SAN BRUNO MOUNTAIN HABITAT CONSERVATION PLAN

Year 2001 Activities Report For Endangered Species Permit PRT-2-9818

Submitted to the
United States Fish and Wildlife Service
by the
County of San Mateo

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* Cover photo: View of San Bruno Mountain summit from Manzanita Dike. *Ceanothus thyrsiflorus* and *Arctostaphylos imbricata imbricata* in foreground.

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INTRODUCTION

This report describes biological and development related activities which took place on San Bruno Mountain under Endangered Species Act Section 10(a) Permit PRT 2-9818 for the 2001 calendar year. It provides information on the relative population status of the butterflies of concern, habitat restoration and exotic species control work, and development activities. Anyone interested in reviewing field data or other information collected by Thomas Reid Associates should contact Patrick Kobernus at (650) 327-0429 (extension #89) or Roman Gankin at (650) 363-1826.

1. STATUS OF SPECIES OF CONCERN

a. Mission Blue Butterfly (*Icaricia icarioides missionensis*)

Methods

Two monitoring methods were used in 2001 to assess the status of the Mission blue butterfly: set transects established in 1998, and wandering transects which have been used since 1982. Set transects are 50-meter-long transects marked in the field that are surveyed frequently during the flight season. These transects provide repeatable, site specific data on butterfly presence/absence and vegetation characteristics. Ideally each transect is monitored once every 7-10 days (the average adult life span for the Mission blue) and all transects are surveyed during warm, calm weather conditions within 1-2 days of one another. Each 50 meter transect is walked in approximately 2 ½ minutes by one person. After the transect observation period ends, average wind speed (1 minute duration) and air temperature are recorded. Only transect visits that had temperatures greater than or equal to 18^0 C and wind speeds less than or equal to 4.0 mph were used in the analysis. Any butterflies observed inside the transect just before or after the 2 ½ minute monitoring period are included as transect observations. All butterflies observed outside of the transect or in the transect vicinity during travel between transects are recorded as incidental observations.

Wandering transects are routes that cover large areas (up to a mile) of the mountain and are monitored typically 1-3 times during the butterfly flight season. The wandering transects provide distribution data on the butterflies, and allow monitors to check on the status of butterfly habitat in remote areas of the park.

Mission blue butterflies use three larval host plants: *Lupinus albifrons, Lupinus formosus* and *Lupinus variicolor.* Early flying Mission blue butterflies (March, April) are associated with *Lupinus albifrons*, and late flying blues (May, June) are associated with the *L. formosus. L. variicolor* is used less frequently, and usually when in proximity to either *L. albifrons*, or *L. formosus* patches.

2001 Mission Blue Butterfly Monitoring Results

MB Data for the 2001 season is shown in Appendix A, Tables A-1 and A-2. The first Mission blue butterfly observed on San Bruno Mountain in 2001 was recorded at Arnold Slope (Guadalupe hills) on April 12. The last Mission blue of the season was

observed at Owl Canyon on June 8. The butterflies were probably flying at least a few days prior and after these recorded.

In 2001, it was another wet year on San Bruno Mountain. Rainfall for the months of January through June was 17.3". Average daily high temperatures and rainfall for the months of January through June for the last six years (1996- 2001) are shown in Table 1.

Table 1. Weather data for San Bruno Mountain: 1996-2001. Average high daily temperature and rainfall shown by month. Data recorded at weather station at County park entrance. A.T.= Average Temperature in Fahrenheit. R= rainfall in inches.

Year	January		February		March		April		May		June	
	A.T.	R	A.T.	R	A.T.	R	A.T.	R	A.T.	R	A.T.	R
1996	56.7	10.0	59.3	8.0	59.9	2.7	65.5	2.03	63.8	2.17	67.1	0.0
1997	52.0	7.54	56.6	0.34	46.4	0.51	61.6	0.77	67.4	0.32	65.5	0.43
1998	54.5	14.6	52.3	16.1	56.4	3.03	58.6	3.23	59.8	4.91	63.6	0.46
1999	52.2	5.63	52.0	7.57	53.4	3.42	57.9	2.77	57.0	0.39	62.0	0.44
2000	53.8	7.23	54.7	10.7	57.9	2.92	60.7	2.21	71.7	1.81	65.7	0.37
2001	52	5.01	53.3	7.43	59.2	2.04	56.5	2.34	67.6	0.19	68.2	0.25

Wandering Surveys

In 2001 wandering surveys were done on the Northeast Ridge, South Slope, Southeast Ridge, Saddle, Hill West of Quarry, West Peak, and Owl and Buckeye Canyons. The location of each adult butterfly observation is shown in Figure 1. Refer to Table 2 for an annual summary of person hours, sightings, and sightings per hour (S/H) for the Mission blue (MB) monitoring period 1982 to 2001. The 173 adults observed in the 21-hour monitoring period in 2001 resulted in a sightings per hour (S/H) figure of 8.2. An additional 56 MB were observed during monitoring of the Callippe transects, resulting in a total of 229 MB observed.

Fixed Transects

The fixed transect locations and Mission blue butterflies observed in 2001 are shown in Figure 2. A summary of the MB set transect data is contained in Appendix A: Table A-2. Typically, MB butterflies begin adult flight in March, are most abundant in April, and begin to drop off by late May. This past year, MB began flying in April and numbers were high at the transects through May (total of 74 observations on the transects). MB transect surveys were not conducted after June 8.

For the past four years of transect monitoring, the peak of mission blue observations has been in April or May. Microclimate factors for each subarea of the mountain are different and each area varies in the timing of the flight season. For example, MB colonies with *Lupinus albifrons* are out earlier and end earlier than

colonies on *Lupinus formosus*. Also colonies on the warmer, dryer south facing slopes begin and end earlier than colonies on the cooler north facing slopes.

Figure 3 shows a comparison of the average number of MB observed at the transects per visit for the years 1998 – 2001. Only transects that had 2 or more visits on monitoring days and had temperatures greater than or equal to18^{0}C, and average wind speeds equal to or less than 4.0 mph were considered in the analysis.

The highest numbers of Mission blues were recorded at transects 5, 6, 7, and 22. Transects 5 (Owl Canyon) and 22 (Guadalupe Hills/ Brisbane water tank area) are *L. formosus* transects, and transects 6 (Owl Canyon) and 7 (Buckeye Canyon) are *L. albifrons* transects. The relatively high number of butterflies seen at transect 7 was encouraging since it demonstrates that the lupines and the butterflies at this transect have recovered since the *L. albifrons* dieback that occurred there after the El Nino rains of 1998.

In 2001, MB observations were down on many of the *Lupinus albifrons* transects (transects 26, 27, 24, 17, and 28). Lupines looked healthy at many of these locations, and weather at the time of monitoring was good. A cool April (average high temperature 56.5^0 F, and a dry May (0.19 inches) appeared to bring the Mission blue flight season on the *Lupinus albifrons* colonies to an early end (Table 1). All of the transects are located in conserved MB habitat areas with the exception of Transect 24, which is located on a restored slope located in the Guadalupe Hills above the Linda Vista development. MB have been recorded at this restoration site since 1995, though none were recorded in 2001.

MB observations were relatively high again at the *Lupinus formosus* transects (5, 22, 1.1), with some exceptions (transects 3 and 4). Transect 4 is located in Devil's Arroyo and has much fewer lupines than the other transects. Transect 3 is located on a San Francisco Water Department (SFWD) easement (roadway), and this roadway was regraveled during replacement of a water pipeline. Though some MB lupines were spared, the loss of the lupines on the road resulted in a major impact to this small MB colony. A restoration plan is being developed by SFWD to replace the habitat that was destroyed in an appropriate location off of the roadway.

Table 2. Mission Blue Wandering data on SBM: 1982 - 2001.

Year	Total Hours	Total sightings *	Sightings/ hour
1982	108.25	338	3.1
1983	61.25	149	2.4
1984	77.75	328	4.2
1985	110.0	293	2.7
1986	102.75	494	4.8
1987	92.0	534	5.8
1988	207.0	883	4.3
1989	115.0	684	5.9
1990	**	608	**
1991	**	433	**
1992	123.0	673	5.5
1993	130.0	320	2.5
1994	118.25	327	2.8
1995	55.5	206	3.7
1996	76.5	312	4.1
1997	78.0	256	3.3
1998	set transects only	set transects only	set transects only
1999	39.50	148	3.7
2000	37	203	5.5
2001	*21.2*	*173*	*8.2*
Totals/ Average	**1531.75**	**7189**	**4.7**

NOTES:* The totals provided are the total butterflies observed for productive wandering transects which is used in the level of effort calculations. This total is usually slightly lower than the total of all butterflies observed because data on poor weather days is not included.

** The annual reports for these years do not include level of effort data.

b. Callippe Silverspot Butterfly (*Speyeria callippe callippe*)

Methods

Two monitoring methods were used in 2001 to assess the status of the Callippe silverspot (CS) butterfly: fixed transects and wandering surveys. Twelve fixed transects were established for CS in spring 2000. These vary from 470 to 2180 meters

in length, and are spread out over the Mountain (Figure 4). Ideally the transects are surveyed several times through the flight season, but the occurrence of unfavorable weather conditions limits the number of visits. Wandering surveys are done to assess areas not covered by the fixed transects.

Wandering Surveys

The first CS observation of the season occurred very early compared to previous years at the Southeast Ridge on April 4. No further CS were recorded until May 8, when 2 were observed mating at Northeast Ridge. The last CS of the season were recorded on August 4 at the Levinson Property and on the Northeast Ridge, east of the power lines. CS were probably flying at least a few days prior to and after these recorded observations. During the 6-week monitoring period, each Callippe silverspot transect received 3 to 4 visits and wandering surveys were done on fifteen occasions. In 2001, CS observation effort was focused primarily on the fixed transects, and many of the wandering surveys were conducted early in the season before fixed transect monitoring began. Wandering surveys for CS were focused on areas not covered by the transects including South Slope above Terrabay, Juncus Ravine, Southeast Ridge, and Northeast Ridge.

In 2001, 784 CS adults were observed in both the wandering and fixed transects combined (Figures 4 and 5), compared to 405 CS adults observed in 2000. The tabulated data for 2001 is contained in Appendix A, Tables A-3 and A-4. Most of the effort during the 2001 peak CS flight season was spent on fixed transect surveys (26 hours total, 721 adult observations). In addition, 22 hours were spent on wandering transects, mostly during the early part of the CS flight season (63 adult observations made). This yielded an overall sightings per hour (S/H) figure of 16.3 -- greater than all survey years except for 1989. See Table 3 for an annual summary of person hours, sightings, and S/H for the monitoring period 1982 to 2001. One CS was observed on sign hill (outside the HCP area – not included in totals) on June 21, 2001.

Fixed Transects

The sightings/hour statistic is also calculated for the fixed transect data. As is typical for callippe silverspot on San Bruno Mountain, the highest numbers and most consistent observations were recorded on the summit of the Southeast Ridge (CS transects #7, 11, and 12), Buckeye Canyon (#10), Owl Canyon (#9) and the Northeast Ridge (#3 and 5) as well as the Levinson property (#4). The transects with the lowest numbers of observations included Dairy Ravine (#1), the Saddle (#2), and Brisbane water tank (#6). In 2001, the CS flight season stretched significantly later into the year than in 2000. The latest surveys done in 2001, on August 3 and 4, included high butterfly observations on some transects, while in 2000, surveys done July 10 - 14 recorded only a few butterflies. Comparison of weather data for the CS flight season in both years did not provide any explanation for this disparity. Figure 5 shows a comparison of fixed transect data for 2000 – 2001.

Table 3. Callippe Silverspot Monitoring on SBM: 1982 - 2001.

Year	Total Hours	Total sightings *	Sightings/ hour
1982	83.25	526	6.3
1983	37.25	114	3.1
1984	77.75	328	4.2
1985	89.0	607	6.8
1986	84.5	617	7.3
1987	76.25	943	12.4
1988	170.0	1734	10.2
1989	81.25	1349	16.6
1990	**	853	**
1991	127.5	927	7.3
1992	108.0	1358	12.6
1993	111.25	996	9.0
1994	111.75	607	5.4
1995	58.75	454	7.7
1996	31.5	296	9.4
1997	46.0	404	8.8
1998	33.0	272	8.2
1999	23.5	362	15.4
2000	38.0	405	10.7
2001	*48.1*	*784*	*16.3*
Totals/ Average	***1436.6***	***13936***	***9.7***

NOTES: * The totals provided are the total butterflies observed for productive wandering transects only which is used in the level of effort calculations. This total is usually slightly lower than the total of all butterflies observed because data on poor weather days is thrown out.

** The annual reports for these years do not include level of effort data.

Callippe silverspot observations fluctuate seasonally, annually, and spatially on the Mountain. Certain locations such as the Summit Trail and Callippe Hill on the Northeast Ridge have had consistently high numbers of observations. In these areas there are large patches of *Viola pedunculata*, hilltop topography, and a prevalence of warm, calm weather during the flight season. Areas with historically fewer CS observations such as Dairy Ravine and the Saddle, which appear to be declining in

numbers, have cooler and windier conditions, and there appears to be a reduction in habitat quality brought on by coastal scrub and/or annual grass invasion. The transect system that was initiated in 2000 is a more consistent method for monitoring the butterflies and correlating changes in butterfly observations with habitat changes (e.g. brush expansion and host plant reductions as well as vegetation management and restoration).

c. San Bruno Elfin (*Callophrys mossii bayensis*)

For the San Bruno elfin (SBE) butterfly, 18 survey points were monitored for adults and 17 points were monitored for larvae on San Bruno Mountain in 2001. These points were installed in 1998 (refer to 1998 Annual Report for details on point methodology). A total of 148 adult SBE butterflies were observed in 2001 (Table A-5). This is greater than twice the 73 adults observed in 2000. In 2001, 60 point surveys were conducted, as compared to 68 in 2000. The first SBE observations were recorded on March 13, with peak observations from March 13 through March 19. The last recorded SBE observations were on March 27 at the end of the flight season. SBE were likely flying a few days prior to and after the recorded observations.

The highest numbers of adult SBE observations (5 or more) were found at the following colonies: ridge above Owl Canyon (Points 2 and 3), ridge above Quarry (Points and 6), Dairy Ravine (Point 16), and Wax Myrtle Ravine (Point 17). Colonies where the fewest SBE adults were recorded (2 or fewer) included Southeast ridge (Points 1.1 and 5), Pacific Rock (Point 10), Lone Pine (Point 14), and the slope below Kamchatka Point (Point 15). However, 5 or more SBE adults were observed incidentally to monitoring at Points 1.1 and 15, so these colonies may support more individuals than represented by the point monitoring. No surveys were conducted at Points 4, 11, 18, 21, and 22 since historically very few butterflies were observed in these areas.

Figure 7 shows the average number of butterflies recorded per visit at the points for 1998 -- 2001. Only point surveys where temperatures were greater than or equal to 14°C and wind speeds were 6.0 mph or less were included in the analysis. The most consistent point has been #13 which is on a roadcut along Radio Road. All other points are located in open grassland or on rocky outcrops. High densities of *Sedum*, wind protection, and a northeast to northwest slope aspect are the factors present at the points with consistent observations.

In 2001, standardized searches for SBE larvae were conducted at 17 points and a total of 526 larvae were observed. All *Sedum* plants within a 25 meter radius of the point were searched at each location. Additionally, 47 incidental SBE larvae were recorded outside of the this area. The greatest numbers of larvae (more than 60) were observed at the ridge above Quarry (Point 6), off Radio Road (Point 12) and Wax Myrtle Ravine (Point 17). Five or fewer larvae were observed at two colonies Nike Road (Point 19) and Horseshoe Ridge (Point 22). A tally of the 2001 San Bruno elfin field data (adults and larvae) is included in Table A-5 in Appendix A.

In comparison to the previous year, larval counts were higher this year, with the colony east of Summit parking lot (Point 9) as the only exception. Fewer points were monitored in 2000, and it is possible that these surveys missed the peak of the larval feeding period. Figure 8 shows a comparison of the larvae observed in 2000 and 2001. Larval searches are useful in determining if San Bruno elfin are present at a location where adult butterflies have gone undetected, but to make useful comparisons of larval numbers between sites, repeated surveys would likely be needed.

d. Bay Checkerspot Butterfly (*Euphydryas editha bayensis*)

No bay checkerspot butterflies (larvae or adults) were observed on San Bruno Mountain by field crew while conducting biological activities and overseeing development activities in 2001. In October 2000, the U.S. Fish and Wildlife Service proposed critical habitat for the bay checkerspot butterfly. The proposed critical habitat designation includes the historic bay checkerspot habitat on San Bruno Mountain.

e. San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*)

No San Francisco garter snakes (SFGS) were observed on San Bruno Mountain by field crew while conducting biological activities and overseeing development activities in 2001. There have been no confirmed observations of SFGS on San Bruno Mountain in the 20 years of the HCP monitoring program.

f. California red-legged frog (*Rana aurora draytonii*)

No California red-legged frogs (CRLF) were observed on San Bruno Mountain by field crew while conducting biological activities and overseeing development activities in 2001. There have been no confirmed observations of CRLF on San Bruno Mountain in the 20 years of the HCP monitoring program.

Plants of Concern

San Bruno Mountain is home to several rare and listed plants. In 2001, rare plant work focused on GPS mapping of Diablo rockrose (*Helianthella castanea*), San Francisco campion (*Silene verecunda verecunda*) in spring and summer of 2001. Figure 9 shows the distribution of these plants on the mountain. In 2002 more of the rare plants on San Bruno Mountain will be mapped using GPS, and by 2003 all of the rare plant populations on San Bruno Mountain should be in GIS format.

h. San Bruno Mountain Cooperative Website and Data Resources

A cooperative website for San Bruno Mountain was developed by TRA in 2001. The site serves as a center for information, announcements, contacts, references, and mapping resources for San Bruno Mountain. This site is intended for use by all volunteers, professionals, government employees, and members of the public who are involved in preservation, restoration, biological monitoring, and planning at San Bruno Mountain.

The site includes:

- Bulletin Board for San Bruno Mountain
- Links to websites of organizations concerned with San Bruno Mountain
- The San Bruno Mountain HCP document
- Mapping and GIS resources, including 1"=500' basemaps with aerial photography
- Contact information for persons concerned with San Bruno Mountain

The purpose of the San Bruno Mountain Cooperative Site is:

1) To facilitate open communication amongst the many parties involved in the various types of work on San Bruno Mountain, in the State and County Park and Habitat Conservation Plan areas

2) To connect groups and individuals by providing links to other San Bruno Mountain websites and contact information for individuals representing ALL organizations involved in the Park or in the HCP, as volunteers, educators, biologists, geologists, restoration experts, landowners, planners, rangers, naturalists, advocates, law enforcement, developers, and the public.

3) To provide a place where mapping and other resources can be shared amongst various groups working at San Bruno Mountain.

In 2001, butterfly monitoring data recorded on San Bruno Mountain over the last 20 years has been entered into GIS format and can be analyzed with ArcView software. This information will be made available on a data CD for purchase through the County of San Mateo.

2. VEGETATION MANAGEMENT AND RESTORATION

a. Update of San Bruno Mountain Five Year Plan for 2002-2007

In recent years, the administrators and managers of the San Bruno Mountain Habitat Conservation Plan (the HCP Trust, the Plan Operator (San Mateo County), USFWS, and the Habitat Manager (Thomas Reid Associates)) have determined a need for a management document that sets specific measurable objectives that are consistent with the biological monitoring and habitat management requirements set forth in the San Bruno Mountain HCP. A 5 year plan was adopted to fulfill this purpose in 1996.

Habitat Management of San Bruno Mountain follows the objectives set forth in the 1996 San Bruno Mountain HCP Five Year Strategic Plan. The five year plan provides a comprehensive breakdown of habitat management goals under different funding scenarios. The specific objectives for exotics control followed are set forth in the medium-level funding scenario in the (1996-2001) plan. The 1996-2001 plan focused on exotic weed control, and expanded this program to cover most of San Bruno Mountain. This was necessary as invasive species such as Fennel (*Foeniculum*

vulgare), French broom *(Genista monspessulana*), and Portuguese broom (*Cytisus striatus*) had been expanding into butterfly habitat areas on the South Slope, Brisbane Acres, and the slopes above Brisbane Industrial Park. Prior to 1996, control efforts were focused primarily on the Saddle, Radio Ridge, Northeast Ridge and in Owl and Buckeye Canyons.

The framework for a new expanded 5-year plan for 2002-2007 is currently in preparation. The plan for will address the following activities:

1) Exotics Control

The exotics control program was thoroughly re-evaluated at the time of the 1996-2001 5 year plan, and the strategies for exotics removal have been effective in protecting butterfly habitat. This program should be used as a template for updating the exotics control program for 2001-2006. The update should provide site prescriptions for each subarea of the Mountain that includes grazing, burning, herbicide, and hand control with a projected timeline.

2) Sensitive species population monitoring and mapping

The list of sensitive species evaluated in the original HCP should be updated and included in the next 5 year plan. A draft list has been prepared by TRA. In the past 4 years, the butterfly monitoring system has been updated to incorporate set transects and GPS technology. It is recommended that this updated method be continued and expanded to create a GPS mapping system of host plants, rare plants, butterfly observations, and other significant biological information.

3) Habitat restoration

Specific objectives for establishing a network of high quality restored habitat islands in the Eucalyptus cut areas and in Saddle should be determined in the 5 year plan. Guidelines for successful habitat restoration for the sensitive butterfly species were developed in 2000 *(San Bruno Mountain HCP Mission Blue and Callippe Silverspot Habitat Restoration Guidelines,* November 2000*)*. These were developed to provide a quantitative measure that could be used to evaluate restoration sites for successful habitat restoration. Grazing/mowing, burning and monitoring should be considered in site prescriptions for each restoration site.

4) Development mitigation

Standards for acceptance of development mitigation lands by the County of San Mateo (San Mateo County) combined with the Habitat Restoration Guidelines are used to evaluate development slopes. Evaluation of development slopes should continue with setting objectives of creating a network of high quality restored habitat islands on development mitigation lands.

5) Public participation

Objectives that should be considered in the new 5-year plan include 1)

Establishing an organized seed collection and growing system with the various volunteer groups and restoration contractors on San Bruno Mountain. This could include development of a native seed storehouse and propagation facilities.
2) Development of a posting site on the web, where groups can access and share SBM data will provide greater efficiency and coordination of efforts between organizations conducting work on the Mountain (TRA, FSBM, CNPS, BAMW), and between groups conducting similar work in the surrounding region (i.e. National Park Service). TRA has recently developed this site for this purpose.

b. Exotics Control Strategy

Exotic plant infestations are prioritized for control work as follows:

Priority 1:	Small patches of exotics within native habitat
Priority 2:	Small patches of exotics at the periphery of native habitat
Priority 3:	Edges of large exotic infestations threatening habitat
Priority 4:	Large exotic infestations

As a general rule, all Priority 1 infestations are treated using hand removal techniques. Priority 2 infestations are treated using both hand and herbicide techniques, and Priority 3 and 4 infestations are treated using herbicide (in combination with mechanical clearing of vegetation in some cases).

Herbicide treatment has consisted of spraying targeted species with an herbicide solution containing either Garlon 4® or Roundup®. These herbicides are used due to their high effectiveness, low toxicity rating, and short half-life in the soil. Herbicide is applied one to two times per year in suitable weather (low wind, low humidity) for maximum plant uptake. The plants are left to decay in place, a process that takes from one to five years, depending upon the size of the plants. In sensitive areas (within 150 feet of private property) mature stands of exotic plants are removed by chainsaw or mowing, followed by seedling and stump herbicide treatment. Garlon 4® herbicide is the preferred chemical since it does not harm monocots (grasses).

Sources of additional funding were secured in 2001 by the County of San Mateo and Bay Area Mountain Watch, both of whom received Coastal Conservancy Grants for exotics control and restoration work.

c. 2001 Exotic Pest Plant Treatment Summary

Exotic pest plant control activities are being conducted to protect, enhance, and restore the native vegetation communities on San Bruno Mountain. Primary emphasis is placed on controlling exotic infestations that are invading or threatening to invade habitat of the three endangered butterflies.

Currently there are 35-40 exotic pest plant species that exist on San Bruno Mountain. As a rule, hand control methods are used to control low density infestations, while high density infestations are controlled using herbicides. Exotics of primary concern that receive the most control work include gorse, French broom, Portuguese

broom, fennel, eucalyptus, Himalaya blackberry, cotoneaster, cape Ivy, English ivy, and iceplant.

The following plant species receive exotics control work on San Bruno Mountain:

Acacia sp. (Acacia)
Carduus pycnocephalus (Italian thistle)
Carpobrotus edulis (hottentot fig, iceplant)
Centranthus ruber (red valerian)
Cirsium vulgare (bull thistle)
Conium maculatum (poison hemlock)
Cortaderia jubata (pampas grass)
Cotoneaster sp. (Cotoneaster)
Cytisus striatus (Portuguese broom)
Erechtites arguta (New Zealand fireweed)
Erodium cicutarium
Eucalyptus globulus (blue gum tree)
Foeniculum vulgare (fennel)
Genista monspessulana (French broom)
Hedera helix (English Ivy)
Oxalis pes caprae (Bermuda buttercup)
Hirschfeldia incana (mustard)
Holcus lanatus (velvet grass)
Hypochaeris radicata
Lactuca virosa (wild lettuce)
Lactuca serriola (prickly lettuce)
Lobularia maritima (Lobularia)
Myoporum laetum (Myoporum)
Picris echioides (bristly ox-tongue)
Pinus radiata (Monterey Pine)
Pyrocantha crenato-serrata (Pyrocantha)
Rubus discolor (Himalaya blackberry)
Scabiosa atropurpurea
Delairea odorata (Cape Ivy)
Silybum marianum (milk thistle)
Ulex europaeus (gorse)

Figure 10 shows the locations where hand and herbicide weed control was done in 2001. West Coast Wildlands, subcontractor to TRA, maintains daily record sheets for all exotic pest plant work conducted on the Mountain. For both herbicide and hand control work the treatment area (in acres) is recorded and mapped on the daily record sheet. In 2001, approximately 53 acres of gorse, fennel, eucalyptus, Himalaya blackberry, French broom, and Portuguese broom plants were controlled with herbicides, and approximately 14 acres of assorted weeds were controlled using hand tools (see Tables B-1 and B-2 in Appendix B). Acreages of exotic pest plants controlled does not always reveal the increased level of effort since density is not factored into the totals presented. For instance, a dense stand of gorse or eucalyptus could take a large crew a day or more to remove and treat, while an acre of scattered fennel can be treated by one person within a few hours or less. For this reason, acreages reported often vary year to year.

Shelterbelt Builders, subcontractor to TRA, conducted annual weed control work in specific areas in the Saddle, Colma Creek, and Dairy Ravine to prepare and maintain planting island sites (see Appendix D).

Other areas that consistently receive exotics control work are: the Botanic Garden and bog area by volunteers of the Friends of San Bruno Mountain; the headwaters of Colma Creek area in the Saddle by Heart of the Mountain (California Native Plant Society); Owl and Buckeye Canyons by Bay Area Mountain Watch; and Point Pacific by Point Pacific Homeowners Association.

Exotics control work has been expanding in scope since the inception of the HCP, and especially over the last six years due to the eucalyptus removal work and the contribution from volunteer groups. This past year, two Coastal Conservancy grants were awarded to groups doing exotics control on San Bruno Mountain. Bay Area Mountain Watch received money that will provide an exotics control and restoration

program in the Brisbane Acres, Owl and Buckeye Canyons, and Devil's Arroyo. San Mateo County received a grant that will provide for an expanded exotics control and restoration program for the Dairy Ravine, Wax Myrtle Ravine, and Cable Ravine areas.

d. Eucalyptus removal and weed control

In 1995, 63 acres of eucalyptus trees were clear-cut on San Bruno Mountain. The 63 acres are broken up into five different restoration units: Dairy Ravine (22.4 acres), Wax Myrtle Ravine (6.4 acres), Hoffman Street (5 acres), Colma Creek (4.8 acres), and April Brook (3.6 acres). The Botanic Garden site (4 acres) is within the Dairy Ravine site and is managed by the Friends of San Bruno Mountain.

The goals of the eucalyptus removal and native habitat restoration on San Bruno Mountain are: 1) to provide corridors and restored grassland habitat for the three endangered butterflies on the Mountain (Mission blue, Callippe silverspot, and San Bruno elfin), and 2) to restore native habitats for other native wildlife species.

Restoration activities include:

- Hand weeding and herbicide work at all restoration sites
- Stump lowering and grinding at the Colma Creek site
- Slash burning of debris at the Wax Myrtle Ravine and Dairy Ravine site
- Removal of slash debris from the Hoffman site
- Grass seeding of open areas
- Controlled field burning, grazing, and/or mowing to reduce annual weeds
- Planting of native species with emphasis on lupines, *Viola*, *Sedum* and appropriate butterfly nectar plants at suitable habitat locations

Since the time of the initial cutting, restoration work has been done on approximately 43 acres (Dairy Ravine, Botanic Garden, April Brook, Colma Creek, Hoffman Street, and part of Wax Myrtle Ravine). The remaining 20 acres are within the Pacific Nursery site located on behind the Pacific Nursery on the south slope of the Mountain. This site has a lower potential for butterfly habitat, and has not received restoration work based on the amount of funding available at this time.

As greater control is being gained on the highly aggressive shrub invaders such as gorse and eucalyptus, the emphasis is now shifting to controlling herbaceous and grass weeds and creating habitat islands. Most areas will continue to require control work and monitoring.

Restoration work in 2001 focused on eucalyptus control, maintenance, and planting at habitat islands created in Dairy Ravine, Colma Creek, and the Saddle. San Mateo County parks cleared approximately 7 ½ acres of eucalyptus regrowth in the Wax Myrtle Ravine area as part of their Coastal Conservancy project.

e. Host plant surveys and restoration guidelines for MB and CS

HCP funded restoration work in the form of weed control, erosion control, and planting has been ongoing on the mountain since the mid-1980's. The primary goal of the restoration work is the establishment of high quality habitat for the Mission blue (*Icaricia icarioides missionensis*) and Callippe silverspot (*Speyeria callippe callippe*) butterflies.

Because the HCP does not specify what is required for successful restoration, guidelines were produced in November 2000 to address some of the previous problems and assist restoration professionals with accomplishing the habitat restoration goals of the HCP. The guidelines include suggested methods on how to select appropriate restoration sites, recommended host plant densities to support the endangered butterflies, and propagation methods. They are to be used in conjunction with the *Standards for Acceptance of any Dedicated Lands by the County of San Mateo in Accordance with the San Bruno Mountain Area Habitat Conservation Plan*, prepared by Roman Gankin, San Mateo County.

f. Restoration of Habitat and Butterfly Utilization

Early attempts at large scale planting on San Bruno Mountain were difficult to maintain and monitor, due to the large influx of weeds. As a result, a strategy of creating small high quality habitat islands has been developed and has been proven to be successful on parkland and development slopes. This approach has been implemented in several areas of the Mountain (Figure 11). Two development slopes have established lupines and have had Mission blue butterfly utilization for a few years now (Northeast Ridge development and another at Linda-Vista/Bay Vista developments). Within the County park, the Colma Creek restoration site had Mission blue utilization this past season, and we are likely to see more habitat island sites (such as Botanic garden, Dairy Ravine, South Slope sites, and the Saddle) with butterfly utilization within the next few years. With continued maintenance of these planting islands and continued creation of additional planting islands each year, it should be possible to restore (and likely surpass in time) the amount of MB habitat taken by development through the HCP.

Restoration of Callippe silverspot habitat will likely take longer because the creation of habitat that can support CS first requires good soil development, while the Mission blue host plants (lupines) are early successional species that do well in poorly developed soils and can colonize on rocky slopes such as on the Northeast Ridge. Alternatively, the host plant for the Callippe silverspot, *(Viola pedunculata)* requires thicker soils with established grasses. Only recently have slopes on the Northeast Ridge and Terrabay developed good native bunchgrass grasslands after years of weed control, hydroseeding, and erosion control. These slopes may now be capable of supporting plantings and/or seeding of *Viola pedunculata*.

Viola pedunculata propagules were planned for planting in several planting islands in the Saddle, Dairy Ravine, and on the Northeast Ridge in 2001, however

growing this species in the nursery has proved problematic. Nearly 2000 seedlings grown in the nursery did not survive transplanting in the nursery, and were not available for replanting. A new crop of *Viola* seedlings is growing now, and different methods will hopefully insure that these get planted on the Mountain in 2002/2003.

Restoration Islands in Park Areas and Volunteer Activities

- Heart of the Mountain, CNPS. The California Native Plant Society formed a group specifically to do volunteer work on San Bruno Mountain ("Heart of the Mountain"). Led by Mary Petrilli, the group has conducted weed control and erosion control and public outreach activities since 1999 (Figure 13). See Appendix E-2 for a summary of the groups activities on the Mountain in 2001.

- Friends of San Bruno Mountain: In 2000, The Friends of San Bruno Mountain modified the Botanic Garden by creating two small hills with donated soils brought over from the Terrabay development on the south slope. Planting with native grasses and plants has begun on these hills. The hills add some topography to the Garden, and provide a good substrate for the creation of grassland butterfly habitat . The Friends created two small planting islands on the east side of the Garden in 1997 and have successfully established *Sedum spathulifolium*, host plant for the San Bruno elfin butterfly (Figure 14). These islands, and other areas of the Garden where the Friends have established *Sedum*, could support SBE butterflies in the near future. Doug Allshouse and other volunteers have been active in recording flora and fauna information on the Mountain. For a summary of Doug's observations and FSBM activities in 2001, see Appendix E-1.

- Habitat Manager: TRA: Habitat islands have been established at the several sites within the Colma Creek, Dairy Ravine, and Saddle areas. These sites are being managed by Shelterbelt builders, Inc. (Figure 11). In July 2001, mission blue adults, larvae, and eggs were observed on *Lupinus formosus* plants that were planted at the Colma Creek (CC2) habitat island (Figure 17 and 18). See Appendix C for a year end report on habitat restoration at the planting islands.

- Pointe Pacific Patrick MacNamara and volunteers from the Pointe Pacific Homeowners Association have been conducting exotic pest plant control for several years within and around their development. In 1999, volunteers cleared a section of coyote brush that was threatening to overtake Mission blue habitat (adjacent to MB transect #27). The volunteers also have planted *Lupinus albifrons* in several locations. In 2001, the group has been expanding their plans to remove coastal scrub vegetation that has encroached on MB habitat, and create a swath of continuous butterfly habitat around the southern periphery of the development.

Restoration Islands on Development Slopes

Restored habitat slopes that were graded for housing developments have been

receiving weed control and hydroseeding treatments for several years mostly by Pacific Open Space and Rana Creek Habitat Restoration. Many of these slopes currently have improved cover of native bunchgrasses and decreased cover of invasive plants. Recent planting islands created by PG&E are also included in this section.

- Northeast Ridge: Several planting islands have been demarcated for planting on the Northeast Ridge graded slopes. Most notably, two areas already have high quality Mission blue butterfly habitat. These areas have dense patches of *Lupinus albifrons* and *L. formosus* respectively. On May 30, 2000, Five Mission blues were observed using the *L. formosus* habitat island that is just upslope of Mission Blue Drive. No Mission blues were observed at this site in 2001.

- Terrabay: Several slopes above the development have good establishment of *Lupinus albifrons* and in some places, *Lupinus variicolor*. These areas may already have MB present based on the density of the lupines which have been established for over six years. Five MB were observed at the far western habitat island on April 4, 2001.

- Bay Vista/ Linda Vista The restored slopes behind the Linda-Vista development (approximately four acres) have good establishment of MB host and nectar plants. The site has consistently supported MB's for at least five years, and a MB transect (#24) was established there in 1998. Six MB were observed on these restored slopes during the transect visits in 2000, however no mission blues were observed in 2001.

- Brisbane Technology Park: Restoration planting and site preparation work was done on the Brisbane Technology Park slopes in 2000. The focus for this site will be the creation of Callippe silverspot habitat.

- Saddleback: Gorse removal for this project has begun, and planting islands are scheduled to be created once gorse has been controlled.

- PG&E: *Viola pedunculata* was successfully planted this past season at four tower locations on the Northeast Ridge and Transmission Line Ridge (Figure 11). Each of PG&E's habitat restoration islands were observed to have high numbers of healthy *Lupinus albifrons*, *Lupinus variicolor*, and *Viola pedunculata* as of January, 2002. Several hundred lupines that were planted have flowered and set seed since last year (Figure 15).

g. Grazing and Burning (by David Amme, Conservation Grazing Specialist)

A public workshop will be scheduled for the spring of 2002 to get input from peer review groups and the community on the following proposed grazing plan. Implementation of the plan will require the cooperation of San Mateo County Parks, California State Parks, the Department of Fish and Game, the U.S. Fish and Wildlife Service and local volunteer groups.

Since the cessation of livestock grazing in the early 1960's and the more efficient prevention of fires since that time, the native prairie grassland has become more weedy with less native wildflowers. The balance of the coastal scrub and prairie plant communities has also shifted towards the expansion and growing senescence of the scrub and chaparral plant communities. The combined effect of introduced exotic species and the expansion of the native scrub community threatens to displace the prairie community that supports host plants and nectar resources for three endangered butterfly species. For the native grasslands of San Bruno Mountain the "canary in the coal mine" are the Mission Blue Butterfly, Callippe Silverspot Butterfly, and San Bruno Elfin Butterfly (*Incisalia mossii bayensis*). A small population of the Bay Checkerspot Butterfly (*Euphydryas editha bayensis*), existed on the summit of San Bruno Mountain until the mid 1980's. An uncontrolled burn and invasion of filaree, *Erodium sp.* apparently extirpated this butterfly from the Mountain.

The Stewardship Grazing Management Model

The two most important ecological processes that govern the structure, function, and composition of California's grassland, scrubland, and forested plant communities are fire and grazing. The native grasslands and coastal scrub communities evolved with these processes long before the arrival of European man. In pre-European times the populations of the native grazing species (rodents, rabbits, mule deer, elk, and antelope) responded to fire events and hunting/predator pressures. The composition and diversity of the contiguous native perennial grasslands and savannas that once dominated the coastal mountain valleys were shaped by the ebb and flow of fire and grazing.

The negative effects of uncontrolled, year-round livestock grazing are well known. They include soil compaction, degraded riparian habitat, poor water quality, erosion, the elimination of native perennial grasses, and wildlife habitat degradation. Combined with the dominance of introduced annual grasses and weeds, the effects of total rest from grazing (no grazing) can be just as damaging. Rank, undecomposed annual grass mulch smothers and eventually eliminates the native perennial grasses as well as the native wildflowers. Since the removal of grazing, the native grassland plant community on San Bruno Mountain has mirrored grassland succession in other parts of the Bay Area where native grasslands are gradually being overtaken by expanding exotic grasses, forbs, and weeds and dramatic encroachment of the native coyote brush (*Baccharis*) scrub. These problems can only be addressed through the reintroduction and the strategic use of fire and grazing.

The primary goal of a stewardship grazing program is the utilization of controlled livestock grazing as a tool to enhance and restore the health, diversity, and productivity of native grassland plant communities through the careful management of livestock numbers and the control of the season, frequency, duration, and intensity of grazing. Grazing can not replace fire nor can fire replace grazing. They are both needed. This stewardship goal includes all facets of the grassland community: species diversity, wildlife richness, aquatic and riparian habitat quality, and the human community.

Draft Grazing Plan

The following draft grazing plan will be reviewed during a grassland management workshop that is scheduled for the spring of 2002. The workshop will be held to solicit comments from scientific peer review groups and the public. The draft grazing plan consists of two primary objectives:

Pilot Grazing Program: An initial 3-year prescribed grazing program will be established utilizing a combination of goats and sheep on designated priority grasslands to evaluate the response of exotic weeds and the native prairie vegetation to late fall and early spring grazing.

Infrastructure Improvement: The gradual 5-year development of a basic fence and water system infrastructure that will serve the Saddle, Guadalupe Hills, and the large southeast grassland for a long-term grazing program.

3-Year Pilot Grazing Program

The goal of the 3-year grazing program is to enhance the native species composition of selected grassland areas. The key to achieving this goal is the ease and precision of utilizing a combination of goat and sheep grazing. The animals are controlled and moved with the use of movable electric fences. Their water requirements are relatively modest and can be served with a mobile water tank and trough. Grazing effects will be periodic: once in the late fall, and once in the spring growing season. The pilot grazing program will have the following elements:
100 animals (60 goats and 40 sheep) will be utilized. Sheep are heavier animals and can consume almost twice the amount of grassland forage as can goats. An 8-acre grassland area can be grazed effectively in 5 days without harmful physical effects to the soil or the native perennial plants. The small number of animals will facilitate efficient and economical movement between treatment areas. Twenty-four hour supervision would be provided by a shepherd.

Both late fall (October-November) and early spring (March-April) grazing treatments will be applied to approximately 35 acres of selected grassland areas. Some sites will be grazed in the spring and fall while other sites will be grazed only in the spring or fall.

Monitoring plots will be established and recorded prior to and after the grazing treatments over the three year period. A ten meter square area (100 m^2) will be excluded from grazing and monitored as a control in each treatment area.
Parts of five priority areas will be grazed: Dairy Ravine, the Saddle, Guadalupe Hills, Tank Ravine, and the Buckeye Canyon/Army Road corridor west of the Brisbane city limits. The number of locations and seasonal treatments (spring/fall) will be decided after funding has been secured.

Grazing Program Cost: $ 50,000/year ($ 150,000 for three years) including monitoring.

5-Year Infrastructure Development

For the grazing program to be economical in the long-term and be a useful tool in managing large grassland areas (several hundred acres) on San Bruno Mountain, significant infrastructure development is needed. The goal of the five year infrastructure development program is to gradually build a permanent boundary fence system and water development for the Guadalupe Hills and the Southeast Ridge, the two largest contiguous grasslands on San Bruno Mountain. As this baseline system is built, future management options of the mountain utilizing both prescribed grazing and fire will be greatly enhanced. The infrastructure development program will include: 1) Approximately 12 miles of fencing to encompass the perimeter of the Guadalupe Hills and Southeast Ridge grasslands, and 2) Water development for the Guadalupe Hills and the Southeast Ridge grassland. The initiation of fund raising for the infrastructure portion of the plan can be delayed a year or two in order to compile and evaluate the results of the 3-year pilot grazing program. The cooperation of the HCP property owners such as developers with lands to be dedicated, the State of California, and San Mateo County Parks is critical to negotiate dedicated funds and cooperation for the baseline infrastructure improvements.

Infrastructure Program Cost: The fence system will cost approximately $130,000. This can be achieved for $26,000/year over a 5 year period. The materials and labor cost for a basic water system will be $85,000.

Burning on San Bruno Mountain, 2001

No controlled or uncontrolled burns occurred on San Bruno Mountain in 2001. An uncontrolled burn occurred in the Brisbane Water Tank area (approximately 10 acres) in September 2000. An area of Mission blue habitat (*L. albifrons*) that burned was flagged and mapped in 2000, and recovery of host plants at this site has been excellent (Figure 12). The fire burned vegetation to bare ground, however the charred remains of adult lupine plants was still visible. A 5 x 10 meter plot was demarcated within the burn area, and lupines were flagged. The plot was monitored on May 8, 2001 and again in January 30, 2002 (Figure 16). Two MB butterflies were observed at the site on the May 8th visit. Nearly all of the *Lupinus albifrons* plants recovered after the burn, and new ones that had not been flagged also emerged. Most encouraging was the discovery of 31 *Lupinus albifrons* seedlings and 51 *Viola pedunculata* plants within the plot on the January 30 field visit. Also observed in the burn area were "carpets" of the invasive *Erodium sp.* and *Oxalis pes caprae*. Any burns planned for San Bruno Mountain will need to consider the control of these and other invasive species in sensitive grassland areas.

A controlled burn is planned for the Juncus Ravine area (south slope) in 2002. This is the same area that was planned to be burned in 2001, but a reduction in manpower at CDF in the fall of 2001 prevented the burn from being carried out. The goals of the burn are to conduct training for fire crews, reduce invasive species, and reinvigorate native plant species.

A controlled burn did not occur at the San Bruno Mountain manzanita colony on Kamchatka Point in 2001. This colony was partially defoliated by a tussock month infestation in 1999, and the area was scheduled to be burned in fall 2000. The objective of the burn would have been to kill the tussock moth infestation and stimulate seedling germination of the colony, which has not burned for decades. The status of the colony will be re-evaluated in 2002 to determine if burning should still be used for this purpose.

3. DEVELOPMENT ACTIVITIES

Incidental take of habitat for the Mission blue butterfly on San Bruno Mountain was authorized under the Endangered Species Act Section 10(a)(1)(B) Permit PRT 2-9818. Development related activity which may have resulted in take of the Mission blue butterfly occurred during grading for "the Commons" neighborhood of the Terrabay Project. The 2001 San Bruno Mountain HCP Operating Program is included as Appendix E to this report.

No take of the Callippe silverspot occurred or was authorized in 2001 as each development site was carefully assessed for the presence of *Viola pedunculata* during its peak bloom period, and no plants were found. Take of Callippe silverspot individuals or habitat (*Viola pedunculata*) either through development, routine maintenance, and/or restoration work is not authorized under the Habitat Conservation Plan. An amendment to the HCP to authorize take of Callippe is being reviewed by USFWS.

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TABLE A-1. MISSION BLUE BUTTERFLY WANDERING SURVEY DATA –2001

DATE	LOCATION	ELAPSED TIME	NUMBER OBSERVED	WEATHER CONDITIONS
4/4	South Slope	4.5	26	Temp: 17.8-35 C Wind: 0-8 mph average
4/23	Brisbane Acres	0.4	0	Temp: sunny Wind: calm
4/24	SE Ridge	1.1	4	Temp: 17.8 C Wind: 2.5 mph average
4/24	SE Ridge	0.7	7	Temp: 17.8 C Wind: 2.5 mph average
5/8	NE Ridge	2.1	23	Temp: 24.2 C Wind: 2.1 mph average
5/8	NE Ridge	0.7	10	Temp: 24.2 C Wind: 2.1 mph average
5/8	Saddle	1.8	23	Temp: 25.3 C Wind: 3.3 mph average
5/8	NE Ridge	0.2	4	Temp: ? Wind: ?
5/9	Radio Ridge	2.0	9	Temp: mild, warm Wind: 4.1 mph average
5/10	Owl/Buckeye	1.4	8	Temp: 26.2 C Wind: 0.5 mph average
5/10	Owl/Buckeye	2.4	24	Temp: 21.6 C Wind: 0.7 mph average
5/10	SE Ridge	2.3	24	Temp: 23.8-33.1 C Wind: 0-4.6 mph average
5/18	Owl/Buckeye	1.6	11	Temp: ? Wind: 0.8-2.9 mph average
	Mission Blues seen during Callipe fixed transect surveys	incidental	*56	
TOTAL	ALL AREAS	21.2	229	173/21.2 = 8.2 Sightings Per Hour

*Incidental Mission Blue sightings not included in sightings per hour calculation.

TABLE A-2. MISSION BLUE BUTTERFLY FIXED TRANSECT DATA–2001

Transect Number	Transect Attempts and Sightings	Incidental Sightings	Total Mission Blue Sightings	Location
1	4,0,0,0,0	1,1	6	Northeast Ridge- road
2	0,1,0,1,1,1,0	1,1,1,2,1	10	Northeast Ridge- Arnold Slope
3	0,0,0,0,0		0	Brisbane Office Park
4	0,0,0,0,0		0	Devil's Arroyo
5	2,4,5,1,0,1	6,1,2	22	Owl Canyon
6	0,0,1,3,0,0,2,3	2	11	Owl/ Buckeye subridge
7	0,2,1,1,1,2,3	1,3	14	Buckeye Canyon
8	0		0	Upper Buckeye Canyon
12	0,2,0,0,0	2	4	Southslope, Skypark/Parkridge
13	0,0,1,0,0		1	Southslope, Skypark
14	0,0,0,0,0		0	Hillside
17	0,0,0,2		2	West Peak
18	0,0,0,0		0	Nike Road
21	0,1,2,0,1	1	5	Colma Creek
22	1,1,5,2,6	1,1,1,1	19	Brisbane Water Tank-road
23	1,0,0,0	1,1	3	Brisbane Water Tank-slope
24	0,0,0	1,3	4	Linda Vista restored slope
25	0,1,2	1	4	East Saddle Above Carter Street
26	0,0,0,1,0		1	Pointe Pacific Lower
27	0,0,0,0,0	1	1	Pointe Pacific Upper
28	0,0,1,3,0	1	5	Wax Myrtle Ravine
TOTAL			**112**	

TABLE A-3. CALLIPPE SILVERSPOT BUTTERFLY WANDERING SURVEY DATA –2001

DATE	LOCATION	ELAPSED TIME	NUMBER OBSERVED	WEATHER CONDITIONS
4/4	South Slope	4.5	3	Temp: 17.8-35 C Wind: 0-8 mph average
4/23	Brisbane Acres	0.4	0	Temp: sunny Wind: calm
4/24	SE Ridge	1.1	0	Temp: 17.8 C Wind: 2.5 mph average
4/24	SE Ridge	0.7	0	Temp: 17.8 C Wind: 2.5 mph average
5/8	NE Ridge	2.1	11	Temp: 24.2 C Wind: 2.1 mph average
5/8	NE Ridge	0.7	0	Temp: 24.2 C Wind: 2.1 mph average
5/8	Saddle	1.8	2	Temp: 25.3 C Wind: 3.3 mph average
5/8	NE Ridge	0.2	0	Temp: ? Wind: ?
5/10	Owl/Buckeye	1.4	0	Temp: 26.2 C Wind: 0.5 mph average
5/10	Owl/Buckeye	2.4	0	Temp: 21.6 C Wind: 0.7 mph average
5/10	SE Ridge	2.3	1	Temp: 23.8-33.1 C Wind: 0-4.6 mph average
5/18	Owl/Buckeye	1.6	0	Temp: ? Wind: 0.8-2.9 mph average
6/20	South Slope	1.6	9	Temp: Hot Wind: 5.3 mph average
6/21	Sign Hill	*0.8	*1	Temp: 23.7 C Wind: 2.6 mph average
6/21	South Slope	1.3	4	Temp: 26.2 C Wind: 5.0 mph average
	Callipes seen during Mission Blue fixed transect surveys and rare plant surveys	incidental	**33	Temp: 26.2 C Wind: 5.0 mph average
TOTAL	ALL AREAS	22.1	63	30/22.1 = 1.4 Sightings Per Hour

*Callipe observation on Sign Hill not included in total calculations, since Sign Hill is not part of the HCP.
**Incidental Callipe sightings not included in sightings per hour calculation.

TABLE A-4. CALLIPPE SILVERSPOT BUTTERFLY FIXED TRANSECT DATA -- 2001

Location	Elapsed Time (Hours)	Sightings	Sightings Per Hour	Incidental Sightings	Total Sightings
1. Dairy Ravine	1.62	8	4.9	3	11
2. Saddle	1.77	10	5.7	1	11
3. NER, W of TL	1.70	36	21.1	0	36
4. Levinson	2.83	71	25.1	2	73
5. NER, E of TL	2.35	58	24.7	2	60
6. Brisbane Water Tank	1.52	3	2.0	0	3
7. SE Ridge, Above Quarry	3.08	89	28.9	0	89
8. Hill N of Quarry	1.53	18	11.7	0	18
9. Owl Canyon	2.32	67	28.9	0	67
10. Buckeye Canyon	1.97	45	22.9	0	45
11. SE Ridge, Above Brisbane	2.67	229	85.9	0	229
12. SE Ridge, Above Bayshore	2.67	79	29.6	0	79
TOTAL	26.03	713	27.4	8	**721**

TABLE A-5. SAN BRUNO ELFIN ADULT AND LARVAL OBSERVATIONS –2001 BY DATE AND POINT # (point/incidental)

POINT #	FEB 15	MAR 13	MAR 19	MAR 26	MAR 27	TOTAL (P/I) L=LARVAE
1.1		0/0	1/5		1/2	2/7, L-21
2	0/0	1/0	3/4		1/1	5/5, L-25
3	0/0	1/0	5/5		1/6	7/11, L-18
4						
5	0/0	0/0	2/0		0/0	2/0
5.1			2/3		3/0	5/3, L-18
6	0/0	0/1	4/0		2/0	6/1, L-100
7	0/0	0/0	3/2	0/2	0/0	3/4, L-19
8	0/0	0/2	3/1	0/0	1/0	4/3, L-37
9		2/2	0/0	0/1	1/3	3/6, L-15
10	0/0		1/0			1/0
11						
12		0/4	2/2		1/1	3/7, L-69
13	0/0	3/2	5/2	2/0		10/4, L-40
14			1/0			1/0
15		0/1	0/2		1/2	1/5, L-40
16		2/1	5/0		0/1	7/2, L-12
17		4/9	5/1		2/0	11/10, L-80
18						L-11
19		3/0	0/0	0/0		3/0, L-5
20		2/0	1/3		0/0	3/3, L-16
21						
22						L-0
TOTAL	0/0	18/22	43/30	2/3	14/16	77/71=**148** *L-573

*Larval count = 526 larvae counted within a 25 meter radius of points plus 47 incidental larvae seen outside of this area.

APPENDIX B — EXOTIC PEST PLANTS REMOVED BY HAND AND HERBICIDE WORK ON SBM IN 2000

Table B-1. Acres of Exotic Pest Plants Removed by Hand Work on San Bruno Mountain in 2000[1]

Area	UE	EG	GM	FV	Other/ Combined	Total
Bay Ridge/Linda Vista			1.00	1.50	1.75	4.25
Saddle	1.00	0.50	0.25			1.75
Devil's Arroyo				0.75		0.75
Callippe Hill/NER				2.50		2.50
Brisbane Water Tank					0.50	0.50
Owl/Buckeye Subridge					0.75	0.75
Brisbane Acres/above Bayshore				0.75	3.00	3.75
Terrabay/ South Slope				3.00		3.00
Juncus Ravine/ Hillside				13.00		13.00
Guadalupe Canyon Parkway		0.25		0.50		0.75
April Brook		0.25				0.25
Wax Myrtle		1.50			0.75	2.25
Total	**1.00**	**2.50**	**1.25**	**22.00**	**6.75**	**33.50**

1. Plants were removed using weed wrenches, maddox's or by hand pulling. Categories represented are: **UE**: *Ulex europaeus* (gorse), **EG**: *Eucalyptus globulus* (blue-gum tree), **GM**: *Genista monspessulana* (French broom), **CS**: *Cytissus striatus* (Portuguese broom), **FV**: *Foeniculum vulgare* (fennel), and **PE**: *Picris echiodes* (bristly ox-tongue). Other category includes additional weed species receiving hand control or a combination of several weed species in a given treatment.

Table B-2 Acreages of exotic pest plants treated with herbicide at Saddle and Main Mountain areas in 2000.

Area	Gorse (UE)	F.Broom (GM)	P.Broom (CS)	Fennel (FV)	Com-bined/ Other	TOTAL
Saddle- Main treatment areas	17.75					17.75
Bitter Cherry Ridge					0.5	0.50
Botanic Garden					3.00	3.00
Colma Canyon					1.0	1.00
NE Ridge / Water Tank Area				1.75	9.00	10.75
Radio Road/Summit					3.0	3.00
Guadalupe Cyn Pkwy		1.0	0.5	0.5	3.75	5.75
Brisbane Acres		2.0		0.5		2.50
Linda Vista Area					3.25	3.25
SE Ridge/Above Bayshore					9.0	9.0
Tank Ravine				2.5		2.50
Juncus Ravine				7.5		7.50
Wax Myrtle Ravine	0.75				14.25	15.00
Dairy Ravine					3.75	3.75
Carter Street	0.5					0.50
Hoffman Street					3.5	3.50
West Peak				1.75	0.25	2.00
Brisbane Office Park		0.75		0.25		1.00
Old Ranch Road	0.5	0.5		0.5	1.0	2.50
Owl/Buckeye		2.0		1.75		3.75
Above Terrabay				10.5		10.75
TOTAL	**19.50**	**6.25**	**0.50**	**27.50**	**55.25**	**109.00**

Categories represented are: UE: *Ulex europaeus* (gorse), EG: *Eucalyptus globulus* (blue-gum tree), GM: *Genista monspessulana* (French broom), CS: *Cytissus striatus* (Portuguese broom), FV: *Foeniculum vulgare* (fennel). Other category includes German ivy, English ivy, cotoneaster, pampas grass, iceplant, (*Carpobrotus edulis*), and *Echium sp.*, or it represents several weed species treated in a given area.

Appendix C: Butterfly Island Year End Report, San Bruno Mountain
by Mark Heath, Shelterbelt Builders, Inc. August 20, 2001.

Habitat Islands

The Colma Creek planting islands remain the strongest performers to date. After excellent survivability of lupine in the first year (1999/2000), we planted additional host and nectar plants at each site in year 2 (2000/2001). Six species of nectar plants were planted at both sites with good success (see table below). Species were allocated to each island based on the water availability (CC2 tends to be hotter and dryer than the more sheltered CC1). Both islands had great establishment of coast buckweat (*Eriogonum latifolium*) and CC2 had great establishment of golden aster (*Heterotheca sessiflora*). Both appear to be capable of establishing well without much supplemental irrigation.

Most of the plants grown in 2" containers had poor establishment. The D16 and 4" pot size established much better than the smaller container sizes. In the future, we will eliminate the 2" size for butterfly island planting. D16's will be the most likely replacement as they are much better suited for wildland planting situations.

Colma Creek 1 Planting Summary

Number	Container Size	Species	First Year survival	Establishment
105	2"	*Aster chiloensis*	12	11%
10	Stubbie	*Cirsium quercetorum*	0	0%
36	2"	*Erigeron glaucus*	9	25%
112	4"	*Eriogonum latifolium*	42	38%
66	2"	*Heterotheca sessiflora*	4	6%
49	2"	*Horkelia californica*	1	2%
378	--	**Total Nectar Plants**	**68**	**18%**
300	D16	*Lupinus formosus & albifrons*	63	21%
678	--	**Total Plants for CC1**	**131**	**19%**

CC1 continues to have good plant establishment. Nearly 20 percent of the 2001 plantings survived throughout the summer with only 2 supplemental waterings throughout the driest periods of the season. This island is the most developed of all those started since last year. 16 *L. formosus* planted last year were found flowering this summer. Most of last years surviving host lupines are large and healthy. 2 small plants also seem to have established from seed from last year's plantings meaning the installed host plants are beginning to recruit new plants on their own.

The last two years of island stewardship have reduced the exotic radish, mustards, and thistles that were once common throughout the site. Annual grasses have never been much of a problem, though the perennial London fog grass (*Holcus* sp.) is beginning to establish. The site is quite moist which will aid in *Holcus* establishment and its arrival should be monitored. This island is on its way to being sustainable and restored.

Recommendations for next year: The formosus at this island is doing outstanding and is already quite dense. This island can use a few additional nectar plants in the 2001/02 planting season.

Colma Creek 2 Planting Summary

Number	Container Size	Species	First Year survival	Establishment
33	2"	*Aster chiloensis*	2	6%
10	Stubbie	*Cirsium quercetorum*	1	10%
1	2"	*Erigeron glaucus*	0	0%
67	4"	*Eriogonum latifolium*	50	75%
58	2"	*Heterotheca sessiflora*	45	82%
2	2"	*Horkelia californica*	0	0%
171	---	**Total Nectar Plants**	**98**	**57%**
152	D16	*Lupinus formosus*	45	30%
323	—	**Total Plants for CC2**	**143**	**44%**

CC2 had a similar performance to CC1. This year's plantings were focused in areas that had good establishment last year. Throughout the island, there are microtopopgraphical features which seem to limit the density of annual grasses within the island. The soils and sun/wind exposure are very different for both CC1 and CC2, but each had similar patterns of plant establishment. The common bond both islands share is a lack of annual grass competition. Success of both these islands reflect how important annual grass competition is in getting small host plants established. Even with supplemental mowing, hand weeding, and watering, the islands with less annual grass competition seem to support new host and nectar plants much better. Future year's should concentrate on increased host plant densities, since the established plants tend to be spread out throughout the large island. This island has the first confirmed sighting of mission blue butterfly larvae feeding on restored lupine plantings. Enhancement will be critical in maintaining this beachhead population of butterflies.

Recommendations for next year: This island has good establishment but the plants grow much more slowly than CC1. This island should get some additional *L.albifrons* to increase density and a few more nectar plants.

Dairy Ravine Summary

These butterfly island sites are scattered throughout the Dairy Ravine restoration area. The islands with the least amount of weed competition, especially annual grasses, tend to have the best establishment. Dairy Ravine 1 is developing slowly, but will eventually have a nice *albifrons* colony along the main ridge of Dairy Ravine. DR 4 (Elfin Ridge) now has very dense stands of *Sedum*, both naturally occurring and planted, which extends the Elfin butterfly habitat up along the ridge separating Dairy Ravine from Wax Myrtle canyon. DR2 and DR3 had poor establishment of lupines so future efforts here must be considered carefully.

Dairy Ravine 1

Number	Container Size	Species	First Year survival	Establishment
9	2"	*Aster chiloensis*	0	
37	Stubbie	*Cirsium quercetorum*	0	
21	2"	*Erigeron glaucus*	14	67%
40	4"	*Eriogonum latifolium*	18	45%
61	2"	*Heterotheca sessiflora*	5	9%
147	2"	*Horkelia californica*	0	0
40	2"	*Phacelia californica*	3	8%
355	---	**Total Nectar Plants**	**40**	11%
146	2"	*Lupinus albifrons*	71	49%
501	—	**Total Plants for DR1**	**111**	22%

Dairy ravine's rocky soils and bounty of weeds have hindered establishment at DR1 but it continues to develop slowly. The lower portion of the island (below the old road) had better establishment this year and the lupines are all doing quite well down there. Horkelia and aster are abundant naturally throughout the island giving it good preexisting sources of nectar. Additional buckwheat and phacelia would be a nice addition and they both flower a bit earlier than the others. Large weeds like himalayaberry, cotoneaster, and hemlock are very common around the perimeter of the site. If this island is to sustainablly exist in the future, these weeds need to be controlled near the island.

Recommendations for next year: Continuing to add lupine, especially in the upper portions of the island, will help increase plant densities. The addition of more phacelia and buckwheat will give the island more sources of early summer nectar.

Dairy Ravine 2 - New Island

230	D16	*Lupinus formosus*	15	7%
230	—	**Total Plants for DR2**	**15**	7%

Dairy Ravine 2 has very thick stands of quacking grass (*Briza maxima*) throughout the entire site except for a small old road area. A few lupines established along this road but all that were planted in the grassland areas were lost in a sea of grass. Spring mowing of grasses did not help the lupine establishment here. This island has little potential for a large lupine colony. It may be possible to establish a few more lupines along the road, but the colony would be very small at best.

Recommendations for next year: Hold off planting any more plants here and monitor the development of the few surviving lupines along the road. Efforts are better spent on the other more successful islands.

Dairy Ravine 3 -Uppermost combo island

98	2"	*Sedum spathulifolium*	no count	no count
35	2"	*Lupinus albifrons*	0	0

We used a mixed bag of leftover plants to enhance this site that already contained lots of *Viola* and *Sedum*. Most of the *Sedum* survived, though we missed getting a count of the survivors. No Lupine were found surviving. 2" starts don't have enough root mass to establish plants late in the season.

Recommendations for next year: This site is maxed out with *Sedum* plantings at all available rock outcrops. In the future, it would be nice to try to establish Lupines in the upper areas of the island when additional funds become available. Next year should only concentrate on weed maintenance and monitoring.

Dairy Ravine 4 Elfin Ridge

480	2"	*Sedum spathulifolium*	264	55%
196	2"	*Eriophyllum staechadifolium*	no count	---
676	—	**Total plants for DR4**	---	---

The highest survivability of *Sedum* came from the individuals planted in rocky outcrop areas. Many of these areas already contain naturally occurring *Sedum*. We added plants to areas on the periphery of natural colonies and tried to fill in the gaps to develop dense stands of *Sedum* in the outcrops of the area. We also tried planting in shallow soiled meadow areas. Most of these plantings failed. Even with mowing, the grass tended to outcompete the small 2" plantings. In the future, we will concentrate exclusively on rocky outcrop areas for the *Sedum*.

Approximately 200 *Eriophyllum* were planted in the perimeter of the island area to increase nectar plant diversity near the planting island. The island already contains many patches of naturally occurring *Mahonia, Aster*, and *Heterotheca* in the meadow areas. The *Eriophyllum* will add nectar sources in the surrounding coastal scrub areas. Since there is much of it already present, it was difficult to count and estimate its survivability. It typically does very well, so establishment is assumed to be good.

Recommendations for next year: This site is also maxed out with *Sedum* at all available rock outcrops. There are many preexisting nectar plant colonies with need no augmentation. Weed maintenance and monitoring is all that is recommended for next year.

Saddle Summary

One great success and a failure characterized last year's Saddle island installation. S1 was found to be almost totally unplantable in it's current configuration as where S2 had the shockingly highest establishment of any other island. The surprise success of S2 introduced the idea of potentially quicker conversions of gorse stands to butterfly habitat. Restoration techniques developed at S2 might prove useful in the restoration of more gorse infested areas throughout the Saddle region.

Saddle 1

148	2"/D16	*Lupinus albifrons*	2	1 %
148	—	**Total Plants for S1**	2	1%

There was less suitable planting area at the site than we originally estimated. We plated all the rocky outcrop areas. The edges of the rock outcrop are unsuitable for planting. All plantings failed there. The soils all have a solid bedrock hardpad that prevents plant establishment. When you move off the rock areas into deeper soils, thick annual grasses become the major problem for plant establishment.

The most promising area of the island seems to be the top ridge which is an old road. There are many established colonies of buckwheat, golden aster, Chilean aster, and seaside daisy along the top of the road which would complement the lupine plantings very nicely. We planted a few plants in the road area, but only a few have survived so far. The best opportunity to establish an island in the area will probably be along this old road. Major stands of gorse persist all along the road, so it would be beneficial to push the gorse back to find more suitable planting sites in the area.

Recommendations for next year: No additional plantings are recommended at this site until more gorse has been removed along the old road at the top of the island. After more gorse has been removed, it will be useful to look at the site and consider extending the island boundaries to include more of the old road and gorse areas.

Saddle 2 - GCP Island Site

120	2"/D16	*Lupinus albifrons*	78	65%
100	flats/plugs	*Koeleria macrantha*	103*	52%*
100	flats/plugs	*Festuca californica*	103*	52%*
2/LB	seed	*Bromus carinatus*	33	---
320		**Total Plants for S2**	**181**	**57%**

*grasses were too young to identify.

The GCP experimental site was a great surprise success. The site was completely barren after gorse was stripped from the site in late Fall. We were unsure how the direct planting of lupine and grass plugs into a completely barren site would preform. We were really concerned about a major weed explosion that potentially would have taken over the entire site. We were pleasantly surprised to find that there was very little weed establishment at the site. The majority of the exotics such as *Lactuca*, *Hypochoeris*, bull thistle, and dandelion tend to be poor competitors and won't last long once native cover is established. We believe the gorse was present on the site for so long that most of the exotic seed bank (other than gorse) was lost.

The plantings were very successful as well. Establishment was very high (nearly 60%!) and even the very small grass starts took very well and some bromus seed established. All the lupines did very well and many look as if they are two years old already! Weed free rice straw was used as a mulch to preserve as much moisture as possible and deter weed establishment near the plantings. The high nitrogen content of the soil left over from many years of gorse also gave the new plantings a first year advantage. 2 hand waterings helped the plants maintain their growth throughout the driest parts of the summer.

It will be critical to establish native cover at this site that will support the lupine plantings. If no cover is established, weeds will eventually move in and plague the future maintenance of the island. Grasses have done very well so far. More need to be added in densities sufficient enough to prevent the development of unwanted plant species. With a thick cover of grasses, more lupine can be added along with nectar plants to create a very high quality butterfly island nearly from scratch.

Recommendations for next year: The gorse stumps are vigorously resprouting and starting to cover the lupine plantings. Small gorse seedlings are arising from the seed bank. The immediate and careful control of gorse is the top priority to maintain the current lupine plantings. Once the gorse has been controlled, this winter will be critical in establishing a native grass cover to reduce the potential spread of nearby exotics. A combination of grass plugs and seed is recommended to quickly establish a dominant native cover. More lupine and nectar plants will also intensify the butterfly potential of the island.

Weed management and Stewardship

GCP Site

The GCP bowl weed control was very effective this year. The dry summer conditions stressed late developing exotics such as fennel, hemlock, and thistle species. Two well timed mows knocked out most of these plants before they set seed. We also hand pulled hemlock out of the adjacent native scrub. Some Italian thistle set seed before our first mow, so this species will continue to be persistent on the site. It is likely to become the most challenging weed on the site. Last year, there was much more late season moisture that assisted the hemlock and Italian thistle to continue to flower after the final mow. This year there was almost no flowering of these two species after the final mow. We used our final mow to mulch much of the dead gorse thickets that persist on the site. Breaking down this debris make future weed mowing more efficient.

If the dry trend continues next year, follow-up mows and hand pulling will continue to reduce the weeds occurring at this site. As we continue to experiment with native grassland restoration at the neighboring S2 butterfly island, it is time to start planning the actual restoration of the GCP bowl. Native scrub is slowly moving upslope from established native scrub areas below the site but additional plantings would be helpful in accelerating the process. We will soon reach a threshold of weed control at the site and we will only be able to move forward by adding native competitors to the site.

April Brook Hemlock Control Site

This site was another effective control effort benefitted by the unusually hot and dry summer. The late season hemlock mowing resulted in very little reflowering. The main hemlock patch was only mown, but the entire perimeter was hand pulled to insure complete removal. We also hand pulled 4 small nascent patches that extended all the way down the Colma Creek drainage to the butterfly islands. There was a single large patch in very thick coastal scrub half way between the CC2 and the main hemlock patch that wasn't treated for lack of budget. It remains the biggest exotic plant threat to the central part of the watershed. Three or more years of dry conditions coupled with mowing and hand pulling could significantly reduce this plants presence in the Colma Creek watershed. Without future treatment, however, the wet stretch of Colma Creek between the islands and the botanic garden will only fill in completely with hemlock.

Radish and mustard were hand pulled between Summit Road and the Colma Creek trail. This area is filling in nicely with native coastal scrub plants. If exotics can be reduced, there will soon be a near continuous coverage of native coastal scrub and thus be more resistant to future invasions. This section also had a little cape ivy that was treated previously with herbicide. The interior of the patch had been killed, but the perimeter was still alive and radiating into neighboring young scrub. We headed off the ivy and cut a bare ground control swath around the entire infestation. The ivy/coastal scrub debris complex was piled in the center of the infestation. This infestation needs to be constantly monitored so it isn't allowed to radiate into anymore intact coastal scrub. A second application of herbicide to the living ivy in the pile would be helpful in killing off this persistent exotic.

Colma Creek

The restored coastal scrub between CC1 and CC2 is maturing very well. Two successive years of weed management have reduced the amount of radish, mustard, hemlock, and thistle on the site. A few more years of weed management will allow the scrub to fill in completely without any dominant weed patches. The reduction of weeds in this area insures the butterfly islands continue to remain free of large competitive exotics.

Appendix D. Volunteer Activities

Friends of San Bruno Moutain

Report by Doug Allshouse, 2001

It was a rather dry winter with storms in late January, mid February, and early April rating any consideration. First recorded Wilson's & orange-crowned warblers appeared on March 26. A spring bird walk on April 22 turned up 39 species. The day began with a foggy overcast and turned sunny about 11:00. Olive-sided flycatcher, northern oriole, western tanager and Swainson's thrush were the highlights.

Three new species were recorded: magnolia warbler, blue-winged warbler and grasshopper sparrow bringing the total bird species count to 164 for San Bruno Mountain. On the first day of summer a second-year female hooded oriole or orchard oriole appeared at the Colma Creek site cleared by CNPS. We did not count this as a new species because positive identification could not be made. The fist brown creeper in years was spotted in the willows along the creek and a possible black-headed/rose-breasted grosbeak hybrid was spotted.

As of July 12, fog had been minimal with nightly intrusions burning off by day. It has been at a higher altitude, barely covering the summit at times. A warmer weather pattern has emerged.
Robins fledged big numbers. Juncos did well, at least 2 broods. Allen's hummingbirds were everywhere, chasing intruders all over the park. Olive-sided flycatcher numbers were down, with only one possible nest. Swainson's thrush numbers were down as well, only 3-4 singers,? nests.

Orange-crowned warbler had one brood. Wilson's warbler numbers were good, 3-4 nests. Common yellowthroat had several nests with good numbers in the bog, April Brook and Dairy Ravine. Starling numbers appeared soft. American and lesser goldfinch numbers were strong. Stellar's jay had one brood and a pair of raven's fledged two chicks. Red-tailed hawk fledged three. Red-shouldered hawks were driven off their first and second nest by ravens and left the park. They were spotted near Pointe Pacific. Pygmy nuthatch had one brood. Bewick's wren hung around the Day Camp. Downy woodpeckers were numerous and Hutton's vireo numbers were average. Quail chicks were very prominent signaling a good year.

A couple of weasels were spotted and rabbit numbers improved with lots of little critters spotted. In fact, the improved rabbit numbers may have been the reason that 3 red-tailed hawk chicks survived. Gray fox is still an uncommon mammal on the northern mountain and may be extirpated in this area. Rangers in the West Ridge area have confirmed sightings of jackrabbits. A bobcat sighting was reported by Sally de Becker of PG&E but is unconfirmed by anyone who spends a great deal of time here. How it would get here (and from where) is unknown.

Fox and golden-crowned sparrows were late fall arrivals, a month late, appearing on October 10. Ruby and golden-crowned kinglets arrived five days later. Fox sparrows are very numerous, as are hermit thrushes.

The first good rainstorm arrived 10/30 with .38". November 10-12 recorded over 2.5"

and November 30-December 1 saw 2.68" with high winds. December 28-31 we got almost 4.5". The last five weeks of the year 14.79" of rainfall were recorded making it the wettest December in many years.

Restoration Day, 12/3, was postponed due to rain and rescheduled 12/9. The day began cold & windy, ended cool & sunny. About 40 volunteers planted about 1000 plants on the western hillock. Although *Lolium* and *Holcus* continue to cause trouble in the garden, most of it was buried under the soil from Terrabay. There has been an increasing presence of *Vulpia bromoides* and *Bromus diandrus*. These grasses are easier to remove by hand than are the other two. We began the practice of mowing the grasses monthly throughout the spring & summer to keep them down. In 2000, Mike Forbert applied herbicide to the area in front of the Grassland Community, effectively killing a large infestation of *Lolium*. It was replaced in 2001 by *B. diandrus* and *Claytonia perfoliata*. Where the *Claytonia* seed came from is anyone's guess.

Westcoast Wildlands weeded the eastern hillock however a pre-emergent was not applied this year resulting in new weed growth. Pre-emergent spraying in the fall of 2000 was extremely effective at keeping weed growth to a minimum. There have been infestations of *Foeniculum* and *Oxalis pes-caprae* with the new soil. One of our dune natives, beach sagewort (*Artemisia pycnocephala*) has begun to escape eastward from its original plantings. It evidently likes the habitat and is threatening to become a nuisance elsewhere in the garden, especially on trail edges. Hand removal of new sprouts has begun.

The greenhouse in S. San Francisco occupied much of our time in the latter part of 2001 to prepare it for winter planting. We have managed to build it out for about our stated budget of $3,000.

APPENDIX E
OPERATING PROGRAM BY ADMINISTRATIVE PARCEL -- 2001

Administrative Parcel	Species Monitoring	Exotics Control	Revegetation	Planning Assistance *
GUADALUPE HILLS (1)				
01 Linda Vista III (Bay Ridge)	X	X	X	X
02 Carter St.	X	X		
03 Rio Verde Heights	X			X
04 Levinson Property	X			
05 Brisbane Office Park	X			
06 Parcel Z	X		X	X
07 Northeast Ridge Project	X	X	X	X
08 Guadalupe Valley West	X	X		
09 State Park	X	X	X	X
10 Guadalupe Canyon Pkwy.	X	X		X
11 PG&E Transmission Lines	X			X
12 PG&E Fee	X			
13 Water Pipelines	X	X	X	X
14 Linda Vista I	X	X		
15 Water Tank				
16 Parcel V	X	X		
SOUTHEAST RIDGE (2)				
01 Quarry	X	X	X	X
02 Owl and Buckeye Canyons	X	X	X	
03 Brisbane Acres	X	X		X
04 Terrabay Project	X	X	X	X
05 County Park	X	X		X
06 Hillside School				
07 PG&E Transmission Lines	X	X		X
08 Juncus Ravine	X	X	X	X
09 Water Pipelines	X			X
10 Fire Breaks	X			X
RADIO RIDGE (3)				
01 Telecommunications Site	X	X		X
02 County Park	X	X	X	X
03 Guadalupe Canyon Pkwy.	X	X		
04 PG&E Transmission Lines	X		X	X
SADDLE (4)				
01 Pointe Pacific	X	X		
02 Village-in-the-Park		X		
03 South Hills Estates		X		
04 State Park	X	X	X	X
05 Guadalupe Canyon Pkwy.	X	X		X
06 Water Tanks				

* Includes monitoring of construction, project design review, and HCP compliance review

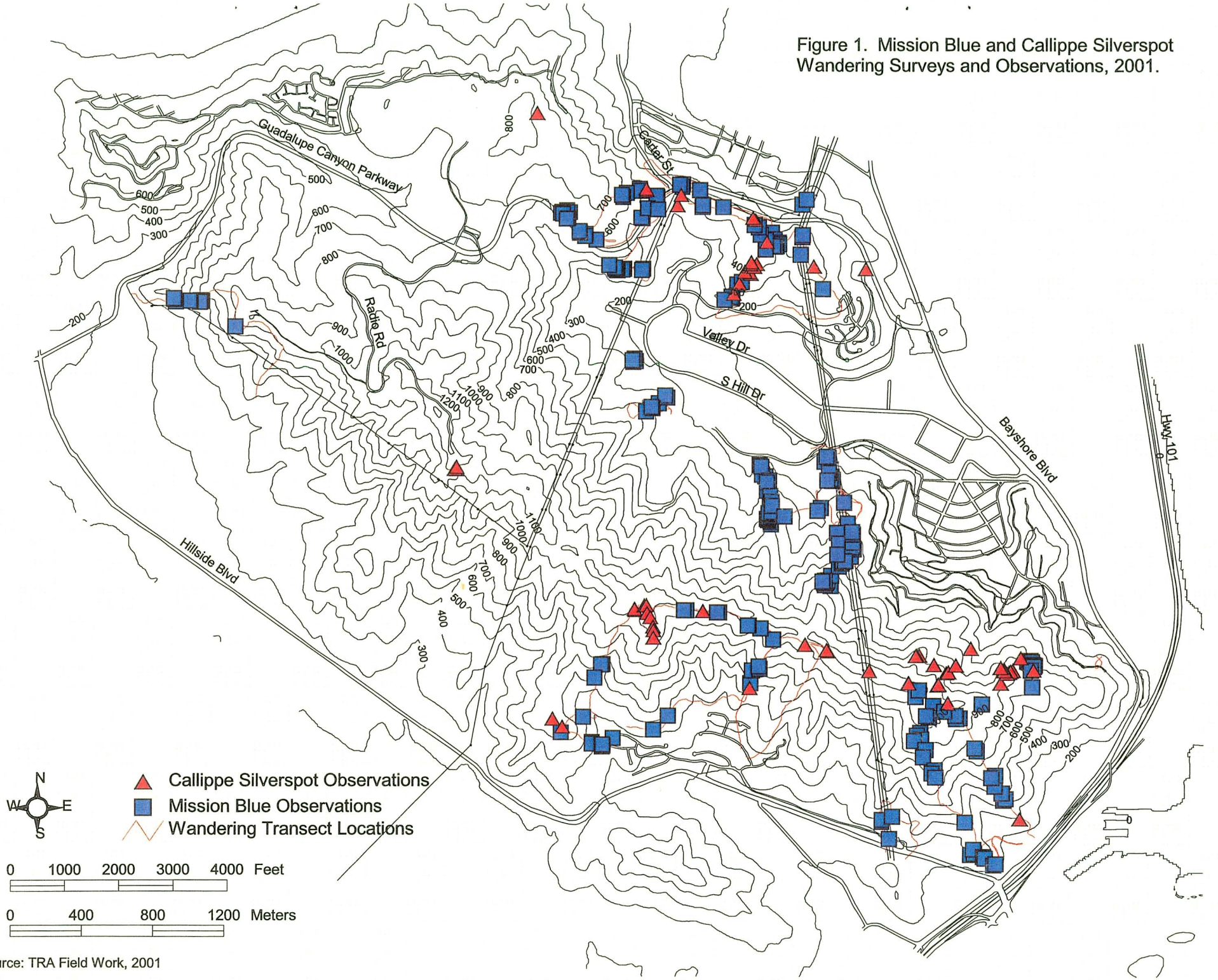


Figure 1. Mission Blue and Callippe Silverspot Wandering Surveys and Observations, 2001.
Guadalupe Canyon Parkway
Carter St
Radio Rd
Valley Dr
S Hill Dr
Bayshore Blvd
Hwy 101
Hillside Blvd
N
W
E
S
Callippe Silverspot Observations
Mission Blue Observations
Wandering Transect Locations
0 1000 2000 3000 4000 Feet
0 400 800 1200 Meters
Source: TRA Field Work, 2001

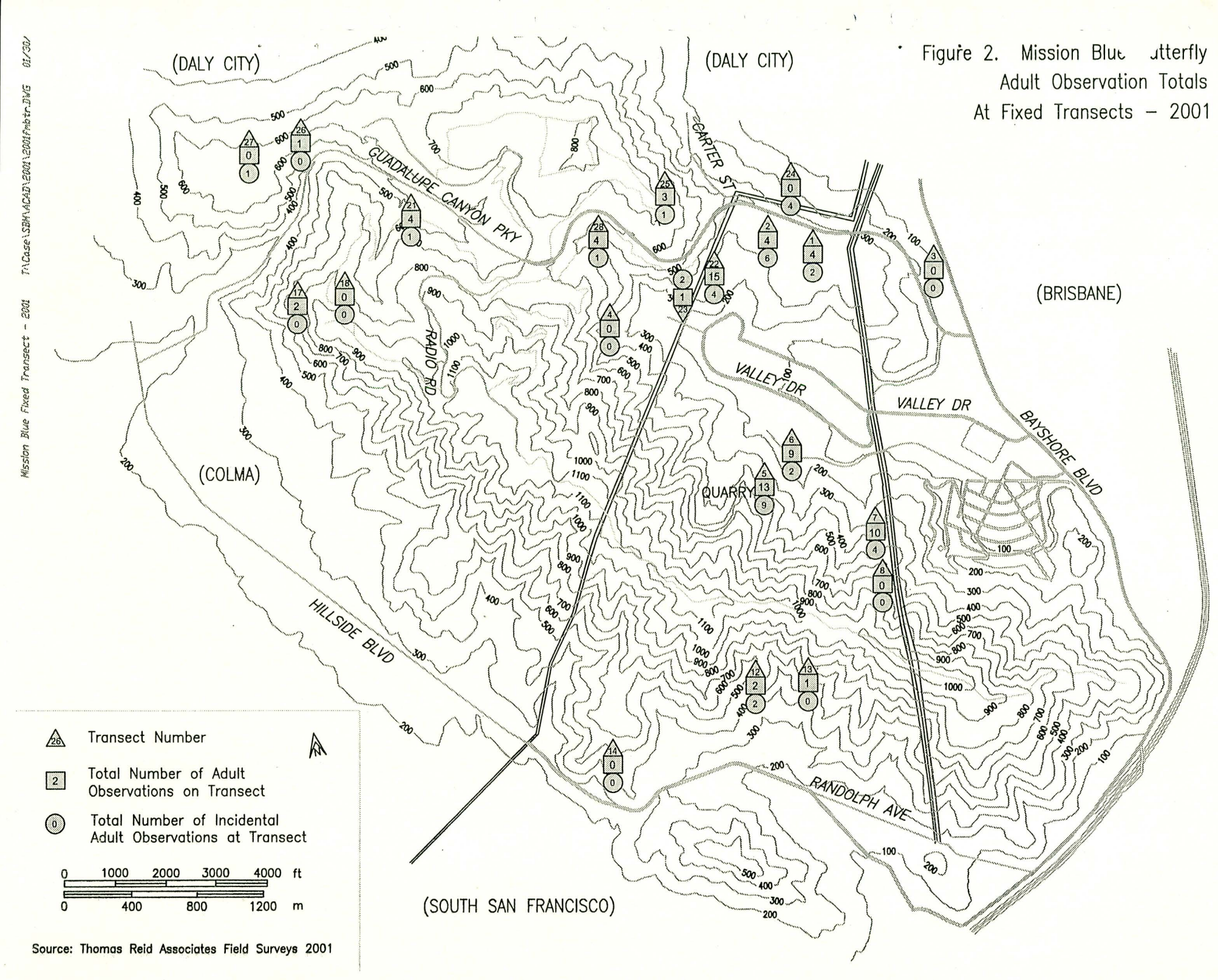
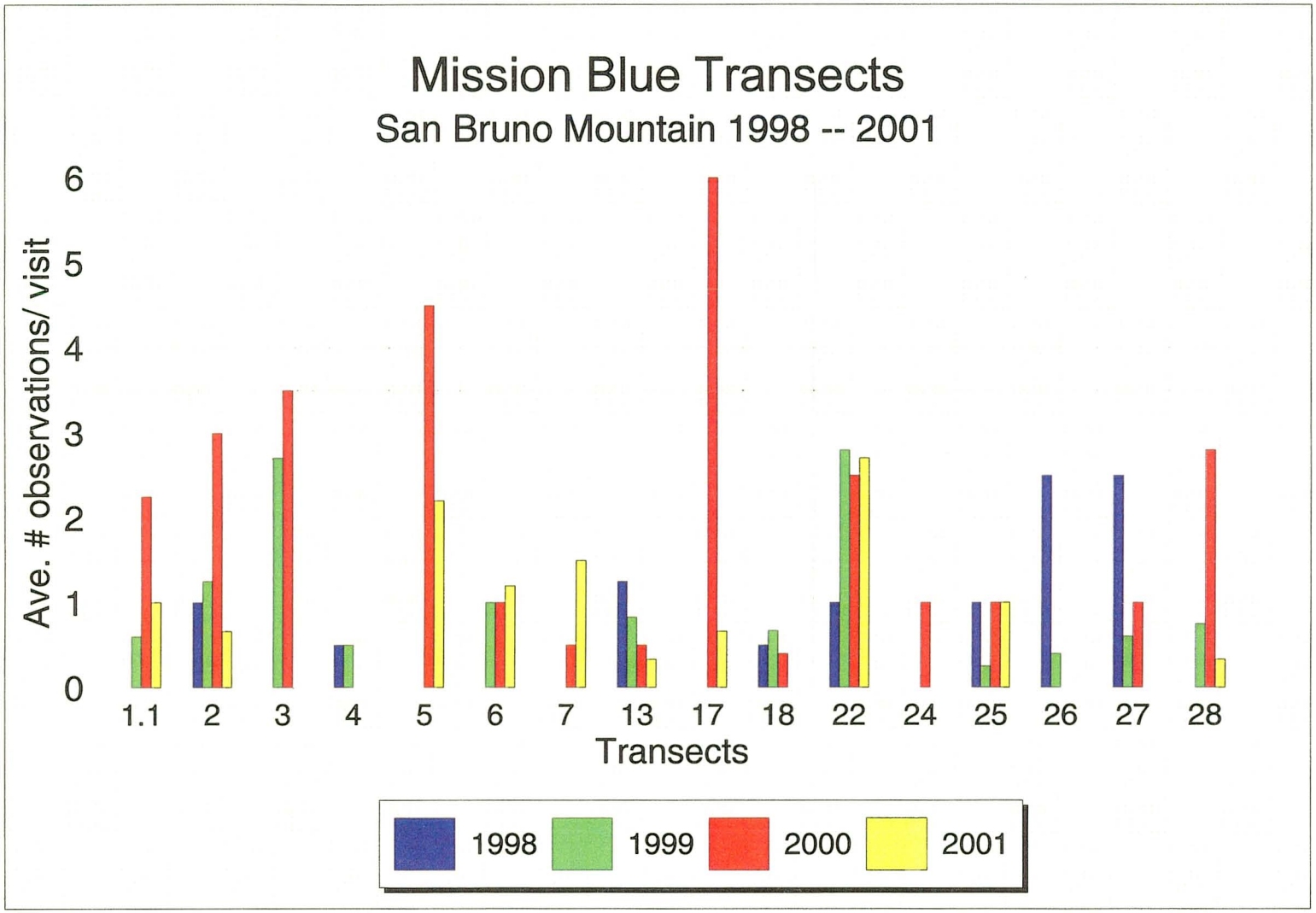


Figure 2. Mission Blue Butterfly
Adult Observation Totals
At Fixed Transects – 2001
(DALY CITY)
(DALY CITY)
(BRISBANE)
(COLMA)
(SOUTH SAN FRANCISCO)
GUADALUPE CANYON PKY
CARTER ST
RADIO RD
VALLEY DR
VALLEY DR
BAYSHORE BLVD
QUARRY
HILLSIDE BLVD
RANDOLPH AVE
Transect Number
Total Number of Adult Observations on Transect
Total Number of Incidental Adult Observations at Transect
0 1000 2000 3000 4000 ft
0 400 800 1200 m
Source: Thomas Reid Associates Field Surveys 2001
Mission Blue Fixed Transect - 2001 T:\Case\SBM\ACAD\2001\2001FmbtrJWG 01/30/

Figure 3. Mission Blue Transects: Average Number of Observations/Visit: 1998-2001



TRA 1/29/02. Only data collected on good weather days during the butterfly flight season is depicted in the graph.

Figure 4. Callippe Silverspot Fixed Transects and Observations, 2001.

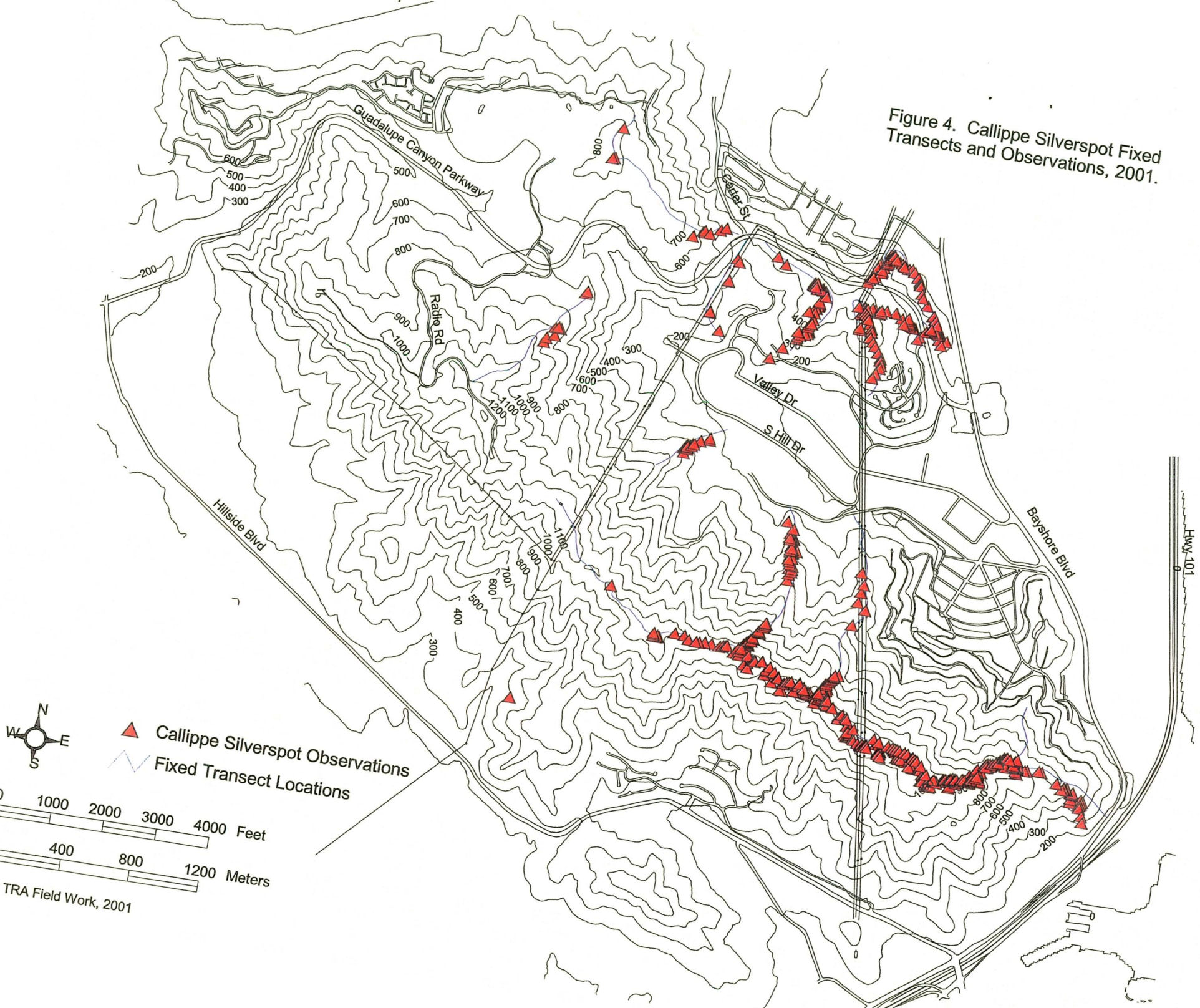
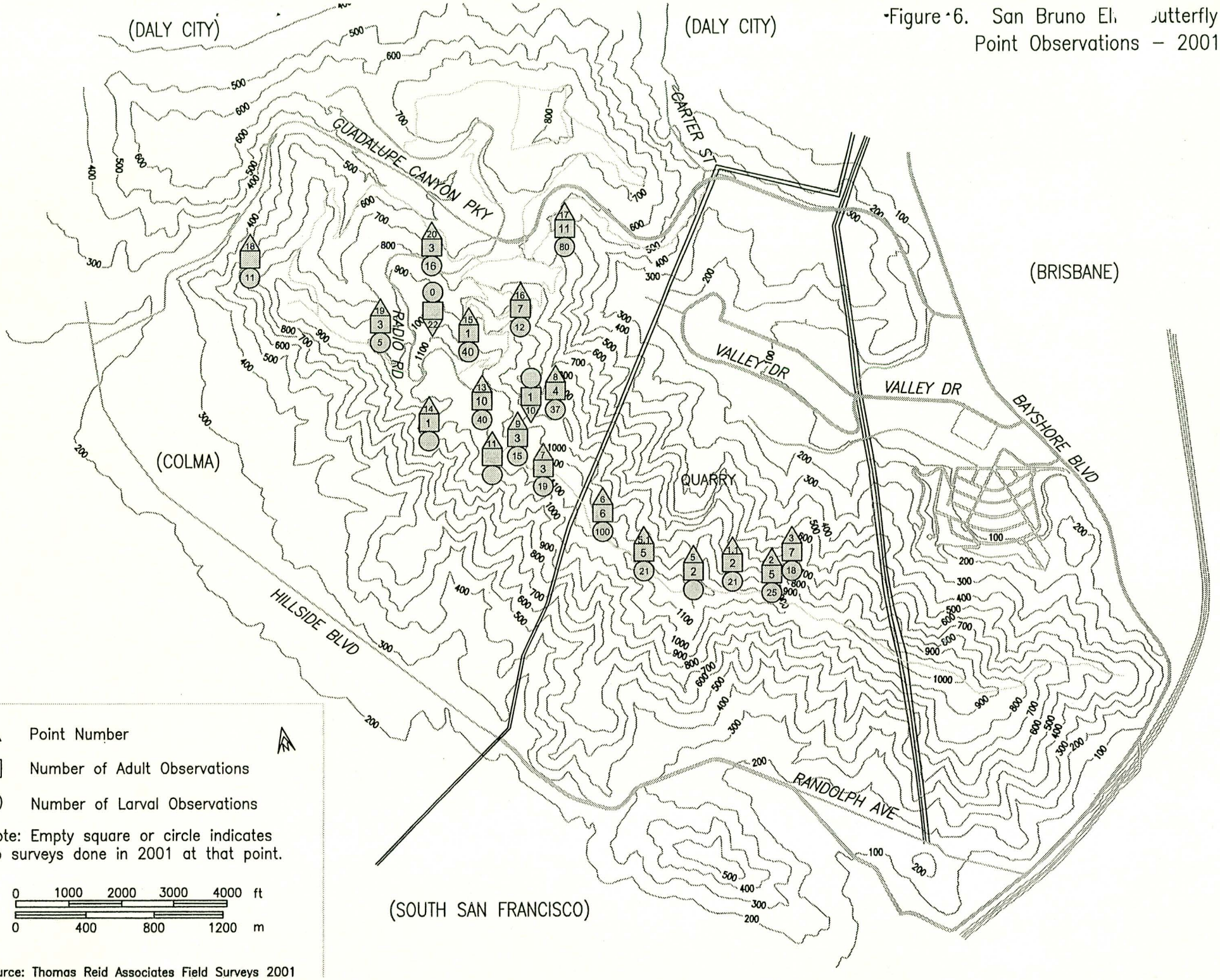


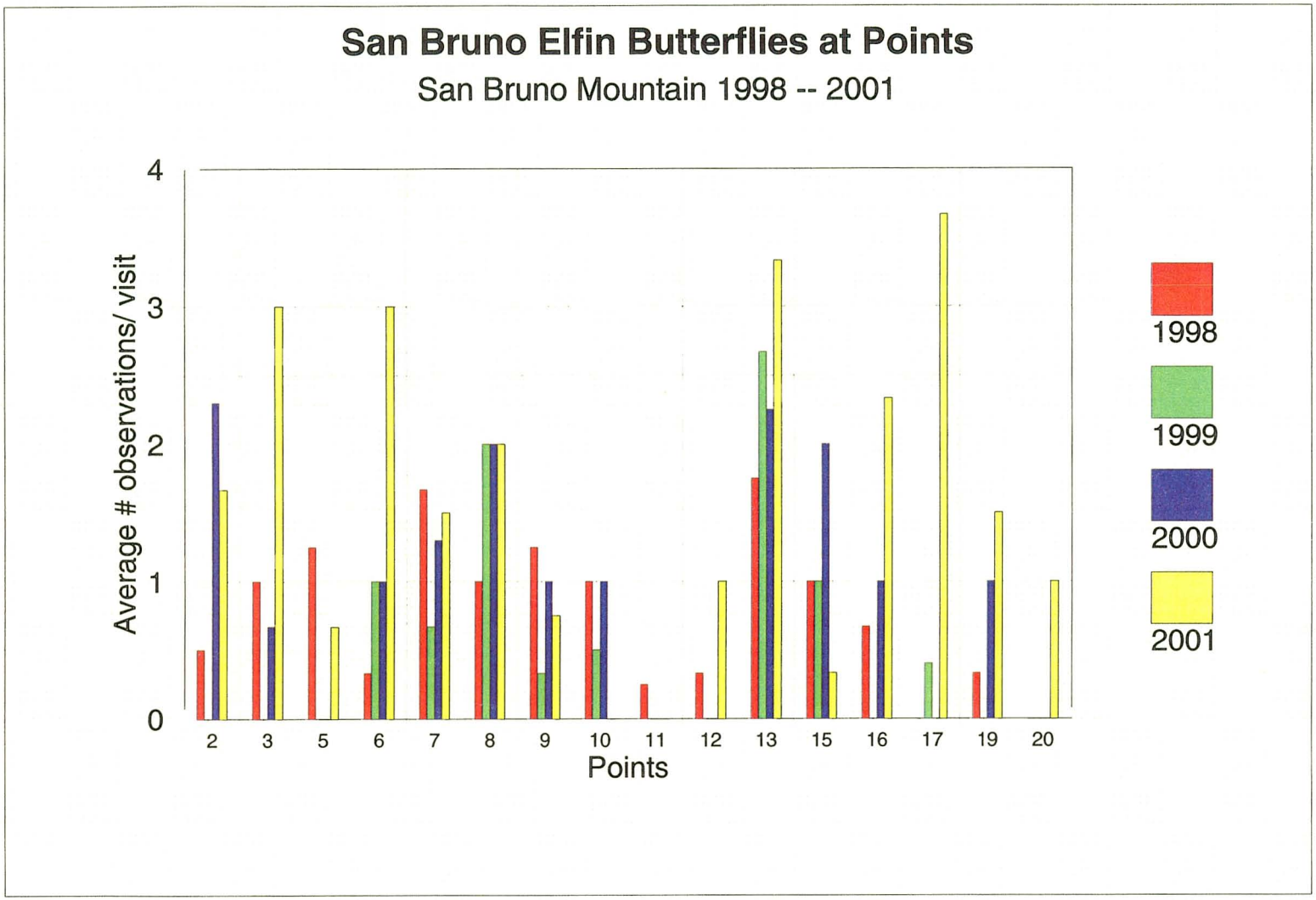
Figure 6. San Bruno El[illegible]utterfly Point Observations – 2001



Source: Thomas Reid Associates Field Surveys 2001

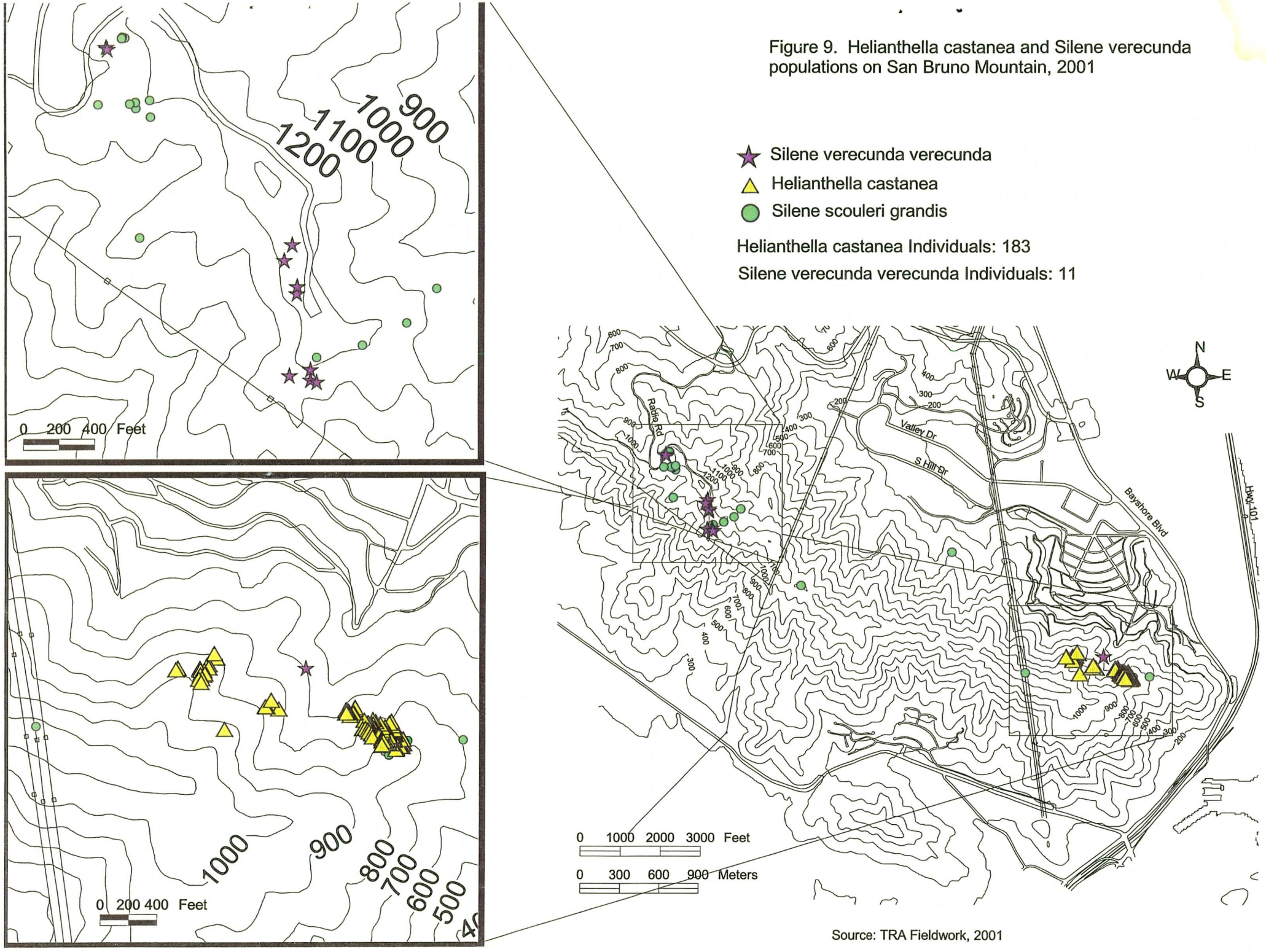
San Bruno Elfin Observations - 2001 T:\BSBM\ACAD\2001\2001ELFI.DWG 01/30/

Figure 7. San Bruno Elfin Points: Average Number of Observations/ Visit 1998-2001



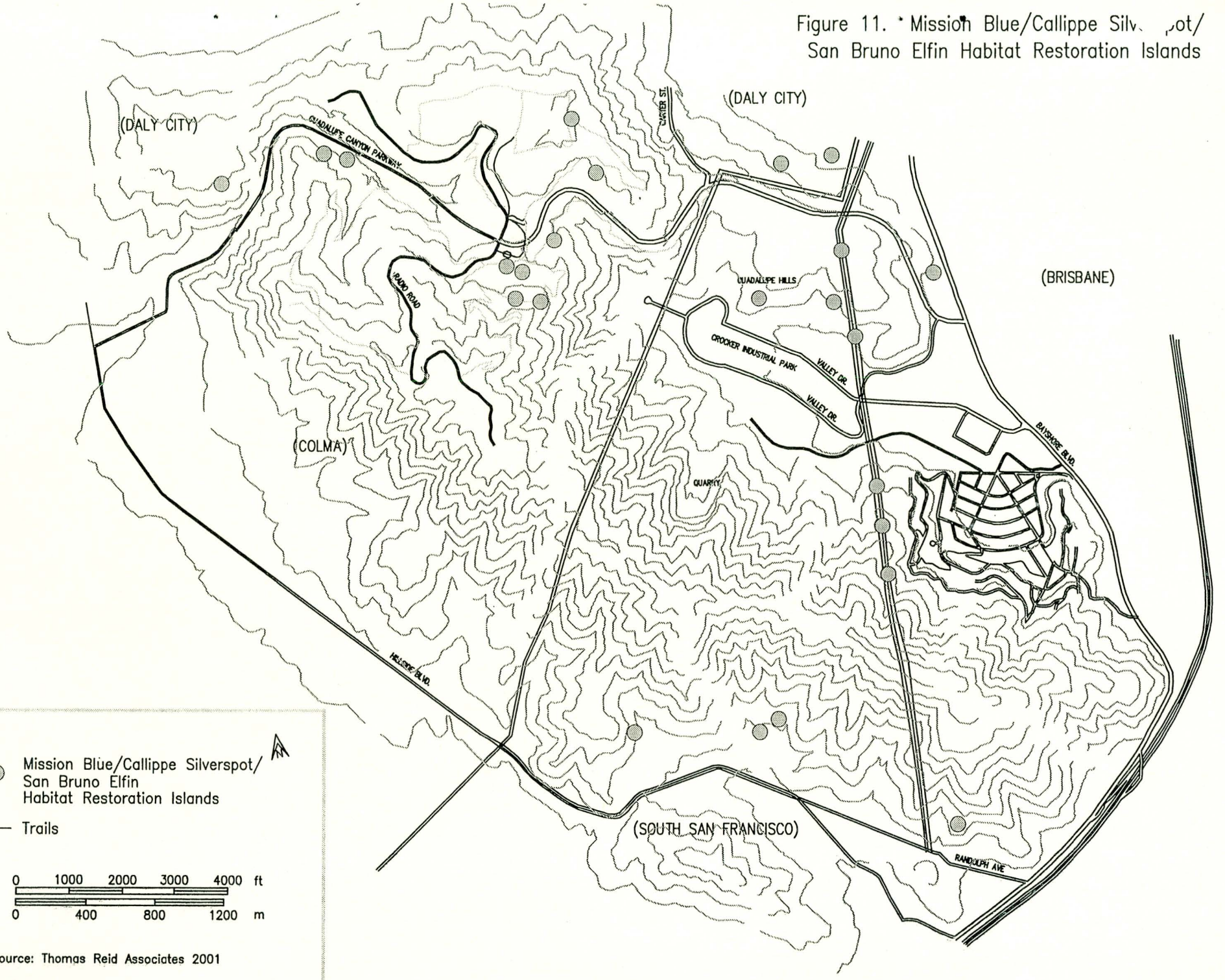
TRA 1/30/02

Figure 9. Helianthella castanea and Silene verecunda populations on San Bruno Mountain, 2001



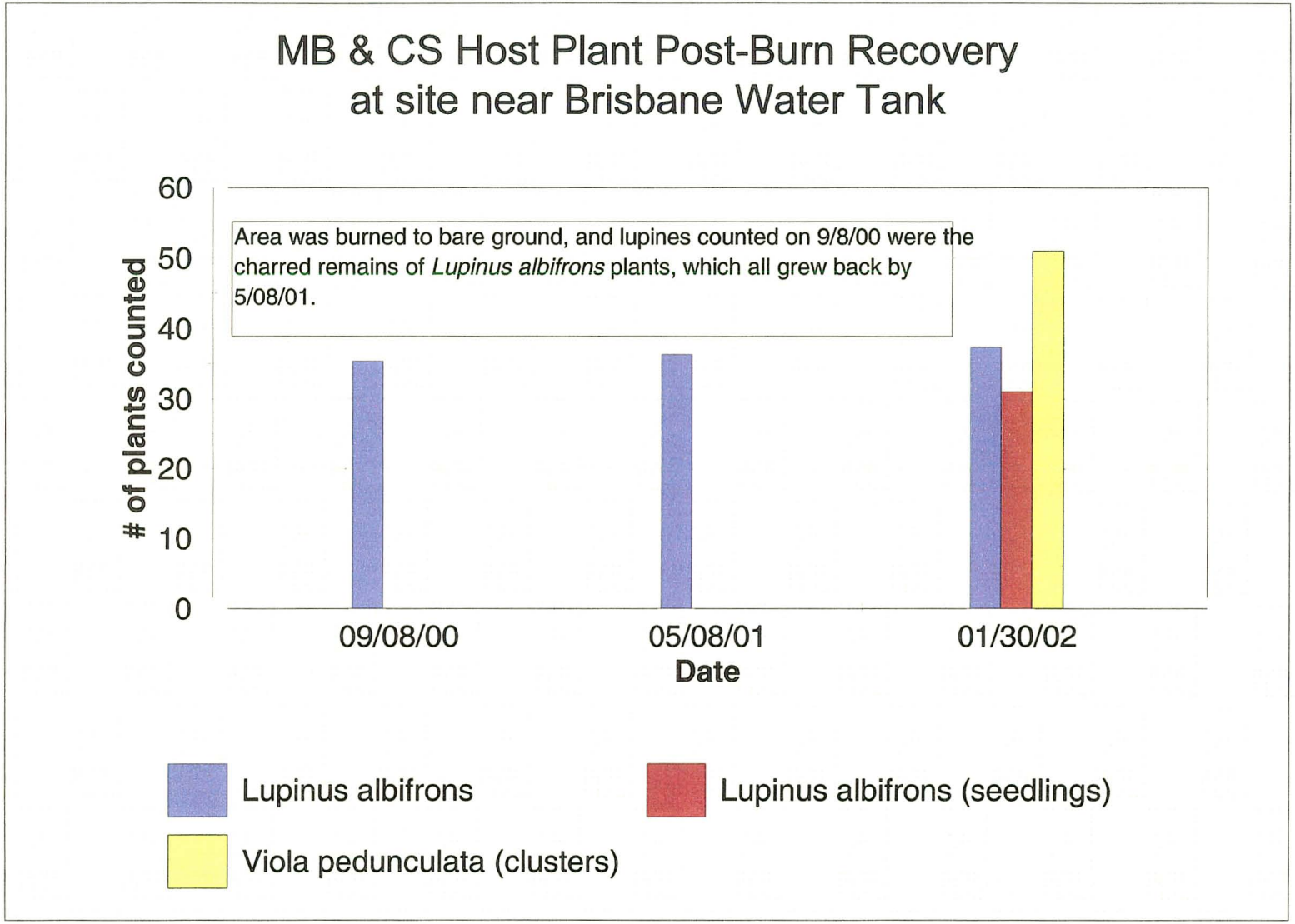
Source: TRA Fieldwork, 2001

Figure 11. Mission Blue/Callippe Silverspot/
San Bruno Elfin Habitat Restoration Islands



Bfly Habitat Restoration Islands 2001 (T:\Case\SBM\2001\2001isl.dwg) 1/30/02

Figure 12. MB and CS Host Plant Recovery at Burn Site near Brisbane Water Tank



TRA 01/30/02

FIGURE 13. Erosion and weed control work by CNPS Heart of the Mountain Volunteers in headwaters of Colma Creek, Saddle bog area. Photo Date: 2001.

FIGURE 14. Planting island with *Sedum spathulifolium*, host plant for the San Bruno elfin butterfly. Site is was created by the Friends of San Bruno Mountain.
Photo date: 1/26/01.

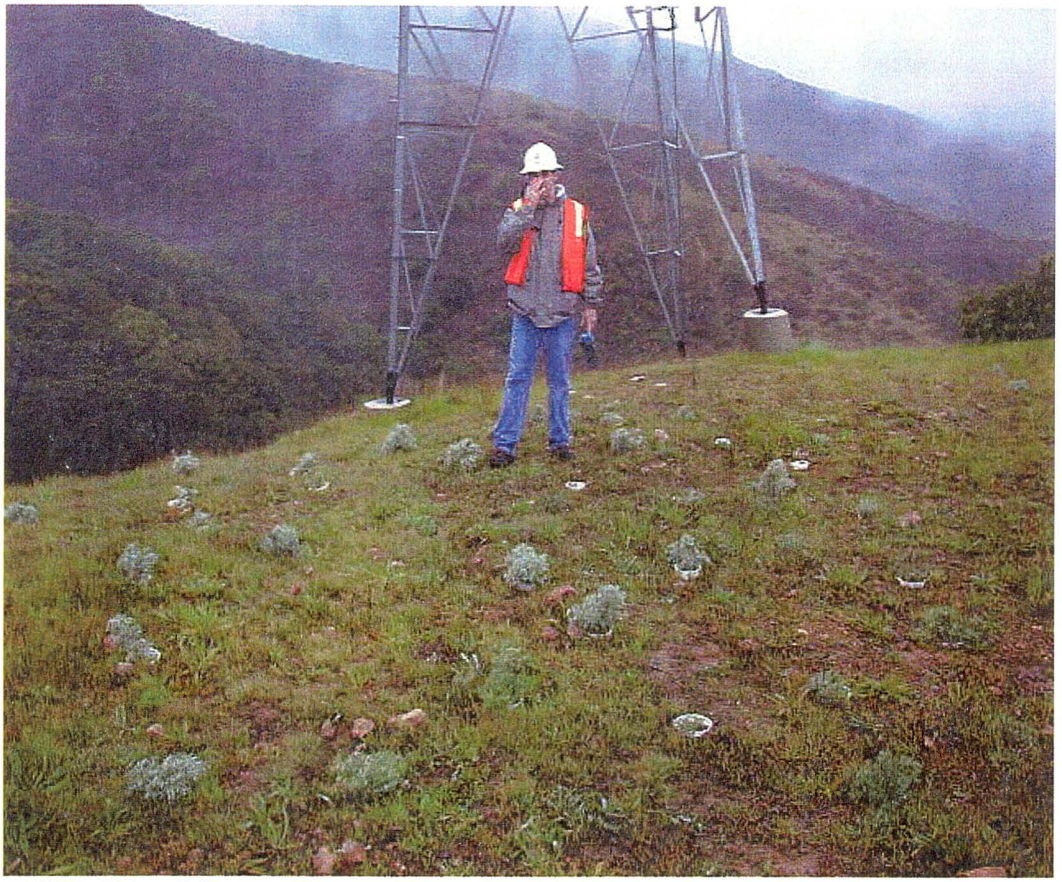


FIGURE 15. PG&E restoration site on Transmission line ridge. *Lupinus albifrons, Lupinus variicolor and Viola pedunculata* plantings are shown. Photo date: 1/26/02.

Figure 16. Five x ten meter plot within area that burned over labor day weekend, 2000. Area was burned to bare ground. Host plant recovery has been excellent (*Lupinus albifrons* and *Viola pedunculata),* however invasive species such as *Oxalis pes caprae* and *Erodium sp.* have also moved into the burn area. Photo date: 1/30/02.

Figure 17. Colma Creek restoration site, San Bruno Mountain–1995. Site was a dense stand of Eucalyptus trees (*Eucalyptus globulus*). The trees were clear-cut in spring 1995, and the site was burned in December, 1995.

Figure 18. Colma Creek restoration site, San Bruno Mountain, 2001. Site was planted in 1996 with approximately 10,000 native plants. Summer lupine (*Lupinus formosus)* was planted in 2000 and 2001. Mission blue butterflies (adults, larvae, and eggs) were observed on the site in July, 2001.