 2000-2006). Flight periods of bay checkerspots at Kirby were initially monitored through contacts with the U.S. Fish and Wildlife Service to ensure that butterfly survey dates occurred during the flight season for the region. The survey dates for 2007 are consistent with prior years.

In the Silver Creek Preserve survey area, two biologists conducted the surveys on foot by walking ten meters apart along two parallel survey routes totaling 7,562 meters in length. Each biologist surveys an area 10 meters wide, translating to a 151,238 square meter (15.12 hectare) survey area on the Silver Creek Preserve. The survey route was established to traverse areas known to have good quality butterfly habitat including high dwarf plantain and native forb densities. The survey route was chosen based on many years of experience with butterflies on these properties and followed the original Pollard transect established in 1991 on the Silver Creek Valley Country Club property (Hellyer Ridge Preserve), but with more emphasis on the central ridgetop where butterflies had previously been observed. Survey routes are mapped on Figure 2a. All 2007 surveys were performed during warm, sunny weather. Dates of surveys are found in Table 1. The walking pace was deliberate, approximating the pace recommended for the quino checkerspot (*Euphydryas editha wrighti* Gunder = *Euphydryas editha quino* (Behr))(U.S. Fish & Wildlife Service 2000b). Every adult butterfly observed was tabulated on a data form that separates the survey routes into eight standard segments. In an effort to monitor geographic changes in the adult checkerspot population at the Silver Creek Preserve, nine additional transects were added to the monitoring methods beginning in 2005. These additional transects cover habitat areas previously known to support bay checkerspot butterfly that are not covered in the standard transects. The nine additional transects are randomly broken into three new groupings every three years. Every year one-third of these additional transects will be visited, then another third will be visited the next year (different than the ones visited in the previous year). This pattern will continue so that all of the additional transects will be visited within a three-year cycle. Additional transects 10, 11, and 12 were monitored in 2007.

Results and Discussion

Larval Surveys

Bay checkerspot larvae were neither observed on the Silver Creek Preserve, nor at Kirby in 2007 (Table 1). Only one round of larval surveys was conducted (February 21-22). Adults were observed during the second attempt to survey larvae so larval surveys were stopped. The 2007 larvae season appeared to be impacted by unusually dry weather. Limited rainfall and an early and brief wildflower bloom may have reduced the amount of available forage for larvae, resulting in increased larval mortality and earlier emergence of adult bay checkerspot butterflies.

Adult Surveys

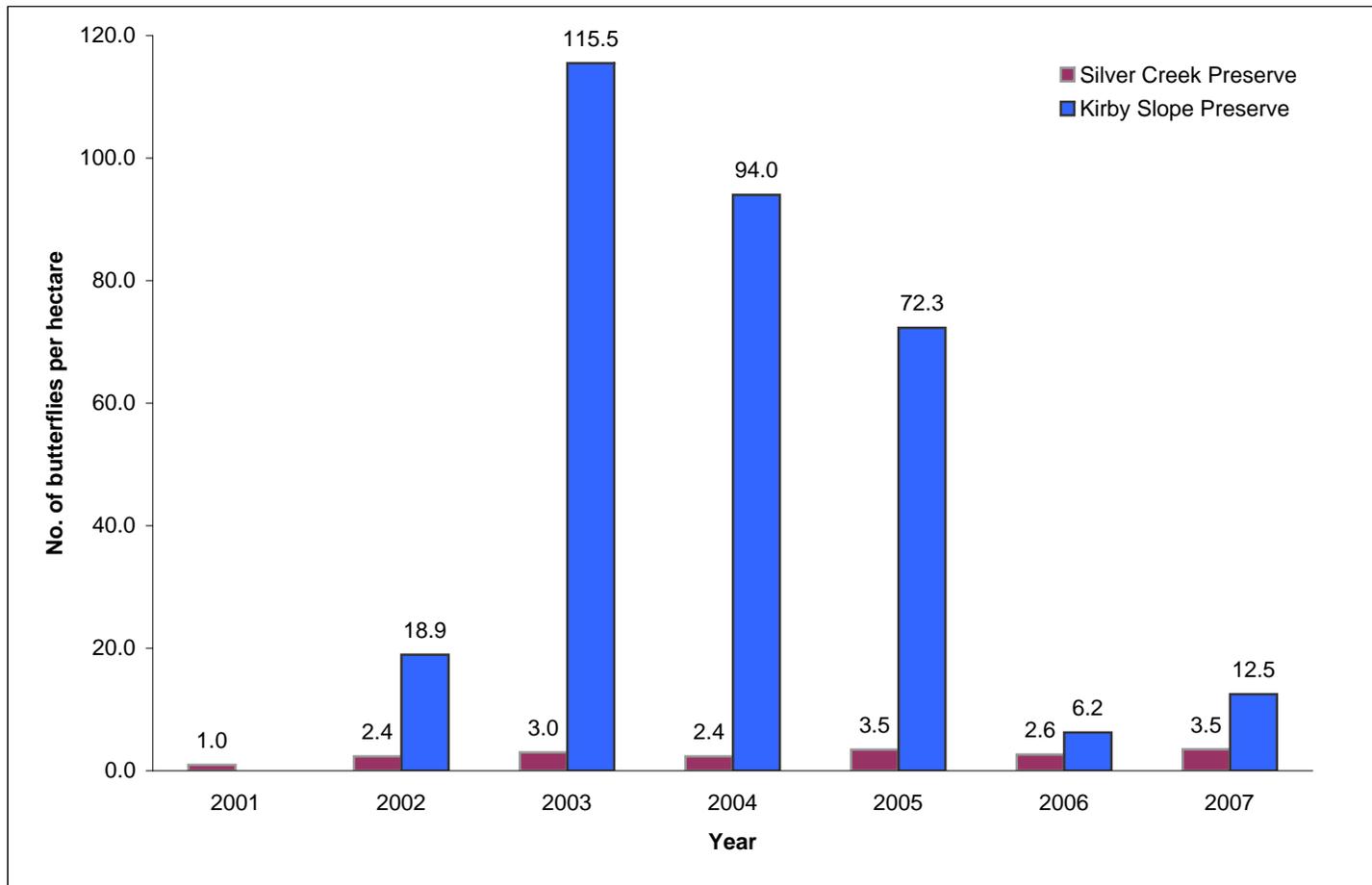
During the flight period, 37 adult butterflies were observed on the Hassler Ranch Preserve, 15 on the Hellyer Ridge Preserve, and 1 on the Yerba Buena Preserve. A total of 86 butterflies were observed at Kirby (Table 1).

Figure 2b illustrates the generally increased trend in adult sightings from 2001-2007 on the Silver Creek Preserve. Given the disparity in survey efforts over the last twelve years, it is difficult to make comparisons with results from years prior to 2001. Changes in monitoring personnel and establishment of new transect routes also make comparisons uncertain. Use of the current transect routes on the Preserve started in 2001 (Live Oak Associates, Inc. 2001). This route resulted in finding 11 adult butterflies in seven visits over the course of 28 days in 2001; 27 butterflies were found in six visits over the course of 35 days in 2002; 34 butterflies were found in

Table 1. Summary of bay checkerspot butterfly surveys for the Silver Creek Preserve and Kirby Slope Preserve in Winter/Spring 2007.

Dates of Surveys (2007)	Observations			
	Hassler Ranch Preserve	Hellyer Ridge Preserve	Yerba Buena Preserve	Kirby Slope Preserve
2/21/2007 (larval) RL/SG	-	-	-	0
2/22/2007 (larval) RL	0	0	0	-
TOTAL LARVAE	0	0	0	0
3/15/2007 (adult) RL/SG	4	2	0	-
3/16/2007 (adult) RL/SG	-	-	-	26
3/21/2007 (adult) BS, JWD	6	0	0	-
3/22/2007 (adult) BS/JWD	-	-	-	32
3/28/2007 (adult) RL/BS	-	-	-	21
3/30/2007 (adult) RL/BS	16	5	0	-
4/3/2007 (adult) RL/JWD	11	8	1	-
4/4/2007 (adult) RL/JWD	-	-	-	6
4/13/2007 (adult) JD	-	-	-	1
TOTAL ADULTS	37	15	1	86

Figure 2b. Bay checkerspot adult butterfly sightings at the Silver Creek Preserve and Kirby.



six visits over the course of 37 days in 2003; 27 butterflies were found in four visits over the course of 34 days in 2004, 51 butterflies were found in seven visits over the course of 42 days in 2005, 40 butterflies were found in seven visits over the course of 39 days in 2006, and 53 butterflies were found in nine visits over the course of 30 days in 2007.

Conclusion

In 2007, 37 adult bay checkerspot butterflies were observed on the Hassler Ranch Preserve, 15 were observed on the Hellyer Ridge Preserve, and one was observed on the Yerba Buena Preserve. A total of 53 adult butterflies was observed on the Silver Creek Preserve compared with 86 adults observed at Kirby. This is the highest butterfly count observed on the Silver Creek Preserve since monitoring began in 2001. The number of butterflies on the Preserve and adjacent parcels is expected to continue to increase as the habitat quality improves further. Reintroduction of cattle grazing on all remaining fenced portions of the Preserve in March 2006 is already producing a noticeable decrease in the height and cover of grass species that compete with butterfly host and nectar plants. Increased grazing activity over the past two years is improving butterfly habitat and should lead to further increases in the number of adult butterflies in 2008.

2.1.2 Dwarf plantain monitoring

Introduction

The primary goal of the host and nectar plant restoration and maintenance program is to reduce non-native annual grass cover and promote adequate densities and distribution of dwarf plantain (*Plantago erecta*) and secondary host plant owl's clover species (*Castilleja densiflora* and *C. exserta*) to support the bay checkerspot butterfly. In order to support a viable and persistent population of bay checkerspot butterfly, dwarf plantain patches must have a density greater than one hundred plants per square meter (H.T. Harvey 1997). The objectives of management activities on the Silver Creek Preserve are:

- At least 17 acres should be established containing dwarf plantain patches in densities of several hundred plants per square meter (City of San Jose, 1993).
- Patches of dwarf plantain should be present on as many aspects of slope as possible.
- Owl's clover, the secondary host plant for bay checkerspot butterfly, should be interspersed with the dwarf plantain in all 17 acres of dense dwarf plantain.
- Appropriate nectar species for bay checkerspot butterfly must be present throughout the Butterfly Preserve in densities sufficient to attract and support adult butterflies.

Managed grazing within the Silver Creek Preserve is the primary method of reducing annual grass cover to improve conditions for the bay checkerspot butterfly host plants. The dwarf plantain monitoring program is designed to measure changes in distribution and density of dwarf plantain and secondary host plants and grasses. This information is used to make any necessary adjustments to the grazing program.

In 1994, Dr. Ray White conducted a survey of dwarf plantain patches with greater than 100 plants per m² within the Hassler Ranch Preserve ("Preserve") (Figure 3a). He mapped patches of dwarf plantain as either smaller individual patches or larger complexes of patches (R. White, personal communication, 2001). A qualitative assessment of dwarf plantain patches conducted by Ray White and WRA on May 1, 2001 found that distribution and density of these patches was

substantially reduced compared to the 1994 survey. Non-native annual grasses, primarily Italian ryegrass (*Lolium multiflorum*) and soft chess (*Bromus hordeaceus*), had increased in height and density. Many dwarf plantain patches surveyed in 1994 could not be located and were presumed to have been replaced by non-native grasses. Patch complexes were generally more discontinuous than in 1994, with smaller patches and lower density of dwarf plantain. The survey found that only one to five percent of the areas mapped as dwarf plantain patches and complexes in 1994 were occupied by similar densities and distribution of dwarf plantain in 2001.

In May 2001, 20 permanent transects were established within potential butterfly habitat on the Preserve (Figure 3a). In order to track the effectiveness of managed grazing in increasing the distribution and density of dwarf plantain and secondary host plants, transects were placed in areas with dwarf plantain and in areas dominated by non-native annual grasses, both inside and outside the dwarf plantain patches mapped in 1994. An additional five transects were established at the Kirby Slope Preserve (“Kirby”) in 2002 as a reference site for comparison (Appendix A). The Kirby transects serve as an ideal habitat reference site, as this area is known to support a large population of bay checkerspot butterfly and has been grazed regularly for many years.

Methods

A total of 20 permanent monitoring transects, each 10 meters long, was established within the Preserve in 2001. This year’s monitoring data was collected on April 2-3, 2007 . Vegetation cover was measured using 0.25 m² quadrats placed at two meter intervals along each transect for a total of five quadrats, or 1.25 m² of area measured along each transect. Percent cover of plant species and bare ground was recorded using Braun-Blanquet cover classes shown in Table 2 and calculated using the percent cover midpoints for each cover class. The number of dwarf plantain and secondary host plant individuals, as well as the maximum and average height of the dominant grass within each quadrat were also recorded.

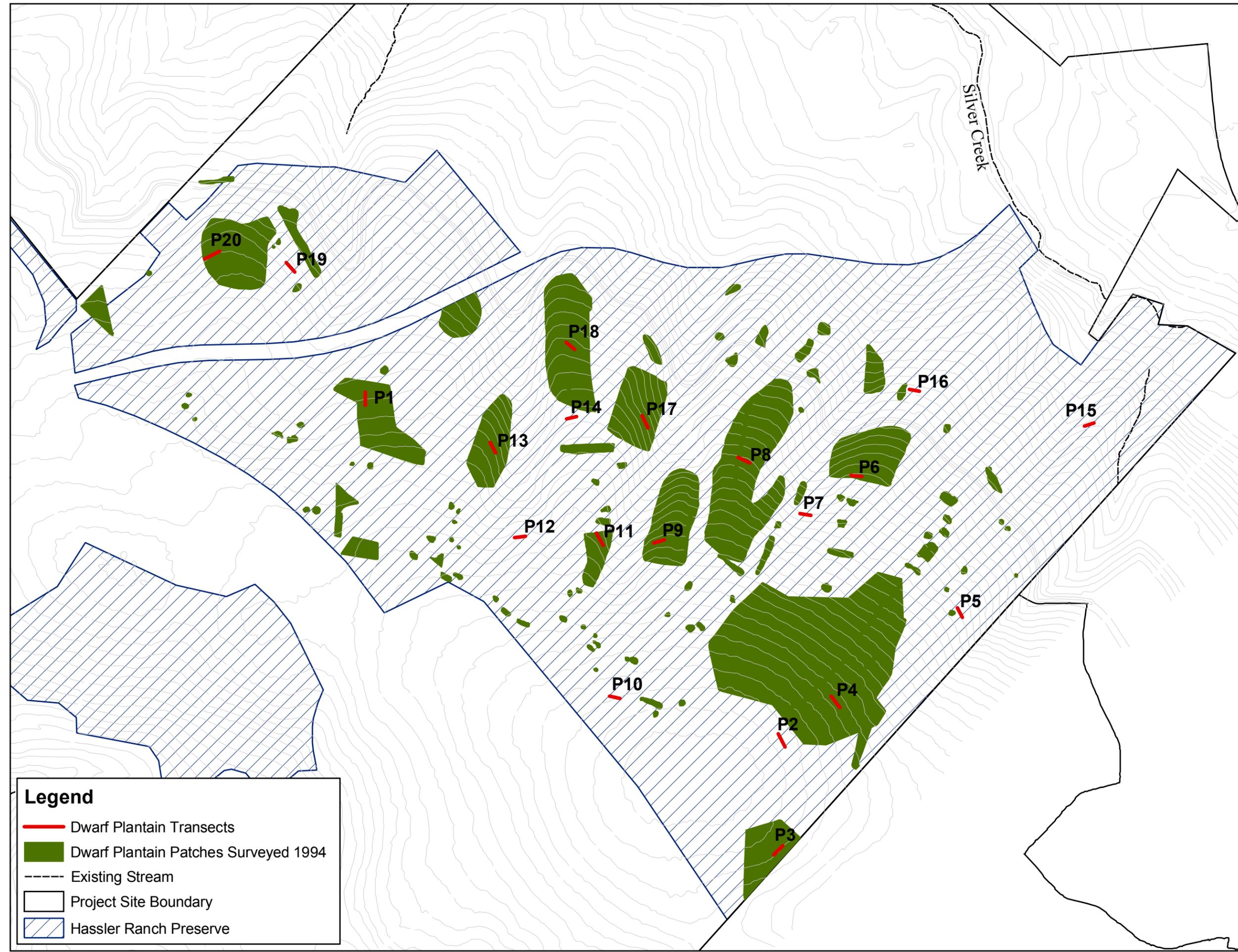
Cover Class	Percent Cover Range	Percent Cover Midpoint
1	0.1-5%	2.5%
2	5-25%	15%
3	25-50%	37.5%
4	50-75%	62.5%
5	75-100%	87.5%

Transects established at Kirby are 24 meters long, with 0.25 m² quadrats placed every four meters along the transect, for a total of five quadrats, or 1.25 m² sampled along each transect. Data were collected at Kirby on April 4, 2007 using the same methods used at the Preserve.

SILVER CREEK PRESERVE
 SAN JOSE, CA

Figure 3a

Dwarf Plantain Transect
 Locations on the
 Hassler Ranch Preserve



Legend

-  Dwarf Plantain Transects
-  Dwarf Plantain Patches Surveyed 1994
-  Existing Stream
-  Project Site Boundary
-  Hassler Ranch Preserve

SCALE: 1"=300'



Results and Discussion

Data from 2007 dwarf plantain monitoring are included in Appendix B, and are summarized in Table 3. Dwarf plantain was observed in all 20 transects, covering all aspects of slope occurring in the Preserve.

Average density of dwarf plantain was 318 individuals per square meter in 2007, comparable to the 304 individuals found in 2004, and substantially greater than the average density of dwarf plantain found in the Kirby transects (187 individuals per square meter) (Figure 3b). Density in 2007 decreased by 19 percent compared to 2006. Density of dwarf plantain at the Preserve in 2007 ranged from 63 to 950 individuals per square meter. The number of transects with dwarf plantain density greater than 100 individuals per square meter (a density adequate for supporting bay checkerspot butterflies) was smaller than in 2006 (14 transects vs. 16 transects). However, it is greater than that observed from 2001-2005.

The average percent cover of dwarf plantain in the transects at the Preserve in 2007 was 9.7 percent, up from 6.4 percent observed in 2006. Percent cover of dwarf plantain at the Preserve ranged from 2.5 to 29 percent (Appendix B). Cover of dwarf plantain at Kirby increased from 9.0 percent in 2006 to 15.9 percent in 2007.

Cover of owl's clover at the Preserve decreased in 2007. The average absolute percent cover of owl's clover at the Preserve in 2007 was 0.3%, which is noticeably less than that observed since 2003 (Table 3, Figure 3c). Cover of owl's clover ranged from 0 to 1.5 percent in 2007, and the number of transects with owl's clover (*C. exserta*, *C. densiflora*) present decreased from 14 transects in 2006 to 7 transects in 2007. Average percent cover of owl's clover increased at Kirby, from 0.3% in 2006 to 0.6% in 2007. This is comparable to percent cover observed in 2004 and 85 percent lower than levels in 2002, when percent cover of owl's clover was greatest at Kirby.

Year	Density of dwarf plantain (plants/m ²)	Absolute percent cover of dwarf plantain	Absolute percent cover of owl's clover	Absolute percent cover of nectar species	Absolute percent cover of non-native grasses	Height of grasses (in inches)
Preserve						
2001	137	5.0%	0.25%	1.0%	58.38%	27.6
2002	185	4.75%	0.25%	3.38%	58.0%	14.3
2003	407	6.3%	0.4%	5.0%	40.6%	7.1
2004	304	7.9%	0.9%	2.0%	47.9%	4.9
2005	204	7.6%	0.93%	3.2%	39.6%	0.7
2006	394	6.4%	1.5%	5.2%	53.3%	0.5
2007	318	9.7%	0.3%	3.8%	44.6%	4.0

Kirby						
2002	598	17%	4%	6.5%	34%	10
2003	417	19.1%	1.3%	4.5%	34.7%	5.2
2004	453	17.9%	0.5%	3.5%	32.8%	5.4
2005	496	9.9%	0.8%	4.7%	25.8%	0.6
2006	472	9.0%	0.3%	4.0%	31.7%	0.4
2007	187	15.9%	0.6%	4.6%	47.6%	3.2

Average cover of nectar plants at the Preserve decreased from 5.2 percent in 2006 to 3.8 percent in 2007 (Figure 3d). Percent cover of nectar plants at the Preserve in 2007 ranged from 0 to 11.5 percent and at least one nectar plant species was observed in 19 of 20 transects at the Preserve during 2007, compared to 17 transects in 2006 (Appendix B). Cover of nectar plants at Kirby was 4.6 percent, a slight increase from 2006 and 29 percent less than 2002, when cover of nectar plants was greatest.

Cover of non-native grasses decreased at the Preserve but increased at Kirby since 2006 (Table 3, Figure 3e). Absolute percent cover of non-native grasses at the Preserve ranged from 22 to 70 percent. Average cover of non-native grasses in 2007 was 45 percent, a 16.3 percent decrease from 2006. Cover of non-native grasses at Kirby has generally been lower compared to the Preserve but exceeded the cover of non-native grasses at the Preserve for the first time in 2007 (Table 3). Italian ryegrass, slender wild oat (*Avena barbata*), and soft chess were the dominant grass species observed within the quadrats at the Preserve in 2007. The mean height of the dominant grass species increased considerably at both the Preserve and Kirby (Table 3) back to levels seen prior to the very wet, cold springs in 2005 and 2006.

Conclusion

Average dwarf plantain density at the Preserve was at its peak in 2003 when the number of plants per square meter was double the preserve goal. Though dwarf plantain density declined in 2007 from 2006, it still remains high. Dwarf plantain density at Kirby has decreased considerably since 2006 and for the first time, is less than that observed at the Preserve. On average, dwarf plantain at the Preserve currently occurs at densities two to three times that required to support bay checkerspot butterflies (at least 100 plants per square meter).

Approximately five percent cover of dwarf plantain is sufficient to provide a density of 100 plants per square meter. Average cover of dwarf plantain at the Preserve has remained above this level since 2003. Average cover of dwarf plantain at Kirby has remained above this level since monitoring began.

Average percent cover of bay checkerspot butterfly secondary host plants at the Preserve decreased in 2007 to 0.3, the lowest percent cover since 2002, while the average percent cover

Figure 3b. Average dwarf plantain density per square meter at the Silver Creek Preserve and Kirby.

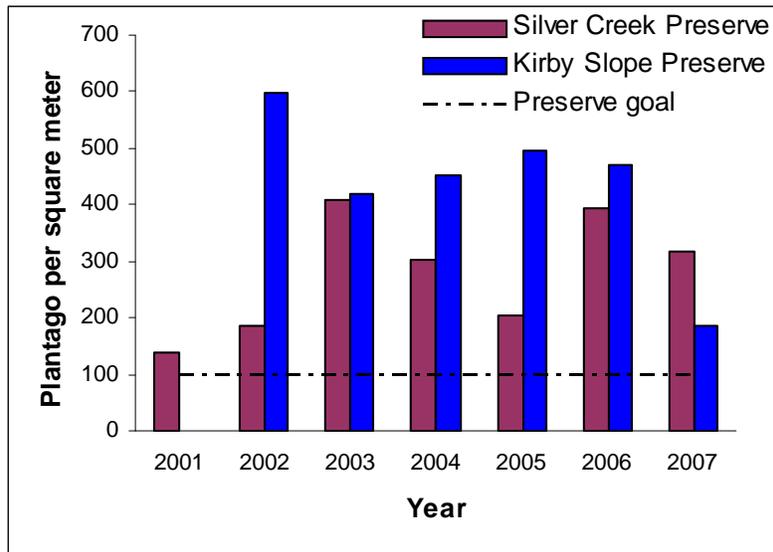


Figure 3c. Average percent cover of bay checkerspot butterfly secondary host plants at the Silver Creek Preserve and Kirby.

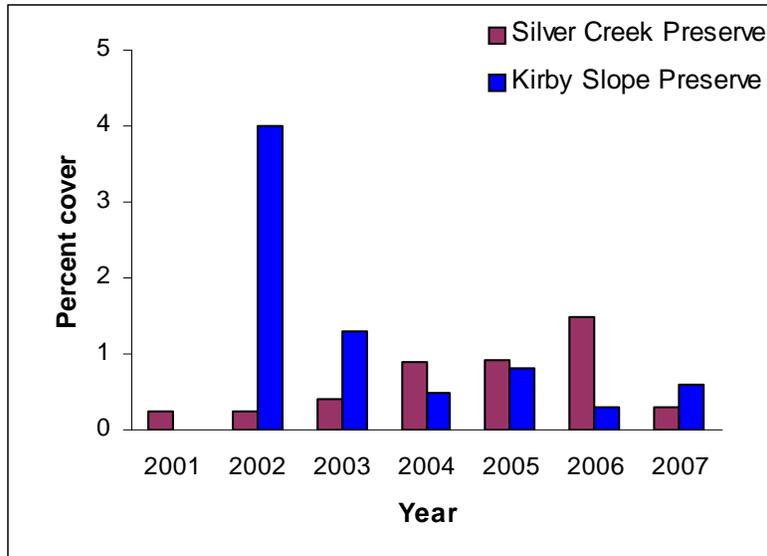


Figure 3d. Average percent cover of bay checkerspot butterfly nectar plants at the Silver Creek Preserve and Kirby.

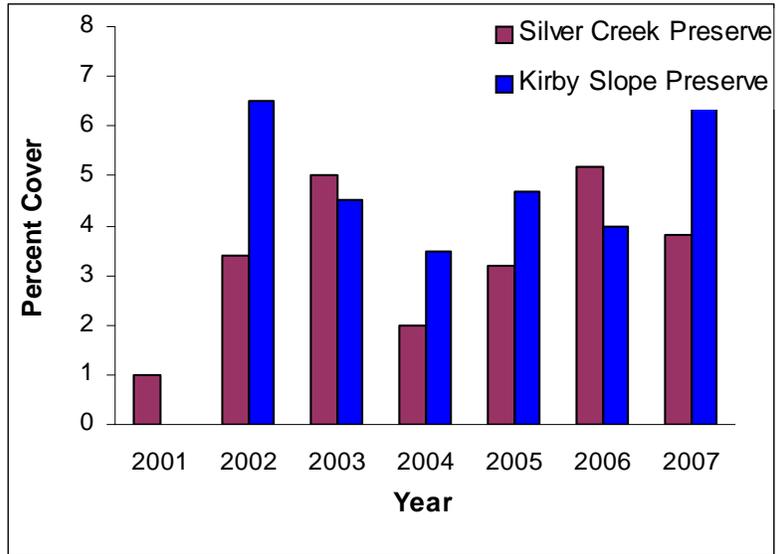
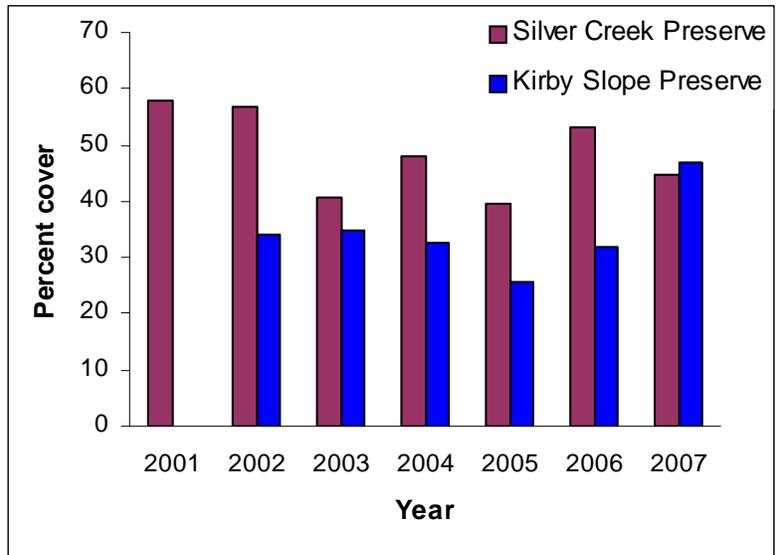


Figure 3e. Average percent cover of non-native annual grasses at the Silver Creek Preserve and Kirby.



at Kirby increased from 0.3 percent in 2006 to 0.6 percent. Average percent cover of bay checkerspot butterfly nectar plants at the Preserve also decreased in 2007 while nectar plant populations at Kirby increased in 2007 to 4.6.

Average percent cover of non-native annual grasses at the Preserve decreased in 2007 to 44.6 and for the first time since monitoring began, was less than the cover of non-native annual grasses at Kirby (47.6 percent). This decline in non-native annual grass cover demonstrates the success of managed grazing as a method for reducing annual grass cover to improve conditions for bay checkerspot butterfly host plants. Average percent cover of non-native annual grasses at Kirby has increased steadily since 2005.

Density of dwarf plantain and cover of owl's clover and nectar species have all decreased since 2006. However, percent cover of non-native grasses also decreased on the Preserve in 2007. This decrease may be due to cattle grazing on the Preserve, which is expected to continue reducing the cover of non-native grasses. As the cover of non-native grasses decreases, cover of dwarf plantain, owl's clover, and nectar species should increase.

2.1.3 Temporarily Disturbed Butterfly Preserve monitoring

Introduction

Approximately 30 acres of the Butterfly Preserve were temporarily disturbed by grading activities to stabilize developed areas during construction at The Ranch on Silver Creek (Figure 4a). These disturbed areas are being restored to conditions resembling those present on undisturbed portions of the Preserve as required in the Biological Opinion. Construction activities in all of these areas, with the exception of an eight acre parcel at the top of the hill, south of Hassler Parkway, were completed in the Fall of 2002 and the areas were stabilized with erosion control fabric and a hydroseed mix. The remaining eight-acre parcel was graded and seeded in Fall 2006. The required seed mix for the Temporarily Disturbed Butterfly Preserve (TDBP) is comprised of native species present on other areas of the Preserve, including purple needlegrass (*Nassella pulchra*), California brome (*Bromus carinatus*), California goldfields (*Lasthenia californica*), tidy tips (*Layia platyglossa*), California melic (*Melica californica*), annual fescue (*Vulpia microstachys*), and dwarf plantain. Protection from access by foot and vehicular traffic is also required in the TDBP. The TDBP is required to meet the following specific performance standards for restoration to be considered successful.

Performance Standards for TDBP Areas:

1. Absolute percent cover of vegetation is within 20 percent of the percent cover in adjacent undisturbed Butterfly Preserve habitat;
2. Absolute percent cover of native species is within 10 percent of the percent cover of native species in adjacent undisturbed Preserve habitat;
3. Absolute percent cover of dwarf plantain is within 20 percent of the cover of dwarf plantain in adjacent undisturbed Preserve habitat;
4. Absolute percent cover of bay checkerspot butterfly nectar and host plant species is within 20 percent of the percent cover of nectar and secondary host plant species in adjacent undisturbed Preserve habitat; and

5. There is less than five percent absolute percent cover of invasive plant species on the CallIPC High List within the restoration area.

The temporarily disturbed areas are expected to meet these standards by the end of five years of monitoring. Spring 2007 was the fifth year of monitoring for most of these areas. Annual monitoring of the TDBP will continue until performance standards are met.

Methods

In April 2003, 16 permanent transects, each 24 meters long, were established within the TDBP. Four additional transects were added to the remaining eight acre parcel in Spring 2006. On April 3-4, 2007, monitoring data were collected by placing 0.25 m² quadrats at four meter intervals along each of the 20 TDBP transects, for a total of 1.25 square meters of area monitored along each transect. Percent cover of each species and bare ground was recorded within each quadrat using Braun-Blaquet cover classes (Table 2). Percent cover of each species and bare ground was calculated using the midpoints of each cover class. Data from the TDBP monitoring transects were compared to data from undisturbed areas of the Preserve gathered on April 2-3, 2007 (Section 2.1.2) to determine if the temporarily disturbed areas are being successfully restored to conditions observed in adjacent undisturbed areas.

Results and Discussion

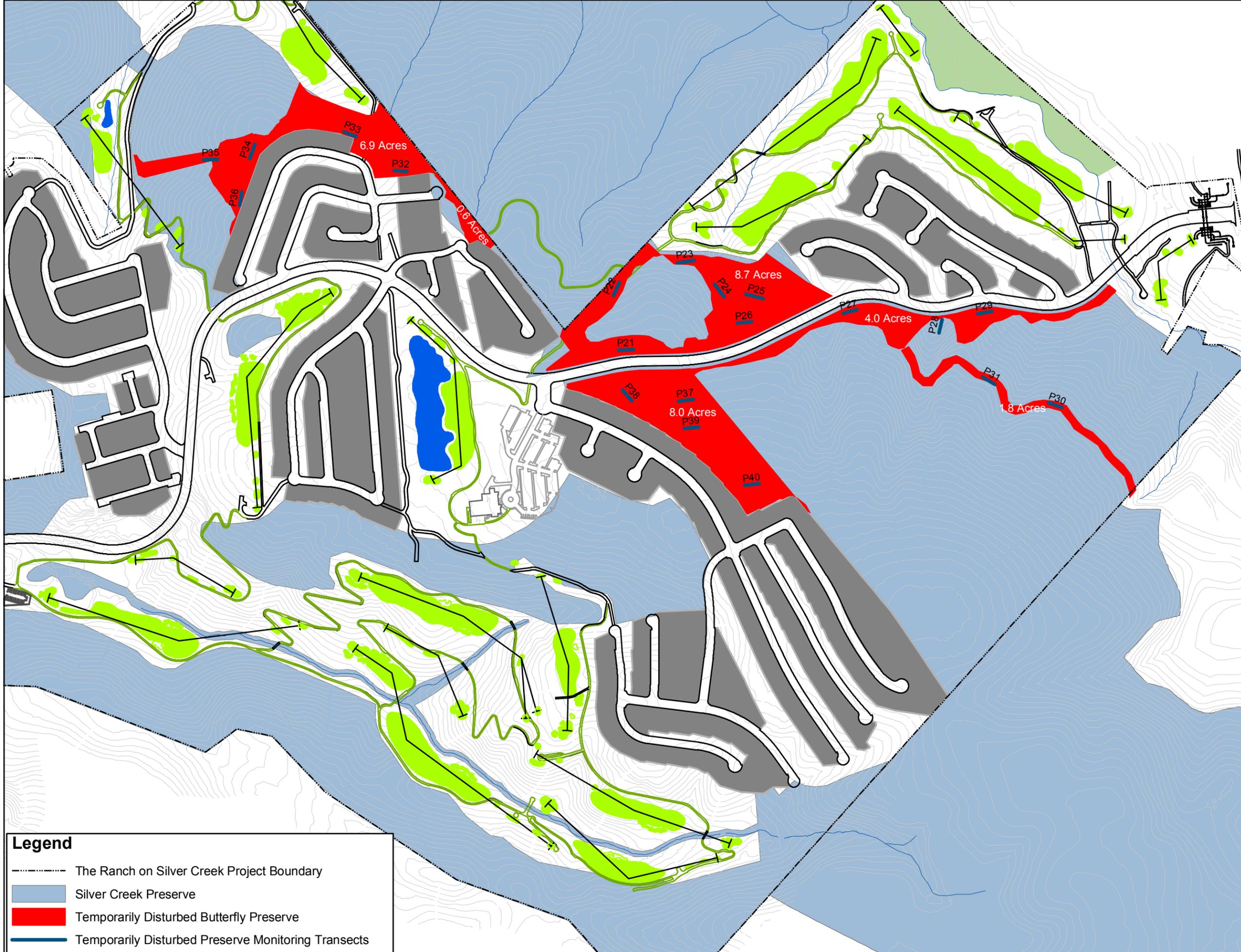
Data from the fifth year of monitoring in the TDBP are included in Appendix B, and are summarized in Table 4. The percent cover of vegetation in the TDBP and the Butterfly Preserve in 2007 was 74 percent, which exceeds Performance Standard #1. Percent cover of vegetation increased substantially in 2007 from 51 percent in 2006 (Figure 4b). Percent cover of native plant species in the TDBP increased in 2007 to 19.9 percent compared to 29.1 percent in the Preserve (Figure 4c). This does not meet Performance Standard #2 (Figure 4c). However, percent cover of native species is greater than that observed in 2005 and 2006. Percent cover of dwarf plantain nearly doubled in 2007 from that observed in 2006 (Figure 4d) but does not meet Performance Standard #3. Percent cover of secondary host plants increased to 1.1 percent in 2007 and exceeds the 0.2 percent cover required by Performance Standard #4a. Percent cover of nectar species increased to 5.9 (Figure 4e) and now exceeds Performance Standard #4b. Invasive species were not found in any of the transects within the TDBP, satisfying Performance Standard #5. Four of the six performance standards were met in 2007 and the remaining Performance Standards were closer to being met in 2007 than in 2006.

The dominant plant species within the quadrats in the TDBP were soft chess (*Bromus hordeaceus*), bur-clover (*Medicago polymorpha*), slender wild oats (*Avena barbata*), and Italian ryegrass (*Lolium multiflorum*). Percent cover of vegetation ranged from 44.5 to 104; bare ground ranged from four to 72.5 (Appendix B). Percent cover of native species in the transects ranged widely, from one to 74 percent. All of the transects contained at least one native species. Dwarf plantain was observed along 14 of the monitoring transects in 2007, compared to nine of the transects in 2006. Percent cover of nectar species ranged from 0 to 22.5 percent. Invasive species were not found in any of the transects and only one of the 20 transects was dominated (contained >50 percent cover) by non-native grasses (Appendix B).

SILVER CREEK PRESERVE
SAN JOSE, CALIFORNIA

Figure 4a

Temporarily Disturbed
Butterfly Preserve Areas



Legend

-  The Ranch on Silver Creek Project Boundary
-  Silver Creek Preserve
-  Temporarily Disturbed Butterfly Preserve
-  Temporarily Disturbed Preserve Monitoring Transects

SCALE: 1 inch= 500 feet



Figure 4b. Average percent cover of vegetation at the Butterfly Preserve and TDBP.

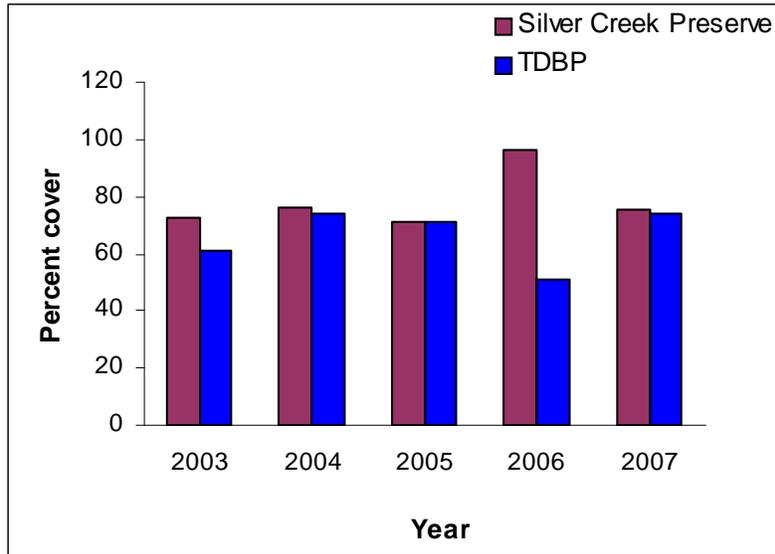


Figure 4c. Average percent cover of native species at the Butterfly Preserve and TDBP.

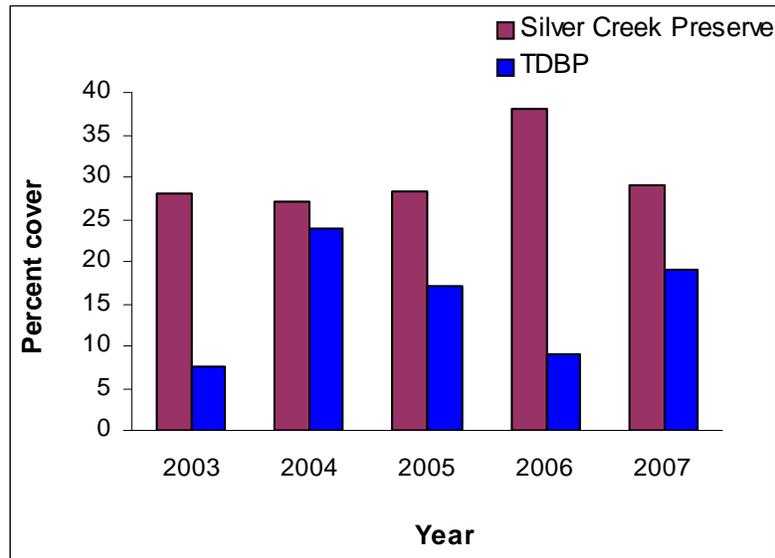


Figure 4d. Average percent cover of dwarf plantain at the Butterfly Preserve and TDBP.

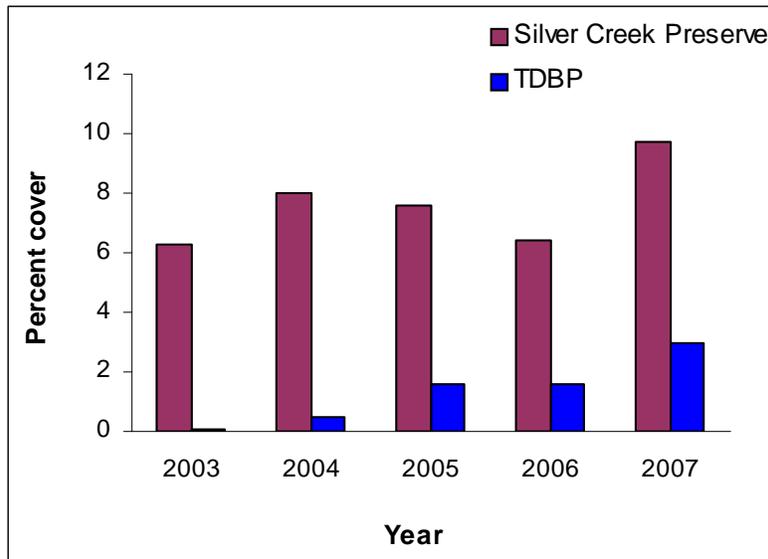


Figure 4e. Average percent cover of nectar species at the Butterfly Preserve and TDBP.

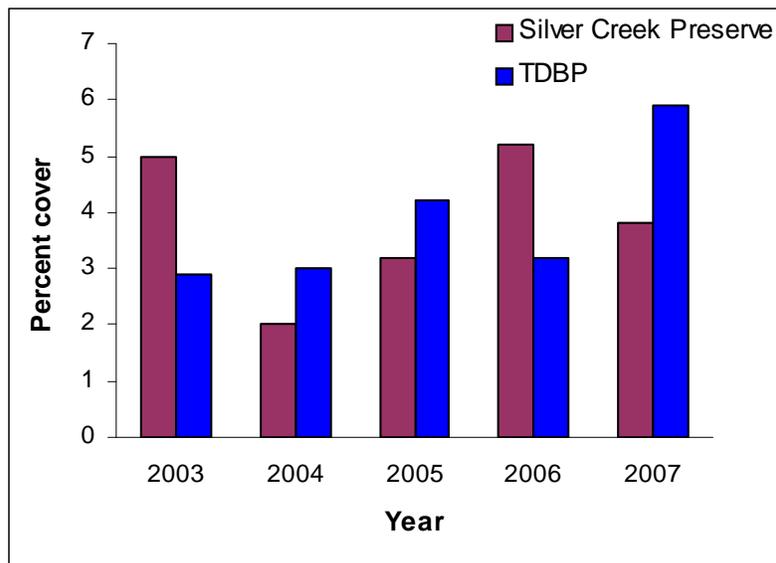


Table 4. Summary of results of 2007 monitoring of the Temporarily Disturbed Butterfly Preserve.				
Performance Criteria	Butterfly Preserve	TDBP	Performance Standards	Meets Performance Standard?
1. Average percent cover of vegetation.	75.1%	74.3%	>60%	Y
2. Average percent cover of native species	29.1%	19.9%	>26%	N
3. Average percent cover of dwarf plantain	9.7%	3.0%	>7.8%	N
4a. Average percent cover of bay checkerspot butterfly secondary host plants	0.3%	1.1%	>.24%	Y
4b. Average percent cover of bay checkerspot butterfly nectar plants	3.8%	5.9%	>3.0%	Y
5. Average percent cover of invasive species	0.5%	0%	<5%	Y

The eight acre parcel at the top of the hill, south of Hassler Parkway was seeded in for a second time in Fall 2006 with nectar species including dwarf plantain, owl's clover, and California goldfields (*Lasthenia californica*). The seeding was successful. Though under-represented in the transects, nectar species were abundant throughout the eight acre parcel. The success of seeding was aided by grazing, which was introduced prior to seeding and kept the non-native grass populations low, thereby minimizing competition between non-native grasses and the seeded nectar species.

Conclusion

Four of the six performance standards were met in 2007: average percent cover of vegetation was greater than 60 percent, average percent cover of secondary host plants was greater than 0.2 percent, average percent cover of nectar species was greater than 3.0 percent, and average percent cover of invasive species was less than five percent. Average percent cover of native species and dwarf plantain were not sufficient to conclude that the temporarily disturbed areas have been successfully restored to conditions resembling adjacent undisturbed areas.

Conditions continue to improve in the TDBP. Percent cover of vegetation, dwarf plantain, and nectar species have all increased since monitoring first began in 2003, while invasive species appear to have been eliminated. Grazing was implemented in 2006 in all portions of the TDBP and as expected, the cover of native vegetation increased in 2007. Cover of non-native grasses also increased. However, as grazing continues in the TDBP, the cover of non-native grasses is expected to decrease while the cover of native vegetation is expected to continue increasing. The improving conditions at the TDBP observed in 2007 are largely due to grazing activity and the successful seeding effort in the eight acre parcel.

2.2 California Red-Legged Frog

Introduction

California red-legged frog (CRLF) (*Rana aurora draytonii*), is a federal-listed threatened species (May 23, 1996) and CDFG Species of Special Concern. The range of the frog extends along the coast from Marin County to northwestern Baja California and inland from the vicinity of Redding, Shasta County. It is typically associated with isolated ponds or pools, or slow-moving perennial or ephemeral streams, where water remains long enough for breeding and development of young. Emergent or shoreline riparian vegetation closely associated with deep, still, or slow-moving water is the preferred but not essential habitat. California red-legged frog breeds from November to April; larval young require 3.5 to 7 months in suitable aquatic habitat to metamorphose (Jennings et al. 1993). Adults may disperse to nearby aquatic areas and foraging habitat or estivate in upland habitat until the winter rains return.

Summary of Management Actions, 2007

No direct management actions were taken for California red-legged frog in 2007. Annual surveys for CRLF and non-native bullfrogs were conducted on July 3, 2007 at the irrigation pond on Hole 18, the Quarry Pond (adjacent to Hole 7), and the detention basin just west of the Quarry Pond. The Created CTS pond in Hellyer Canyon (mitigation wetland 7) was dry and therefore did not constitute habitat for CRLF or bullfrogs. No observations of CRLF or bullfrogs resulted from these surveys.

Recommendations

Suitable CRLF breeding habitat does exist in the ponds on the Silver Creek Preserve and visual surveys for egg masses and tadpoles should be continued annually. Annual monitoring for bullfrog and/or CRLF presence in aquatic habitat will be conducted during California tiger salamander monitoring as well as one additional time in late summer. All observed bullfrog adults and larvae will be dispatched if possible.

2.3 California Tiger Salamander

Introduction

California tiger salamander (CTS) was a federal candidate species at the time of issuance of the Biological Opinion for this project in October 2000, but was federally-listed as a threatened species in August 2004. This species is also a California Species of Special Concern. CTS is restricted to grasslands and low foothill habitats where aquatic sites are available for breeding. They prefer natural ephemeral pools or ponds that mimic them, such as stock ponds. California tiger salamander is prone to local extinction because of its relatively long period of metamorphoses and small breeding populations, and require large contiguous areas of multiple potential breeding ponds to avoid extinction at any one pond. After breeding and development, the salamanders seek refuge in upland burrow habitat often associated with California ground squirrels.

CTS were observed on The Ranch on Silver Creek project site during surveys in 1998. To prevent impacts to the species due to construction activities, a salvage and translocation effort was conducted on-site by moving the salamanders to a newly-created pond ("Created CTS Pond") in

upper Hellyer Canyon on the Preserve, in accordance with an agreement with the California Department of Fish and Game, entitled the *CTS Mitigation Plan, Part 1, On-site Salvage Plan - Version 5* (CDFG 2000). Sycamore Associates prepared reports describing this effort in 1999-2000 (Sycamore Associates, 2000 and 2001). WRA conducted pitfall trapping in the winter of 2000-2001 and conducted aquatic larval surveys in the Created CTS Pond on the Hassler Ranch Preserve to confirm that the CTS relocation effort was successful. No CTS were observed in the impacted portion of the project site during the 2000-2001 season and five larval CTS were observed at the Created CTS Pond in 2001, indicating a successful relocation effort.

Summary of Management Actions, 2007

Aquatic larval surveys were conducted in March 2007 in the Created CTS Pond on the Hassler Ranch Preserve and in a small pond located upstream along Hellyer Creek.

Results and Discussion

Annual monitoring conducted in March 2007 found no CTS larvae in the Created CTS Pond or in the small pond located upstream. The Created CTS Pond only held about two inches of water at the time of monitoring and the small pond upstream was completely dry during monitoring. Neither pond provided adequate breeding habitat for CTS larvae due to the very limited rainy season experienced in 2007. However, both ponds are expected to again provide suitable habitat for CTS larvae when more normal rainfall patterns resume. There continue to be large numbers of California ground squirrels in the area, as observed by WRA personnel during multiple site visits, so suitable burrow habitat is available to CTS for the non-breeding portion of their lifecycle.

Conclusion

The two ponds in upper Hellyer Canyon will continue to be monitored annually through 2010 to document any salamander breeding that may occur. The Created CTS Pond has been shown to provide suitable sustainable breeding habitat for CTS on the Silver Creek Preserve based on presence of CTS larvae in 2000-2003, and 2005-2006.

2.4 Tule Elk

Tule elk (*Cervus elaphus nannodes*) were observed on the Hassler Ranch Preserve in 2007. Individuals were observed grazing along the ridge south of Hellyer Canyon. No additional monitoring or management activities are planned for this species, but incidental observations will be made during Preserve visits.

3.0 PLANTS

3.1 Santa Clara Valley Dudleya

Introduction

Santa Clara Valley dudleya (*Dudleya setchellii*) is federal-listed as endangered and is on CNPS List 1B. Santa Clara Valley dudleya (“dudleya”) is known only from Santa Clara County, and is restricted to the hills surrounding the southern end of the Santa Clara Valley from San Jose south about 20 miles to San Martin (CDFG 2005). It grows on and around weathered serpentine rock outcrops in shallow surface depressions, cracks, and fissures between 80-980 feet in elevation.

Dudleya is found throughout the Hassler Ranch Preserve (henceforth referred to as “the Preserve”) with the majority of the plants located on south, southwest, and west facing slopes. In 1998, a total of 21,947 plants were counted and mapped at The Ranch on Silver Creek Project Area (Sycamore Associates 2000). The 1998 number is considered the pre-project population number.

There are 35 Plant Conservation Areas (PCAs) located within the Preserve; 22 of these are known to contain dudleya (PCAs 1-17 and 31-35). Permanent monitoring plots enclosing all known dudleya patches within PCAs 7-15, 17, and 31-35 were staked and labeled in 1998 (Sycamore Associates 2000). PCAs 1-6 and 16 were not divided into plots at that time; each of these PCAs was treated as a single monitoring unit during initial population surveys.

Summary of Management Actions, 1999-2007

A summary of management actions from 1999-2007 is presented in Table 5. In 1999, Sycamore Associates removed 3,573 mature dudleya from the Project Area (Sycamore Associates 2000). Of these, 1,277 were immediately transplanted into suitable PCAs; the rest were held in the on-site nursery, which also housed additional plants either removed as tiny seedlings or grown from collected seed. In late 1999, approximately 0.13 acres of rocky serpentine dudleya habitat was created in the quarry area. After initial plant removal and relocation management actions were completed, 17,450 of the 21,947 pre-project plants remained within natural areas of the Preserve.

In 2000, 2,177 plants held in the nursery were transplanted into the quarry (PCA 7). In addition, 102 adult plants were removed from the Project Area and directly transplanted into the quarry. Additional seedlings were removed and transferred to the nursery. A 2000 survey of the Preserve (Sycamore Associates 2000) located 19,094 natural plants and 673 surviving transplants in PCAs.

In 2001, 257 dudleya held in the nursery until maturity were transplanted into suitable rocky serpentine habitat areas of PCAs 32 and 33. An additional 50 adult plants from Plot 406 (PCA 10) were removed and immediately transplanted into transplant Plot 446 within this PCA. Permanent monitoring subplots for naturally-occurring dudleya were established in PCAs 1-6 and 16, which previously had not had them. During 2001 monitoring, an extrapolated total of 23,271 naturally-occurring dudleya, and 2,464 surviving transplants were counted within the Preserve.

In March 2002, 25 mature plants were removed from the North Quarry and transplanted into new plots located west of the quarry, but still in PCA 8. Additionally, nine adult plants were removed from PCA 10 and PCA 17 and placed in pots for dry season care.

Table 5. Summary of dudleya management actions, 1999-2007.				
Year	Natural population	Plants removed	Plants transplanted	Surviving transplants
1998	21,947	--	--	--
1999	--	3,573	1,277	--
2000	19,083	102	2,279	2,952
2001	22,058	50	307	2,464
2002	24,096	34	25	2,166
2003	29,668	2	11	1,486
2004	23,949	0	0	890
2005	26,951	0	0	851
2006	16,553	0	0	766
2007	15,356	0	0	725
TOTAL	--	3,761	3,899	--

In January 2003, two mature plants were transplanted within Plot 259 in the quarry. The nine additional mature plants placed in pots the previous year were transplanted into PCA 17.

All transplants and seeded plots were monitored for survival in April 2007. In addition, population monitoring of natural plants was conducted by stratified sampling within the Preserve. No dudleya transplanting has taken place since 2004 and no future transplanting is expected now that project construction has been completed.

Performance Standards

The final performance standard, at the end of the ten-year restoration and monitoring period, is to achieve, at a minimum, preservation of natural plants within the Preserve (no net loss from the 1998 number of plants counted), 100 percent replacement of all impacted dudleya plants, and 1:1 replacement of lost dudleya habitat on an acreage basis. The project has impacted 3,761 individual plants and approximately 0.87 acres of occupied dudleya habitat as a result of construction activities; therefore, at least 21,947 plants and approximately 0.87 acres of new occupied dudleya habitat will be established on the site by 2010 (plant number and acreage figures based on 1998 field data and 2005 GIS data analysis of the area within impacted dudleya plots).

Methods

Dudleya monitoring during the ten-year restoration and management program on the Preserve includes the following annual components:

(1) Annual spring stratified sampling of preserved dudleya plots: plots were randomly selected in 2001 from each of the PCAs that contain dudleya for use as reference plots. Within each PCA, additional reference plots were selected until the total number of dudleya counted in selected plots exceeded 10 percent of the pre-project preserved population for that PCA. A new set of reference plots was selected in 2006 using this method as specified in the RMP. In 2007, the set of reference plots was increased by 5 percent per PCA, making the sample size 15 percent of the total number of plots within each PCA. Seedling and mature plants in the reference plots were counted in April 2007. Surrounding suitable habitat was also searched for new and previously uncounted plants.

(2) Annual spring survivorship monitoring of all dudleya transplants: tags were placed on most of the 3,556 plants transplanted in 1999 and 2000. Monitoring the survivorship of transplanted dudleya consisted of locating each of the remaining transplanted dudleya and recording if it is alive or dead.

(3) Annual spring survivorship monitoring of seeded dudleya areas: seeded plots were monitored in April 2007 and the total number of dudleya seedlings was estimated. Plants with four or more leaves greater than one inch long are recorded as adults; plants with leaves 1/4 to 1 inch long are recorded as "juveniles"; and plants smaller than 1/4 inch are recorded as seedlings.

(4) Annual calculation of habitat occupied by dudleya: habitat occupied by dudleya is calculated using ArcView software. The total area of occupied transplant and seed plots is compared to the area of natural plots that were removed from 1999 to 2003.

Results and Discussion

Preserved Dudleya

Mature plants were counted in each reference plot during 2007 spring monitoring, conducted on April 2nd-3rd. Locations of PCAs containing dudleya within the Preserve are shown in Figure 5a. Adult totals per plot were then compared to totals from the same reference plots counted in 1998 to assess population trends in individual plots. The number of naturally-occurring dudleya plants in 2007 for the entire Preserve was calculated by dividing the total of all reference plots (PCAs 7-15, 17, and 31-35 only) counted in 2007 by the total of all corresponding 1998 plots to determine the average percent change for the Preserve. This number was then multiplied by the total number counted in preserve plots in 1998.

Naturally-occurring dudleya calculation:

2,091 dudleya were counted in 2007 reference plots.

2,375 dudleya were counted in corresponding plots in 1998.

17,450 dudleya were counted in all Preserve plots in 1998.

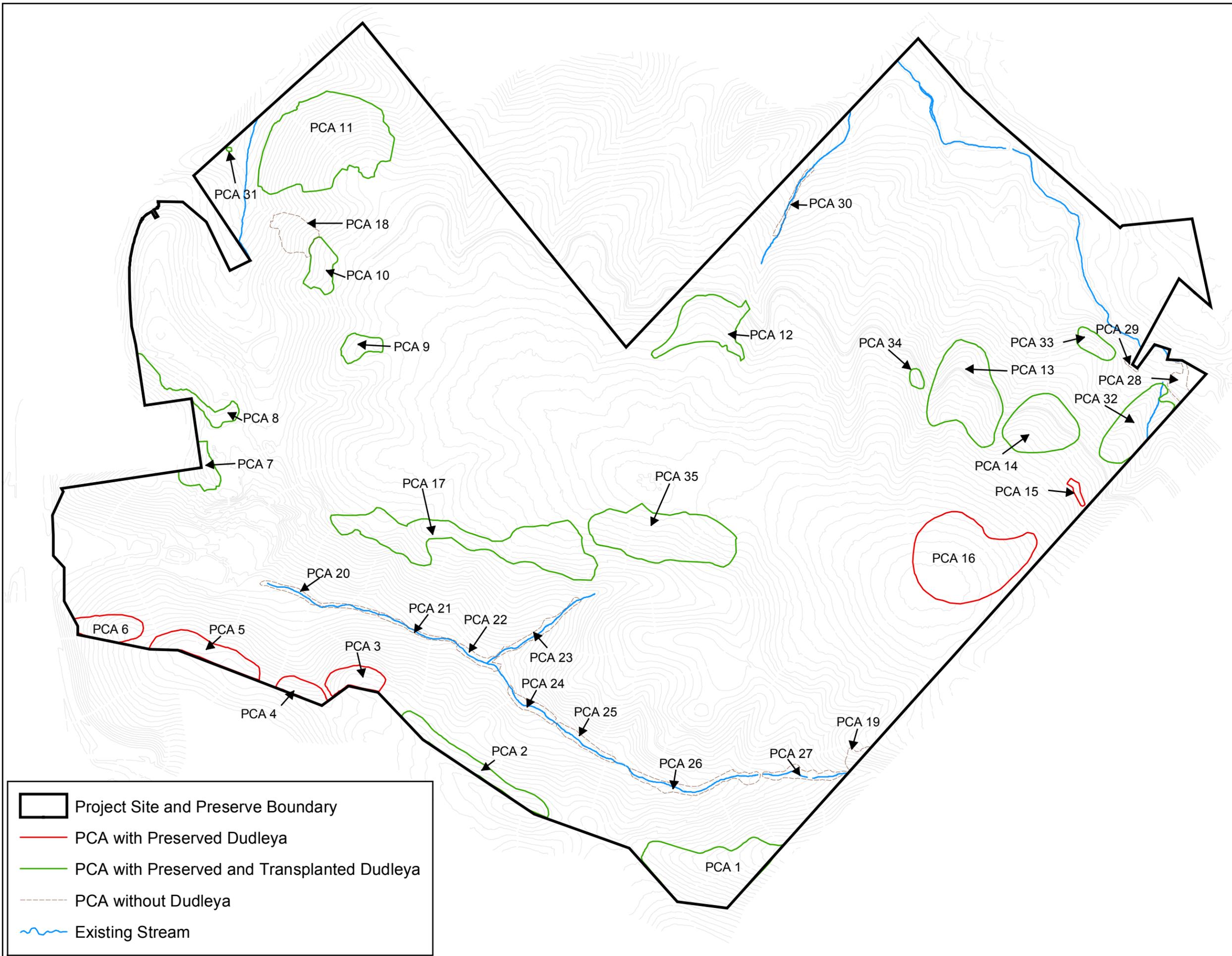
$2,091/2,375 = 88$ percent of the number of dudleya counted in 1998.

$0.88 \times 17,450 = 15,356$ naturally-occurring dudleya estimated to occur on the Preserve in 2007.

Numbers of adult dudleya counted within the plots of each PCA and the 2007 extrapolated totals per PCA are provided in Appendix B(ii). A summary of this data by PCA is given in Table 6. A comparison of Preserve population totals from 1998-2007 is shown in Figure 5b. As shown above, the sampled dudleya population is 12 percent smaller than it was in 1998. This is the second year

Figure 5a

Locations of Santa Clara
 Valley Dudleya within the
 Hassler Ranch Preserve



-  Project Site and Preserve Boundary
-  PCA with Preserved Dudleya
-  PCA with Preserved and Transplanted Dudleya
-  PCA without Dudleya
-  Existing Stream

SCALE: 1" = 600'



that the extrapolated total of naturally-occurring dudleya total is smaller than the 1998 total. The decrease in population size may be due in part to rodent activity. As high rodent activity has been suspected in the last few years, management actions to reduce the rodent population should be implemented and additional seeding should be undertaken in these areas. Also, the low amount of rainfall in 2007 may have affected survival rates of dudleya seedlings and juveniles.

Transplanted Dudleya

Survivorship monitoring of all 1999-2003 transplanted dudleya was conducted on April 2, 2007. The surveys involved visiting all plots on the Preserve which were known to have transplants and recording survival status (alive or dead) and location (by PCA number and plot number) of all observed transplants. After 2007 monitoring, 725 of the 3,899 transplanted dudleya (18.4%) were alive (Figure 5c). Transplant survival is given by plot in Appendix B(ii) and is summarized by PCA in Table 7.

Seeded Dudleya

Dudleya seed collected in September 2006 was redistributed in November 2006 into seed plots established in 2001-2004, and were monitored in March 2007 to assess seed germination and seedling survival rates. The total number of dudleya seedlings, juveniles, and adults were estimated per plot. The seedlings are from the 2006 seeding, while the adults and juveniles represent the 2001-2005 seeding efforts.

In 2007, 118 adults, 50 juveniles and 9 seedlings were found in the seeded plots (Table 8). Though the seeded dudleya survival counts are lower in 2007 than in 2006, past years have shown that dudleya plants successfully propagate from seed. The low counts in 2007 are likely due to the low amount of rainfall received in the spring. Additional seed was collected from healthy plants in September 2007, and is scheduled to be distributed in late fall of 2007. Seeding will continue to occur in late fall through 2008 to ensure that all existing seed plots, as well as fire or rodent-depleted plots, are successfully occupied, and that plant numbers continue to increase.

Dudleya Habitat

The calculated area occupied by dudleya in 2007 is 0.91 acre; this now replaces the 0.87 acre of habitat lost from plant removal. Seeding efforts will continue for several more years to ensure that seeding and transplant plots with very few plants remain occupied.

In July 2005, a fire along Highway 101 spread into the west edge of the Preserve and burned the western portion of PCA 8. The fire did not seem to have a large impact on the dudleya population as live naturally occurring and transplanted dudleya plants were observed during the 2006 and 2007 monitoring. However, the naturally-occurring dudleya population is noticeably smaller than it was in 1998. Seed was spread in PCA 8 in November 2006 and additional seed will be spread in PCA 8 in late Fall 2007.

Potential impacts of grazing to dudleya health and survival were assessed during 2007 annual monitoring. Minor damage to dudleya continued to be observed in portions of the Preserve where cattle graze; none of the plants appeared to be eaten, but a few were uprooted (probably due to hoof impact). The majority of the cattle damage continues to occur to the rebar used to mark the dudleya plots within the Preserve. Rebar maintenance will take place in late Fall 2007 when dudleya seed are dispersed within the PCAs.

Figure 5b. Hassler Ranch Preserve dudleya population trends

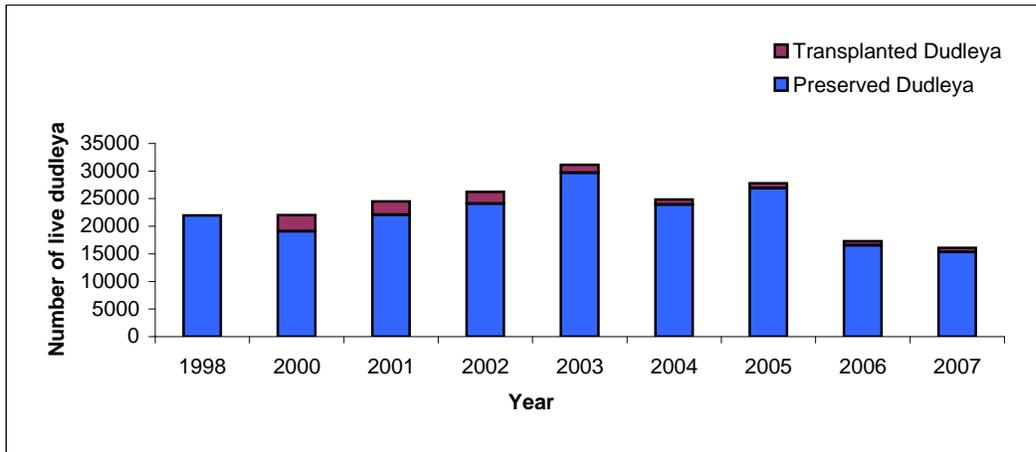
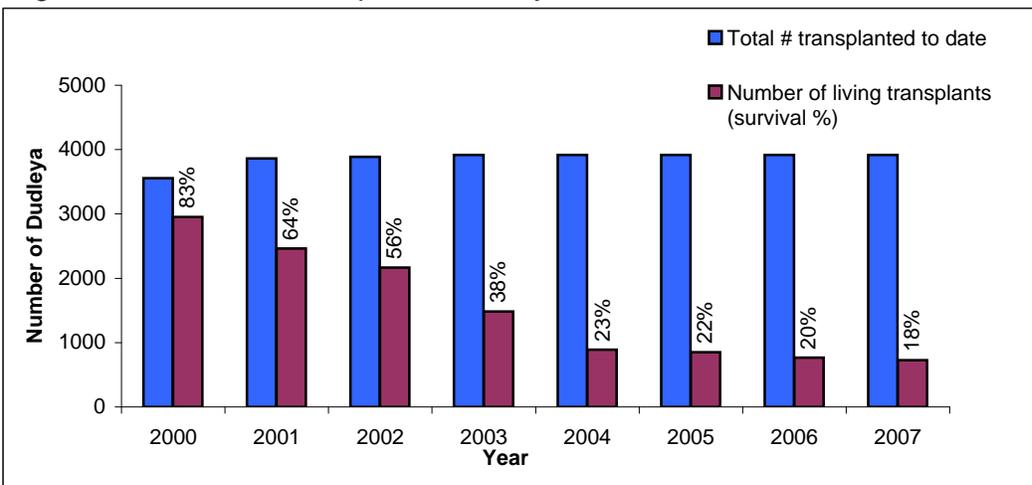
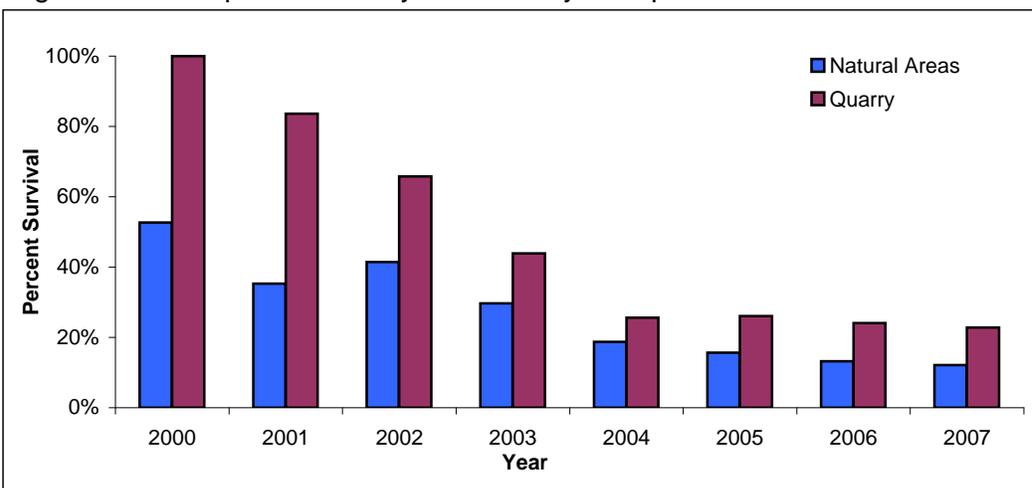


Figure 5c. Survival of transplanted dudleya*



*Survival results suggest that each individual plant has a finite life span.

Figure 5d. Transplanted dudleya survival by transplant location



PCA	1998*		2007
	Total (All Plots)	Reference Plots	Reference Plots
1	1308	N/A**	181
2	483	N/A**	34
3	64	N/A**	17
4	164	N/A**	6
5	443	N/A**	52
6	369	N/A**	22
16	1293	N/A**	471
7	2026	445	361
8	3387	572	177
9	628	158	146
10	324	52	27
11	474	80	131
12	850	141	196
13	143	36	89
14	168	41	70
15	43	43	124
17	1706	262	254
31	8	8	17
32	239	31	48
33	1126	134	194
34	13	13	87
35	2191	339	170
Total PCAs 7-35**	13,326	2,355	2,091
Extrapolated Preserve Total 2007 (see Results for calculation): 15,356			

* 1998 data from Sycamore Associates 2000

** PCAs 1-6 and 16 were not divided into plots until 2001, therefore, these PCAs had no previous plot count data, and extrapolated totals per PCA are not possible to calculate.

PCA	Number of live transplanted dudleya
1	4
2	34
7	534
8	3
9	0
10	0
11	1
13	26
14	21
17	32
32	13
33	49
34	6
35	2
TOTAL:	725

PCA	Adult dudleya	Juvenile dudleya	Seedling dudleya
12	78	30	5
13	2	8	4
14	0	0	0
17	1	0	0
32	10	6	0
33	8	1	0
35	19	5	0
TOTAL:	118	50	9

No apparent impacts from development of the golf course were observed in dudleya habitat in 2007. Results from reference plots adjacent to development areas will continue to assess indirect impacts to dudleya from development in addition to tracking and documenting natural population trends. No clear explanation for the decrease in dudleya numbers was apparent during 2007 monitoring though impacts from rodents (most likely ground squirrels) and limited rainfall have likely affected dudleya numbers in 2007. Management actions to reduce the rodent population are recommended and additional seeding will be undertaken in these areas to attempt to replace the lost plants.

In addition to the monitoring of known Preserve plots, a reconnaissance-level survey is conducted annually throughout the Preserve during the monitoring visit to estimate the size and extent of additional dudleya patches which may become observable if grazing exposes additional potential habitat locations on the site. No such dudleya patches were located during 2007 monitoring.

Conclusion

The population of Santa Clara Valley dudleya within the Preserve has continued to decrease since the 2005 monitoring. The 2007 population estimate is based on a new set of randomly selected plots that were monitored starting in 2006. Additional plots were added in 2007 to increase the sample size of monitored plots to 15 percent of the total number of plots within each PCA. These plots will be monitored until Year 10. The current number of dudleya present on the Hassler Ranch Preserve falls below the 21,947 plants of the 1998 baseline; therefore, the performance standard regarding 100 percent replacement of impacted dudleya plants is not being met. Monitoring of natural plants in Preserve areas has shown a twelve percent decrease in healthy adults within reference plots.

Transplants have also not been as successful as in past years (18.4% survival). New patches of adult dudleya have been found since those originally located in 1998; these individuals and their occupied habitat acreage will be counted in the final total. In addition, many seedlings have been observed within natural, transplant, and seeded areas. Ongoing monitoring efforts suggest that dudleya seeding efforts have more long term success in establishing viable plants than has been observed in transplantation results, and Year 10 plant counts are expected to meet performance criteria.

Total transplants counted alive during 2007 monitoring:	725
Total naturally-occurring plants in 2007:	15,356
Seed plot adults	118
Total dudleya on-site in 2007:	16,199
Total dudleya on-site in 1998:	21,947

The current area occupied by transplanted and seeded dudleya on the Hassler Ranch Preserve is 0.91 acre, which exceeds the 0.87 acre of impacted occupied habitat; therefore, the performance standard regarding 1:1 replacement of impacted dudleya habitat is being met in 2007. In order to sustain this newly occupied habitat, dudleya seeding will continue in existing seed and transplant plots throughout the Preserve.

Approximate occupied habitat acreage lost from plant removal:	0.87 acres
Approximate occupied habitat added to-date:	0.91 acres

A complete census of the entire dudleya population within the Preserve will be performed in Year 10 (2010). Year 7 monitoring results suggest that the performance standard regarding 100 percent plant replacement is no longer being met but is likely to be met in Year 10. The performance standard regarding 1:1 habitat replacement will continue to be met if current management actions continue.

3.2 Metcalf Canyon Jewelflower

Introduction

Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albidus*) is an annual herb of the mustard family. It is a federal-listed endangered species (USFWS 1995) and is included in CNPS List 1B. Metcalf Canyon jewelflower (“jewelflower”) occupies serpentine soils in valley and foothill grassland and chaparral (Tibor 2001). The species is locally ephemeral, appearing in great numbers after soil disturbance such as fire, then decreasing in following years. Jewelflower distribution is limited to Santa Clara County.

Several substantial populations of jewelflower were located on The Ranch on Silver Creek project site (currently the Hassler Ranch Preserve) surrounding serpentine rock outcrops and in non-native annual grassland during surveys in 1992 (City of San Jose 1993); additional patches were located on the project site during a May 1998 survey (City of San Jose, 1999). The populations were distributed in the southern, central, and northern areas of the project site. Approximately 75,000 plants were estimated during a survey census and mapping on the project site in May 1998 (City of San Jose 1999). In contrast, monitoring of the jewelflower population conducted in 1999 did not locate any plants and less than 100 were observed during monitoring in 2000 (Sycamore Associates 2000). During 2001 surveys, the jewelflower population was again observed throughout its 1998 range on the Hassler Ranch Preserve (“Preserve”). Population monitoring has been conducted annually by WRA since 2001 (WRA 2001b, 2002, 2003b, 2004, 2005a, 2006). Total population size estimates have fluctuated from year to year, ranging from 5,800 individuals (2002) to 17,395 individuals in 2007. However, numbers have always been less than the 75,000 observed in 1998 and more than the 100 individuals observed in 2000.

Summary of Management Actions, 2001-2007

Jewelflower seed collected from PCAs on the site in the summers of 2001 and 2002 (WRA 2001b, 2002) was redistributed in late fall of both years in unoccupied habitat areas within the same PCAs. Seed collection and redistribution were conducted in order to facilitate expansion of the plant into all suitable habitat areas in the Preserve. Seed test plots (J1 and J2) were established on the Preserve (in PCAs 1 and 35) in 2001 to assess the seed germination rate of the species. In 2001, these plots were seeded with 100 jewelflower seed pods each; in 2002, each plot received 200 seed pods.

A portion of the collected jewelflower seed was sent to the Rancho Santa Ana Botanical Garden in February 2002 for long-term storage per the Conservation Recommendations in the Biological Opinion (USFWS 2000a). The purpose of long-term seed storage is to preserve a genetic sample of the population, which may eventually be needed for research or restoration purposes.

The 2002 seeding effort was the second and final of the two years of seed collection and redistribution as required by the Biological Opinion (USFWS 2000a). No further seeding actions have been undertaken, and no additional management actions have been required since 2002.

Annual monitoring of the jewelflower population on the Preserve was conducted on May 22nd and 23rd, 2007. The Year 7 monitoring results are discussed below.

Performance Standards

No Metcalf Canyon jewelflower individuals were impacted and no occupied habitat was lost due to The Ranch on Silver Creek project. The jewelflower restoration and monitoring effort on the Preserve is being conducted with the goal of attempting to increase the area occupied by jewelflower (not a requirement of the Biological Opinion), as well as enhancing and preserving the existing population (USFWS 2000a).

Methods

Monitoring of jewelflower within the PCAs includes the following, to be conducted on an annual basis for a ten year period: (1) an estimate of the total size and distribution of the jewelflower population in the PCAs, and (2) monitoring of the seeded areas to quantify germination success. Each of these components is discussed below.

The jewelflower population was monitored on May 22nd and 23rd, 2007. Each PCA on the Preserve known to support, or potentially support, jewelflower was visited to determine the size and extent of the jewelflower population. Within each PCA, each observed patch of jewelflower was mapped in the field using GPS and the number of individuals was conservatively estimated and recorded. This information was used for comparison to the population distribution in 1998 to determine if the area occupied by jewelflower has increased.

Results and Discussion

Approximately 17,395 jewelflower individuals were observed on the Preserve in May 2007; data summaries for each PCA are presented in Table 9. This population estimate is the highest since annual monitoring began on the Preserve in 1999, and up from the population estimate of 8,620 individuals in 2006. It is considerably lower, however, than the baseline population estimate of 75,000 individuals in 1998. This observed variation in population size between 1998 and 2007 supports the theory that populations of annual plants can vary by several orders of magnitude from year to year depending on variable site factors, such as precipitation and temperature.

Although plant numbers were higher than past year's monitoring results, geographic distribution of jewelflower has remained consistent with that observed in 1998. Figure 6a shows the distribution of jewelflower on the Preserve in 2007 as compared to the 1998 baseline distribution. All of the patches observed in 2007 are generally in the same locations as those observed in 1998, although overall acreage is slightly less. Compared to monitoring conducted in 1998 (Sycamore Associates 2000), three of the mapped patches in 2007 remain larger than they were in 1998 (PCAs 11, 18 and 19), and PCAs 1, 17 and 35 remain smaller. Some of this difference may be attributed to a difference in mapping methods used during the 1998 survey which involved flagging large polygons and mapping the flags with GPS at a later time (WRA 2001b).

Both population size and occupied area of jewelflower increased from 2002-2005. Jewelflower distribution extended into new suitable habitat areas during this period, but less than optimal environmental conditions may have resulted in a smaller population size compared to 1998. The slight decrease in population size and occupied area in 2006 may be due to the wetter than average 2005-2006 rainy season that ended with heavy rains later in the year. Drier conditions in 2007 may have resulted in higher observed population numbers than in 2006. As the population continues to build up a persistent seedbank, a population size similar to that observed in 1998 may occur under favorable environmental conditions.

Table 9. Approximate number of jewelflower individuals observed within each PCA in 2007.

PCA number	Approximate number of jewelflower individuals observed in 2007
1	3,000
11	5,500
17	1,395
18/10	3,000
19	2,500
35	2,000
TOTAL	17,395

No jewelflower individuals were observed growing within established seed plots in 2002. Plants were observed in established seed plots during 2003 and 2004 monitoring (31 and 16 plants, respectively), indicating that the population is capable of expanding outside its known distribution if environmental conditions are favorable and a seed source is present in a given year. In 2006, ten plants were observed in only one of the seed plots; the second plot was unidentifiable. In 2007, 16 plants were observed growing in the same seed plot; the second plot was again unidentifiable.

Conclusion

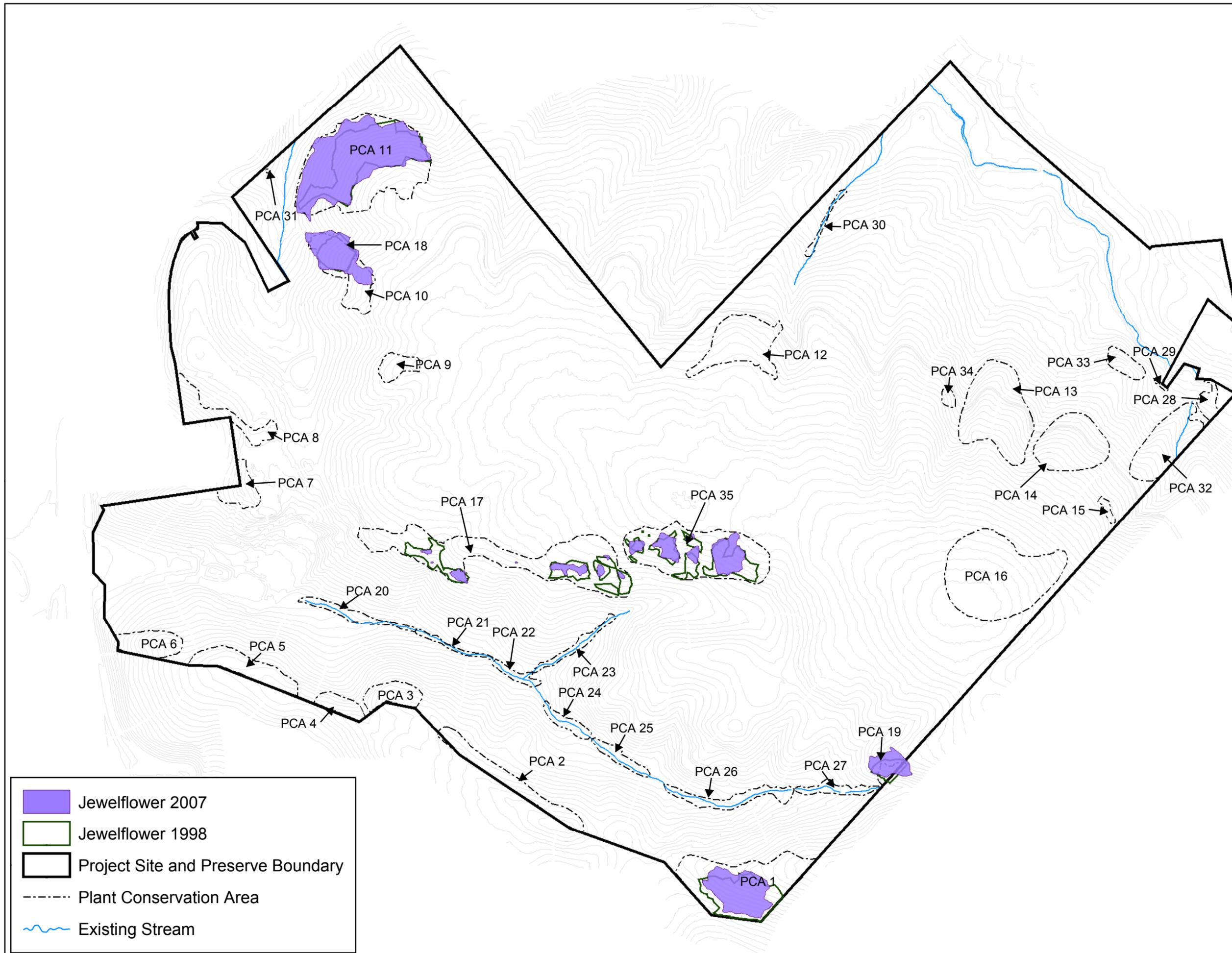
The estimated jewelflower population on the Preserve for 2007 is 17,395 individuals. This number shows a marked increase in observed population numbers in recent years, as shown in Figure 6b. It is still considerably less than that of the baseline 1998 population; however, due to the wide range of variability in the jewelflower population observed since 1998, the 2007 population can be considered well within the normal range of population fluctuation. Total acreage has increased from 10.29 acres in 2006 to 12.38 acres in 2007; a total acreage very close to the baseline acreage of 12.8 acres observed in 1998.

The jewelflower restoration and monitoring effort on the Preserve is being conducted with the goal of attempting to increase the area occupied by jewelflower (not a requirement of the Biological Opinion), as well as enhancing and preserving the existing population (USFWS 2000a). The goal of increasing and enhancing the population of Metcalf Canyon jewelflower as stated in the

SILVER CREEK PRESERVE,
 SAN JOSE, CALIFORNIA

Figure 6a

Distribution of Metcalf
 Canyon Jewelflower
 within the Hassler
 Ranch Preserve

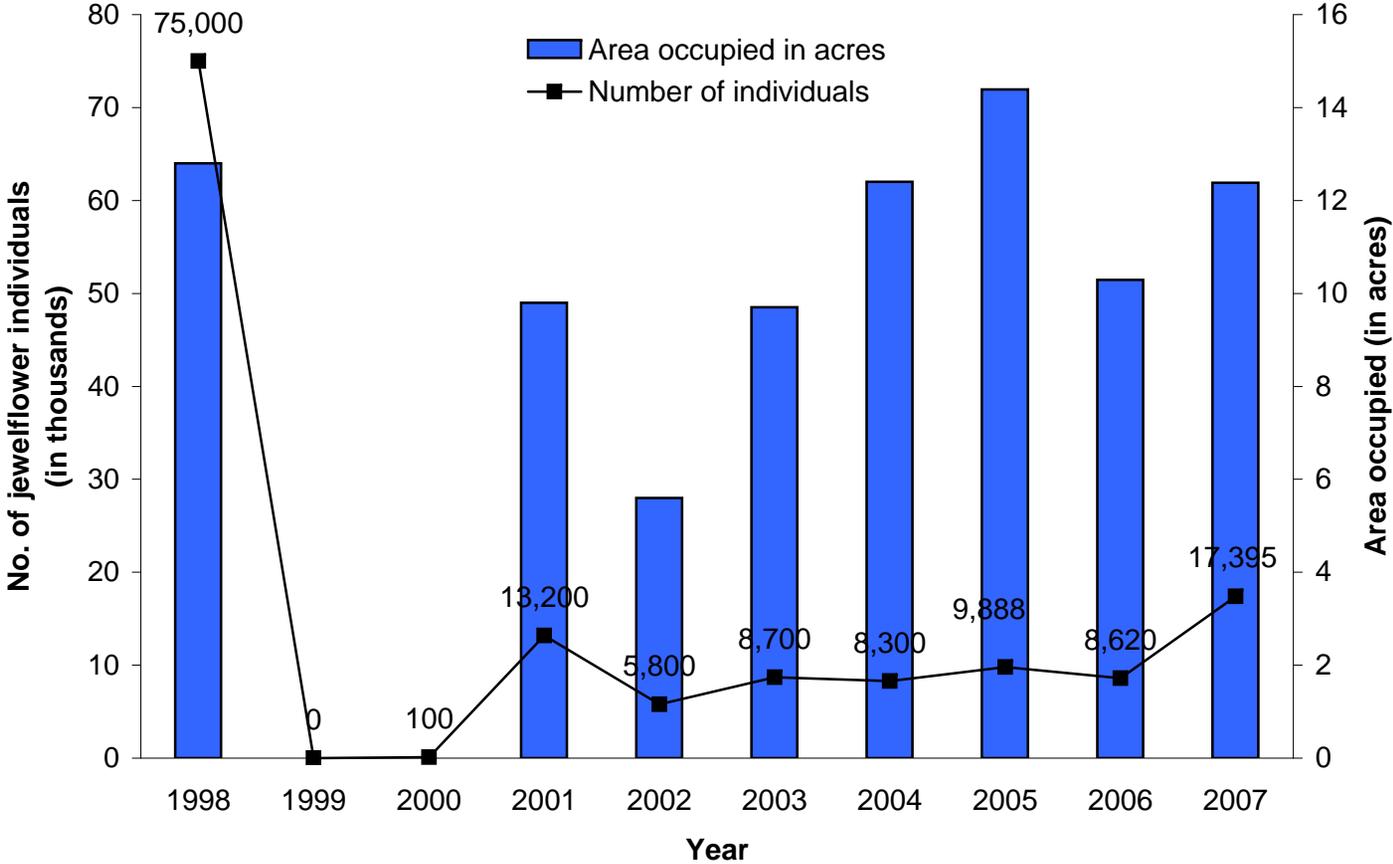


	Jewelflower 2007
	Jewelflower 1998
	Project Site and Preserve Boundary
	Plant Conservation Area
	Existing Stream

SCALE: 1" = 600'



Figure 6b. Total number of Metcalf Canyon jewelflower plants estimated on the Preserve, and the area occupied by jewelflower.



Biological Opinion was met in 2007 due to the increase in total individual plants observed. The total number of individual jewelflower plants observed in 2007 was greater than in any previous year of monitoring, although still less than the 1998 baseline population estimate of 75,000 plants. Populations of annual plants can vary by several orders of magnitude from year to year depending on variable site factors, such as precipitation and temperature, and the increase in observed population numbers from 1999-2007 can be considered normal.

The goal of increasing the area occupied by Metcalf Canyon jewelflower was met in 2007. Total acreage occupied by jewelflower populations in 2007 was higher than in 2006, at 12.38 acres up from 10.29 acres, and is close to the baseline acreage from 1998 of 12.8 acres.

3.3 Mt. Hamilton Thistle

Introduction

Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*) is a federal species of concern and is on CNPS List 1B. It occupies moist seasonal and perennial drainages, seeps, and streams on serpentine soils at elevations between approximately 300 and 3,000 feet (CDFG 2007). Approximately 3,000 Mt. Hamilton thistle (“thistle”) plants were counted and mapped within approximately 1.86 acres on The Ranch on Silver Creek Project Area during field surveys in 1998 (City of San Jose 1999; H.T. Harvey & Associates 1998). This population ranks as the fourth-largest recorded occurrence in Santa Clara County. The largest subpopulation on the site, approximately 1,700 plants, was found in Hellyer Creek and its tributary. Several other subpopulations, approximately 1,300 plants, were found in seeps within the Silver Creek watershed.

Summary of Management Actions, 1999-2007

In March 1999, a total of 988 thistle individuals were salvaged from 0.20 acres of proposed impact areas along Silver Creek and from a seep in the quarry in the western section of the site, resulting in 1.66 acres of occupied habitat remaining on the Hassler Ranch Preserve (henceforth referred to as “the Preserve”). These plants were transplanted into unoccupied potential habitat in the Northern Tributary and portions of Hellyer Creek. Only a few of these transplanted plants survived.

In December 2001, Mt. Hamilton thistle seed collected on the site in Summer 2000 by Pacific Coast Seed was redistributed in suitable habitat in unoccupied areas of PCAs in Hellyer Canyon.

Erosion control and creek repair were undertaken in August 2003 along the Hellyer tributary, and temporary impacts to thistle plants along this drainage occurred while completing the necessary repair work.

As a result of observed grazing impacts during 2002 monitoring, it was recommended that cows be excluded from PCA 28. After changes to fencing, a substantially greater number and area of thistles was observed along the seep in PCA 28 during 2003 monitoring. However, during the 2004 thistle monitoring visit it was noted that cows had returned to the southern portion of PCA 28 where grazing and trampling impacts were again observed. A realigned segment of permanent livestock fencing was installed in Fall 2004 to resolve this situation. In addition, an enclosure fence was installed in 2005 to protect an area of thistle habitat in PCA 27 that had been trampled by cows.

In May 2004 thistle seed was spread in Mitigation Wetland 4 (in PCA 26) and in the Hellyer tributary (PCA 23; includes Mitigation Wetland 3), and new thistles had germinated by the August 2004 monitoring visit. Additional thistle seed was spread in Mitigation Wetland 2 (in PCA 20) and 3 (in PCA 23) during the 2004 thistle monitoring visit. In December 2005, thistle seed was spread along Hellyer Canyon in PCA 20 and PCA 27, at the north end of PCA 30, and all along the northern tributary.

Methods

Thistle monitoring during the ten-year restoration and management program on the Preserve includes the following annual components: (1) accurate mapping of the thistle population on the Preserve, (2) estimating the total number of thistle individuals per mapped patch to determine a

total population size estimate, and (3) tracking changes in the population by monitoring established sample plots. Annual thistle monitoring for 2007 was conducted on July 19th.

Population size and distribution

During 2007 monitoring, the number of thistle plants (both mature and young¹) in each observed thistle patch within Hellyer Creek, Silver Creek, and several unnamed drainages was conservatively estimated (or, in small patches, exactly counted); dead plants (plants without any green growth) were not included in the estimate. These numbers were totaled to provide an estimated thistle population size for the entire site. This estimate was compared to the pre-transplant population size of 3,000 individuals in order to determine whether the performance standard of 100 percent replacement of impacted (transplanted) plants is being met.

A GPS unit was used to map the exact location and extent of each thistle patch in the field. The acreage of the population was then calculated to compare to the acreage of the “pre-transplant” thistle distribution (1.86 acres) in order to determine whether the performance standard of 1:1 replacement of occupied habitat is being met.

Population monitoring plots

A total of five permanent monitoring plots were established in 2001 at two locations on the Preserve: four plots were established in Hellyer Creek (one within the tributary), and one was established in a seep which enters Silver Creek. These plots were installed in order to gain more detailed information on fluctuations in population size, area, and/or age structure over time. Erosion and creek repair in Hellyer Canyon in late 2003 destroyed three of the monitoring plots. Two new plots were established in 2004. An additional new plot was established in 2005 and one of the existing plots from 2001 was moved. During the 2007 monitoring visit, the total numbers of mature (flowered, as evidenced by a live or dried flower stalk), immature (non-flowering), and dead (no green growth) thistle individuals were accurately counted and recorded within four of the five current plots.

¹ Mature individuals are defined here as plants greater than one foot in diameter and/or have produced flowers (presence of a dried or live flower stalk). Young individuals are defined here as plants less than one foot in diameter but are large enough to be identifiable as Mt. Hamilton thistle (usually greater than 3 inches in diameter).

Figure 7a

Distribution of Mt.
 Hamilton Thistle within
 the Hassler Ranch Preserve

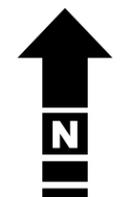
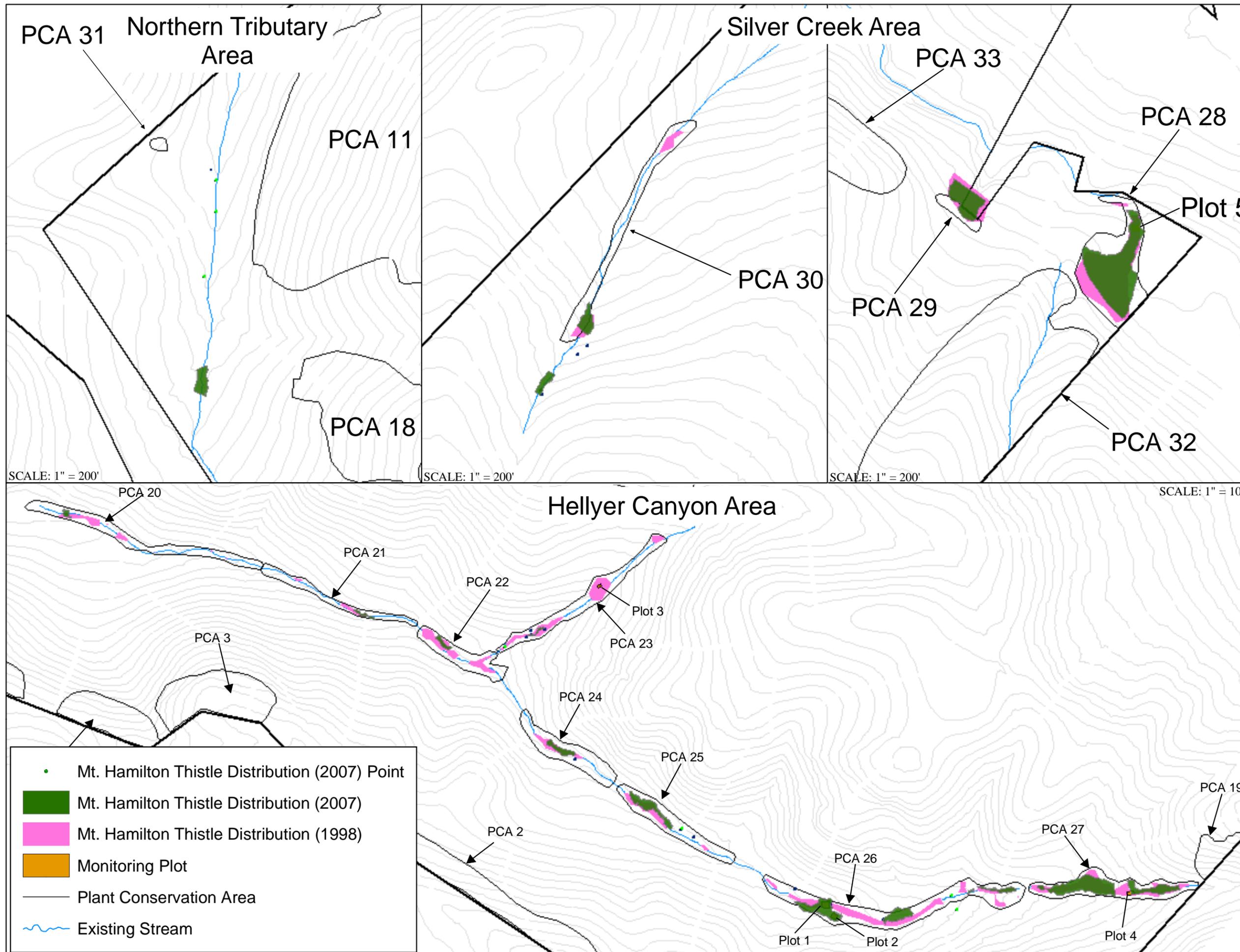


Figure 7b. Thistle population trends within the Preserve, 1998-2007

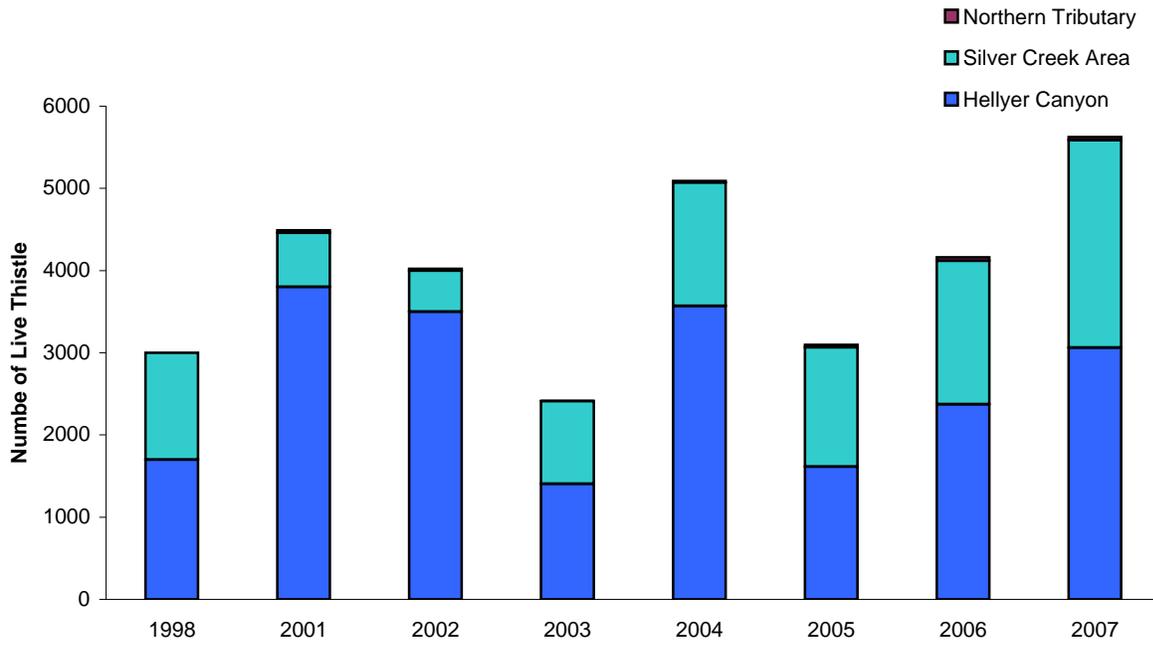
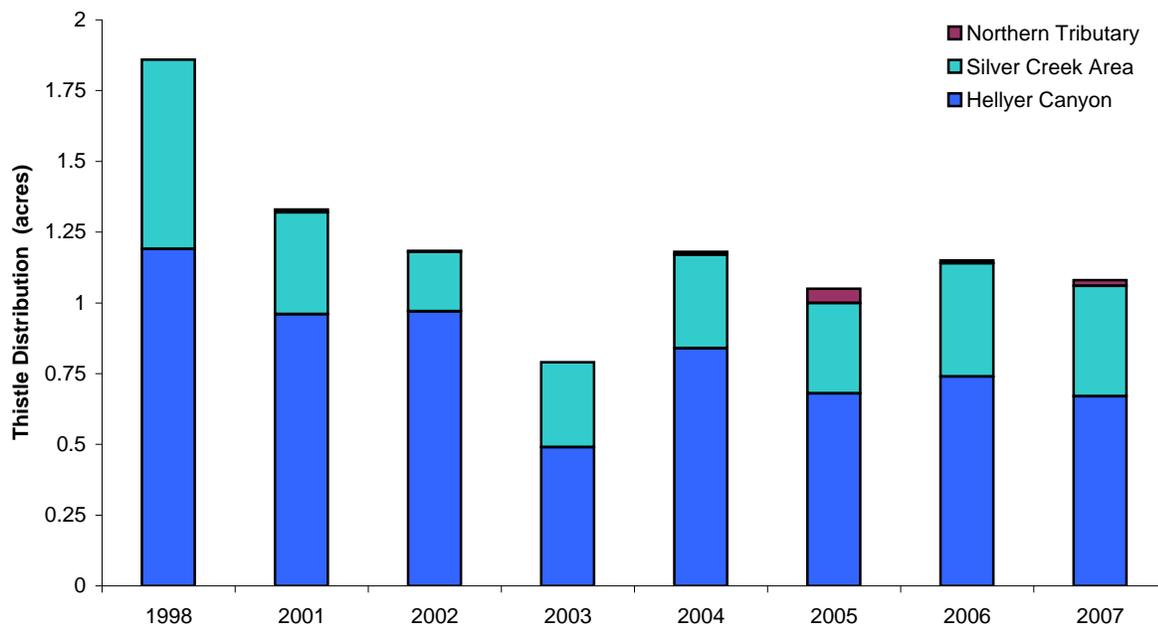


Figure 7c. Thistle distribution within the Preserve, 1998-2007



Results and Discussion

Population size and distribution

Figure 7a shows the distribution of thistle on the Preserve in 2007. Figures 7b and 7c and Table 10 show the approximate number of thistle individuals and occupied habitat acreage per subpopulation area within the Preserve.

The total acreage occupied by thistle in 2007 is 1.08 acres, which is less than the “pre-transplant” 1.86 acres occupied in 1998 (H.T. Harvey & Associates 1998). The total number of thistle individuals in 2007 is 5,623, which is the greatest population estimate observed since monitoring began in 2001 and exceeds the 1998 population estimate of 3,000.

Table 10. Approximate area and number of thistles on the Preserve in each subpopulation area from 1998-2007

		Hellyer Canyon	Silver Creek Area	Northern Tributary	TOTAL
1998	# thistle individuals	1,700	1,300	0	3,000
	Acres occupied	1.19	0.67*	0.00	1.86
2001	# thistle individuals	3,800	660	29	4,500
	Acres occupied	0.96	0.36	0.01	1.33
2002	# thistle individuals	3,500	500	22	4,022
	Acres occupied	0.97	0.21	0.004	1.18
2003	# thistle individuals	1,406	1,007	3	2,416
	Acres occupied	0.49	0.30	0.0001	0.79
2004	# thistle individuals	3,568	1,502	20	5,090
	Acres occupied	0.84	0.33	0.01	1.18
2005	# thistle individuals	1,616	1,450	30	3,096
	Acres occupied	0.68	0.32	0.05	1.05
2006	# thistle individuals	2,373	1,745	42	4,160
	Acres occupied	0.74	0.40	0.01	1.15
2007	# thistle individuals	3,060	2,526	37	5,623
	Acres occupied	0.67	0.39	0.02	1.08

*This includes the 0.20 acres of thistle habitat removed and transplanted elsewhere on the Preserve; however, the acreage shown in Figure 7a is the “post-transplant” 0.47 acres.

The 2007 distribution decreased slightly from 1.15 acres observed in 2006 to 1.08 acres. However, the counts of individuals are higher than those observed in all previous years of monitoring. In 2007, thistle numbers substantially increased in Hellyer Canyon and the Silver Creek Area and slightly decreased in the Northern Tributary. The majority of thistle plants were larger individuals, but more seedlings and juveniles were observed in 2007 than in 2006.

Hellyer Canyon:

There were approximately 3,060 thistle individuals observed this year in the Hellyer Canyon area (Hellyer Creek and a tributary). The total acreage occupied in Hellyer Canyon this year was 0.67 acre. Totals for thistle counts and acreage in 2001-2007 are shown in Table 10 and Figures 7b and 7c. Thistle numbers, including the number of seedlings, have increased since 2004. The seeds planted in the seep alongside the stream in PCA 23 still seem to be outcompeted by non-native plants and individuals were difficult to locate due to the dense non-native vegetation (black mustard (*Brassica nigra*), bull thistle (*Cirsium vulgare*) and Italian thistle (*Carduus pycnocephalus*, primarily). An enclosure fence at the east end of PCA 27 was installed after the 2005 monitoring and the thistle habitat there is now in very good condition. Approximately 725 thistle plants were counted in that location during the 2007 monitoring, which is almost four times as great as the number counted in 2005. While competition from cattail (*Typha* sp.) and stinging nettle (*Urtica dioica*) may limit the thistle population in Hellyer Canyon, overall conditions seem to be more favorable for thistle than in 2005 and 2006.

Silver Creek Area:

Approximately 2,526 thistle individuals were observed within the Silver Creek area: two patches were located along a tributary of Silver Creek and two patches were located within two seeps which flow into Silver Creek at the eastern corner of the property. The number of individuals observed this year was greater than in any other year since monitoring began. Acreage in the Silver Creek area in 2007 (0.39 acre) was about the same as the measured acreage in 2006 (0.40 acre) and is greater than the measured acreage in 2002-2005 (Table 10). Thistle plants in PCA 28, 29, and the upper portion of PCA 30 exhibited dense growth and appeared to be healthy and thriving in 2007.

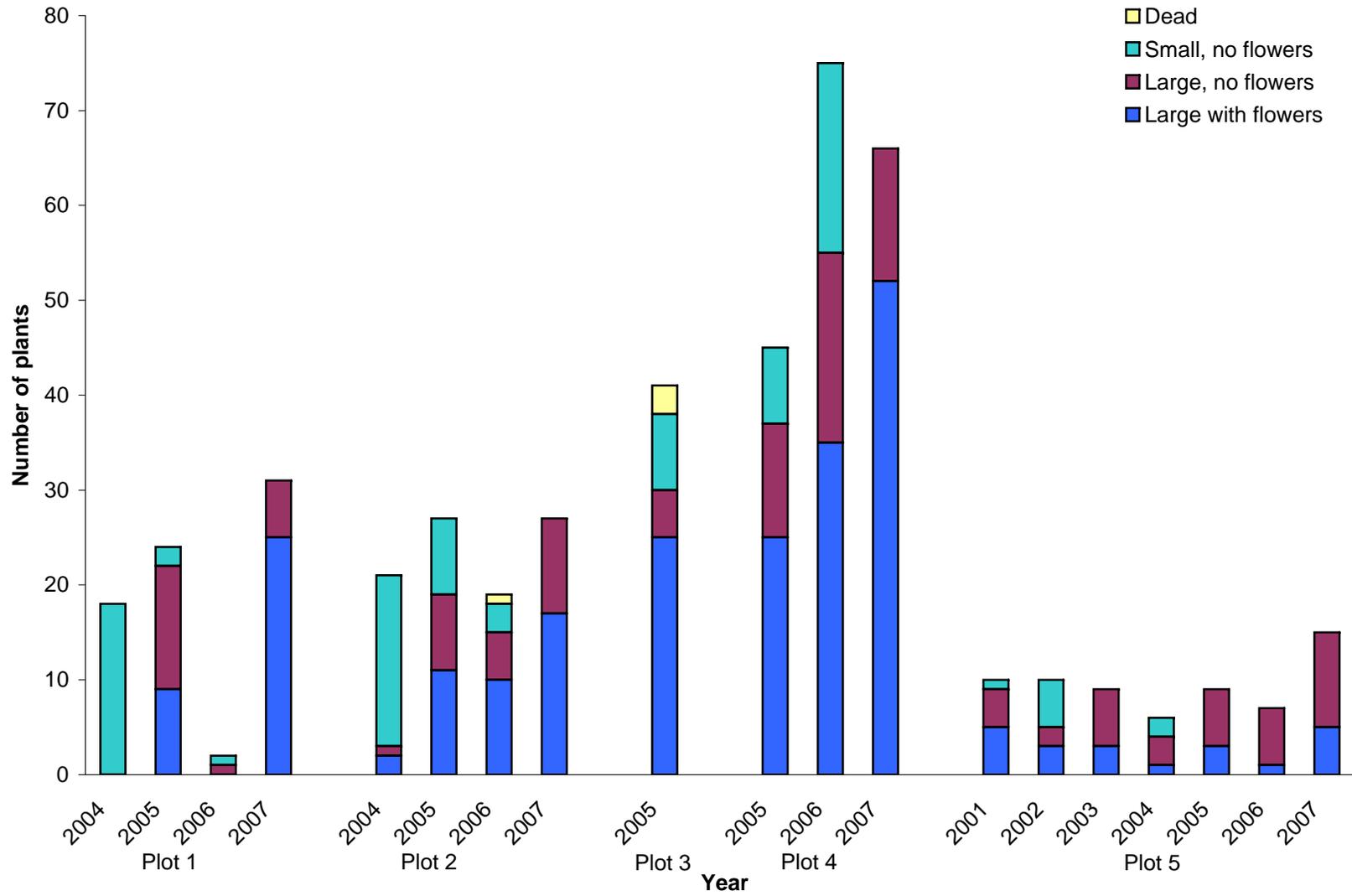
Northern Tributary:

Thirty-seven individuals were observed in the Northern Tributary in 2007. This is only slightly smaller than the number of thistles observed in this area in 2006. The acreage in the Northern Tributary in 2007 was 0.02 acres, which is greater than the acreage measured in 2006. Thistle plants in the Northern Tributary appeared healthy. Most of the thistles were large flowering adults. Weed control efforts were implemented in 2004 to remove pepperweed (*Lepidium latifolium*) in the Northern Tributary and appeared to be successful as evidenced by the general increase in thistle since 2004. However, pepperweed is still dominant in some areas and additional weed control efforts may help to maintain and expand the current population.

Population monitoring plots

Figure 7d shows the population structure in the old and new sample plots from 2001 to 2007. A substantial increase in individuals was observed in sample plot 1. An increase in large flowering adults was observed in all sampled monitoring plots. Small non-flowering thistles and dead thistles were not observed in any of the monitoring plots. Seedlings were observed in all sampled monitoring plots. As in 2006, sample plot 3 could not be accessed due to overgrown weeds. Therefore, no counts were collected for this plot in 2007. Plot 3 will be moved to a more accessible location before conducting 2008 thistle monitoring.

Figure 7d. Population trends of thistles in sample plots



Site observations

Both native and non-native plant species were observed growing in dense populations among Mt. Hamilton thistle in several areas within Hellyer Canyon. Italian thistle and bull thistle, two invasive plant species² on the Cal-IPC Moderate list (Cal-IPC 2007), were observed growing in PCA 23. Pepperweed (Cal-IPC High list) was again observed growing in the Northern Tributary and is dominant in some areas. Additional weed control activities are recommended to reinforce the weed control efforts made in 2004 and to help maintain and expand the thistle population.

Native plants such as common spikerush, monkeyflower, nettle, blackberry (*Rubus ursinus*), cattail, and arroyo willow (*Salix lasiolepis*) are growing very densely in some portions of Hellyer Canyon where thistle was mapped in 1998. These plants may be outcompeting the thistle in these areas of the Preserve. Nettle seems to be the most common native plant competitors. Nettle occurs in dense patches along Hellyer Canyon. Willow trees were overgrown and outcompeting thistle plants near the stream in PCA 23. If thistle acreage in the other areas of Hellyer Canyon are seen to decrease without other explanation, control measures for these competing species may also be merited.

Conclusion

Based on the results of 2007 thistle monitoring, the thistle population on the Preserve increased in number in 2007. These results meet the performance criterion of 100 percent replacement of impacted thistles, but at this time do not meet the criterion of 1:1 occupied habitat replacement. It is expected that the Mt. Hamilton thistle population within the Preserve will meet both performance criteria by Year 10 after additional steps are taken to remove and control competing weed occurrences. Monitoring has shown that subpopulations can recover quickly once disturbances, such as erosion or grazing, are corrected, and weed control should have a similar effect.

3.4 Other Rare Plants

Introduction

Fragrant fritillary (*Fritillaria liliacea*), a member of the lily family (Liliaceae), is a Federal Species of Concern and is on CNPS List 1B³. Fragrant fritillary occupies woodlands, coastal scrub, and grassland habitats, often on serpentine and clay soils (CDFG 2007). Surveys conducted from 1990 to 1992 identified four patches of fragrant fritillary (approximately 185 individuals) on The Ranch on Silver Creek project site (currently the Hassler Ranch Preserve ("Preserve")) (City of San Jose 1993). However, subsequent surveys in 1998 located only 76 individuals within the existing population (City of San Jose 1999).

Hall's bush mallow (*Malacothamnus hallii*) is an evergreen shrub of the mallow family (Malvaceae) and is on CNPS List 1B (CNPS 2007). Hall's bush mallow occupies chaparral and coastal scrub habitats, sometimes on serpentine (CNPS 2007). Surveys were not conducted for Hall's bush mallow for the 1993 EIR; however, surveys conducted in May 1998 identified approximately 100

² Invasive plant species are defined in the Draft Restoration and Management Plan (WRA 2001a) as those plants listed on the most recent version of the California Invasive Plant Council (Cal-IPC) "List A" and "Red Alert List."

³ CNPS List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere (Tibor ed. 2001).

individuals on the site in roughly one-half acre of Diablan Sage Scrub habitat (City of San Jose 1999). Many of the plants were juveniles that had apparently regenerated following a small intensity fire that occurred less than two years prior to the 1998 survey (City of San Jose 1999).

Summary of Management Actions, 2007

Annual fragrant fritillary monitoring was conducted on the Preserve on February 27, 2007. Hall's bush mallow was observed during jewelflower monitoring in May 2007.

Performance Standards

No actions other than annual monitoring are required for the fragrant fritillary or Hall's bush mallow populations on the Preserve.

Methods

Monitoring of the fragrant fritillary and Hall's bush mallow populations, as required in the Biological Opinion (USFWS 2000a), was conducted in the spring by surveying previously mapped patches and suitable adjacent areas, and recording population estimates in any patches observed.

Results and Discussion

The original location of fragrant fritillary was mapped in the EIR Addendum; surveys conducted in this area in 1998 estimated a population of 76 individuals (City of San Jose 1999). Fragrant fritillary was observed in 2001 (3 individuals) and 2002 (20 individuals) within the northeast corner of the Preserve downslope of PCA 16 (WRA 2001b, 2002), in the same location mapped in the EIR Addendum; however, none were located in 2003 and in 2004. This absence may be attributable to the introduction of cattle grazing onto the Preserve since cattle may eat the flowers before the survey is conducted, or due to the lateness of the surveys. The species was found in 2005 (18 individuals) and in 2006 (15 individuals). Five individual plants were observed in 2007.

Approximately 100 Hall's bush mallow individuals were observed in 1998 and mapped in the EIR Addendum (City of San Jose 1999). The population (in PCA 17) was estimated at about 100 individuals in 2002 (WRA 2002). In 2003, this population was mapped with GPS and population size was estimated at approximately 275. The upper (original) patch of Hall's bush mallow consisted of about 75 larger, mature individuals with a few young plants. In addition, a larger number of young individuals (approximately 200) were observed growing below the mature patch in an area that appeared to have been disturbed and/or graded in the past (patch 2).

In 2007 the upper (original) patch of Hall's bush mallow consisted of about 75 large shrubs and at least 25 seedlings in erosive soil areas on the edge of the path. Many new bush mallow plants were found in the disturbed lower area, especially along the old canal have been found in past monitoring years. Approximately 100 total individual bush mallow plants, including shrubs and seedlings, were observed in 2007.

Conclusion

A total of five fragrant fritillary individuals were observed in 2007. The fritillary population size fluctuates from year to year and likely will increase and decrease in future monitoring years. This species will continue to be monitored annually in February. The Hall's bush mallow population has remained steady since 2004. The large number of seedlings (over 200) observed in 2003 has not been observed since (approximately 100 in 2004-2007); this is likely due to natural seedling mortality.

4.0 GENERAL PRESERVE MANAGEMENT

4.1 Overall Preserve Management Actions, October 2005 to Present

A series of management actions were undertaken on the Silver Creek Preserve in 2007 to comply with U.S. Fish and Wildlife Service requirements in the Biological Opinion (USFWS 2000a) and Amended Biological Opinion (USFWS 2001). Required habitat restoration and management activities are discussed in greater detail in Section 2.0 of the final *Restoration and Management Plan* (WRA 2005).

A summary of each Preserve management action taken in 2007 is included in one of three categories below:

Conservation Easements

- The final RMP governing restoration and management activities with the conservation areas was recorded in late 2005.

Restoration and Management

- Monitoring actions outlined in the final RMP are being implemented on the Silver Creek Preserve.
- Grazing continued on the "Butterfly Preserve" and began within all other fenced parcels on the Silver Creek Preserve in March 2006. A reduction in height and coverage by non-native grasses and increase in cover by native plant species was observed throughout the Preserve in Spring 2007 butterfly habitat vegetation monitoring, and elsewhere on the Preserve as the year progressed.
- Cattle water troughs, livestock fences, and gates for all pastures were all up and running and occasional repairs were needed to troughs and fences as cattle put this new infrastructure through its initial stress load.
- The final eight-acre area of temporarily disturbed Butterfly Preserve lands was seeded in October 2005 with local, native seed to restore bay checkerspot butterfly habitat. Grazing was introduced to this area in March 2006. This timing has benefitted the growth of the desired native species by controlling competing weed species. Additional butterfly nectar plant seeding took place in this eight-acre area in October 2006.
- Yellow star thistle (*Centaurea solstitialis*) was observed in significant numbers during annual Metcalf Canyon jewelflower surveys in May 2005 in several locations in and adjacent to PCA 17. The plants were removed by hand in June 2005 and visits to these areas in 2007 suggested that this species was substantially reduced in these areas. A continued monitoring for this and other problematic weed species will be conducted on the Preserve next year.
- Required wetland mitigation sites were constructed and planted in Hellyer Canyon in 2003. These sites were monitored for the fourth of five years in Summer 2007, and they are meeting wetland performance criteria. Some problem weed removal will occur in two mitigation wetlands in the near future.
- Golf operations at the Ranch Golf Club began in May 2004. Visits during 2007 continue to ensure that golf play is not affecting Preserve restoration and management activities. Cattle grazing in PCA 12 and the Yerba Buena Preserve have introduced the presence of cattle

along a section of golf cart path. So far, inter-species contact has gone well, but this interaction will continue to be monitored.

Special Status Species Management

- Annual monitoring surveys were conducted for bay checkerspot butterfly and California tiger salamander.
- The Quarry Pond, golf course lake at Hole 18, and Hellyer detention basin were surveyed for California red-legged frog and bullfrogs in 2007. Neither species was observed at these locations.
- Annual monitoring of (1) dwarf plantain and butterfly habitat, (2) temporarily disturbed butterfly habitat, (3) Santa Clara Valley dudleya, (4) Metcalf Canyon jewelflower, (5) Mt. Hamilton thistle, and (6) fragrant fritillary and Hall's bush mallow were conducted throughout the Preserve in Spring and Summer 2007.
- Dudleya seed collected in Fall 2006 was distributed in suitable habitat on the Preserve in December 2006, and monitored this year. Dudleya seeding of unoccupied habitat begun in December 2001 continues to show positive results.
- Additional seed was collected from dudleya plants on the Preserve in September 2007 for restoration purposes and will be distributed in suitable habitat in late 2007.

4.2 Future Management Actions and Recommendations

During the remainder of this year, several additional Preserve management actions will take place. During the late fall or early winter, dudleya seed will be distributed in established seed and transplant plots on the Preserve to ensure the continued presence of viable plants in these areas and to boost plant numbers in areas that have suffered some plant losses from aggressive rodent activity as well as losses from a July 2005 fire.

In 2008, annual monitoring for all special status species will continue. Cattle have been introduced to all fenced areas on the Silver Creek Preserve and stocking rates have been increased on the Butterfly Preserve. Observations of the benefits the cattle provide to butterfly habitat as well as the ongoing grazing impacts on special status plant populations will continue. Evaluation of rodent impacts to dudleya plants will be ongoing and focused eradication efforts may be undertaken if necessary.

Observation of ongoing golf play adjacent to Preserve areas will continue through 2008.

5.0 CONCLUSION

Overall, the special-status species on the Silver Creek Preserve are progressing satisfactorily toward meeting their respective goals and performance standards, and Preserve management actions are being conducted to ensure that all goals and standards are met by Year 10 of the management and monitoring period (Tables 11 and 12).

Table 11. Special-status wildlife species goal status in 2007.

Special-status wildlife species	Goal	Status in 2007
Bay checkerspot butterfly	Protect and manage high quality bay checkerspot butterfly habitat primarily through a grazing program;	Complete. Butterfly Preserve protected and managed grazing continues.
	Develop and implement habitat restoration and management measures that are based on sound scientific knowledge and the advice of established experts in bay checkerspot butterfly restoration and management;	Complete. RMP was developed and management measures are being implemented.
	Coordinate conservation and management programs with adjacent lands that currently support, or may potentially support bay checkerspot butterfly (i.e., Kirby Canyon) to ensure that regional approaches for conservation are coordinated and effective;	Complete. Annual monitoring for the bay checkerspot butterfly and its habitat, Santa Clara Valley dudleya, and Mt. Hamilton thistle was conducted on the Kirby Slope Preserve in 2007.
	Provide community education and awareness about the bay checkerspot butterfly conservation efforts in the Butterfly Preserve and regionally.	Complete. Educational brochures have been prepared and distributed to homeowners and the City, and signage has been posted throughout the development.
	Create at least 17 acres of dwarf plantain in densities of several hundred plants per square meter	Partially complete. Grazing reintroduced on the Preserve in 2001 is already showing good results, and dwarf plantain percent coverage has increased to this density over many large areas.
	Stands of dwarf plantain should be established on a variety of slopes, aspects and topographies	Partially complete. Dwarf plantain seed has been distributed on a variety of slopes and aspects and monitoring continues.
	Promote the growth of secondary host plants, such as owl's clover, within stands of dwarf plantain	Partially complete. Managed grazing has limited the cover and height of non-native annual grasses, thereby promoting the growth of secondary host plants.

Special-status wildlife species	Goal	Status in 2007
	Promote the growth of appropriate nectar sources throughout the Butterfly Preserve	Partially complete. Managed grazing has limited the cover and height of non-native annual grasses, thereby promoting the growth of nectar sources.
California red-legged frog	All residential development will be set back from Silver Creek and half of the frontage will be permanent open space	Complete. The project has been designed and implemented accordingly.
	240 acres of the project site will remain permanently in natural condition with connections to natural open space and wetlands	Complete. The project has been designed and implemented accordingly.
	The entire length of Hellyer Creek and all but 0.25 acres of on-site wetlands will remain unfilled and will be preserved	Complete. The project has been designed and implemented accordingly.
	Bullfrogs will be controlled in the Hellyer Canyon pond and golf course water features	Partially complete - ongoing. Bullfrog monitoring is conducted annually and any observed bullfrogs will be dispatched. No bullfrogs have been observed to date.
	A golf course pesticide management program will be prepared and approved by USFWS to ensure minimization of impacts to CRLF	Complete. A CHAMP was submitted to the USFWS and RWQCB in 2001.
California tiger salamander	Any CTS found in the development area during and after construction will be relocated to the on-site created or off-site modified ponds.	Complete. No CTS were found in the development area during site grading and construction.
	Grazing will be implemented around the created and modified ponds to promote ground squirrel colonization for CTS estivation burrows.	Complete. Grazing and fencing plans have been prepared and livestock fencing has been installed. Grazing continues on the Hellyer Ridge Preserve and began on the Hassler Ranch Preserve near the Created CTS Pond in early 2006.
	If found, known CTS predators will be controlled.	Partially complete - ongoing. Bullfrog monitoring is conducted annually and any observed bullfrogs will be dispatched.
	The on-site Created CTS Pond will be marked with signs prohibiting entry	Complete. Permanent warning signs are present on the edge of this pond.

Special-status wildlife species	Goal	Status in 2007
	A golf course pesticide management program will be prepared and approved by USFWS to ensure minimization of impacts to CTS	Complete. A CHAMP was submitted and reviewed by the USFWS and RWQCB in 2001.

Table 12. Special-status plant species performance standard status in 2007.

Special-status plant species	Performance Standard	Status in 2007
Santa Clara Valley dudleya	Replacement of the 3,675 plants impacted by construction activities at a replacement ratio which reflects the trend in the preserved population;	Partially complete. 725 transplants surviving; total dudleya on site is 27% less than the 1998 population.
	1:1 replacement of lost dudleya habitat on an acreage basis.	Complete. Approximately 0.91 acres of dudleya habitat has been planted to replace the 0.87 acres of occupied habitat lost through project development.
Metcalf Canyon jewelflower	Attempt to increase the area occupied by jewelflower and enhance and preserve the existing population	Partially complete. Species distribution increased considerably in 2007 but is less than the 1998 baseline in total occupied acreage.
Mt. Hamilton thistle	100 percent replacement of impacted (transplanted) thistle plants;	Complete. Thistle population consisted of approximately 5,623 individuals, an 87.4 percent increase since 1998.
	1:1 replacement of lost thistle habitat on an acreage basis.	Partially complete. Acreage occupied is 1.08 acres, less than the 1.86 acres mapped in 1998. Additional weed control will take place to expand the occupied habitat.
Other rare plants	Populations on the Preserve will be monitored	Complete. Seventh year of annual monitoring occurred in 2007.

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Appendix A. Kirby Slope Preserve Annual Monitoring Report

KIRBY SLOPE PRESERVE

An off-site component of the Silver Creek Preserve

Annual Monitoring Report (2007)

SILVER CREEK PRESERVE
SAN JOSE, SANTA CLARA COUNTY
CALIFORNIA

Prepared For:

William Lyon Homes, Inc.
2603 Camino Ramon, Suite 150
San Ramon, CA 94583
Kevin Ebrahimi
(925) 543-5500

Contact:

Tom Fraser
fraser@wra-ca.com

Date:

October 15, 2007

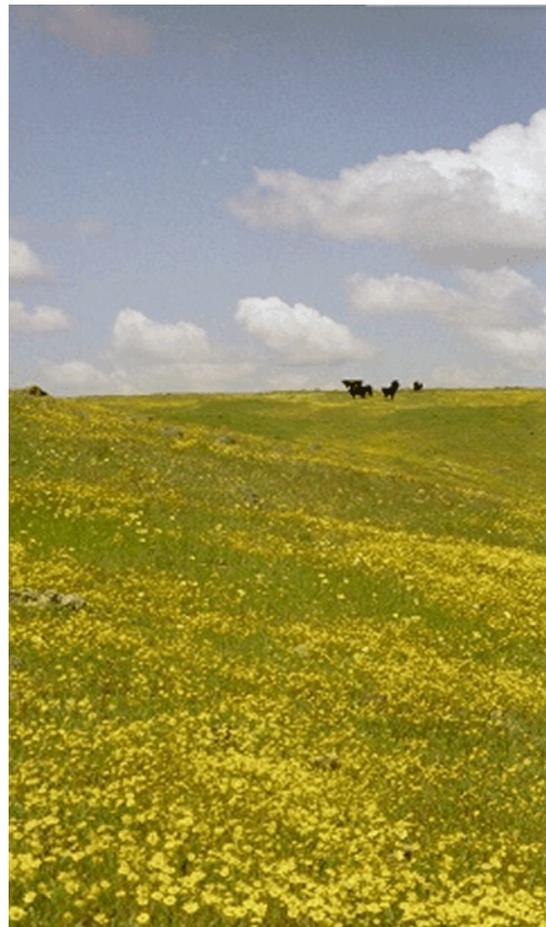


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1.0 INTRODUCTION

The Kirby Slope Preserve (“Kirby”) is a 75-acre parcel along the western slope of Coyote Ridge, located south of San Jose and north of Morgan Hill at the Coyote Creek Golf Course exit from Highway 101 in Santa Clara County, California (Figure A1). This parcel was purchased by William Lyon Homes, Inc. in 2001 and transferred to **Silver Creek Preserve, a California non-profit public benefit corporation (“SCP”)**, to serve as bay checkerspot butterfly and Santa Clara Valley dudleya mitigation for impacts at The Ranch on Silver Creek project site in San Jose, California as specified by the U.S. Fish and Wildlife Service (USFWS) in their Biological Opinion for the project (2000a).

The primary goals on the Kirby Slope Preserve are to protect and maintain the existing quality of bay checkerspot butterfly habitat through managed grazing and non-native species management. Secondary goals include maintaining the existing population of Santa Clara Valley dudleya (*Dudleya setchellii*) and maintaining the existing habitat quality for other rare plant species, such as Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*) and most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*) which also occur at Kirby. These goals are being accomplished through a ten-year management regime that includes grazing, non-native plant species control, and annual species monitoring.

This report presents the results from the monitoring and management actions conducted at Kirby during 2007 (February through May).

2.0 MANAGEMENT ACTIVITIES 2007

The Kirby Slope Preserve was grazed from October 2006 through May 2007, as specified in the *Management Plan* for the Kirby Slope Preserve (WRA 2005). Annual monitoring for the bay checkerspot butterfly and its habitat, Santa Clara Valley dudleya, Mt. Hamilton thistle, and most beautiful jewelflower was conducted in Spring 2007.

3.0 SENSITIVE SPECIES

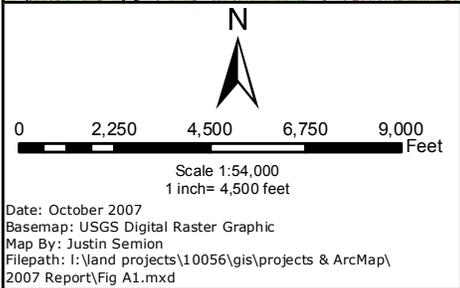
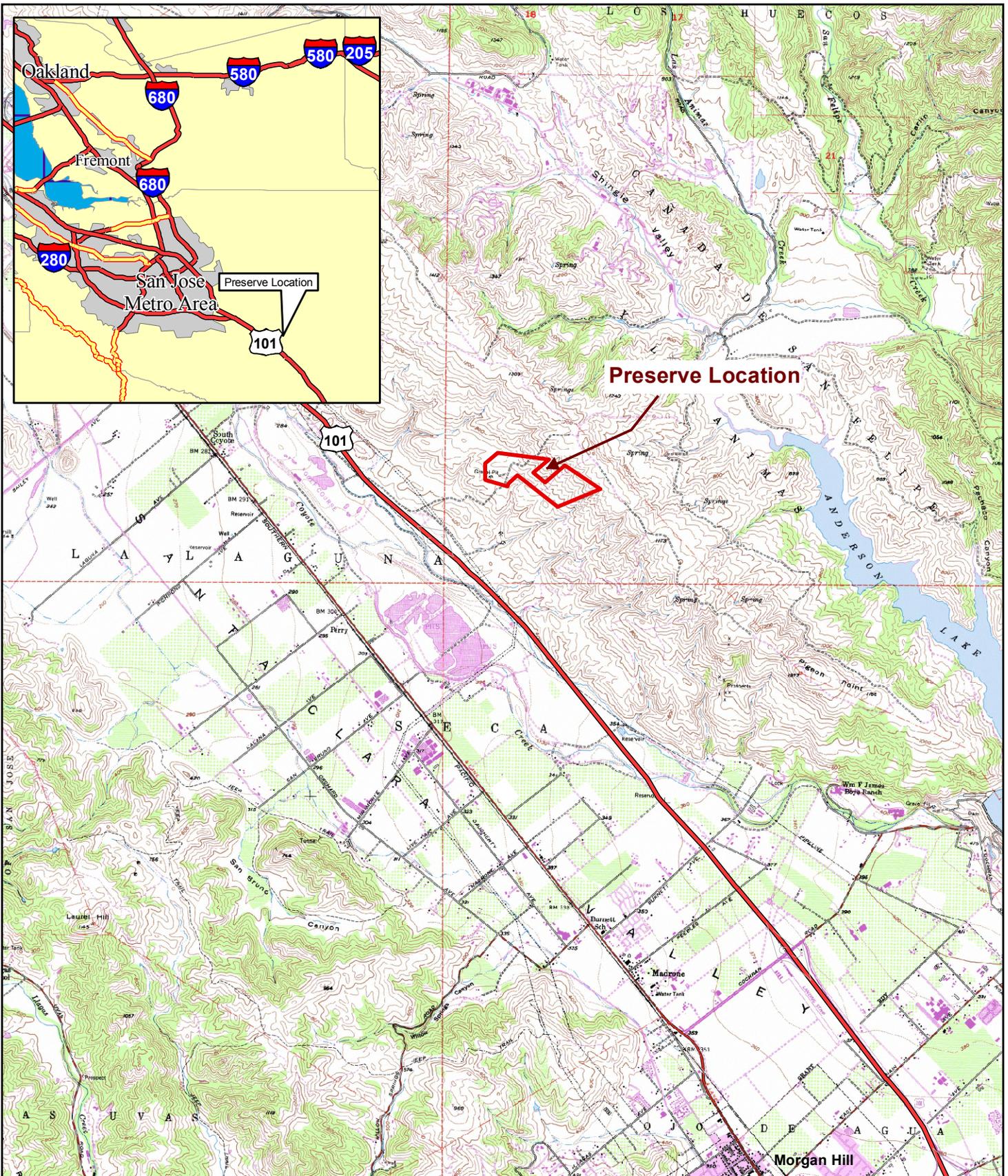
3.1 Bay Checkerspot Butterfly

Annual monitoring evaluates the quality of butterfly habitat using two measures; (1) butterfly population size and distribution and (2) frequency and distribution of host and nectar plants. In order to support a viable and persistent population of bay checkerspot butterfly, dwarf plantain (*Plantago erecta*) patches must have a density greater than 100 plants per square meter (H.T. Harvey 1997). The butterfly census data and the habitat data collected at Kirby are used as a comparative reference for the butterfly census and habitat monitoring data collected annually on the Hassler Ranch Preserve (the on-site component of the Silver Creek Preserve).

3.1.1 Bay Checkerspot Butterfly Surveys

Methods

Two methods were used to assess the status and distribution of bay checkerspot butterfly (*Euphydras editha bayensis*) at Kirby. These included surveys for postdiapause larvae based on previous methods (Harvey and Associates 1997), and transect surveys for adult butterflies. Surveys for postdiapause larvae of the bay checkerspot were conducted in late February and early



Kirby Slope Preserve
Figure A1
Regional Location Map

William Lyon Homes, Inc.
 2603 Camino Ramon, Suite 150
 San Ramon, CA 94901
 Contact: Mr. Greg Mix
 Phone: (925) 543-5533

wra

ENVIRONMENTAL CONSULTANTS

2169-G East Francisco Blvd.
 San Rafael, CA 94901
 Phone: (415) 454-8868
 Fax: (415) 454-8868

March 2005. These dates are consistent with the timing of concurrent surveys conducted at the Hassler Ranch Preserve, Hellyer Ridge Preserve, and Yerba Buena Preserve. Larval surveys were conducted in patches of the host plant, dwarf plantain, and were performed under sunny conditions suitable for the detection of postdiapause larvae.

Surveys for adult butterflies were conducted from early March through mid April during periods of suitable weather for butterfly flight. These survey dates are consistent with the timing of surveys in previous years. A transect pattern developed in 2002 was traversed by WRA biologists in 2007. The survey path traversed ridgelines and areas that had the best dwarf plantain and nectar plant densities. The locations of the transects are shown on the sample data sheet (Figure A2). The walking pace was deliberate, approximating the pace recommended for the quino checkerspot (*Euphydryas editha wrighti* Gunder = *Euphydryas editha quino* (Behr))(U.S. Fish & Wildlife Service 2000b).

Results

A total of 86 adults was observed at Kirby in 2007. No bay checkerspot larvae were observed during the monitoring period. Table A1 presents a data summary of the monitoring surveys conducted at Kirby in 2007. A total of nine adult butterfly survey visits were made to Kirby in 2007.

Table A1. Summary of bay checkerspot butterfly surveys for the Kirby Slope Preserve in 2007.		
Date of survey	Larvae	Adult
February 21	--	--
February 22	--	--
March 15	--	--
March 16	--	26
March 21	--	--
March 22	--	32
March 28	-	21
April 3	-	-
April 4	-	6
April 13	-	1
Total	0	86

Kirby Slope Preserve

Figure A2

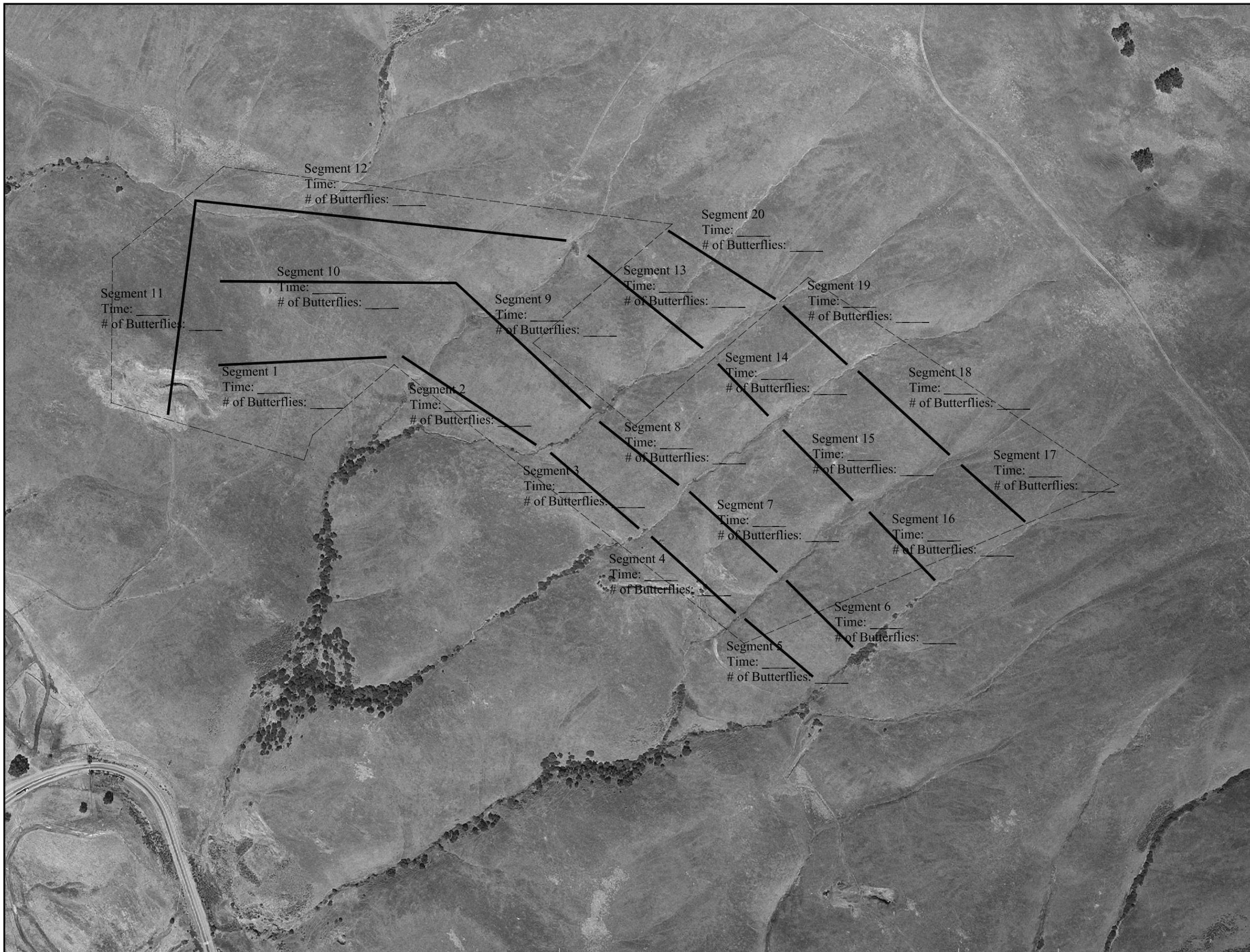
Bay Checkerspot Butterfly Adult Survey Data Sheet

Date: October 2007

Observers:

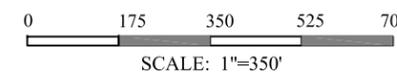
Weather Conditions:

Comments:



Legend

- Kirby Slope Preserve Boundary
- Bay Checkerspot Butterfly Transects



A summary of the larvae and adult bay checkerspot butterfly survey results at the Kirby Slope Preserve from 2002-2007 is provided in Table A2.

Table A2. Summary of larvae and adult bay checkerspot butterfly survey results at the Kirby Slope Preserve from 2002-2007.		
Year	Larvae	Adult
2002	8	126
2003	477	768
2004	21	625
2005	24	498
2006	0	34
2007	0	86

The number of adult butterfly observations increased in 2007. However numbers were still substantially lower than those observed prior to 2006, including the first year of monitoring in 2002. The increase in numbers observed in 2007 compared to 2006 is likely due to the increased number of sampling days. Sampling days were reduced in 2006 due to an abnormally heavy rainy season and inclement weather on sampling days. There were widespread reports that 2006 was a poor year for many butterfly species in Northern California due to the long wet spring rainfall season. It appears that the butterfly populations are still recovering from 2006 weather conditions.

3.1.2 Host and Nectar Plant Monitoring

Methods

Bay checkerspot butterfly habitat at Kirby was monitored on April 4, 2007. Five permanent transects were established in 2002 in areas with dwarf plantain, secondary host plants, nectar plants and non-native annual grasses (Figure A3). Data was collected every four meters along each 24-meter long by 10-centimeter wide belt transect and included: the estimated number and percent cover of dwarf plantain, secondary host plant and nectar plant individuals; the percent cover of non-native annual grass species; and California Invasive Plant Council (CalIPC) listed invasive plant species. Data recorded within the quadrat also included the absolute percent cover of all species present, and average height of the single most dominant grass species to the nearest centimeter.

Results

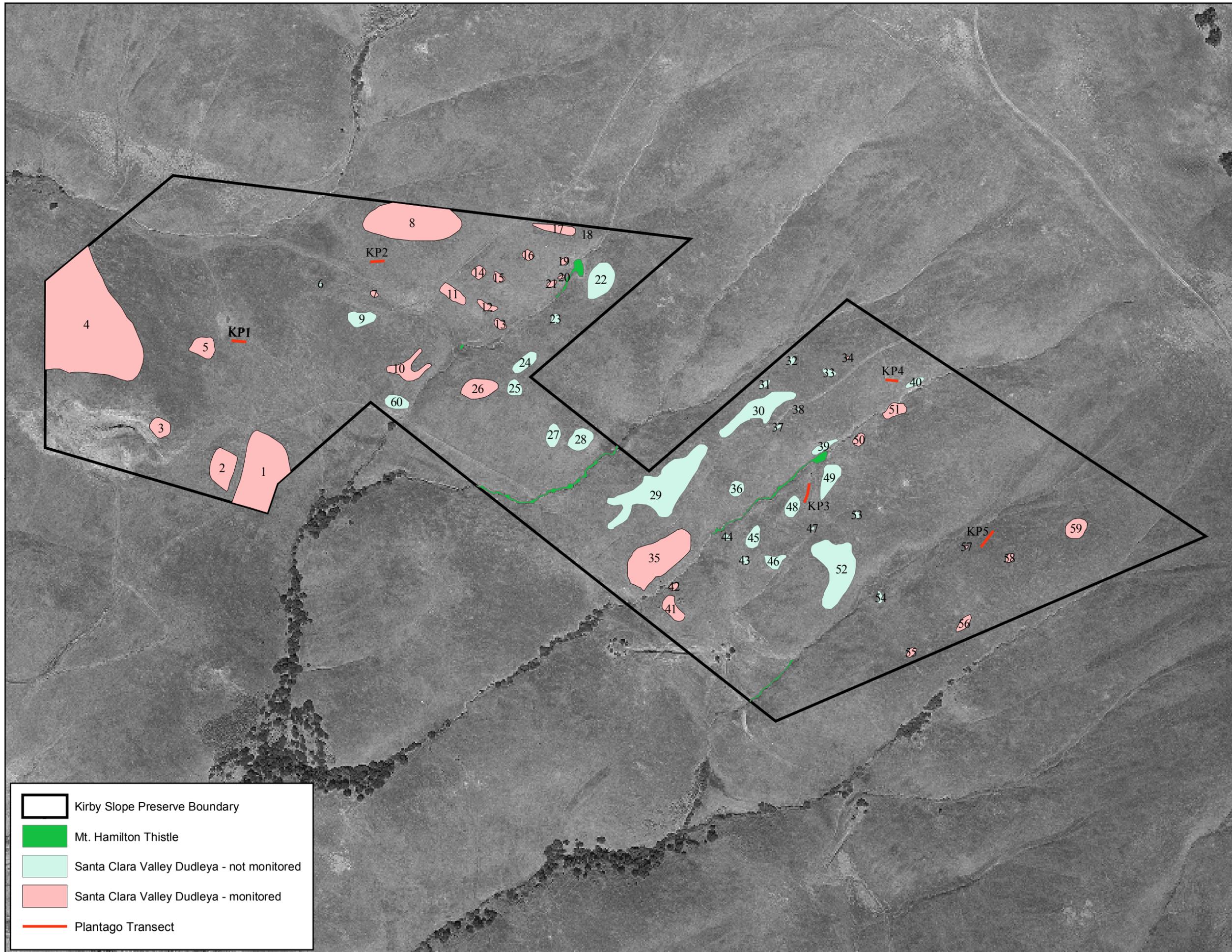
The average vegetation composition for all five monitoring transects is presented in Figure A4 and Appendix B(1). Non-native grasses occupied the largest percentages of the transects, with 47.6 percent cover. Native vegetation occupied the next largest percent of the area along the transects, with 36.1 percent cover. Dwarf plantain cover averaged 15.9 percent along the transects.

SILVER CREEK PRESERVE,
SAN JOSE, CALIFORNIA

Figure A3

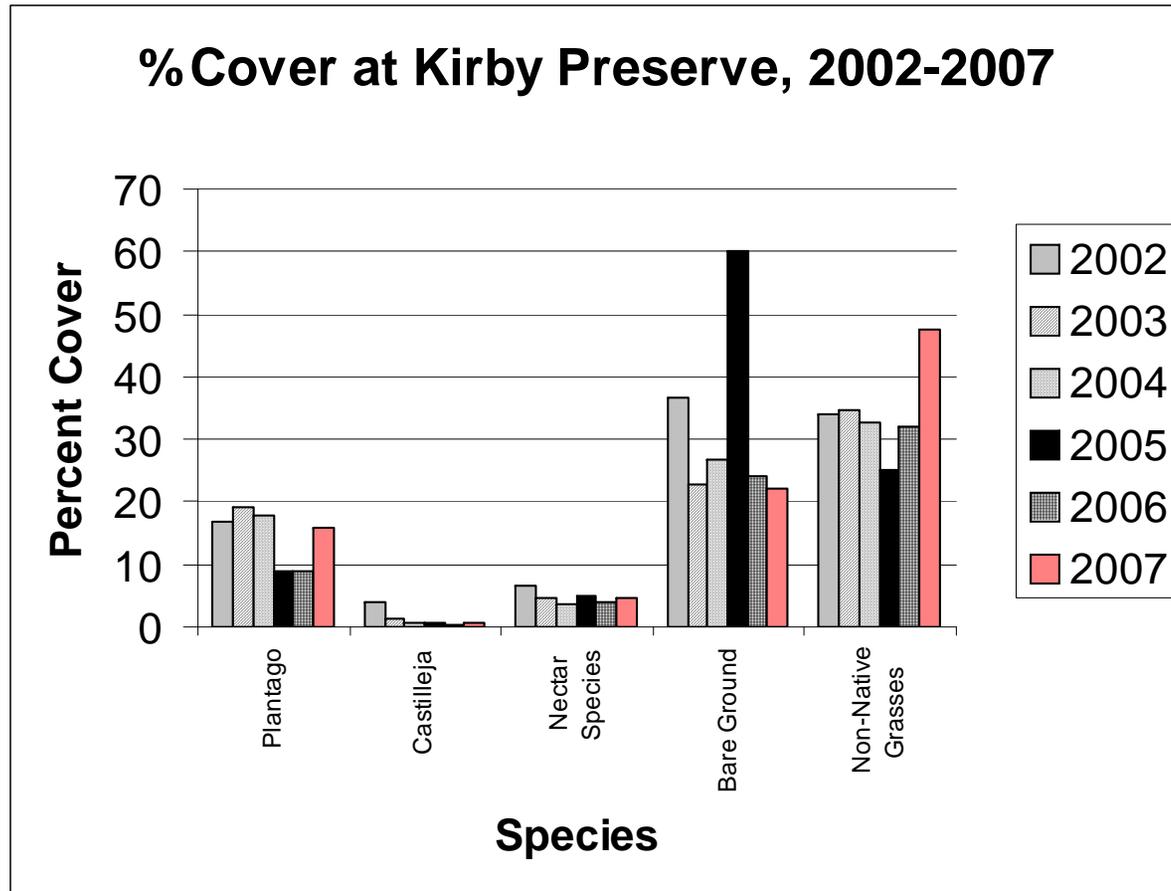
Locations of Santa Clara Valley Dudleya, Mt. Hamilton Thistle, and Plantago Monitoring Transects within the Kirby Slope Preserve

SCALE: 1" = 300'



	Kirby Slope Preserve Boundary
	Mt. Hamilton Thistle
	Santa Clara Valley Dudleya - not monitored
	Santa Clara Valley Dudleya - monitored
	Plantago Transect

Figure A4. Analyzed data for the dwarf plantain transect monitoring at Kirby.



The overall mean density of the dwarf plantain at Kirby was 187 individuals per square meter, which is the lowest density of dwarf plantain observed since monitoring began. The secondary larval host plant, owl's clover (*Castilleja exserta*), was present within 2 of 5 belt transects. The average percent cover of owl's clover across all five transects was 0.6. Nectar plant species cover was 4.6 percent, with at least one nectar plant species present within four of the five belt transects. Nectar plants used by adult butterflies include tidy tips (*Layia platyglossa*), California goldfields (*Lasthenia californica*), desert-parsley (*Lomatium sp.*), and common muilla (*Muilla maritima*). Non-native grass species cover was 47.6 percent. Within the quadrats, the dominant vegetation was soft chess (*Bromus hordeaceus*). One CallPC species with a High rating (*Bromus madritensis ssp. rubens*) was observed in one transect, resulting in 0.5 percent cover across all five transects.

Discussion

The average density of dwarf plantain in 2007 showed a 60 percent decrease from 2006, and a 69 percent decrease from the average density in 2002. The substantial decrease in dwarf plantain density may be associated with the observed increase in percent cover of non-native grasses (Appendix B(1)) and limited rainfall in Spring 2007. Four of the five transects had more than 100 plants per square meter needed to support the bay checkerspot butterfly. Despite the noticeable decrease in average density, dwarf plantain at Kirby is expected to increase which will in turn help the bay checkerspot butterfly population to increase.

3.3 Santa Clara Valley Dudleya

The primary goal of the management effort for Santa Clara Valley dudleya (*Dudleya setchellii*) at Kirby is to preserve the existing dudleya population and to maintain existing high quality habitat conditions to promote population expansion. Baseline data regarding Santa Clara Valley dudleya population size and distribution were collected in 2002 (Year 1). Annual monitoring data are compared to the Year 1 baseline data to determine population size and distribution and to determine any necessary changes to the management regime.

Methods

The original census of the dudleya population at Kirby was performed in April 2002 and consisted of counting all the dudleya individuals in the Preserve. The second year of monitoring included counting the number of adult dudleya individuals within a 50 percent sub-sample of the total observed patches found on site. In an effort to observe dudleya sub-populations that would be comparable from year to year, patches chosen for annual monitoring were determined to be those with well defined margins and good accessibility. These patches were counted on April 4, 2007 and will be monitored annually for the remainder of monitoring efforts at Kirby through 2010.

Results

Approximately 1,287 individuals of Santa Clara Valley dudleya were observed within 27 of the 60 total patches at Kirby in April 2007, a 5 percent increase compared to results from these patches in 2002. Using a basic extrapolation technique, this percent increase is multiplied by the total of all plants located in 2002 giving an estimate of 3,135 naturally occurring dudleya at Kirby in 2007. The largest concentration of dudleya individuals are located in areas with prominent rocky

serpentine outcrops accompanied by sparse vegetation. The distribution of the patches visited in 2007 is shown in Figure A3. The number of dudleya individuals observed within each patch is presented in Table A3.

Discussion

The size of the dudleya population decreased in 2007 compared to that observed in 2006. This may be due to the short rainy season in Spring 2007. However, the dudleya population is still greater than that observed in 2002 and the population is expected to remain steady or increase at Kirby in the future.

3.4 Mt. Hamilton Thistle

The primary goal of the management effort for Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*) at Kirby is to preserve the existing thistle population and to maintain existing high quality habitat conditions to promote population expansion. Baseline data was collected in 2002 (Year 1) to determine the distribution of Mt. Hamilton thistle and to assess whether direct management activities are required at Kirby.

Methods

Observations of the overall distribution and abundance of Mt. Hamilton thistle in 2007 were made during the site visit on April 4, 2007. The extent of the Mt. Hamilton thistle population was mapped on an aerial photograph during the site visit and is included on Figure A3.

Results

Mt. Hamilton thistle was observed growing at five different locations within four drainages at Kirby (Figure A3). The 2007 site visit revealed that the extent of the Mt. Hamilton thistle population within the Study Area has remained essentially unchanged over the past year.

Discussion

Results of 2007 monitoring for Mt. Hamilton thistle reveal that healthy populations of this species are supported on site, occupying approximately the same area as in previous years. Direct management actions are not necessary for Mt Hamilton thistle at this time.

Table A3. Number of dudleya in each observed patch at Kirby, April 2007.

Patch #	Number of dudleya						Patch #	Number of Dudleya					
	2002	2003	2004	2005	2006	2007		2002	2003	2004	2005	2006	2007
1	103	139	164	135	124	88	31	14					
2	27	42	70	33	42	28	32	6					
3	35	52	70	78	67	58	33	7					
4	55	60	62	67	130	116	34	4	51	24	26		13
5	6	3	46	17	5	27	35	174	242	271	430	312	330
6	5	1	9	17			36	21					
7	2	5	5		1	6	37	8					
8	197	202	189	246	227	47	38	3					
9	61						39	15					
10	85	158	121	167	114	152	40	26	35				
11	75	125	132	146	155	109	41	61	43	73	85	48	33
12	23	39	31	52	23		42	10	44	11	16	13	0
13	9	1	8	23	0		43	20					
14	46	80	73	85	123		44	16					
15	9	14	28	41	35	30	45	27					
16	53	70	75	67	48	0	46	57					
17	63	73	66	89	85	0	47	10					
18	2	6	5	7			48	46					
19	4	4	6	11	10	0	49	33					
20	32	35	30	44	26	0	50	25	40	34	39	14	46
21	19	18	17	16		0	51	7	8	8	8	2	10
22	285						52	90					
23	16						53	5					
24	65						54	3					
25	52						55	4	3	4	3	3	2
26	146	198	188	307	188	171	56	2	2		10	4	2
27	244						57	2	2	2	1	10	14
28	302						58	3	7	8	31	6	1
29	149						59	21	35	22	49	4	4
30	45						60	200					
TOTAL								3,135	1,837	1,852	2,348	1,890	1,287
EXTRAPOLATED TOTAL DUDLEYA AT KIRBY									4,406	4,442	5,611	4,702	3,135

Extrapolation Calculation

1,287 dudleya were counted in 27 reference plots in 2007

1,224 dudleya were counted in corresponding reference plots in 2002.

3,135 dudleya were counted in all 60 Kirby plots in 2002

1,287/1,224 = 105%, a 5% increase in the number of dudleya since 2002.
105% x 3,135 = 3,292 naturally occurring dudleya estimated to occur on the Preserve in 2007.

3.5 Other Sensitive Species

One additional sensitive species, most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*), was monitored throughout Kirby on June 6, 2007. Most beautiful jewelflower is a Federal Species of Concern and is a CNPS List 1B plant. An estimated 7,433 individuals (Table A4) were observed growing in shallow, sparsely vegetated areas with serpentine soils during 2007 monitoring efforts. Figure A5 provides a map of the distribution of individuals per sub-area.

This is the fifth year most beautiful jewelflower was monitored at Kirby (population size estimates were not made in Year 1, 2002). Using results from 2003 as baseline data, there has been a 36 percent drop in the jewelflower population. This decrease can be attributed to normal fluctuations in population size, which may have been affected by the low levels of precipitation observed in 2007.

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Figure A5

Locations of Most
Beautiful Jewelflower
within the Kirby
Slope Preserve

SCALE: 1" = 300'



 Kirby Slope Preserve Boundary
 most beautiful jewelflower

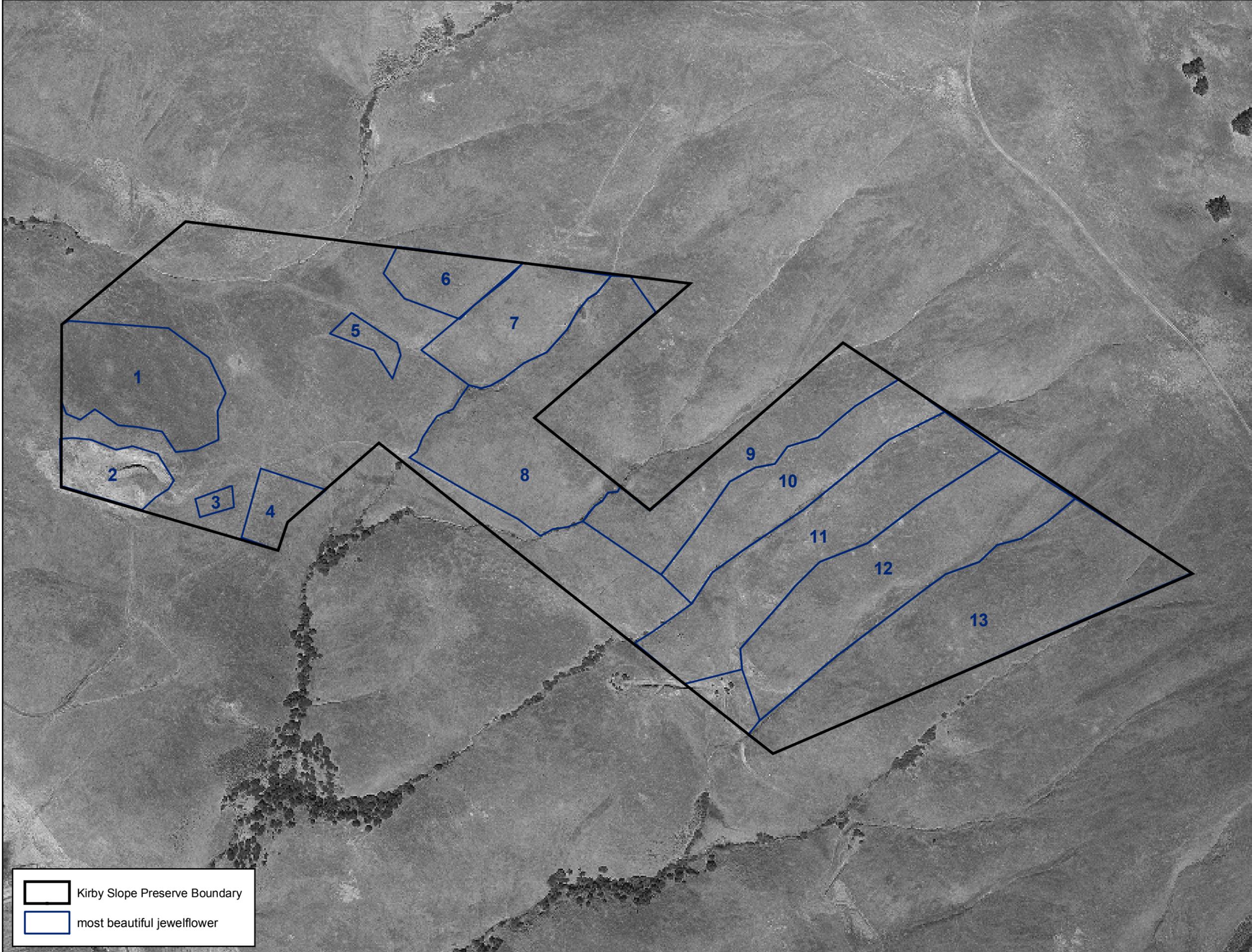


Table A4. Number of most beautiful jewelflower in each observed patch on the Kirby Slope Preserve, June 6, 2007.

Patch Number	Number of most beautiful jewelflower individuals
1	0
2	550
3	3
4	0
5	30
6	400
7	850
8	1,200
9	550
10	700
11	1,000
12	1,200
13	950
Total	7,433

4.0 CONCLUSION

Overall, 2007 monitoring of the Kirby Slope Preserve continued to provide encouraging results. A slight was observed in the abundance of bay checkerspot butterfly adults in 2007. As in 2006, no bay checkerspot larvae were observed during 2007. This may be due to a decrease in dwarf plantain density as well as natural yearly population fluctuations. The abundance of dwarf plantain, as well as secondary host and adult nectar plants within the Preserve are expected to increase and can in turn support large, healthy populations of butterflies. No changes in management actions are necessary to improve habitat conditions for the bay checkerspot butterfly at Kirby over the next year.

The 2007 monitoring results demonstrated that populations of Santa Clara Valley dudleya, Mt. Hamilton thistle, and most beautiful jewelflower were vigorous and showed no obvious signs of decline. Therefore, no changes in management actions are necessary at Kirby for any of these plant species this year.

The following individuals from WRA participated in the Year 6 Kirby monitoring effort and report

preparation: Stacie Auvenshine, Julie Rentner, Jen Adler, Leslie Lazarotti, Rhonda Lucas, Suzanne Gearhart, Bill Stagnaro, John Doudna, Jeff Dreier, and Amy Langston.

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Appendix B. Respective data for sensitive species on the Hassler Ranch Preserve

Appendix B(i). Butterfly habitat vegetation data

Appendix B(1). Butterfly habitat vegetation data

Hassler Ranch										
2007	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	310.4	19.5	0.0	1.5	38.5	65.5	30.5	33.0	0.0	3.8
P2	361.6	10.0	0.0	6.5	42.5	79.0	43.0	34.5	0.0	3.0
P3	414.4	5.0	0.0	0.5	52.5	55.0	16.5	38.0	0.0	3.6
P4	444.0	7.5	0.0	2.5	43.0	73.5	24.5	48.5	0.0	3.2
P5	220.0	5.0	0.0	4.5	42.5	75.5	14.5	57.5	9.5	4.4
P6	138.4	5.0	0.0	1.0	42.5	79.0	23.5	55.5	0.0	4.6
P7	292.0	6.5	0.5	5.5	47.5	74.5	33.5	38.5	0.0	4.2
P8	340.8	10.0	0.0	5.5	52.5	89.5	28.5	61.0	0.0	3.8
P9	950.4	29.0	1.5	6.0	42.5	96.0	50.0	41.5	0.0	4.0
P10	170.4	7.5	0.0	6.0	38.5	79.5	27.5	51.5	0.0	3.0
P11	362.4	7.5	1.0	1.0	57.5	80.0	30.5	49.0	0.0	3.2
P12	903.2	24.0	1.5	11.5	47.5	93.0	65.5	25.5	0.0	2.6
P13	196.0	16.0	0.5	3.0	45.0	53.0	31.0	22.0	0.0	4.4
P14	217.6	14.5	0.5	5.0	40.0	63.5	35.5	26.5	0.0	4.2
P15	130.4	5.0	0.0	2.0	43.0	96.0	35.0	61.0	0.0	4.2
P16	84.0	2.5	0.0	7.5	38.0	90.5	18.5	70.0	0.0	5.4
P17	244.0	5.0	0.0	2.5	48.0	62.5	21.0	41.0	0.0	5.0
P18	325.6	7.5	0.5	2.5	33.0	96.5	29.0	64.5	0.0	3.4
P19	200.0	4.5	0.0	0.0	30.5	48.5	11.0	36.0	0.0	4.4
P20	63.2	2.5	0.0	1.0	43.0	51.5	13.5	36.0	0.0	5.2
Average	318.4	9.7	0.3	3.8	43.4	75.1	29.1	44.6	0.5	4.0

2006	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	526.4	11.0	0.0	1.1	42.5	89.7	48.7	40.5	0.0	0.7
P2	528.0	6.5	0.0	8.0	21.5	99.2	39.1	54.5	0.0	0.4
P3	262.4	3.5	0.0	0.0	38.0	71.3	25.2	45.0	0.0	0.3
P4	939.2	9.5	0.0	6.5	29.0	97.7	40.2	52.5	0.0	0.4
P5	352.0	4.5	1.0	1.5	34.0	76.9	28.3	44.0	0.0	0.5
P6	113.6	1.5	1.0	0.5	24.0	88.4	34.3	54.0	0.0	0.7
P7	205.6	6.5	9.0	0.6	24.5	104.8	42.3	46.5	0.0	0.4
P8	474.4	10.0	4.0	13.5	43.5	87.1	57.6	25.5	0.0	0.4
P9	456.8	12.0	0.5	1.5	47.5	94.0	42.5	37.0	0.0	0.4
P10	464.8	7.0	4.5	2.0	35.5	95.2	40.1	53.5	0.0	0.3
P11	529.6	6.5	1.0	17.0	42.5	113.0	48.5	45.5	0.0	0.4
P12	369.6	4.5	0.5	1.5	42.5	80.7	32.6	46.0	0.0	0.4
P13	497.6	11.5	0.0	21.0	47.5	93.1	58.6	33.5	0.0	0.4
P14	356.8	3.5	4.0	14.5	33.0	126.6	64.6	53.5	0.0	0.5
P15	76.0	4.0	1.0	1.0	19.5	106.7	49.7	52.5	0.0	0.4
P16	118.4	4.5	0.0	5.5	28.5	199.3	24.3	173.5	0.0	0.9
P17	653.6	12.5	3.5	2.0	38.0	89.2	40.2	48.5	0.0	1.1
P18	231.2	2.0	0.0	6.0	38.0	88.6	27.6	57.5	0.0	0.5
P19	323.2	6.5	0.0	0.0	29.0	62.2	13.2	48.5	0.0	0.7
P20	52.8	0.5	0.0	0.0	43.0	60.1	3.1	53.5	0.0	0.7
Average	393.6	6.4	1.5	5.2	35.1	96.2	38.0	53.3	0.0	0.5

2005	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	283.2	11.0	3.0	3.0	57.5	60.5	29.5	29.0	0.0	0.5
P2	273.6	10.0	0.0	6.0	19.5	84.0	27.5	51.0	0.0	0.7
P3	265.6	4.0	0.0	0.5	38.0	51.5	25.0	26.5	0.0	1.0
P4	520.0	10.0	0.0	3.5	43.0	65.5	30.5	34.5	0.0	0.6
P5	84.8	4.0	0.0	6.5	19.5	78.5	26.5	48.5	0.0	0.7
P6	72.8	1.5	0.0	0.0	37.5	62.0	19.0	41.5	0.0	0.8
P7	145.6	4.0	2.0	6.5	33.5	78.0	36.0	37.0	0.0	0.7

P8	165.6	5.0	1.5	1.5	67.5	45.0	18.0	24.0	0.0	0.7
P9	404.0	14.5	1.5	1.5	42.5	75.5	39.0	34.0	0.0	0.7
P10	394.4	14.5	1.5	4.0	33.5	65.5	40.5	19.5	0.0	0.5
P11	188.0	10.5	2.0	10.5	42.5	86.0	39.5	46.0	0.0	0.6
P12	184.0	10.0	2.0	6.0	28.5	94.0	31.0	58.0	0.0	0.7
P13	104.0	3.5	0.5	2.0	48.0	78.0	19.5	55.5	0.0	0.7
P14	132.8	9.0	2.0	2.5	42.5	78.5	37.0	38.5	0.0	0.6
P15	103.2	5.0	0.0	2.2	24.0	80.7	35.7	44.5	0.0	0.4
P16	90.4	2.5	0.0	2.5	57.5	62.0	21.5	37.0	0.0	0.7
P17	212.0	7.5	0.0	1.5	52.5	57.5	23.5	28.5	0.0	1.1
P18	264.8	7.5	1.0	3.0	43.5	68.5	27.0	35.5	0.0	0.8
P19	144.0	14.0	1.5	0.5	24.5	71.0	23.5	43.0	0.0	0.4
P20	52.8	4.0	0.0	0.0	14.5	76.0	14.0	59.0	0.0	0.5
Average	204.3	7.6	0.9	3.2	38.5	70.9	28.2	39.6	0.0	0.7

2004	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	120.8	8.5	1.0	2.0	24.5	66.5	25.5	41.0	0.0	5.2
P2	644.0	13.5	0.0	3.5	17.0	94.0	37.0	55.5	1.0	4.8
P3	185.6	3.5	0.0	0.0	33.5	77.0	18.0	58.0	0.0	4.4
P4	1012.0	21.5	0.5	2.0	24.5	81.0	38.0	42.5	0.0	3.2
P5	382.4	12.0	0.0	2.0	13.5	93.0	33.5	58.5	0.0	5.0
P6	98.4	2.0	0.5	0.0	24.0	72.0	15.5	56.5	0.0	5.6
P7	272.0	6.5	2.0	2.5	13.5	94.5	25.5	68.0	0.0	6.2
P8	196.0	5.0	2.0	2.5	48.0	60.0	22.5	37.0	0.0	3.4
P9	872.0	19.0	0.2	1.0	24.0	72.2	34.7	36.0	0.0	4.4
P10	243.2	7.5	4.0	1.5	26.0	71.5	31.5	39.5	0.0	3.4
P11	508.0	13.0	1.5	1.5	14.0	73.0	34.0	39.0	0.0	4.4
P12	218.4	5.0	1.5	3.0	26.0	77.0	30.5	43.0	0.0	4.2
P13	73.6	4.0	1.0	3.0	17.0	85.5	25.5	60.0	3.0	4.4
P14	105.6	3.5	2.5	5.5	24.0	84.0	28.5	55.5	0.0	4.8
P15	256.0	6.5	0.5	1.0	24.5	76.0	42.5	33.0	0.0	4.0
P16	36.8	2.5	0.0	3.5	33.5	70.0	19.0	47.0	1.0	6.6
P17	136.0	5.0	1.0	1.5	57.5	52.5	17.5	33.0	0.0	7.0
P18	506.4	12.0	0.0	2.5	17.5	79.5	37.5	37.5	0.0	4.6
P19	148.8	4.5	0.5	0.0	34.5	78.5	10.0	65.0	0.0	5.9
P20	64.0	3.0	0.0	1.0	39.5	71.0	14.5	53.0	0.0	6.8
Average	304.0	7.9	0.9	2.0	26.8	76.4	27.1	47.9	0.3	4.9

2003	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	663.2	4.0	0.0	4.5	33.5	62.0	27.0	34.0	1.0	7.2
P2	302.4	7.5	0.0	5.5	21.0	75.5	28.0	47.0	0.0	6.6
P3	40.8	4.0	0.0	1.5	47.5	72.0	18.0	52.0	0.0	8.0
P4	466.4	14.5	0.0	5.0	19.5	86.0	28.0	56.0	0.0	9.6
P5	954.4	16.0	0.0	4.5	28.5	79.5	34.0	43.0	0.0	6.6
P6	181.6	4.5	0.0	0.5	15.0	84.0	19.5	63.5	0.0	7.2
P7	152.8	1.0	0.5	10.5	19.5	83.0	29.0	34.5	0.0	6.2
P8	39.2	4.0	0.0	10.0	24.0	74.5	25.5	38.0	0.0	6.0
P9	403.2	10.0	0.0	5.0	38.0	91.0	41.5	32.0	0.0	5.4
P10	635.2	11.0	1.5	4.5	19.5	80.0	31.0	53.0	0.0	6.2
P11	1.6	0.5	1.5	8.0	38.0	63.5	28.0	34.5	0.0	7.2
P12	157.6	2.0	0.0	3.0	33.0	58.0	17.5	38.0	0.0	5.4
P13	312.8	4.0	0.5	2.0	42.5	64.0	22.0	32.0	3.5	7.2
P14	128.0	3.5	1.5	9.5	28.5	82.5	29.5	53.0	0.0	7.8
P15	1448.0	11.0	1.5	4.5	15.0	78.5	57.5	21.0	0.0	4.6
P16	67.2	2.5	0.0	3.0	28.5	74.0	21.5	45.0	1.5	6.4
P17	407.2	4.5	0.0	7.5	48.0	52.5	20.5	30.0	0.0	8.8
P18	1113.6	16.5	0.0	6.0	52.5	55.5	34.5	19.0	0.0	6.0

P19	179.2	1.5	0.0	1.0	29.0	71.5	9.0	59.5	0.0	8.2
P20	481.6	3.5	0.0	3.0	17.0	70.5	40.5	27.5	0.0	10.6
Average	406.8	6.3	0.4	5.0	29.9	72.9	28.1	40.6	0.3	7.1

2002	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	132.0	2.5		2.5	37.5	120.0	7.5	70.0		20.0
P2	80.0	2.5			67.5	132.5	10.0	52.5		10.0
P3	18.0				37.5	115.0	10.0	65.0		10.0
P4	223.0	2.5		2.5	2.5	95.0	7.5	80.0		10.0
P5	275.0	2.5		5.0	15.0	110.0	7.5	65.0		20.0
P6	231.0	2.5		2.5	2.5	95.0	10.0	75.0		10.0
P7	72.0			2.5	2.5	90.0	7.5	62.5		10.0
P8	103.0			2.5	2.5	90.0	5.0	77.5		20.0
P9	126.0	2.5		2.5	2.5	87.5	12.5	65.0		10.0
P10	123.0	37.5		2.5		77.5	7.5	15.0		20.0
P11	52.0			15.0	37.5	112.5	20.0	37.5		10.0
P12	59.0			2.5		90.0	10.0	37.5		20.0
P13	125.0	2.5	2.5		15.0	127.5	35.0	57.5		10.0
P14	57.0	2.5	2.5	5.0	62.5	137.5	27.5	37.5		20.0
P15	870.0	2.5			15.0	100.0	30.0	37.5		16.0
P16	6.0	2.5				97.5	12.5	82.5		20.0
P17	633.0	2.5		17.5	37.5	107.5	12.5	37.5		10.0
P18	284.0	15.0		2.5	15.0	110.0	15.0	62.5		10.0
P19	51.0	15.0		2.5		72.5	12.5	42.5		20.0
P20	182.0					87.5	7.5	77.5		10.0
Average	185.1	6.8	2.5	4.8	23.5	102.8	13.4	56.9		14.3

2001	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non-Native Grasses	% Cover Invasive Species	Average Grass Height
P1	42.0	2.5			2.5	80.0	10.0	65.0		30.0
P2	41.0	2.5			37.5	92.5	17.5	20.0		
P3	18.0				52.5	105.0	2.5	65.0		
P4	75.0				17.5	100.0	5.0	77.5		30.0
P5	170.0			2.5	17.5	105.0	5.0	65.0		20.0
P6	281.0	2.5				102.5	7.5	90.0		30.0
P7	24.0			2.5	15.0	110.0	2.5	87.5		40.0
P8	72.0			2.5	5.0	102.5	5.0	90.0		30.0
P9	177.0	15.0			15.0	97.5	5.0	62.5		40.0
P10	64.0	15.0		2.5	37.5	92.5	5.0	15.0		20.0
P11	125.0			2.5	62.5	112.5	10.0	37.5		20.0
P12	36.0				15.0	102.5	10.0	62.5		
P13	125.0	2.5			37.5	110.0	22.5	45.0		30.0
P14	110.0	15.0	2.5	2.5	15.0	75.0	2.5	37.5		20.0
P15	646.0	2.5	2.5		62.5	120.0	10.0	37.5		20.0
P16	12.0				2.5	107.5	2.5	102.5		30.0
P17	345.0	2.5		2.5	62.5	112.5	5.0	40.0		30.0
P18	296.0	37.5			15.0	100.0	10.0	37.5		30.0
P19	21.0	2.5		2.5	15.0	77.5	2.5	55.0		20.0
P20	77.0				2.5	100.0		65.0		30.0
Average	137.9	9.1	2.5	2.5	25.8	100.3	7.4	57.9		27.6

Temporarily Disturbed Butterfly Habitat

2007	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
P21	1.6	0.5	0.0	8.0	4.0	98.5	25.0	10.5	0.0	6.4
P22	921.6	34.0	0.0	2.0	7.0	102.0	74.0	27.5	0.0	3.6
P23	69.6	8.5	0.0	15.0	22.0	71.5	33.0	20.0	0.0	4.6
P24	0.0	0.0	0.0	7.5	33.5	83.0	17.5	36.0	0.0	5.8
P25	3.2	1.5	1.0	1.0	4.5	82.0	4.5	49.0	0.0	4.6
P26	49.6	2.0	1.5	4.0	7.5	104.0	29.0	63.5	0.0	6.2
P27	4.8	0.5	0.0	11.0	33.5	68.5	12.5	39.0	0.0	4.0
P28	0.0	0.0	0.0	4.5	14.0	98.0	5.5	70.0	0.0	4.0
P29	0.0	0.0	0.0	0.5	57.5	50.5	7.0	33.5	0.0	4.0
P30	0.8	0.5	0.0	3.0	28.5	69.0	13.0	38.0	0.0	4.6
P31	0.8	0.5	0.0	4.0	33.5	58.0	7.0	35.0	0.0	3.0
P32	0.0	0.0	0.0	4.0	6.5	82.0	8.0	63.5	0.0	4.6
P33	0.8	0.5	0.0	22.5	12.5	64.0	39.0	21.5	0.0	4.6
P34	0.0	0.0	0.0	0.0	26.0	57.0	1.0	56.0	0.0	9.4
P35	0.0	0.0	0.0	5.0	4.5	74.0	10.0	63.0	0.0	10.4
P36	1.6	3.0	0.0	2.0	29.0	68.0	14.0	43.5	0.0	5.6
P37	9.6	1.0	0.5	7.5	41.0	65.0	25.5	19.0	0.0	4.6
P38	6.4	2.0	4.5	11.0	29.0	71.0	35.0	11.5	0.0	4.4
P39	23.2	3.5	4.5	2.5	72.5	44.5	13.5	3.5	0.0	3.3
P40	8.0	1.0	10.0	3.5	17.0	75.0	24.0	47.5	0.0	3.2
Average	55.1	3.0	1.1	5.9	24.2	74.3	19.9	37.6	0.0	5.0

2006	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
P21	1.6	0.0	0.0	4.0	28.5	44.0	10.0	17.5	0.0	0.9
P22	378.4	29.0	0.0	0.1	43.0	50.6	34.1	16.5	0.0	0.5
P23	29.6	0.5	0.0	9.5	15.0	54.1	11.6	33.5	0.0	0.7
P24	0.0	0.0	0.0	1.0	28.5	32.2	4.1	23.1	0.0	0.7
P25	0.0	0.0	0.0	0.0	17.0	52.6	0.5	51.0	0.0	0.8
P26	16.8	0.5	0.5	10.5	19.5	34.1	14.6	17.0	0.0	0.8
P27	1.6	0.0	0.0	8.0	38.5	26.2	9.1	7.5	0.0	0.6
P28	0.0	0.0	0.0	0.5	4.5	65.1	8.0	54.5	0.0	0.6
P29	0.0	0.0	0.0	0.0	33.0	22.6	8.6	9.0	0.0	0.5
P30	0.8	0.0	0.0	0.0	29.0	38.2	2.6	30.1	0.0	0.7
P31	0.0	0.0	0.0	1.1	19.0	44.3	3.1	26.6	0.0	0.5
P32	0.0	0.0	0.0	7.0	10.0	70.5	7.5	55.0	0.0	1.4
P33	0.0	0.0	0.0	0.0	79.5	9.6	1.5	7.6	0.0	0.6
P34	0.0	0.0	0.0	3.5	19.5	88.1	3.5	81.5	0.0	2.3
P35	0.8	0.0	0.0	0.0	7.5	88.0	2.0	77.5	0.0	1.7
P36	0.0	0.0	0.5	0.0	28.5	78.2	1.1	47.1	0.0	1.6
P37	0.0	0.0	0.5	6.0	38.5	70.5	11.0	14.0	0.0	0.6
P38	3.2	1.0	7.5	9.5	62.5	64.0	25.5	13.5	0.0	0.6
P39	0.0	0.0	0.0	0.0	93.5	8.1	0.0	0.6	0.0	0.3
P40	0.8	0.0	4.5	4.0	33.5	75.6	24.1	35.5	0.0	0.5
Average	21.7	1.6	0.7	3.2	32.4	50.8	9.1	30.9	0.0	0.9

2005	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
P21	0.0	0.0	0.0	1.5	17.0	73.0	4.5	64.0	0.0	0.5
P22	960.0	24.0	0.5	5.0	5.5	82.5	78.5	3.5	0.0	0.1
P23	2.4	0.5	0.0	5.5	15.5	67.5	9.0	19.5	0.0	0.5
P24	0.0	0.0	0.0	8.5	13.0	78.5	11.0	52.5	0.0	0.3
P25	0.0	0.0	0.0	0.5	14.0	76.0	26.5	47.5	0.0	0.4

P26	0.0	0.0	0.0	1.0	20.5	79.0	2.5	28.5	0.0	0.3
P27	0.0	0.0	0.0	8.5	20.5	80.0	9.0	66.5	0.0	0.4
P28	0.0	0.0	0.0	4.5	29.0	59.5	6.0	29.0	0.0	0.4
P29	0.0	0.0	0.0	0.0	36.0	56.5	8.0	25.5	0.0	0.2
P30	0.0	0.0	0.0	0.5	33.5	74.5	29.5	22.0	0.0	0.2
P31	0.0	0.0	0.0	1.0	42.5	66.0	19.0	19.0	0.0	0.2
P32	0.0	0.0	0.0	17.0	18.0	78.0	21.0	38.0	0.0	0.3
P33	0.8	0.5	0.0	3.5	29.0	69.0	33.5	28.0	0.0	0.3
P34	0.0	0.0	0.0	5.0	16.5	81.0	5.5	73.0	0.0	0.6
P35	0.0	0.0	0.0	1.0	22.5	55.0	1.0	53.5	0.0	0.7
P36	6.4	1.0	0.5	3.5	22.5	60.5	9.5	37.5	0.0	0.4
Average	60.6	1.6	0.1	4.2	22.2	71.0	17.1	38.0	0.0	0.4

2004	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
P21	0.0	0.0	0.0	1.0	21.0	86.2	1.5	17.5	0.0	11.6
P22	108.8	7.5	0.0	0.5	39.0	68.5	54.0	14.5	0.0	4.6
P23	0.0	0.0	0.0	1.0	14.0	98.0	39.0	26.0	0.0	9.4
P24	0.0	0.0	0.0	7.5	25.5	66.0	27.0	18.5	0.0	11.8
P25	0.0	0.0	0.0	0.0	8.0	97.0	57.5	6.5	0.0	11.4
P26	0.0	0.0	0.0	0.5	8.5	94.0	42.0	26.0	0.0	11.0
P27	0.0	0.0	0.0	12.5	42.5	64.5	13.5	45.5	0.0	13.2
P28	0.0	0.0	0.0	1.5	37.5	73.5	1.5	17.0	0.0	9.2
P29	0.0	0.0	0.0	0.0	27.0	85.5	39.0	33.5	0.0	6.8
P30	0.0	0.0	0.0	0.5	0.0	59.0	12.5	27.0	6.0	7.6
P31	0.0	0.0	0.0	0.0	46.5	66.5	8.5	41.0	3.0	7.0
P32	0.0	0.0	0.0	7.5	54.0	44.0	8.5	24.5	0.0	9.2
P33	0.0	0.0	0.0	2.0	36.0	74.5	29.5	24.5	0.0	20.2
P34	0.0	0.0	0.0	2.5	21.5	70.0	9.5	59.5	0.0	16.6
P35	0.0	0.0	0.0	10.0	26.5	69.5	10.5	58.5	0.0	26.6
P36	0.0	0.0	0.0	5.0	31.5	72.0	28.0	36.0	0.0	9.0
Average	6.8	0.5	0.0	3.3	27.4	74.3	23.9	29.8	0.6	11.6

2003	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
P21	0.0	0.0	0.0	0.5	62.5	46.5	1.0	27.0	0.0	10.2
P22	7.2	1.0	0.0	4.5	52.5	53.0	12.0	39.0	0.0	6.2
P23	0.8	0.5	0.0	1.5	67.5	37.5	16.5	16.0	0.0	4.2
P24	0.0	0.0	0.0	7.5	9.5	81.0	9.5	68.5	0.0	9.4
P25	0.0	0.0	0.0	0.0	17.0	84.0	11.5	51.0	6.0	9.2
P26	0.0	0.0	0.0	0.5	17.0	64.5	0.5	61.0	0.0	7.4
P27	0.0	0.0	0.0	1.5	2.5	90.5	1.5	87.0	0.0	15.0
P28	0.0	0.0	0.0	5.0	43.0	62.0	9.5	18.5	3.0	6.8
P29	0.0	0.0	0.0	0.0	42.5	56.5	11.5	40.0	0.0	3.5
P30	0.0	0.0	0.0	1.0	58.0	44.5	5.5	35.0	0.5	8.2
P31	0.0	0.0	0.0	1.5	57.5	52.5	6.0	38.0	11.0	8.6
P32	0.0	0.0	0.0	2.0	29.0	84.0	4.0	67.5	0.0	20.4
P33	0.0	0.0	0.0	10.0	43.0	57.0	12.0	40.5	0.0	12.2
P34	0.0	0.0	0.0	2.5	67.5	42.5	7.5	33.5	0.5	20.0
P35	0.0	0.0	0.0	1.0	19.0	77.0	2.0	75.0	0.0	23.4
P36	0.0	0.0	0.0	7.5	57.5	45.5	10.5	33.5	0.0	18.2
Average	0.5	0.1	0.0	2.9	40.3	61.2	7.6	45.7	1.3	11.4

Kirby Slope Preserve

2007	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	182.4	16.5	0.0	10.5	18.5	81.5	39.0	42.5	0.0	2.6
KP2	291.2	28.5	1.0	1.0	21.0	79.0	56.5	28.5	0.0	3.4
KP3	105.6	10.0	2.0	5.0	12.5	87.5	34.0	60.0	0.0	3.8
KP4	268.8	19.5	0.0	0.0	42.5	57.5	24.5	38.0	0.0	2.8
KP5	87.2	5.0	0.0	6.5	17.0	83.0	26.5	69.0	0.5	3.6
Average	187.0	15.9	0.6	4.6	22.3	77.7	36.1	47.6	0.1	3.2

2006	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	336.0	4.0	0.1	15.1	0.0	68.0	28.4	39.0	0.0	0.5
KP2	802.4	12.1	1.6	0.5	19.5	53.1	27.8	25.3	0.0	0.3
KP3	488.8	12.0	0.0	0.5	19.5	65.0	21.5	43.5	0.0	0.3
KP4	328.0	10.0	0.0	0.0	28.5	45.5	17.2	28.2	0.0	0.5
KP5	404.0	7.1	0.0	4.0	21.5	40.9	18.2	22.6	0.0	0.5
Average	471.8	9.0	0.3	4.0	17.8	54.5	22.6	31.7	0.0	0.4

2005	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	484.0	15.0	0.0	17.0	38.0	82.5	47.5	26.0	0.0	0.4
KP2	852.0	12.5	2.0	2.5	57.5	51.0	29.0	20.5	0.0	0.5
KP3	195.2	5.0	1.0	2.0	57.5	63.0	25.0	35.5	0.0	0.6
KP4	428.0	10.0	0.5	0.0	72.5	53.0	24.5	26.0	0.5	0.7
KP5	522.4	7.0	0.5	2.0	77.5	45.5	24.5	21.0	0.5	0.7
Average	496.3	9.9	0.8	4.7	60.6	59.0	30.1	25.8	0.2	0.6

2004	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	492.0	21.5	0.0	12.0	14.5	70.5	44.5	26.0	0.0	3.8
KP2	444.0	19.0	0.5	1.5	28.5	74.5	30.0	0.5	1.5	5.2
KP3	277.6	12.5	0.0	1.5	26.5	84.0	29.5	53.0	0.0	5.8
KP4	224.0	7.5	0.0	0.0	41.0	53.5	11.5	41.0	1.0	7.0
KP5	832.0	29.0	2.0	2.5	24.0	92.5	47.0	43.5	0.0	5.0
Average	453.9	17.9	0.5	3.5	26.9	75.0	32.5	32.8	0.5	5.4

2003	Plantago/ sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	256.0	11.5	0.0	9.0	3.5	87.5	28.5	47.5	0.5	5.1
KP2	425.6	21.5	1.5	1.0	24.0	72.0	32.5	35.5	0.5	5.1
KP3	250.4	12.5	1.0	2.5	5.0	78.0	32.0	38.5	0.0	5.4
KP4	896.8	38.0	4.0	10.0	19.5	102.5	71.0	26.5	0.5	2.8
KP5	260.8	12.0	0.0	0.0	62.5	53.0	19.5	25.5	0.0	7.6
Average	417.9	19.1	1.3	4.5	22.9	78.6	36.7	34.7	0.3	5.2

2002	Plantago/sq. meter	% Cover Plantago	% Cover Castilleja	% Cover Nectar Species	% Cover Bare Ground	% Cover Vegetation	% Cover Native Species	% Cover Non Native Grasses	% Cover Invasive Species	Mean Average Grass Height
KP1	279.0	15.0		17.5	52.5	130.0	7.5	37.5		10.0
KP2	344.0	15.0	15.0	2.5	15.0	112.5	25.0	37.5		10.0
KP3	104.0	2.5	2.5	5.0	15.0	77.5	10.0	40.0		10.0
KP4	641.0	15.0			62.5	122.5	7.5	37.5		10.0
KP5	1622.0	37.5	2.5	7.5	37.5	107.5	5.0	17.5		10.0
Average	598.0	17.0	4.0	6.5	36.5	110.0	11.0	34.0		10.0

Appendix B(ii). Dudleya monitoring data

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
156	1	*	*	130	142	146	155		227	174
240	1	*	*	8	9	12	8	10	12	7
S	1	1308	2291	*	*	*	*	*	*	*
359	2	*	*	16	14	14	12	11	8	2
360	2	*	*	42	31	30	18	16	26	32
RP*RT	2	483	576	*	*	*	*	*	*	*
361	3	*	*	20	24	25	16	17	16	17
RK*RL	3	64	267	*	*	*	*	*	*	*
362	4	*	*	22	16	24	24	31	23	6
RH*RJ	4	164	381	*	*	*	*	*	*	*
364	5	*	*	37	36	38	5	23	18	14
363	5	*	*	59	62	72	44	60	72	38
RD*RG	5	443	610	*	*	*	*	*	*	*
365	6	*	*	46	62	67	66	83	78	22
RA*RC	6	369	313	*	*	*	*	*	*	*
246	7	237	58	*	*	*	*	*	*	*
247	7	1	1	1	1	4	6	5	5	4
248	7	1	1	1	1	1	1	1	*	*
249	7	9	5	6	8	6	6	6	*	*
250	7	6	1	*	*	*	*	*	7	3
251	7	8	7	12	9	11	9	7	*	*
252	7	5	17	20	19	20	18	24	*	*
253	7	121	140	*	*	*	*	*	*	*
254	7	15	30	28	32	54	48	59	27	57
255	7	214	211	*	*	*	*	*	*	*
256	7	118	156	161	110	129	115	107	*	*
257	7	496	129	*	*	*	*	*	*	*
258	7	59	105	96	112	130	132	121	*	*
259	7	5	2	*	*	*	*	*	0	2
260	7	418	288	*	*	*	*	*	304	295
261	7	308	208	*	*	*	*	*	*	*
271	7	5	7	7	8	8	7	13	*	*
262	8	203	27	*	*	*	*	*	*	*
263	8	2	30	*	*	*	*	*	*	*
264	8	180	66	135	175	216	177	182	*	*
265	8	15	44	*	*	*	*	*	*	*
266	8	69	47	*	*	*	*	*	*	*
267	8	12	9	*	*	*	*	*	*	*
268	8	3	7	*	*	*	*	*	*	*
269	8	14	11	*	*	*	*	*	*	*
270	8	119	97	*	*	*	*	*	*	*
272	8	170	72	*	*	*	*	*	*	*
273	8	106	48	*	*	*	*	*	71	96
274	8	347	169	*	*	*	*	*	*	*
275	8	33	38	*	*	*	*	*	*	*
276	8	594	120	*	*	*	*	*	*	*
277	8	11	4	10	10	10	10	5	6	5
278	8	77	25	*	*	*	*	*	16	4
279	8	248	79	*	*	*	*	*	*	*
280	8	302	64	*	*	*	*	*	*	*
281	8	0	2	*	*	*	*	*	*	*
282	8	227	9	*	*	*	*	*	*	*
283	8	169	10	*	*	*	*	*	*	*
284	8	1	0	*	*	*	*	*	0	0
285	8	4	0	*	*	*	*	*	*	*

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
286	8	183	120	*	*	*	*	*	*	47
287	8	85	63	*	*	*	*	*	*	*
288	8	19	7	*	*	*	*	*	*	*
289	8	182	34	56	20	48	19	17	17	13
290	8	0	11	*	*	*	*	*	*	*
291	8	12	3	*	*	*	*	*	9	9
292	8	0	9	*	*	*	*	*	6	3
227	9	13	28	32	34	34	34	32	*	*
228	9	8	9	*	*	*	*	*	*	*
229	9	38	48	72	79	79	32	30	*	*
230	9	14	18	*	*	*	*	*	*	*
231	9	15	40	*	*	*	*	*	*	*
232	9	3	2	*	*	*	*	*	0	0
233	9	83	58	*	*	*	*	*	*	134
234	9	95	62	*	*	*	*	*	*	*
235	9	4	25	*	*	*	*	*	*	0
236	9	8	6	*	*	*	*	*	*	*
237	9	30	25	25	27	34	10	10	9	3
238	9	48	56	*	*	*	*	*	*	*
239	9	86	81	*	*	*	*	*	*	*
241	9	1	1	*	*	*	*	*	*	1
242	9	2	6	*	*	*	*	*	*	3
243	9	4	3	*	*	*	*	*	*	*
244	9	39	10	*	*	*	*	*	5	5
245	9	8	9	*	*	*	*	*	*	*
401	9	64	91	109	130	136	90	94	*	*
402	9	27	7	11	18	26	2	2	*	*
403	9	0	22	16	25	22	11	18	*	*
404	9	38	19	*	*	*	*	*	*	*
405	10	51	50	R	gone	*	*	*	*	*
406	10	0	1	*	R	gone	*	*	*	*
407	10	0	5	*	*	*	*	*	*	*
408	10	1	2	*	*	*	*	*	*	0
409	10	6	6	*	*	*	*	*	0	0
410	10	0	3	*	*	*	*	*	0	2
411	10	3	2	*	*	*	*	*	0	0
412	10	2	2	*	*	*	*	*	2	12
413	10	66	28	70	67	85	9	29	*	*
414	10	2	5	*	*	*	*	*	*	5
415	10	23	13	21	21	24	0	1	*	*
418	10	7	6	*	*	*	*	*	*	*
419	10	4	15	*	*	*	*	*	*	0
420	10	19	11	11	11	14	6	5	2	6
421	10	78	69	*	*	*	*	*	*	*
422	10	15	7	*	*	*	*	*	*	1
423	10	0	*	4	3	3	2	2	2	1
424	10	15	23	*	*	*	*	*	*	*
425	10	32	24	*	*	*	*	*	*	*
426	10	0	2	5	5	9	0	0	*	*
319	11	2	1	*	*	*	*	*	*	*
320	11	5	1	*	*	*	*	*	*	*
321	11	8	10	*	*	*	*	*	*	*
322	11	0	1	*	*	*	*	*	*	*
323	11	8	5	*	*	*	*	*	*	*
324	11	101	111	*	*	*	*	*	*	*

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
325	11	29	34	*	*	*	*	*	*	*
326	11	3	7	*	*	*	*	*	*	*
327	11	29	57	35	41	57	4	6	*	*
328	11	22	27	*	*	*	*	*	*	*
329	11	5	7	9	8	12	1	3	*	*
330	11	1	1	*	*	*	*	*	*	*
331	11	15	29	*	*	*	*	*	*	*
332	11	3	5	*	*	*	*	*	*	*
333	11	9	8	*	*	*	*	*	*	*
334	11	22	37	*	*	*	*	*	*	20
335	11	6	13	*	*	*	*	*	*	*
336	11	1	2	*	*	*	*	*	2	0
337	11	7	10	*	*	*	*	*	*	*
338	11	31	48	*	*	*	*	*	*	*
339	11	5	10	*	*	*	*	*	*	*
340	11	14	11	*	*	*	*	*	*	*
341	11	0	5	*	*	*	*	*	*	*
342	11	57	211	*	*	*	*	*	68	109
343	11	31	7	20	20	18	1	4	*	*
344	11	11	2	*	*	*	*	*	*	*
345	11	2	2	*	*	*	*	*	*	*
346	11	0	2	*	*	*	*	*	1	2
347	11	0	5	*	*	*	*	*	*	*
348	11	0	4	*	*	*	*	*	*	*
349	11	15	1	*	*	*	*	*	*	*
350	11	6	3	*	*	*	*	*	*	*
351	11	7	11	*	*	*	*	*	*	*
352	11	8	18	*	*	*	*	*	*	*
353	11	11	4	*	*	*	*	*	*	*
354	11	0	5	*	*	*	*	*	*	*
355	11	0	2	*	*	*	*	*	*	*
356	11	0	1	*	*	*	*	*	*	*
357	11	0	3	*	*	*	*	*	*	*
358	11	0	2	*	*	*	*	*	*	*
197	12	9	9	9	10	8	*	*	*	*
198	12	22	36	*	*	*	28	33	25	19
199	12	11	11	11	11	18	14	15	*	*
200	12	14	24	*	*	*	*	*	*	22
201	12	10	28	*	*	*	*	*	*	*
202	12	41	50	*	*	*	*	*	*	*
203	12	2	1	*	*	*	*	*	*	*
204	12	13	21	28	21	129	61	110	53	72
205	12	76	79	*	*	*	*	*	*	*
206	12	3	5	*	*	*	*	*	*	*
207	12	15	35	31	50	59	27	35	4	7
208	12	7	10	*	*	*	*	*	*	*
209	12	3	7	*	*	*	*	*	*	*
210	12	131	176	*	*	*	*	*	*	*
211	12	24	52	*	*	*	*	*	*	*
212	12	18	37	41	52	57	17	26	*	*
213	12	88	104	*	*	*	*	*	*	*
214	12	67	90	*	*	*	*	*	*	*
215	12	17	21	*	*	*	*	*	*	*
216	12	4	6	*	*	*	*	*	*	5
217	12	20	29	27	24	40	34	36	*	23
218	12	13	13	*	*	*	*	*	6	7

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
219	12	16	21	*	*	*	*	*	*	*
220	12	22	33	*	*	*	*	*	40	30
221	12	7	19	*	*	*	*	*	*	*
222	12	1	6	*	*	*	*	*	*	*
223	12	16	23	*	*	*	*	*	7	10
224	12	99	78	*	61	33	7	7	*	*
225	12	79	102	*	*	*	*	*	*	*
226	12	2	1	*	*	*	*	*	*	1
293	13	14	10	9	16	28	78	48	46	62
294	13	17	19	14	12	15	33	15	16	9
295	13	1	0	0	0	0	0	0	0	0
296	13	4	6	6	4	6	13	46	28	18
297	13	107	137	*	*	*	*	*	*	*
371	13	will monitor in Year 10								*
372	13	will monitor in Year 10								*
298	14	3	4	4	7	9	6	11	*	*
299	14	1	4	5	7	15	12	13	*	*
300	14	8	4	4	9	15	2	5	0	1
301	14	21	40	52	51	79	85	99	*	*
302	14	33	14	*	*	*	*	*	29	34
303	14	18	13	17	16	22	20	35	*	*
304	14	84	21	*	*	*	*	*	*	*
305	14	0	32	34	30	37	67	64	*	*
368	14	*	*	63	59	82	83	67	109	35
373	14	will monitor in Year 10								*
427	15	42	75	84	54	81	101	119	115	105
428	15	1	2	4	5	11	9	7	18	19
B	16	1293	1972	*	*	*	*	*	*	*
366	16	*	*	22	26	30	32	27	28	9
367	16	*	*	278	287	443	453	487	543	462
100	17	16	20	*	*	*	*	*	*	16
101	17	1	2	*	R	*	*	*	*	*
102	17	5	7	*	*	*	*	*	*	*
103	17	17	27	55	65	73	79	118	*	*
104	17	2	3	*	*	*	*	*	*	*
105	17	12	11	*	*	*	*	*	2	4
106	17	2	5	*	*	*	*	*	6	6
107	17	62	100	*	*	*	*	*	*	*
108	17	4	3	*	*	*	*	*	*	*
109	17	15	20	16	25	26	36	55	*	*
110	17	2	4	*	*	*	*	*	*	*
111	17	18	32	49	56	49	62	63	*	*
112	17	0	6	5	6	11	13	13	*	*
113	17	3	2	*	*	*	*	*	*	*
114	17	20	26	*	*	*	*	*	*	*
115	17	4	1	*	*	*	*	*	*	*
116	17	7	7	*	*	*	*	*	*	2
117	17	25	23	*	*	*	*	*	*	2
118	17	33	37	42	51	62	61	104	*	*
119	17	21	22	*	*	*	*	*	*	*
120	17	15	24	*	*	*	*	*	*	50
121	17	1	2	2	5	10	8	10	*	*
122	17	1	1	*	*	*	*	*	*	*
123	17	1	1	*	*	*	*	*	*	*
124	17	13	18	*	*	*	*	*	21	42

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
125	17	1	0	1	0	0	2	8	*	*
126	17	303	196	*	*	*	*	*	*	*
127	17	3	5	*	*	*	*	*	*	*
128	17	11	28	*	*	*	*	*	*	*
129	17	12	8	*	*	*	*	*	*	*
130	17	38	55	*	*	*	*	*	*	*
131	17	49	67	*	*	*	*	*	57	38
132	17	1	6	*	*	*	*	*	*	*
133	17	1	0	1	1	1	1	1	*	*
134	17	44	59	*	*	*	*	*	*	*
135	17	20	26	*	*	*	*	*	*	*
136	17	31	46	*	*	*	*	*	*	*
137	17	46	1	*	*	*	*	*	*	*
138	17	89	112	*	*	*	*	*	*	*
139	17	103	86	*	*	*	*	*	*	*
140	17	14	20	*	*	*	*	*	*	11
141	17	26	31	*	*	*	*	*	*	*
142	17	2	7	*	*	*	*	*	12	9
143	17	8	12	20	24	32	36	36	*	*
144	17	1	1	*	*	*	*	*	*	*
145	17	3	4	*	*	*	*	*	3	2
146	17	1	1	*	*	*	*	*	*	2
147	17	9	4	*	*	*	*	*	*	*
148	17	6	5	*	*	*	*	*	*	*
149	17	15	15	*	*	*	*	*	24	11
150	17	13	9	9	10	12	11	15	*	*
151	17	5	2	*	*	*	*	*	*	*
152	17	8	9	14	18	22	26	35	*	*
153	17	1	1	*	*	*	*	*	*	*
154	17	13	12	*	*	*	*	*	*	*
155	17	14	12	*	*	*	*	*	*	*
157	17	4	3	*	*	*	*	*	*	*
158	17	33	27	*	*	*	*	*	*	*
159	17	13	17	*	*	*	*	*	*	*
160	17	8	9	9	12	12	8	11	*	*
161	17	1	5	*	*	*	*	*	*	*
162	17	5	4	*	*	*	*	*	2	1
163	17	23	51	*	*	*	*	*	*	*
164	17	38	61	89	104	114	92	78	52	15
165	17	5	5	*	*	*	*	*	*	*
166	17	3	2	*	*	*	*	*	*	*
167	17	19	16	14	11	12	8	7	*	*
168	17	4	1	*	*	*	*	*	2	5
169	17	2	6	*	*	*	*	*	*	*
170	17	5	10	*	*	*	*	*	*	*
171	17	10	15	*	*	*	*	*	4	3
172	17	16	15	12	11	10	12	15	*	*
173	17	2	1	1	2	2	0 (R)	*	*	*
174	17	3	7	*	*	*	*	*	*	*
175	17	1	1	*	*	*	*	*	*	*
176	17	2	3	4	7	14	2	5	*	*
177	17	26	36	*	*	*	*	*	*	*
178	17	4	4	3	7	7	3	4	*	*
179	17	1	2	*	*	*	*	*	0	0
180	17	1	11	*	*	*	*	*	*	*
181	17	24	24	*	*	*	*	*	*	*

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
182	17	8	13	*	*	*	*	*	*	25
183	17	3	4	*	*	*	*	*	*	*
184	17	7	9	*	*	*	*	*	*	*
185	17	31	33	*	*	*	*	*	*	*
186	17	115	190	*	*	*	*	*	*	*
187	17	19	7	*	*	*	*	*	1	0
188	17	25	32	*	*	*	*	*	*	*
189	17	6	6	*	*	*	*	*	*	*
190	17	13	12	14	11	19	19	20	*	*
191	17	7	12	*	*	*	*	*	*	*
192	17	3	9	*	*	*	*	*	*	10
193	17	1	4	4	5	5	5	4	*	*
194	17	2	2	*	*	*	*	*	*	*
195	17	4	5	*	*	*	*	*	*	*
196	17	18	11	*	*	*	*	*	*	*
369	17	will monitor in Year 10								*
370	17	will monitor in Year 10								*
430	17	0	2	*	*	*	*	*	*	*
431	17	0	1	*	*	*	*	*	0	0
432	17	0	1	*	*	*	*	*	*	*
433	17	0	2	2	5	6	6	5	*	*
434	17	0	7	*	*	*	*	*	*	*
435	17	0	16	*	*	*	*	*	*	*
436	17	0	2	*	*	*	*	*	*	*
437	17	0	1	*	*	*	*	*	0	0
438	17	0	2	*	*	*	*	*	*	*
417	31	8	54	53	43	24	8			17
311	32	172	152	*	*	*	*	*	*	*
312	32	23	23	*	*	*	*	*	*	30
313	32	6	7	8	9	27	13	20	15	14
314	32	2	1	1	1	2	2	1	1	0
315	32	1	2	2	5	5	10	11	*	*
316	32	14	16	16	16	14	1	3	3	2
317	32	15	8	14	12	14	4	5	*	*
318	32	6	5	5	5	6	6	12	3	2
306	33	12	11	9	14	19	8	16	10	6
307	33	75	141	124	164	197	175	148	169	147
308	33	27	21	24	27	39	30	28	27	16
309	33	20	73	61	24	26	28	16	*	25
310	33	992	1498	*	*	*	*	*	*	*
429	34	13	27	43	48	57	70	86	106	87
1	35	103	84	*	*	*	*	*	33	24
2	35	5	6	*	*	*	*	*	*	*
3	35	1	3	*	*	*	*	*	*	*
4	35	47	73	*	*	*	*	*	*	*
5	35	6	6	*	*	*	*	*	*	*
6	35	2	4	*	*	*	*	*	*	*
7	35	2	1	*	*	*	*	*	*	*
8	35	12	16	*	*	*	*	*	*	*
9	35	1	1	*	*	*	*	*	*	*
10	35	5	5	*	*	*	*	*	*	*
11	35	1	1	*	*	*	*	*	*	*
12	35	48	50	*	*	*	*	*	*	*
13	35	6	10	*	*	*	*	*	*	*
14	35	13	8	*	*	*	*	*	*	*

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
15	35	5	5	*	*	*	*	*	*	*
16	35	53	32	*	*	*	*	*	*	*
17	35	6	5	*	*	*	*	*	*	*
18	35	252	423	*	*	*	*	*	*	*
19	35	5	8	*	*	*	*	*	*	*
20	35	4	3	*	*	*	*	*	*	*
21	35	4	1	*	*	*	*	*	*	*
22	35	61	52	*	*	*	*	*	*	*
23	35	21	33	*	*	*	*	*	*	*
24	35	1	2	*	*	*	*	*	0	0
25	35	10	8	*	*	*	*	*	*	*
26	35	1	2	*	*	*	*	*	*	*
27	35	0	1	*	*	*	*	*	*	*
28	35	2	1	*	*	*	*	*	*	*
29	35	7	4	*	*	*	*	*	*	*
30	35	14	?	*	*	*	*	*	0	0
31	35	34	31	*	*	*	*	*	*	*
32	35	24	23	*	*	*	*	*	*	*
33	35	3	1	*	*	*	*	*	*	*
34	35	32	22	26	33	50	25	34	28	15
35	35	0	7	*	*	*	*	*	*	*
36	35	42	89	*	*	*	*	*	*	*
37	35	16	2	*	*	*	*	*	*	*
38	35	5	5	*	*	*	*	*	2	3
39	35	0	7	*	*	*	*	*	*	*
40	35	7	4	*	*	*	*	*	*	*
41	35	4	5	*	*	*	*	*	8	7
42	35	4	3	*	*	*	*	*	*	*
43	35	74	70	59	61	76	61	95	*	*
44	35	5	6	*	*	*	*	*	*	*
45	35	13	11	*	*	*	*	*	*	*
46	35	20	28	33	50	54	62	78	23	4
47	35	5	8	8	14	14	9	11	*	0
48	35	3	1	*	*	*	*	*	*	*
49	35	1	1	*	*	*	*	*	*	*
50	35	12	16	*	*	*	*	*	*	*
51	35	16	26	*	*	*	*	*	*	*
52	35	7	12	*	*	*	*	*	*	*
53	35	60	79	86	122	125	112	124	*	15
54	35	28	53	*	*	*	*	*	*	*
55	35	91	173	*	*	*	*	*	*	*
56	35	53	83	*	*	*	*	*	*	*
57	35	9	16	*	*	*	*	*	*	*
58	35	13	14	*	*	*	*	*	*	*
59	35	7	9	*	*	*	*	*	*	*
60	35	52	105	*	*	*	*	*	*	*
61	35	23	25	29	28	27	31	46	*	*
62	35	8	21	*	*	*	*	*	*	*
63	35	38	44	*	*	*	*	*	6	1
64	35	28	32	*	*	*	*	*	*	23
65	35	0	17	*	*	*	*	*	*	*
66	35	4	2	3	3	3	3	2	*	*
67	35	5	5	*	*	*	*	*	*	*
68	35	146	209	*	*	*	*	*	*	*
69	35	232	298	*	*	*	*	*	*	*
70	35	16	17	*	*	*	*	*	*	*

Naturally-Occurring Dudleya by Plot within the Preserve

* Plot Not Counted

R = Plot Removed

Plot	PCA	1998	2000	2001	2002	2003	2004	2005	2006	2007
71	35	51	40	*	*	*	*	*	*	*
72	35	3	2	*	*	*	*	*	*	*
73	35	22	34	*	*	*	*	*	*	*
74	35	54	88	*	*	*	*	*	*	*
75	35	14	16	*	*	*	*	*	*	31
76	35	1	2	*	*	*	*	*	*	*
77	35	3	4	*	*	*	*	*	*	*
78	35	4	4	*	*	*	*	*	*	*
79	35	5	12	*	*	*	*	*	*	*
80	35	16	22	*	*	*	*	*	*	*
81	35	25	18	*	*	*	*	*	*	*
82	35	3	5	*	*	*	*	*	5	3
83	35	38	60	*	*	*	*	*	*	*
84	35	2	4	*	*	*	*	*	*	*
85	35	0	13	*	*	*	*	*	*	*
86	35	5	5	*	*	*	*	*	*	*
87	35	2	2	*	*	*	*	*	*	*
88	35	0	2	*	*	*	*	*	*	*
89	35	0	1	*	*	*	*	*	*	*
90	35	1	1	*	*	*	*	*	*	*
91	35	4	21	*	*	*	*	*	*	*
92	35	4	8	*	*	*	*	*	*	35
93	35	1	1	*	*	*	*	*	*	*
94	35	8	5	*	*	*	*	*	*	9
95	35	12	22	17	17	20	24	19	*	*
96	35	30	34	*	*	*	*	*	*	*
97	35	44	83	*	*	*	*	*	*	*
98	35	1	0	*	*	*	*	*	*	*
99	35	0	12	*	*	*	*	*	*	*
TOTALS		17,450	19,083	3,083	3,334	4,133	3,452	3,701	2,731	2,874

Transplanted Dudleya by Plot within the Preserve (transplanted from Project Areas)											
Plot	PCA	2001		2002		2003		2004 LIVE PLANTS	2005 LIVE PLANTS	2006 LIVE PLANTS	2007 LIVE PLANTS
		#d tags	no tag	#d tags	no tag	#d tags	no tag				
447	1	8		5		4		3	3	3	1
448	1	2		1		1		1	1	1	2
449	1	3		3		2					
450	1	2		2		2		1	1	1	1
451	1	2		2		2		1	1	1	
452	1	2		1							
453	2	6		5		3		2	2	0	
454	2	17		18		12		12	12	9	2
455	2	3		3		3		3	3	2	1
456	2	6		5		5		2	2	1	1
457	2	8	1	9		9		5	5	5	5
458	2	3	1	3	1	4		1	1	1	
459	2	5		5		2		1	1	1	1
460	2	14		11		9		6	6	6	4
461	2	5		5		4		4	4	3	2
462	2	13		10		7		3	3	2	1
463	2	3		2		2		1	1	1	1
464	2	1		1		1		1	1	1	1
465	2	6		6		6		6	6	5	5
466	2	12	2	11		9		3	3	1	1
467	2	15	1	13		13		6	4	4	3
468	2	1	2	1	2	3		2	2	2	2
469	2	7		8		8		7	5	5	3
470	2	1		1		1					
471	2	3		3		3		2	2	1	1
248	7	5		2				1	1	1	1
249	7	7		10				6	8	6	5
250	7	1		1				1	1	0	
251	7			1							
252	7	8		9	1			5	13	13	11
256	7	1									
QUARRY-C (514, 515)	7	1	1			85		40	62	40	39
QUARRY-J	7	1417	351	1199	161	835		462	429	418	410
QUARRY-S (513)	7	75	10	58	27	76		68	76	66	68
508	8					5					
509	8					20				1	
QUARRY-N	8	16	12			5	4		4	4	3
401	9					3	2	1	3	2	0
402	9					1		1			
406	10	6	14	5	15						
407	10	2		2							
446	10	13	50	8	9	4	9			0	
324	11	2		1		2					
325	11	14		12		9		1		1	1
326	11	4		4		3					
327	11	5		6		4					
355	11	1		1		1					
484	13	2		2						1	
485	13	4		4		2		2	2	2	2
486	13	4		3		2					
487	13	3		3		3		1	1	0	
488	13	16		13		12		10	9	8	7
489	13	8		7		6		2	2	2	2
490	13	10	1	6		5		5	4	4	4
491	13	5	1	5	1	5		4	1	1	
492	13	4		3		2		1		0	
493	13	5		3		3		2	2	2	2
494	13	7		7		6		7	7	7	7
495	13	5		5		2		3	2	2	2
520	13					2		2	1	1	
502	14	-	-	-	-	-	-	2	1	1	1
299	14	6	2	6	2	5		1	1	0	2
301	14	3		4		1		1	2	2	3
472	14	3		3		2		1	1	1	1
473	14	3		3		2		2	2	1	1
474	14	2	3	2	2	3		1			1
475	14	5		5		4		2	2	2	3
476	14	2		2		2		1		0	
477	14	1	2		1	2		1	1	1	1
478	14	2		2		1		1			

Appendix B-Transplanted Dudleya

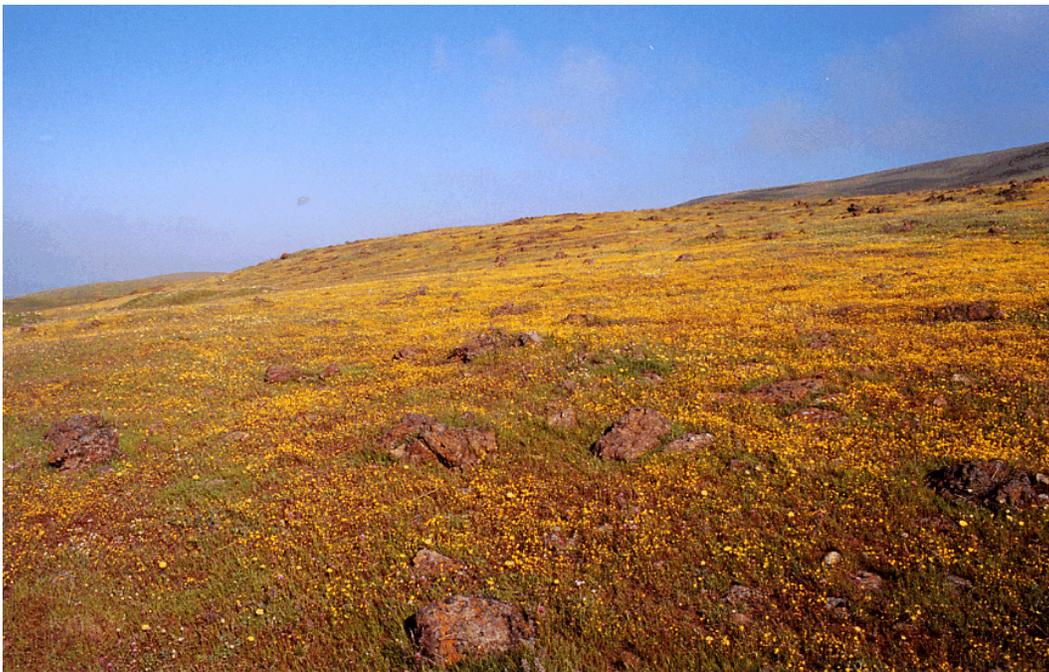
Plot	PCA	2001		2002		2003		2004 LIVE PLANTS	2005 LIVE PLANTS	2006 LIVE PLANTS	2007 LIVE PLANTS
		LIVE PLANTS		LIVE PLANTS		LIVE PLANTS					
		#d tags	no tag	#d tags	no tag	#d tags	no tag				
479	14	7	6	7	6	9		5	6	5	5
480	14	5		3		2		2	2	1	1
481	14	4		4		2		1	1	0	
482	14	1		1							
483	14	2		3		3		2	2	2	2
103	17	3		3		3		2	2	2	
104	17	2		2		2		1	1	0	
105	17	2		2		2		2	2	1	1
106	17	2		2		1		1	1	1	1
107	17	3		3		3		3	2	0	
108	17	1		1		1		1			
109	17	1		1							
110	17	2		1		1					
112	17	1		1		1		1	1	0	
114	17	1		1		1					
116	17	5		2		2		2	2	0	
118	17	1		1							
119	17	7		7							
121	17	1		1		1		1			
124	17	2		2		2		2	2	2	1
126	17	5		4		4		4	4	3	3
127	17	2		2		2		2	2	0	
130	17	6		6		6		6	6	6	5
131	17	2		2		2		2	2	2	2
132	17	1		1							
134	17	3		4		2		2	3	2	2
135	17	5		5		5		5	5	4	3
136	17	3		3		1					
138	17	3		1		1		1	1	1	1
140	17	4		4		4		4	3	3	3
141	17	5	1	3		1		1			
149	17	1		1		1		1	1	1	1
150	17	6		6		6		6	6	4	4
154	17	2		2		2		2		1	
155	17	3		3		3		2	2	2	1
159	17	4		4		5		2	2		
161	17	2		1							
182	17	2		2		2			1	0	
185	17	4		2		2		2	2	1	1
186	17	1		1		1					
192	17	4		4		4		3	3	2	2
193	17	2		1		1		1		0	
510	17										
511	17										
512	17									5	
517	17					3		2	1	0	
518	17					3		2	2	1	1
519	17	5		5		5	4	5	5	0	
439	32				41	24	15	15	33	2	8
440	32				26	14	5			0	3
441	32				31	12	4			2	2
442	32				15	6	3			4	
443	33				57	31	24	22	22	23	18
444	33				41	35	30	30	34	32	31
429	34	16		12		12		8	6	6	6
70	35	3		1					6		
71	35	6		3		3					
73	35	6		5		6		1			
74	35	10		9		8		4		1	1
75	35	1		1		1		1			1
76	35	1		1		1					
95	35	5		5		2		2			
516	35					2					
TOTALS:		2002	461	1693	473	1343	143	890	851	766	725
			2463		2166		1486				
NOTE: Plot number may refer to NEAREST plot, if transplants are not located directly within a plot											

Appendix C. Photographs



Above: Bay checkerspot larvae

Below: Adult bay checkerspot butterfly



Above: Bay checkerspot butterfly habitat at the Silver Creek Preserve.

Below: Bay checkerspot butterfly habitat at the off-site Kirby Slope Preserve.





Above: Santa Clara Valley dudleya blooming at the offsite Kirby Preserve.

Below: Mt. Hamilton thistle at the Silver Creek Preserve.



Above: Fragrant fritillary blooming at the Silver Creek Preserve.

Below: Metcalf canyon jewelflower blooming at the Silver Creek Preserve.



Appendix D. California Natural Diversity Database (CNDDDB) species forms

California Native Species Field Survey Form

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Date of field work: 04 - 02 - 07
mo day year

Scientific Name (no codes): *Dudleya setchellii*

Species Found? [x] []
yes no If not, why?

Reporters: Tom Fraser, Amy Langston
Rosie Wilson, Mark Brandi (WRA, Inc.)

Total # individuals: 15,356 subsequent visit? [x] yes [] no
Compared to your last visit: [] more [] same [x] fewer
Is this an existing NDDDB occurrence? [x] 7 [] []
Yes, Occ.# no unk.

Address: 2169-G E. Francisco Blvd.
San Rafael, CA 94901
Phone: (415) 454-8868

Collection? if yes: _____
number Museum/Herbarium

Other knowledgeable individuals

Plant Information:

Phenology: 100% _____
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____
adults # juveniles # unknown
Site Function: [] [] [] [] [] []
breeding foraging wintering roosting burrow site other

Location: (Please also attach or draw map on back.)

Located on ridges between Highway 101 and Silver Creek Road, within the Silver Creek Preserve.

County: Santa Clara

Landowner/Mgr: William Lyon Homes

Quad Name: San Jose East

Elevation: 400-800 ft NGVD

T 7 S. R 2 E. N/A 1/4 of N/A 1/4 Sec N/A

UTM Zone 10 Datum: NAD 27 Source: USGS map
UTM Coordinates: 4127135N, 607067E

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)

Serpentine outcrops along ridge line. Associated species include *Avena fatua*, *Bromus diandrus*, *Lolium multiflorum*, *Nassella pulchra*, and *Artemisia californica*.

Other rare spp. *Streptanthus albidus* ssp. *albidus*

Site Information:

Current/surrounding land use: Housing development, golf course and some grazing.

Overall site quality: [] Excellent [X] Good [] Fair [] Poor Comments: According to other sources (City of San Jose), this location had 20,869 plants in 1993; 21,947 plants in 1998; 25,735 in 2001; 27,031 in 2002; 24,839 in 2004; 26,951 in 2005; and 16,553 in 2006 (WRA, Inc).

Determination: (Check one or more, fill in the blanks)

Keyed in a site reference: Jepson Manual (1993)
 Compared with specimen housed at: _____
 Compared with photo/drawing in: _____
 By another person (name): _____
 Other: _____

Photographs: (Check one or more) Slide Print

Plant/animal _____
Habitat _____
Diagnostic Feature _____
Other _____
May we obtain duplicates at our expense? [X] yes [] no

California Native Species Field Survey Form

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Date of field work: 05 - 22 - 07 and 05 - 23 - 07
mo day year

Scientific Name (no codes): *Streptanthus albidus* ssp. *albidus*

Species Found?

yes no If not, why?

Total # individuals: 25,080 subsequent visit? yes no

Compared to your last visit: more same fewer

Is this an existing NDDDB occurrence? 15
Yes, Occ.# no unk.

Reporters: Leslie Lazarotti,
Morgan Trieger (WRA, Inc.)

Address: 2169-G E. Francisco Blvd.
San Rafael, CA 94901
Phone: (415) 454-8868

Collection? if yes: _____
number Museum/Herbarium

Other knowledgeable individuals

Plant Information:

Phenology: 20% 80% _____
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____

adults # juveniles # unknown

Site Function:
breeding foraging wintering roosting burrow site other

Location: (Please also attach or draw map on back.)

Located on ridges between Highway 101 and Silver Creek Road, within the Silver Creek Preserve.

County: Santa Clara

Landowner/Mgr: William Lyon Homes

Quad Name: San Jose East

Elevation: 400-800 ft NGVD

T 7 S. R 2 E. N/A 1/4 of N/A 1/4 Sec N/A

UTM Zone 10 Datum: NAD 27 Source: USGS map

UTM Coordinates: 4127038N, 606424E

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)

Serpentine outcrops along ridge line and slopes. Associated species include *Avena fatua*, *Bromus diandrus*, *Lolium multiflorum*, *Nasella pulchra*, and *Artemisia californica*.

Other rare spp. *Dudleya setchellii*, *Malacothamnus hallii*

Site Information:

Current/surrounding land use: Housing development, golf course and grazed habitat mitigation Preserve.

Overall site quality: Excellent Good Fair Poor Comments: According to other sources (City of San Jose), this location had 9,065 plants in 1993 and 75,000 plants in 1998; monitoring of the location did not locate any plants in 1999 and less than 100 were observed in 2000 (Sycamore Associates); 13,200 were found in 2001; 5,800 in 2002; 8,700 in 2003; 8,300 in 2004; 9,888 in 2005; and 8,620 in 2006 (WRA, Inc).

Determination: (Check one or more, fill in the blanks)

Keyed in a site reference: Jepson Manual (1993)

Compared with specimen housed at: _____

Compared with photo/drawing in: _____

By another person (name): _____

Other: _____

Photographs: (Check one or more) Slide Print

Plant/animal _____

Habitat _____

Diagnostic Feature _____

Other _____

May we obtain duplicates at our expense? yes no

California Native Species Field Survey Form

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Date of field work: 07 - 19 - 07
mo day year

Scientific Name (no codes): *Cirsium fontinale* var. *campylon*

Species Found? [x] []

yes no If not, why?

Total # individuals: 5,623 subsequent visit? [x] yes [] no

Compared to your last visit: [x] more [] same [] fewer

Is this an existing NDDDB occurrence? [x] 22 [] []
Yes, Occ.# no unk.

Collection? if yes: _____
number Museum/Herbarium

Reporters: Amy Langston, Leslie Lazarotti (WRA, Inc.)

Address: 2169-G E. Francisco Blvd.
San Rafael, CA 94901
Phone: (415) 454-8868

Other knowledgeable individuals

Plant Information:

Phenology: 60% 1% 39%
% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____

adults # juveniles # unknown

Site Function: [] [] [] [] [] []
breeding foraging wintering roosting burrow site other

Location: (Please also attach or draw map on back.)

Located within Hellyer Creek, and within drainages and seeps associated with Silver Creek within the Silver Creek Preserve.

County: Santa Clara

Landowner/Mgr: William Lyon Homes

Quad Name: San Jose East

Elevation: 350-550 ft NGVD

T 7 S. R 2 E. N/A 1/4 of N/A 1/4 Sec N/A

UTM Zone 10 Datum: NAD 27 Source: USGS map

UTM Coordinates: 4126767N, 606555E

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)

Seasonally to perennially moist soils within creeks, drainages and seeps. Associated species include *Juncus xiphioides*, *Juncus effusus*, *Eleocharis* sp., *Urtica dioica*, *Cirsium vulgare*, *Mimulus guttatus*, *Typha angustifolia*.

Other rare spp.

Site Information:

Current/surrounding land use: Housing development, golf course and grazed habitat mitigation Preserve.

Overall site quality: [] Excellent [X] Good [] Fair [] Poor Comments: According to other sources (City of San Jose), this location had 22,420 plants in 1993 and 3,000 plants in 1998. WRA biologists found 4,500 in 2001; 4,022 in 2002; 2,416 in 2003; 5,090 in 2004; 3,096 in 2005; and 4,160 in 2006 (WRA, Inc).

Determination: (Check one or more, fill in the blanks)

Keyed in a site reference: Jepson Manual (1993)

Compared with specimen housed at: _____

Compared with photo/drawing in: _____

By another person (name): _____

Other: _____

Photographs: (Check one or more) Slide Print

Plant/animal _____

Habitat _____

Diagnostic Feature _____

Other _____

May we obtain duplicates at our expense? [X] yes [] no

California Native Species Field Survey Form

Mail to:

Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Date of field work: 05 - 22 - 07
mo day year

Scientific Name (no codes): *Malacothamnus hallii*

Species Found? [x] []

yes no

If not, why?

Total # individuals: 100 subsequent visit? [x] yes [] no

Compared to your last visit: [] more [] same [x] fewer

Is this an existing NDDDB occurrence? [x] 8 [] []

Yes, Occ.# no unk.

Collection? if yes: _____
number Museum/Herbarium

Reporters: Leslie Lazarotti (WRA, Inc)

Address: 2169-G E. Francisco Blvd.

San Rafael, CA 94901

Phone: (415) 454-8868

Other knowledgeable individuals

Plant Information:

Phenology: 100% _____

% vegetative % flowering % fruiting

Animal Information:

Age Structure: _____

adults # juveniles # unknown

Site Function: [] [] [] [] [] []
breeding foraging wintering roosting burrow site other

Location: (Please also attach or draw map on back.)

Located on a south-facing slope above Hellyer Creek, between Highway 101 and Silver Creek Road, within the Silver Creek Preserve.

County: Santa Clara

Landowner/Mgr: William Lyon Homes

Quad Name: San Jose East

Elevation: 500 -600 ft NGVD

T 7 S. R 2 E. N/A 1/4 of N/A 1/4 Sec N/A

UTM Zone 10 Datum: NAD 27 Source: USGS map

UTM Coordinates: 4127041N, 606613E

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)

Diablan sage scrub surrounded by non-native annual grassland.

Other rare spp. *Dudleya setchellii*, *Streptanthus albidus* ssp. *albidus*

Site Information:

Current/surrounding land use: Housing development, golf course and some grazing.

Overall site quality: [] Excellent [x] Good [] Fair [] Poor Comments: According to other sources, this location had 100 plants in 1998 (City of San Jose), 100 plants in 2002; 275 plants in 2003; 200 in 2005; and 100 in 2006 (WRA, Inc).

Determination: (Check one or more, fill in the blanks)

X Keyed in a site reference: Jepson Manual (1993)

_____ Compared with specimen housed at: _____

_____ Compared with photo/drawing in: _____

_____ By another person (name): _____

_____ Other: _____

Photographs: (Check one or more) Slide Print

Plant/animal _____

Habitat _____

Diagnostic Feature _____

Other _____

May we obtain duplicates at our expense? [] yes [] no

California Native Species Field Survey Form

Mail to:
Natural Diversity Data Base
California Dept. of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only

Source Code _____ Quad Code _____

Elm Code _____ Occ # _____

Copy to _____ Map Index # _____

Date of field work: 02 - 22 - 07 thru 04 - 03 - 07
mo day year mo day year

Scientific Name (no codes): *Euphydryas editha bayensis*

Species Found? [x] []

yes no if not, why?

Total # individuals: 53 subsequent visit? [x] yes [] no

Compared to your last visit: [] more [] same [x] fewer

Is this an existing NDDDB occurrence? [x] [13] [] []

Yes, Occ.# no unk.

Collection? if yes: _____
number Museum/Herbarium

Reporters: Jeff Dreier, Bill Stagnaro, Suzanne Gearhart
John Doudna, Rhonda Lucas (WRA, Inc)

Address: 2169-G E. Francisco Blvd.

San Rafael, CA 94901

Phone:(415) 454-8868

Other knowledgeable individuals

Plant Information:

Phenology: _____
% vegetative % flowering % fruiting

Animal Information:

Age Structure: 53 _____
adults # juveniles # unknown

Site Function: [x] [x] [] [] [] []
breeding foraging wintering roosting burrow site other

Location: (Please also attach or draw map on back.)

Silver Creek Preserve

County: Santa Clara

Landowner/Mgr: William Lyon Homes

Quad Name: San Jose East

Elevation: 400-800 ft NGVD

T 5S R 1W N/A 1/4 of N/A 1/4 Sec N/A

UTM Zone 10 Datum: NAD 27 Source: USGS map

UTM Coordinates: 4127078N, 607485E

Habitat Description: (Plant communities, dominants, associates, substrate/soils, aspect/slope)

Non-native annual grassland on serpentine substrate.

Site Information:

Current/surrounding land use: Housing development, golf course and some grazing.

Overall site quality: []Excellent [x] Good []Fair []Poor Comments:

Determination: (Check one or more, fill in the blanks)

___ Keyed in a site reference: _____

___ Compared with specimen housed at: _____

___ Compared with photo/drawing in: _____

___ By another person (name): _____

X Other: Reference Species at Kirby Slope Preserve

Photographs: (Check one or more) Slide Print

Plant/animal _____ X

Habitat _____

Diagnostic Feature _____

Other _____

May we obtain duplicates at our expense? [x] yes [] no

Appendix E. List of plant species observed on the Hassler Ranch Preserve

Appendix E. List of plant species observed on the Hassler Ranch Preserve, San Jose, California

<i>Scientific Name</i>	Common Name
<i>Achillea millefolium</i>	yarrow
<i>Achyrachaena mollis</i>	blow-wives
<i>Adiantum jordanii</i>	California maidenhair fern
<i>Aesculus californica</i>	California buckeye
<i>Agoseris grandiflora</i>	California dandelion
<i>Ailanthus altissima</i>	tree of heaven
<i>Allium amplexans</i>	narrow-leaved onion
<i>Amsinckia menziesii</i> var. <i>intermedia</i>	fiddleneck
<i>Anagallis arvensis</i>	scarlet pimpernel
<i>Aphanes occidentalis</i>	dew cup
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	mugwort
<i>Arundo donax</i>	giant reedgrass
<i>Astragalus gambelianus</i>	Gambel's locoweed
<i>Athysanus pusillus</i>	dwarf athysanus
<i>Avena barbata</i>	slender wild oat
<i>Avena fatua</i>	wild oat
<i>Baccharis pilularis</i>	coyote brush
<i>Baccharis salicifolia</i>	seep-willow; mulefat
<i>Berula erecta</i>	cutleaf water parsnip
<i>Beta vulgaris</i>	beet
<i>Brassica nigra</i>	black mustard
<i>Brassica rapa</i>	field mustard
<i>Bromus diandrus</i>	ripgut brome
<i>Bromus hordeaceus</i>	soft chess
<i>Bromus madritensis</i> ssp. <i>madritensis</i>	foxtail chess
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome

<i>Scientific Name</i>	<i>Common Name</i>
<i>Calandrina ciliata</i>	redmaids
<i>Calochortus venustus</i>	butterfly mariposa
<i>Calystegia occidentalis</i>	western morning glory
<i>Calystegia subacaulis</i>	stemless morning glory
<i>Camissonia ovata</i>	sun cup
<i>Capsella bursa-pastoris</i>	shepherd's purse
<i>Cardamine californica</i>	milk maids
<i>Carduus pycnocephalus</i>	Italian thistle
<i>Carex subbracteata</i>	small-bracted sedge
<i>Carthamus lanatus</i>	woolly distaff thistle
<i>Castilleja densiflora</i>	denseflower owl's clover
<i>Castilleja exserta</i>	purple owl's clover
<i>Centaurea solstitialis</i>	yellow star thistle
<i>Centaurium davyi</i>	Davy's centaury
<i>Cerastium arvense</i>	field chickweed
<i>Chamaesyce serpyllifolia</i>	thyme-leaved spurge
<i>Chamomilla suaveolens</i>	pineapple weed
<i>Chenopodium album</i>	lamb's quarters
<i>Chenopodium californicum</i>	California goosefoot
<i>Chlorogalum pomeridianum</i>	soaproot
<i>Cirsium fontinale</i> var. <i>campylon</i>	Mt Hamilton thistle
<i>Cirsium occidentale</i> var. <i>venustum</i>	venus thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Clarkia purpurea</i>	purple clarkia
<i>Claytonia exigua</i>	little spring beauty
<i>Claytonia perfoliata</i>	miner's lettuce
<i>Collinsia heterophylla</i>	Chinese houses
<i>Conium maculatum</i>	poison hemlock
<i>Convolvulus arvensis</i>	field bindweed

<i>Scientific Name</i>	<i>Common Name</i>
<i>Convolvulus</i> sp.	morning glory
<i>Crassula connata</i>	pygmy-weed
<i>Cryptantha flaccida</i>	flaccid cryptantha
<i>Cynara cardunculus</i>	artichoke thistle; cardoon
<i>Cyperus eragrostis</i>	umbrella sedge
<i>Datura wrightii</i>	jimson weed
<i>Delphinium hesperium</i>	western larkspur
<i>Dichelostemma capitatum</i>	blue dicks
<i>Distichlis spicata</i>	salt grass
<i>Dodecatheon clevelandii</i>	field shooting star
<i>Dudleya setchellii</i>	Santa Clara Valley dudleya
<i>Eleocharis macrostachya</i>	common spike rush
<i>Elymus multisetus</i>	big squirreltail
<i>Epilobium brachycarpum</i>	tall willow-herb
<i>Eremocarpus setigerus</i>	turkey mullein
<i>Eriogonum nudum</i>	nude buckwheat
<i>Eriogonum vimineum</i>	wicker buckwheat
<i>Erodium botrys</i>	storksbill
<i>Erodium cicutarium</i>	red-stemmed filaree
<i>Eschscholzia californica</i>	California poppy
<i>Eucalyptus globulus</i>	blue gum
<i>Euphorbia peplus</i>	petty spurge
<i>Filago gallica</i>	French filago
<i>Foeniculum vulgare</i>	fennel
<i>Fritillaria liliacea</i>	fragrant fritillary
<i>Galium aparine</i>	goose grass
<i>Galium californicum</i>	California bedstraw
<i>Galium porrigens</i>	climbing bedstraw
<i>Geranium dissectum</i>	cut-leaf geranium

Scientific Name	Common Name
<i>Geranium molle</i>	soft geranium
<i>Gilia capitata</i>	blue field gilia
<i>Gilia tricolor</i>	bird's eye gilia
<i>Gnaphalium californicum</i>	California everlasting
<i>Grindelia camporum</i>	valley grindelia
<i>Guillenia lasiophylla</i>	California mustard
<i>Hemizonia congesta</i>	hayfield tarweed
<i>Hesperevax caulescens</i>	hogwallow starfish
<i>Hesperevax sparsiflora</i>	evax
<i>Heteromeles arbutifolia</i>	toyon
<i>Hordeum brachyantherum</i>	meadow barley
<i>Hordeum jubatum</i>	foxtail barley
<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	Mediterranean barley
<i>Hordeum murinum</i> ssp. <i>leporinum</i>	farmer's foxtail
<i>Hypochaeris radicata</i>	rough cat's ear
<i>Juglans californica</i> var. <i>hindsii</i>	Northern California black walnut
<i>Juncus balticus</i>	wire rush
<i>Juncus phaeocephalus</i>	brown-headed rush
<i>Lactuca serriola</i>	prickly lettuce
<i>Lamarckia aurea</i>	goldentop
<i>Lasthenia californica</i>	California goldfields
<i>Lathyrus vestitus</i>	Pacific pea
<i>Layia platyglossa</i>	tidy tips
<i>Lemna gibba</i>	duckweed
<i>Lepidium latifolium</i>	perennial peppergrass
<i>Lepidium nitidum</i>	shining peppergrass
<i>Lewisia rediviva</i>	bitter root
<i>Leymus triticoides</i>	creeping wild rye
<i>Lolium multiflorum</i>	Italian ryegrass

<i>Scientific Name</i>	<i>Common Name</i>
<i>Lolium perenne</i>	perennial ryegrass
<i>Lomatium dasycarpum</i>	hog fennel
<i>Lotus corniculatus</i>	birdfoot trefoil
<i>Lotus wrangelianus</i>	Chilean trefoil; calf lotus
<i>Lupinus bicolor</i>	miniature lupine
<i>Lupinus succulentus</i>	arroyo lupine
<i>Malva nicaeensis</i>	bull mallow
<i>Marah fabaceus</i>	California man-root; wild cucumber
<i>Marrubium vulgare</i>	horehound
<i>Medicago polymorpha</i>	California burclover
<i>Melica californica</i>	California melic
<i>Melica torreyana</i>	Torrey's melic
<i>Melilotus indica</i>	sweetclover
<i>Micropus amphibolus</i>	Mt Diablo cottonweed
<i>Microseris douglasii</i>	Douglas's microseris
<i>Mimulus aurantiacus</i>	sticky monkeyflower
<i>Mimulus guttatus</i>	common yellow monkeyflower
<i>Muilla maritima</i>	common muilla
<i>Nassella pulchra</i>	purple needlegrass
<i>Nemophila heterophylla</i>	common nemophila
<i>Oxalis pes-caprae</i>	Bermuda buttercup
<i>Pellaea andromedifolia</i>	coffee fern
<i>Pentagramma triangularis</i>	goldenback fern
<i>Phacelia distans</i>	common phacelia
<i>Phacelia imbricata</i>	imbricate phacelia
<i>Phalaris californica</i>	California canary grass
<i>Phlox gracilis</i>	annual phlox
<i>Phoradendron macrophyllum</i>	big-leaf mistletoe
<i>Picris echioides</i>	bristly ox-tongue

<i>Scientific Name</i>	<i>Common Name</i>
<i>Piptatherum miliaceum</i>	smilo grass
<i>Plantago erecta</i>	dwarf plantain
<i>Plantago lanceolata</i>	English plantain
<i>Platystemon californicus</i>	cream cups
<i>Poa annua</i>	annual bluegrass
<i>Poa secunda</i> ssp. <i>secunda</i>	one-sided bluegrass
<i>Polygonum arenastrum</i>	common knotweed
<i>Polypodium californicum</i>	California polypody
<i>Polypogon monspeliensis</i>	rabbitsfoot grass
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood
<i>Prunus ilicifolia</i> ssp. <i>ilicifolia</i>	holly-leaved cherry
<i>Quercus agrifolia</i>	coast live oak
<i>Quercus lobata</i>	valley oak
<i>Ranunculus californicus</i>	California buttercup
<i>Raphanus sativus</i>	wild radish
<i>Rhamnus californica</i>	California coffeeberry
<i>Rosa californica</i>	California rose
<i>Rubus discolor</i>	Himalayan blackberry
<i>Rumex acetosella</i>	sheep sorrel
<i>Rumex conglomeratus</i>	green dock
<i>Rumex crispus</i>	curly dock
<i>Rumex salicifolius</i>	willow dock
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
<i>Salsola tragus</i>	Russian thistle
<i>Salvia mellifera</i>	black sage
<i>Sambucus mexicana</i>	blue elderberry
<i>Sambucus racemosa</i>	red elderberry
<i>Sanicula bipinnatifida</i>	purple sanicle

<i>Scientific Name</i>	<i>Common Name</i>
<i>Sanicula crassicaulis</i>	Pacific sanicle
<i>Schinus molle</i>	Peruvian pepper tree
<i>Scrophularia californica</i>	California figwort
<i>Senecio vulgaris</i>	common groundsel
<i>Sidalcea malvaeflora</i>	checkerbloom
<i>Silene gallica</i>	catchfly
<i>Silybum marianum</i>	milk thistle
<i>Sisyrinchium bellum</i>	blue-eyed grass
<i>Solanum xanti</i>	purple nightshade
<i>Sonchus asper</i>	prickly sow thistle
<i>Sonchus oleraceus</i>	common sow thistle
<i>Stachys ajugoides</i> var. <i>rigida</i>	rigid hedge-nettle
<i>Stellaria media</i>	common chickweed
<i>Streptanthus albidus</i> ssp. <i>albidus</i>	Metcalf Canyon jewelflower
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	snowberry
<i>Taraxacum officinale</i>	dandelion
<i>Toxicodendron diversilobum</i>	poison oak
<i>Tragopogon porrifolius</i>	purple salsify
<i>Trifolium fragiferum</i>	strawberry clover
<i>Trifolium gracilentum</i> var. <i>gracilentum</i>	pin-point clover
<i>Trifolium willdenovii</i>	three-toothed clover/ tomcat clover
<i>Triphysaria eriantha</i>	butter and eggs
<i>Triteleia laxa</i>	Ithuriel's spear
<i>Typha angustifolia</i>	narrow-leaved cattail
<i>Typha latifolia</i>	broad-leaved cattail
<i>Umbellularia californica</i>	California bay
<i>Urtica dioica</i> ssp. <i>holosericea</i>	hoary nettle
<i>Vicia benghalensis</i>	purple vetch
<i>Vicia sativa</i>	field vetch

<i>Scientific Name</i>	Common Name
<i>Vulpia microstachys</i> var. <i>ciliata</i>	Eastwood fescue
<i>Vulpia myuros</i>	rat-tail fescue

Appendix F. Names, titles, and affiliations of persons that prepared reports and conducted field work

Appendix F. Names, titles, and affiliations of persons that prepared reports and conducted field work

Report management and review:

Tom Fraser - Principal Plant Ecologist, WRA, Inc.

Bay checkerspot butterfly:

Jeffrey Dreier - Principal Wildlife Biologist, WRA (field work)

Bill Stagnaro - Wildlife Biologist, WRA (field work)

Suzanne Gearhart - Wildlife Biologist, WRA (field work)

John Doudna - Biologist, WRA (field work)

Rhonda Lucas - Wildlife Biologist, WRA (field work)

Amy Langston - Biologist, WRA (report)

California tiger salamander and bullfrog management:

Suzanne Gearhart - Wildlife Biologist, WRA (field work)

Rhonda Lucas - Wildlife Biologist, WRA (field work)

Amy Langston - Biologist, WRA (report)

Dwarf plantain monitoring:

Justin Semion - Associate Biologist, WRA (field work)

Jen Adler - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Temporarily disturbed butterfly habitat monitoring:

Jen Adler - Biologist, WRA (field work)

Rosie Wilson - Biologist, WRA (field work)

Julie Rentner - Biologist, WRA (field work)

Stacie Auvenshine - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Dwarf plantain monitoring at Kirby Slope Preserve:

Stacie Auvenshine - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Leslie Lazarotti - Biologist, WRA (report)

Santa Clara Valley dudleya monitoring:

Tom Fraser - Principal Plant Ecologist, WRA (field work)

Rosie Wilson - Biologist, WRA (field work)

Mark Brandi - Landscape Designer/Ecologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Kirby dudleya monitoring:

Jen Adler - Biologist, WRA (field work)

Julie Rentner - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (report)

Metcalf Canyon jewelflower:

Leslie Lazarotti - Biologist, WRA (field work)

Morgan Trieger - Biologist, WRA (field work and report)

Mt. Hamilton thistle:

Leslie Lazarotti - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Other rare plants:

Leslie Lazarotti - Biologist, WRA (field work)

Amy Langston - Biologist, WRA (field work and report)

Kirby most beautiful jewelflower monitoring:

Leslie Lazarotti - Biologist, WRA (field work and report)