SAN BRUNO MOUNTAIN
HABITAT CONSERVATION PLAN

Year 2000 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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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 2000 calendar year. It provides information on the relative population status of the butterflies of concern, 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 2000 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 2.5 minutes by one or two people. After the transect observation period ends, average wind speed (1 minute duration), maximum wind speed, air temperature, and humidity are recorded. Only transect visits that had temperatures greater than or equal to 18^0C 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 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 variicolor*, and *Lupinus formosus*. Early flying Mission blue butterflies (March, April) are associated with the *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.

2000 Mission Blue Butterfly Monitoring Results— Summary

MB Data for the 2000 season is shown in Appendix A, Tables A-1 and A-2. Overall, year 2000 was a good one for the Mission blue butterfly on San Bruno

Mountain. The butterflies were observed in abundance at several set transect locations and in certain remote areas discovered during wandering transects. The first Mission blue butterfly observed on San Bruno Mountain in 2000 was recorded on Arnold Slope on the Northeast Ridge on March 30th. The last Mission blue of the season was observed on the hill west of the Guadalupe Quarry on June 1st. The butterflies were probably flying at least a few days prior and after these recorded observations.

In 2000, weather on San Bruno Mountain was good both for butterflies and butterfly monitoring. Rainfall was abundant for the fourth year in a row, as the Mountain received over 33 inches during the 1999-00 rain year. Most of this came in the early spring. A mild spring with abundant rainfall (17.95") in January and February, and warm conditions in April, May and June, made for good monitoring windows, with high numbers of butterflies observed. Toward the latter part of the butterfly season (late May and June) the lack of rainfall in these months (2.18 ") brought the 2000 flight season to an early end, as host and nectar plants dried up and went to seed.

Wandering Surveys

In 2000 wandering surveys were done on the Northeast Ridge, South Slope, Southeast Ridge, West Peak, Saddle and Rio Vista areas (See Figure 1). Refer to Table 1 for an annual summary of person hours, sightings, and sightings per hour (S/H) for the Mission blue (MB) monitoring period 1982 to 1999. The 203 adults observed in the 37-hour monitoring period in 2000 resulted in a sightings per hour (S/H) figure of 5.5. This S/H figure is higher than the sixteen year average S/H figure which is 4.7. The location of each adult butterfly observation is shown in Figure 1.

Fixed Transects

The fixed transect locations and Mission blue butterflies observed in 2000 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 late March and numbers were good at the transects through April (total of 82 recorded) and May (total of 83 recorded). MB transect surveys were not conducted after May 23, 2000. However incidental observations of MB were recorded in June while monitoring for the callippe silverspot butterfly.

Relatively high numbers of Mission blues were recorded at the *L. albifrons* transects (2, 17, 24, 25, 27, and 28). In the beginning of May, 2000 we began to see Mission blues showing up on the *Lupinus formosus* transects (3, 5 and 22,), while some *Lupinus albifrons* transects such as #17 on West Peak, #2 on Arnold Slope, and #28 above Wax Myrtle Ravine continued to have consistent observations of MB through May. Transect 24 is the only transect located on a restored slope. This site is located above the Linda Vista development, and MB have been recorded on this slope since 1995.

Table 1. Mission Blue Wandering data on SBM: 1982 - 1999.

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*
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 thrown out.

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

Figure 3 shows a comparison of the average number of MB observed at the transects per visit for the years 1998, 1999 and 2000. 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.

Mission blue numbers were high (2.5 or greater MB per visit) at transects 2, 3, 5, 17, 22, and 28. All of these transects have a high density of large, healthy lupine plants, and (except for transect 2) are located on dirt roads or road-cut slopes. The

combination of wind protection and presence of large healthy host plants seems to favor higher numbers of MB. The same transects also had the most consistent presence of MB (Figure 4). Alternatively, the lower numbers at transects 4, 7, 13, 26 are likely due to the paucity of host plants and/or greater exposure to the wind at these locations. Transects 18 and 27 have good densities of host plants, however the large die off of *L. albifrons* at these sites in 1998 after the El Nino year appears to still be affecting observations of MB.

Status of *L. albifrons*. Several patches of *L. albifrons* suffered substantial die off after the El Nino rains of 1997-98. The cause is believed to be an air-borne root fungus (personal communication Sue Gardner, Site Stewardship Program, NPS). At Milagra Ridge, MB numbers have been down significantly for the past two years, likely the result of the *Lupinus albifrons* dieback (personal communication Emily Newby, Site Stewardship Program, NPS).

On San Bruno Mountain lupine dieback was most notable at the following areas: Pointe Pacific (transect #27), Saddle (transect #25), Buckeye Canyon (transects #7 and #8), Arnold Slope (transect #2), and Trash Terrace (transect #10). In 2000, high numbers of Mission blues were observed at transect #2, while the *L. albifrons* at transects 7, 8,18, 26, 27, appears to be recovering slowly with few or no MB observations. Since the initial die-off, lupines have reestablished but many plants are still small and stunted and it may be another year or more before plants return to their pre-1998 densities. *Lupinus formosus* habitat was not negatively affected by the root fungus, and Mission blue observations have been consistently high in *L. formosus* patches.

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

Methods

Two monitoring methods were used in 2000 to assess the status of the callippe silverspot butterfly: fixed transects and wandering surveys. Twelve fixed transects were established for the callippe in spring 2000. These vary from 470 to 2180 meters in length, and are spread out over the Mountain (Figure 5). 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 callippe of the season were observed on May 18th on the Levinson property, near the San Francisco Water Department Road. The last callippes of the season were recorded on July 14th at Owl Canyon and on the Southeast Ridge. The callippe were probably flying at least a few days prior to and after these recorded observations. During the 6-week monitoring period, each callippe silverspot (CS) transect received 2 to 5 visits and wandering surveys were done on eight occasions. Wandering surveys were primarily focused on areas not covered by the transects such as Southslope above Terrabay, Juncus Ravine, Southeast Ridge, and Northeast Ridge.

405 callippe adults were observed in 2000 in both the wandering and fixed transects combined (Figures 5 and 6). The tabulated data for 2000 is contained in Appendix A, Tables A-3 and A-4. In 2000, most of the effort was spent on fixed transect surveys (24 hours total, 325 adult observations), with 14 hours spend on wandering transects (80 adult observations made). This yielded an overall sightings per hour (S/H) figure of 10.7 -- less than the previous years figure of 15.4 S/H, but higher than most survey years overall. See Table 2 for an annual summary of person hours, sightings, and S/H for the monitoring period 1982 to 2000.

Table 2. Callippe Silverspot Monitoring on SBM: 1982 - 2000.

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*
Totals/ Average	***1388.5***	***13152***	***9.5***

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.

Fixed Transects

The sightings/hour statistic is also calculated for the fixed transect data. As is typical for callippe on SBM, 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), Hill west of Quarry (#8) and the Northeast Ridge (#3). The transects with the lowest numbers of observations included Dairy Ravine (#1), the Saddle (#2), and Brisbane water tank (#6). Surveys done on July 10, 12, 13, and 14, recorded only a few callippes (all transects combined). These survey dates were done at the tail end of the flight season and were omitted from the transect data shown in Figure 7.

Callippe observations fluctuate seasonally, annually, and spatially on the Mountain and 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 either large patches of *Viola pedunculata*, hilltop topography, or both. Areas with historically fewer callippe observations such as Dairy Ravine and the Saddle, appear to be declining in numbers, and this may be due to a reduction in habitat quality brought on by coastal scrub and/or annual grass invasion. Monitoring at these locations however has not been consistent because when a good weather window is available, these areas– due to their marginal habitat quality--are often not the first priority to monitor. The transect system that was initiated this year 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 butterfly, 18 survey points were monitored for adults and 8 points were monitored for larvae on San Bruno Mountain in 2000. These points were installed in 1998 (refer to 1998 Annual Report for details on point methodology). A total of 73 adult San Bruno elfin butterflies were observed in 2000 (Figure 8). This is a significant increase from the 28 adults observed in 1999. The earliest adults were on March 1, with the peak observations from March 15 through March 22. The last recorded observations were on April 3 at the tail end of the flight season.

More than three adults were found at the following colonies: ridge east of Quarry (Points. 2 and 3), ridge above Quarry (Point. 6), ridge east of Summit parking lot (Points. 7, 8, and 9), the Summit (Point. 13), and the slope below Kamchatka Point (Point. 15). One to three individuals were observed at the Wax Myrtle Ravine (Point. 17), Horseshoe Ridge (Point. 22), and Nike Road (Point. 19). No adults were observed at Points 10, 14, 20, and 21, and no surveys were conducted at Points 4, 11, 12, and 18.

Figure 9 shows the average number of butterflies recorded per visit at the points for 1998, 1999, 2000. Only transects that had 2 or more visits on monitoring days and had temperatures greater than or equal to 14°C and wind speeds 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 2000, standardized searches for elfin larvae were conducted at eight randomly selected points and a total of 169 larvae were observed. All *Sedum* plants within a 25-meter radius of the point were searched at each location. For comparison to 1999 larvae counts, data was also collected within a 25-foot radius. Significant numbers of larvae were observed at five of the seven colonies surveyed in 2000 (Points 7, 8, 9, 10, and 13). Less than five were observed at two colonies (Points 15 and 19). A tally of the 2000 San Bruno elfin field data is included in Table A-5 in Appendix A.

In comparison to the previous year, larval counts were down this year. Since larvae are only counted once or twice during the monitoring season, it is difficult to determine the reason for the variability. For instance, Point 8, which had the same observation numbers/visit for adult butterflies in both 1999 and 2000, had 55 larvae recorded within a 25-foot radius of the point. In 2000 at this same point, 0 larvae were recorded within the same radius. It is possible that this years counts missed the peak of the larval feeding period.

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 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 2000. 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. A final rule on this will likely come out in 2001.

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 2000.

f. Plants of Concern

San Bruno Mountain is home to several rare and listed plants. In 2000, rare plant work focused on the preparation of a burn plan for Kamchatka Point, where the San Bruno Mountain manzanita (*Arctostaphylos imbricata imbricata*) had significant leaf damage and dieback from a Tussock moth infestation. A burn permit was issued in

November 1999 and again in October 2000 by the Bay Area Air Quality Management District, however the onset of cool and wet weather conditions precluded the controlled burn from being set. The burn needs to be conducted in the dry season so as to stimulate proper seed germination of the San Bruno Mountain manzanita, which reproduces only by seed. An extension of the burn permit will be requested in the late Summer of 2001.

Rare plants such as the San Bruno Mountain Manzanita, Diablo rockrose (*Helianthella castanea*), San Francisco campion (*Silene verecunda verecunda*) and others will be mapped using GPS in spring and summer of 2001.

2. VEGETATION MANAGEMENT AND RESTORATION

a. Exotics Control Strategy and Future Goals

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 grasses.

High priorities for expanded exotics control work include: 1) the Southeast Ridge and South Slope areas where fennel is a continuing problem, and 2) areas on the south side of the Brisbane Industrial Park and in the Brisbane Acres where French and Portuguese broom infestations have expanded. Sources of additional funding will be sought again in 2001 to supplement the HCP budget and provide for expanded exotics control work on the Mountain. For more information, refer to the 1996 San Bruno Mountain HCP Five Year Strategic Plan, which provides a comprehensive breakdown of habitat management goals under different funding scenarios. The framework for a new expanded 5-year plan is currently in preparation.

b. 2000 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 typically 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)
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)

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 2000, approximately 109 acres of gorse, fennel, eucalyptus, Himalaya blackberry, French broom, and Portuguese broom plants were sprayed with herbicides, and over 33 acres of assorted weeds were controlled using hand tools (see Tables B-1 and B-2 in Appendix B). Also Shelterbelt, another 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. Figure 10 shows a generalized view of the locations where hand and herbicide weed control was done in 2000.

Other areas that consistently receive exotics control work are the Botanic Garden and bog area by volunteers of the Friends of San Bruno Mountain, Owl and Buckeye Canyons by Bay Area Mountain Watch, and Point Pacific by Point Pacific Homeowners Association.

c. 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 upon lupines, *Viola*, *Sedum* and appropriate butterfly nectar plants at suitable habitat locations

2000 Summary of Restoration work

After 5 years of weed control within the eucalyptus cut areas, targeted infestations of eucalyptus, Himalayan blackberry, gorse, and cotoneaster, and Cape ivy have been controlled. Restoration work in 2000 focused on herbicide treatment at the Dairy Ravine, Colma Creek, Wax Myrtle Ravine, and Hoffman sites. Approximately 15 acres were treated with herbicide. As greater control is being made 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.

Since the time of the initial cutting, restoration work has been done on approximately 40 acres (Dairy Ravine, Botanic Garden, April Brook, Colma Creek, Hoffman Street, and part of Wax Myrtle Ravine). The remaining 23 acres are within the lower section of Wax Myrtle Ravine and the Pacific Nursery site. These sites have a low potential for butterfly habitat, and have not received restoration work based on the amount of funding needed to restore these sites.

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

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 restoration work is the establishment of high quality habitat for the Mission blue (*Icaricia icarioides missionensis*) and callippe silverspot (*Speyeria callippe callippe*) butterflies.

Guidelines for successful restoration sites 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, 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.

Recommended plant densities were determined from biological data collected in 2000 in habitat areas that have supported consistent MB and CS colonies. The lupine densities are based on data taken from fourteen 50 by 10 meter transects that have

Mission blue utilization. The average range of % cover was found to be about 1-3% cover for *L. formosus* and/or *L. albifrons*. This translates to approximately 200 to 300 medium-sized plants (250 average) per transect.

The CS host plant densities are based upon *Viola pedunculata* distribution data collected on the Northeast Ridge in 2000. The Northeast Ridge has had consistent observations of callippe silverspots over the past 18 years of monitoring. The range of host plant densities found for *Viola* was approximately 500 - 1500 plants per acre on 25% of the lands of the Northeast Ridge. This corresponds to an average of 250 plants per acre.

e. Restoration of Habitat and Butterfly Utilization

Early attempts at large scale restoration work in the Botanical Garden found that it is difficult, if not impossible, to maintain large restoration areas from being overtaken by weeds. As a result, a strategy of creating small high quality habitat islands has been developed and has been proven to be successful in the Botanic Garden. This approach has begun being implemented in several other areas of the Mountain (Figure 11). Two areas have established lupines and Mission blue butterfly utilization (one on the Northeast Ridge and another at Linda-Vista), and there are likely to be several more within the next couple of 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 callippes first requires the development of soils that can support a high percent cover of native grasses. 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, the host plant for the callippe, *(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 (Figure 12). These slopes may now be capable of supporting plantings and/or seeding of *Viola pedunculata*. *Viola pedunculata* propagules are planned for planting in several planting islands in the Saddle, Dairy Ravine, and on the Northeast Ridge in 2001.

<u>County Park Areas</u>

- <u>Botanic Garden:</u> 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 southslope. 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 (Figure 13). 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. These islands, and other areas of the

Garden where the Friends have established *Sedum*, could support SBE butterflies in the near future. Thousands of native plants are planted in the Garden every year by the Friends and participating school groups.

- 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 swath of coyote brush that was threatening to overtake Mission blue habitat (adjacent to MB transect #27). The volunteers also have planted *Lupinus albifrons*. As of January 2001, some of the lupines are doing well while many have died from snail predation. Whenever adjacent to irrigated landscaping, snail control is necessary to help seedlings get established.

- Colma Creek and Dairy Ravine (Eucalyptus controlled sites): In 2000, four planting islands were prepared by weeding and mowing and three areas were planted (two at Colma Creek and one at Dairy Ravine). Each planting island area is roughly 1/8 acre in size. Approximately 200 lupines (*L. formosus* and *L. albifrons*) were planted at each island in February 2000. Lupine survival after one year has been good with about 30% or better survival at each site, with several plants going to seed in their first year.

- Saddle (gorse controlled sites): 2 planting islands were prepared in 2000 and are scheduled for planting in Winter 2001.

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 (Terrabay) and the Rana Creek Habitat Restoration Group (Northeast Ridge). Many of these slopes have much improved cover of native bunchgrasses and lack of invasive plants. Slope conditions as assessed in 2000 are as follows:

- Northeast Ridge: Several planting islands have been demarcated for planting on the NER graded slopes. Most notably, two areas already have high quality Mission blue butterfly habitat. These areas have dense patches of *Lupinus albifrons* (Figure 14), and *L. formosus* respectively. On May 30, 2000, 9 Mission blues were observed using the *L. formosus* habitat island area.

- Terrabay: Several slopes above Phase I have good establishment of *Lupinus albifrons*. These areas may already have MB present based on the density of the lupines which have been established for over 6 years. These sites will be monitored for MB utilization in 2001, and more habitat islands will be planned in accordance with the restoration guidelines.

- Bay Vista/ Linda Vista The restored slopes behind the Linda-Vista development (approximately 4 acres) have good establishment of MB host and nectar plants. The site has consistently supported MB's for at least 5 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 (Figure 15).

- 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 the creation of planting islands are scheduled to be created once gorse has been controlled.

f. Grazing and Burning

To date, the primary tools used in managing the ecological plant communities of San Bruno Mountain State and County Park have been herbicide or hand labor. These methods have been effective at controlling the spread and/or reducing the amount of exotic species such as gorse, French broom, eucalyptus, pampas grass, Portuguese broom, and others. These highly invasive species have been seen as the greatest threat to the native plant communities and endangered species on the Mountain. As a result, control efforts have focused on these species since the inception of the HCP in 1983.

However, other types of vegetative changes have occurred on the Mountain and are impacting the native grasslands and the endangered butterflies. The vegetation changes occurring on San Bruno Mountain can be broken down into four types:

1) Invasive of exotic perennial shrubs and trees (Gorse, French broom, eucalyptus, etc.) replacing grassland and coastal scrub;
2) Expansion of native coastal scrub replacing mixed native/non-native grassland;
3) Invasive of European grasses and forbs replacing native grassland;
4) Senescence of coastal scrub vegetation (*Ceanothus* and *Arctostaphylos* of primary concern).

Through comparison of historical and recent aerial photography of the Mountain, it is clear that coastal scrub has expanded and overtaken hundreds of acres of grassland habitat, especially on the north-facing slopes of San Bruno Mountain. This has occurred over the past 30 years since the removal of cattle grazing. In some areas, coastal scrub is being cut back where it is directly threatening to overtake butterfly host plants. It follows that a more comprehensive vegetation management program that incorporates the additional tools of grazing and fire needs to be developed.

In the 1999-2000 fiscal year, a conservation grazing plan was written for San Bruno Mountain. This plan is currently being revised to include specifics on a pilot grazing experiment. Exact timing, livestock, herd size, and duration of the grazing experiment will depend upon the vegetative characteristics of the area chosen and the management goals for that area. Input from the public and grazing professionals will be solicited before the final draft is completed. The grazing experiment is tentatively planned for fall 2001.

No controlled burns were conducted in 2000 on San Bruno Mountain. Uncontrolled burns occurred in the Brisbane Water Tank area (approximately 10 acres), and the West Peak area. An area of Mission blue habitat (*L. albifrons*) that burned near the Brisbane Water Tank was flagged and mapped.

A controlled burn is currently being planned for the Juncus Ravine area on the southslope of the Mountain. Local fire agencies, CDF, San Mateo County, Myers Development, and the City of South San Francisco have been coordinating this burn. The goals of the burn are to conduct training for fire crews, reduce invasive species, and reinvigorate native plant species. In 2001 a controlled burn for Kamchatka Point is planned (see section 1.f. Plants of Concern).

The framework for a new 5 year plan for the San Bruno Mountain Habitat Conservation Plan is currently being developed. This plan will address specifics in regards to areas and acreages of habitat to be managed by grazing and burning in the next five years (2001-2006).

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. Figure 14 shows the land status of parcels as of December 2000. Development-related activity which may have resulted in take of the Mission blue butterfly occurred during grading for Phase 2 of the Terrabay Project (The "Woods"); the Bay Vista project in Daly City, and maintenance activities conducted by utility companies (PG&E, San Francisco Public Utilities Commission). No take of the callippe silverspot occurred or was authorized in 2000 as each development site was carefully assessed for the presence of *Viola pedunculata* during its peak bloom period, and no plants were found on either site. PG&E obtained special authorization from the U.S. Fish and Wildlife Service, through a Section 7 consultation with the U.S. Army Corps of Engineers, to conduct a transmission line tower replacement and reconductoring project which may have resulted in take of the callippe silverspot and/or its habitat. Construction is continuing on the Crystal Springs water pipeline replacement project, which is being managed by the San Francisco Public Utilities Commission. This project is avoiding callippe silverspot habitat on the easement in the Brisbane Office Park area.

In 1999, the County of San Mateo and cities of Brisbane, Daly City, and South San Francisco submitted an application to the U.S. Fish and Wildlife Service seeking to amend Section 10(a)(1)(B) Permit PRT 2-9818 to include incidental take of the callippe silverspot butterfly. A decision on the application is pending.

The following is the status of the major development projects on the Mountain:

- The Northeast Ridge project (A.P. 1-07) completed home building in the Phase 1 area.

- Phase 2 of the Terrabay project (2-04) began grading for a residential project known as Woods East and Woods West. A wetland restoration project was carried out in Tank Ravine to mitigate loss of wetlands on the Terrabay Site.

- Grading was completed and home construction is proceeding at Bay Vista (1-03) in Daly City. Restoration of dedicated habitat began.

- The Brisbane Technology Park (1-06) project was completed and occupied. Habitat restoration of adjacent slopes is ongoing.

The 2000 San Bruno Mountain HCP Operating Program is included as Appendix C to this report.

Bibliography and References

Gardner, Sue. Supervisor, National Park Service's Site Stewardship Program. Personal Communication, 1999.

Newby, Emily. Supervisor of Mission Blue Monitoring at Milagra Ridge, National Park Service's Site Stewardship Program. Personal Communication, 1999.

Manus, Kathy. Co-Founder, Friends of San Bruno Mountain. Personal Communication January, 2000.

National Park Service. 1999 Survey of the Endangered Mission Blue Butterfly on the Marin Headlands. Golden Gate National Recreation Area. Report prepared by V. K. Rashbrook, and J. H.Cushman.

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Native Plant Restoration: Shelterbelt, Mark Heath, Supervisor
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Figure 1 — Mission Blue Butterfly Wandering Surveys, Transects and Observations — 2000

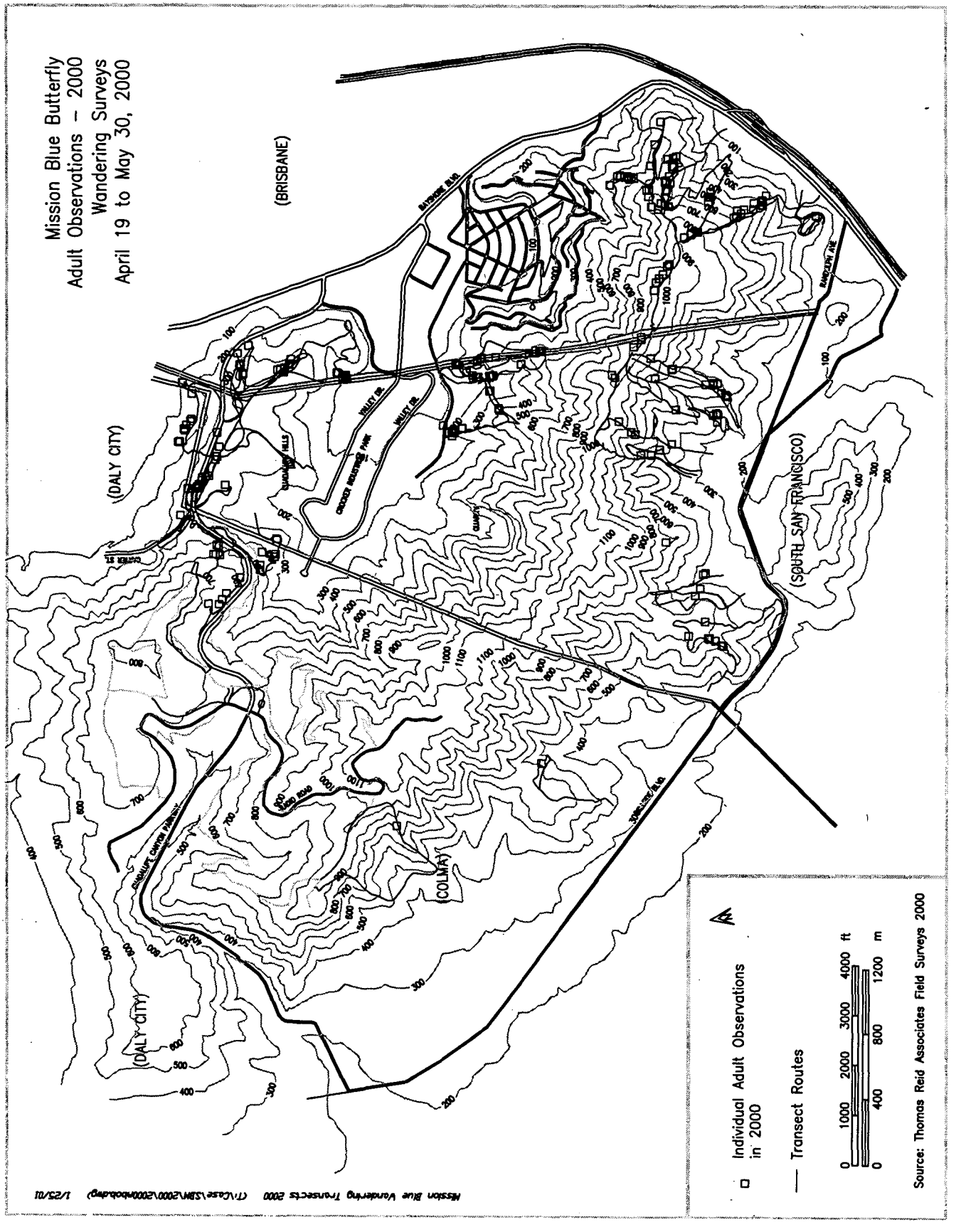
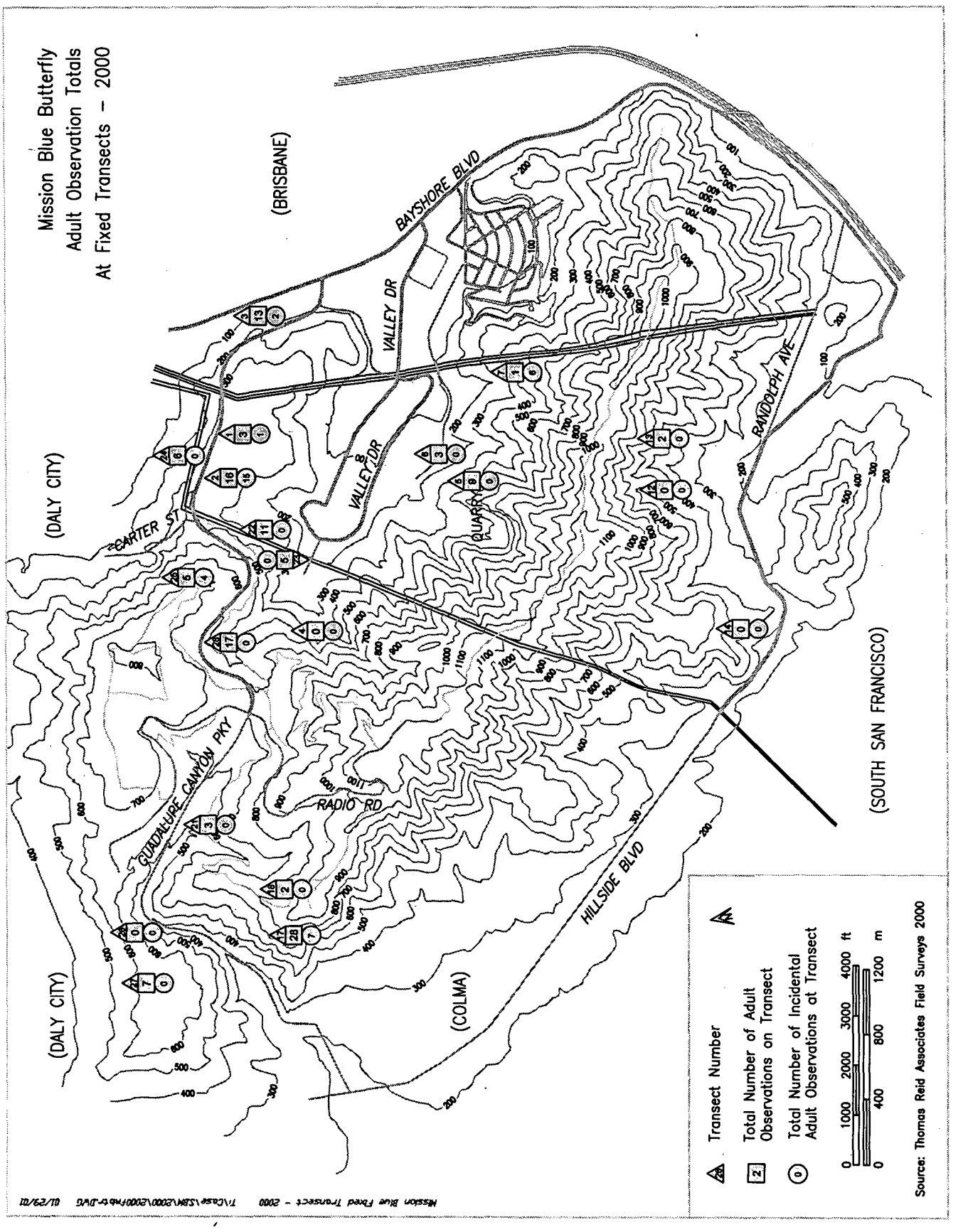


Figure 2 — Mission Blue Butterfly Fixed Transect Surveys, Transects and Observations — 2000



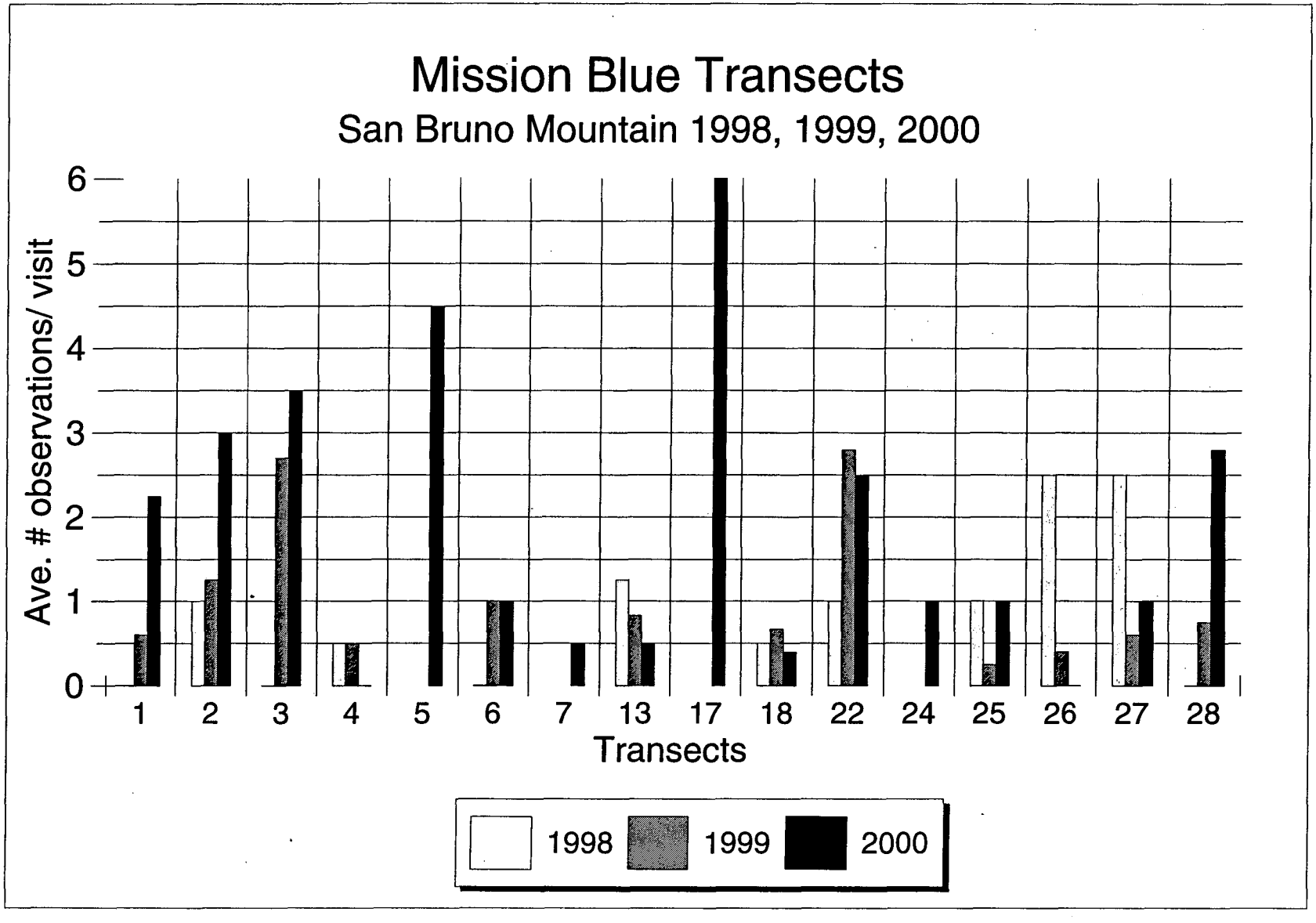


Figure 3— Mission Blue Transects; Ave/ # Observations/ Visit– 1998,1999, 2000

TRA 1/29/01

Figure 4 —Mission Blue Transects: Percentage of Visits with MB Presence- 2000

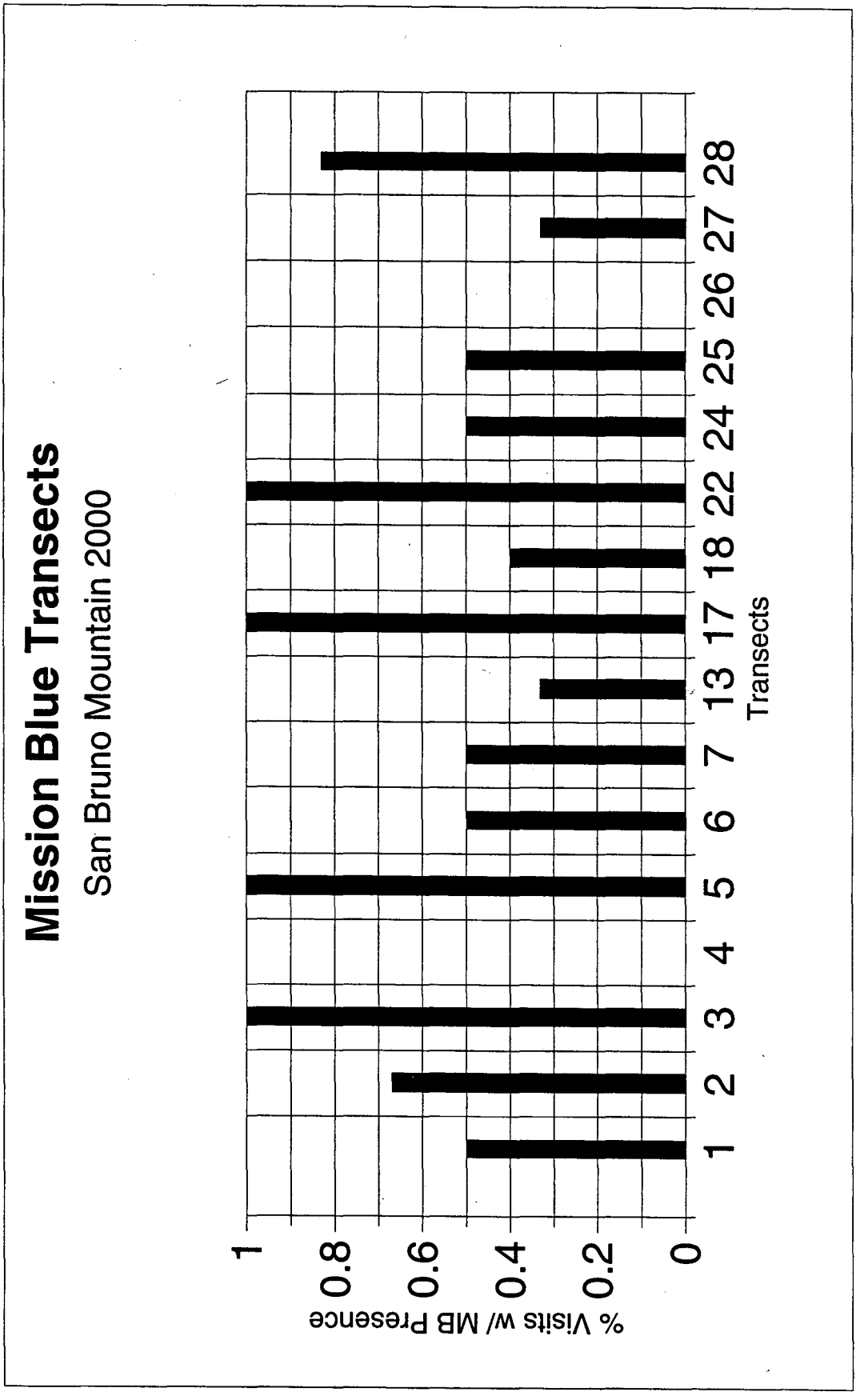


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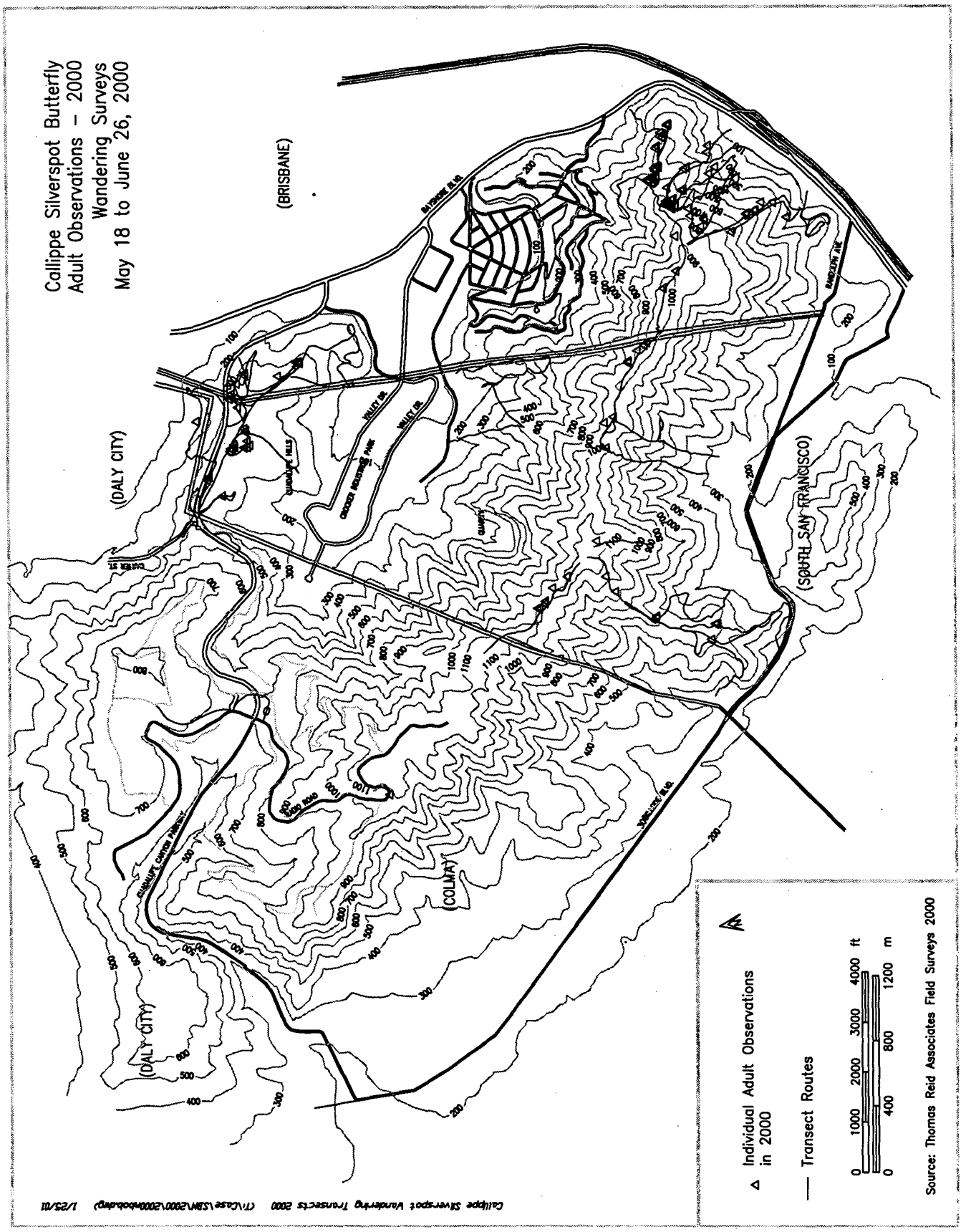
Figure 5— Callippe Silverspot Butterfly Wandering Surveys, Transects and Observations — 2000



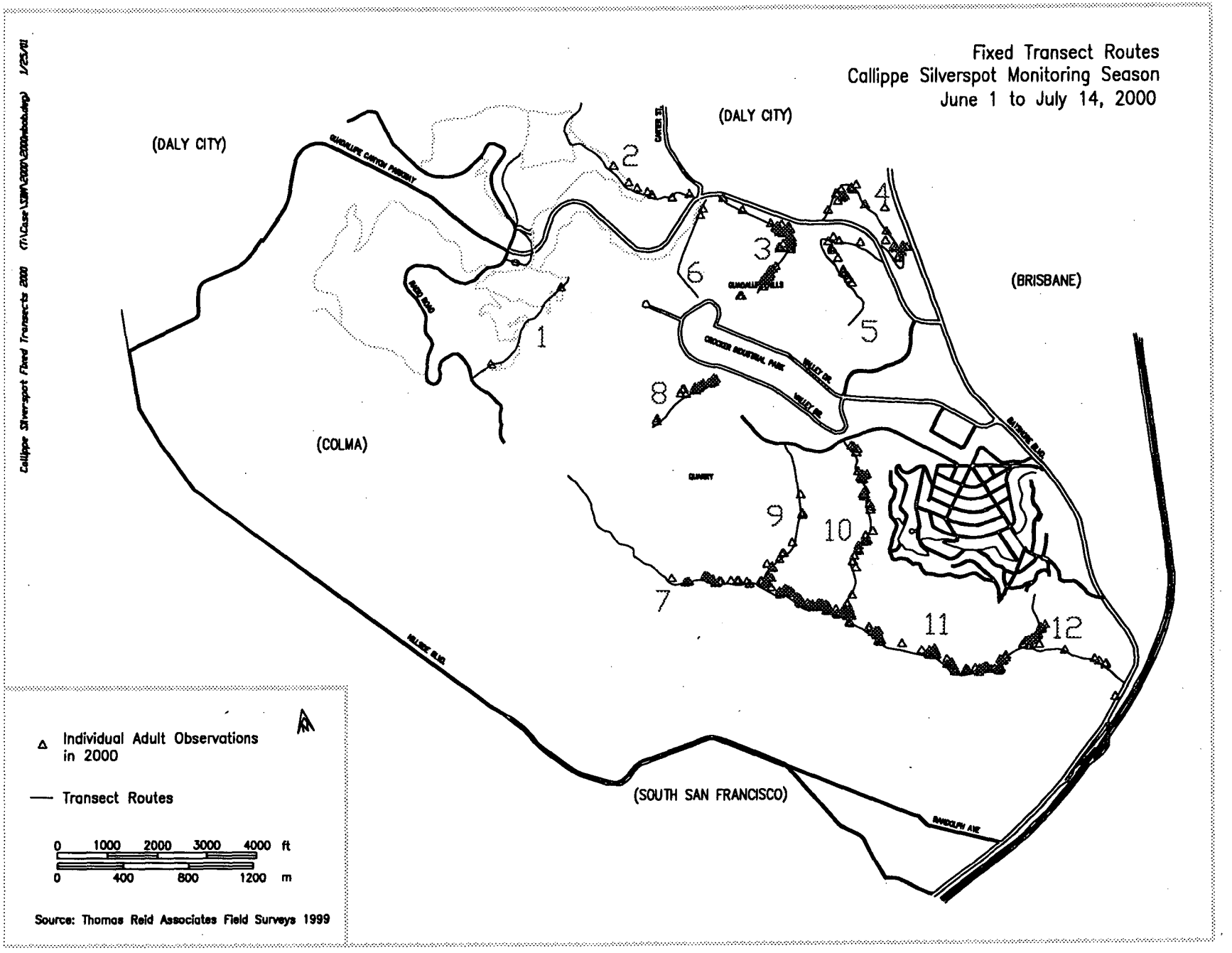
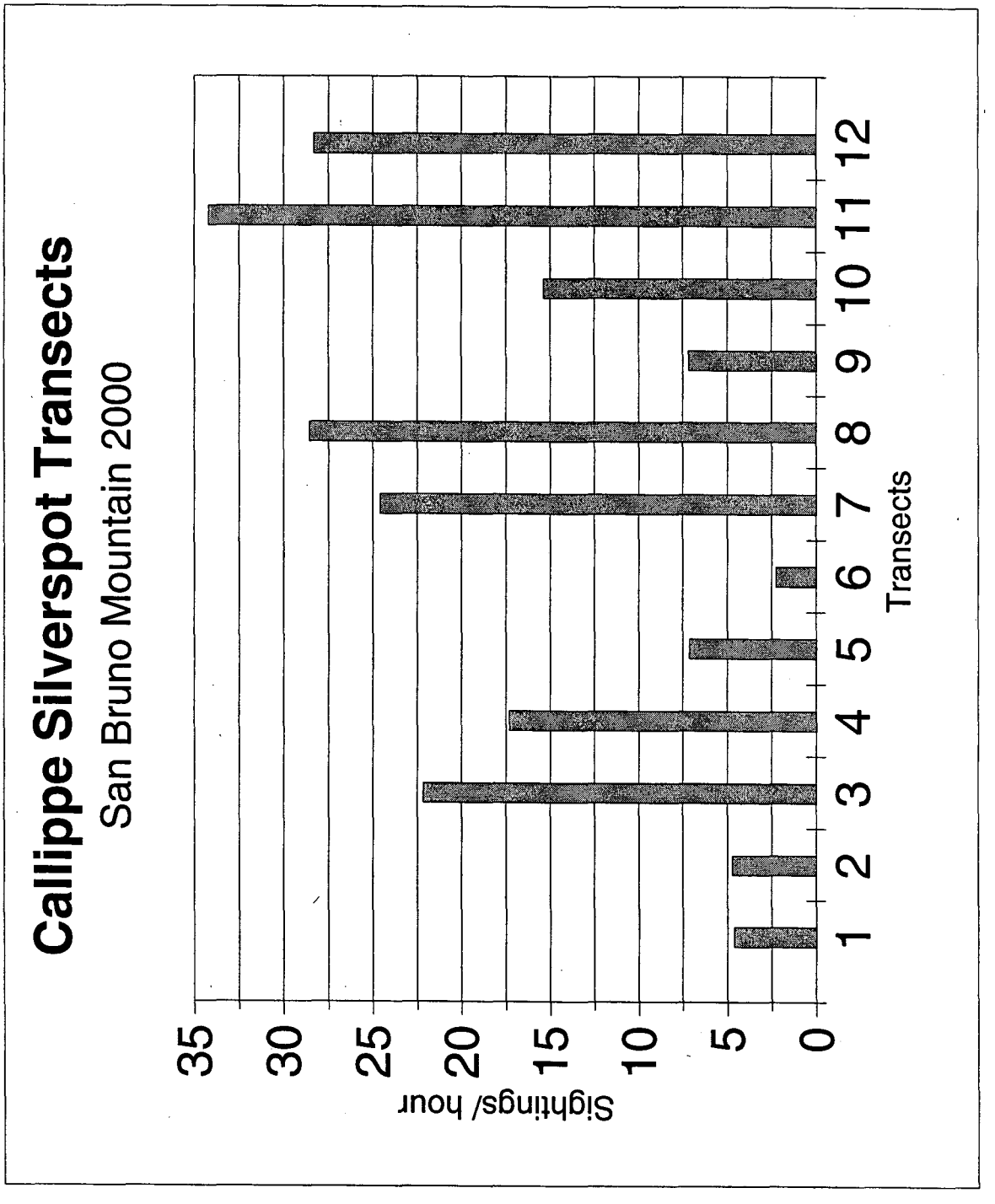


Figure 6— Callipe Silverspot Butterfly Fixed Transect Surveys, Transects and Observations — 2000

Figure 7 — Callippe Silverspot Transects; Sightings/ hour — 2000



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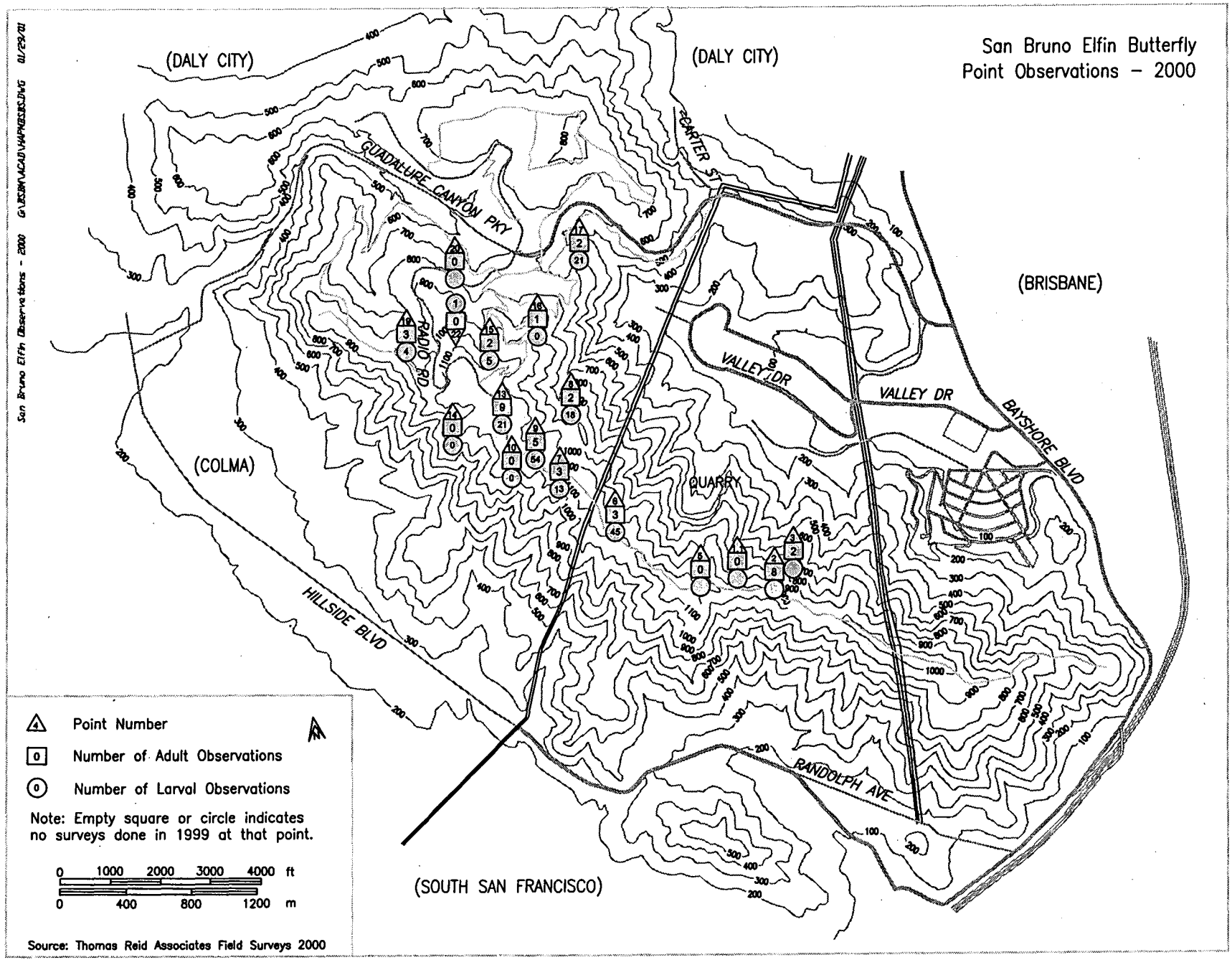

Figure 8 — San Bruno Elfin Butterfly Adult and Larval Surveys: Points and Observations— 2000

San Bruno Elfin Butterflies at Points

San Bruno Mountain 1998, 1999, 2000

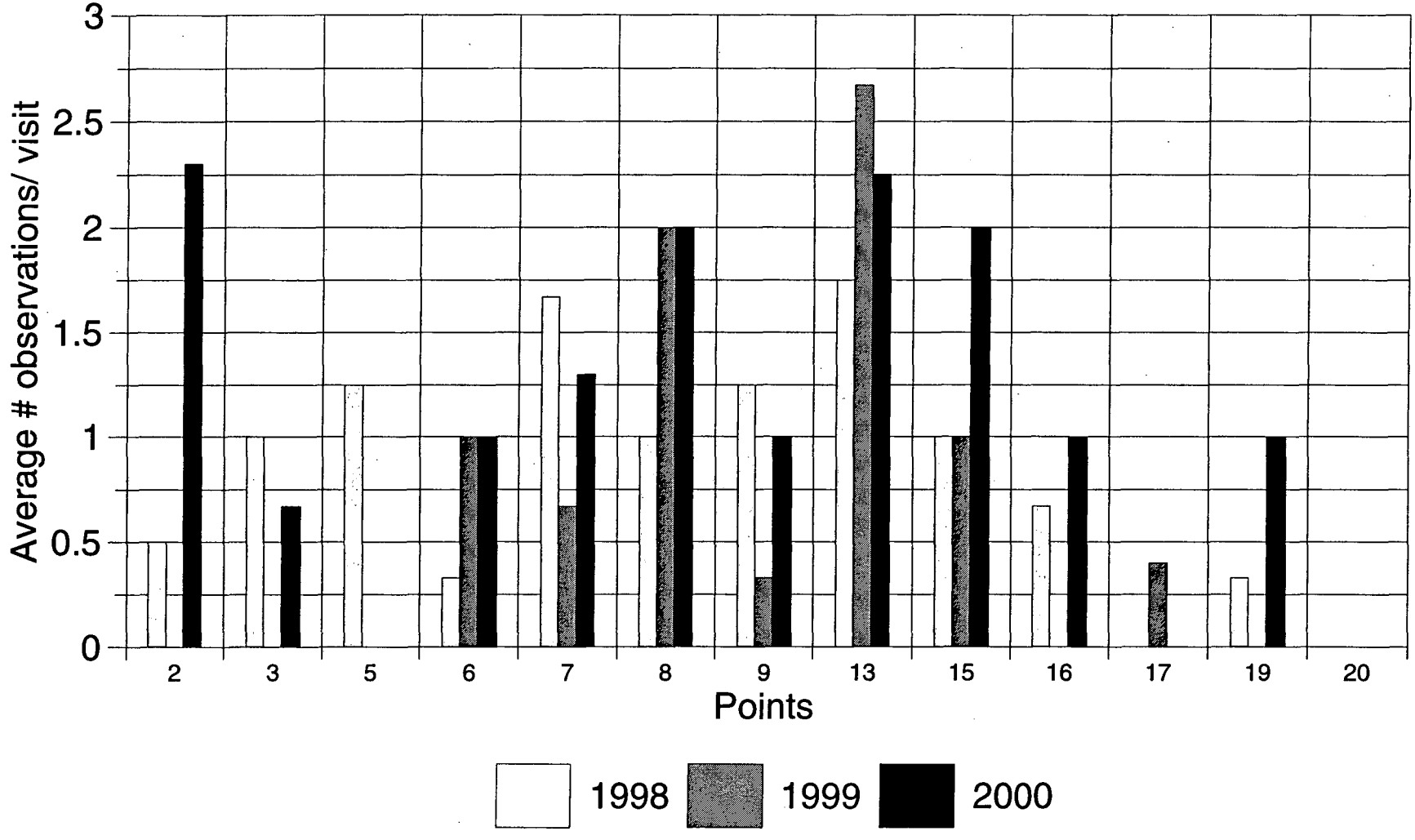

Figure 9— San Bruno Elfin Points; Ave/ # Observations/ Visit– 1998,1999, 2000

Figure 10— Generalized Locations of Hand/Herbicide Weed Control on San Bruno Mountain — 2000

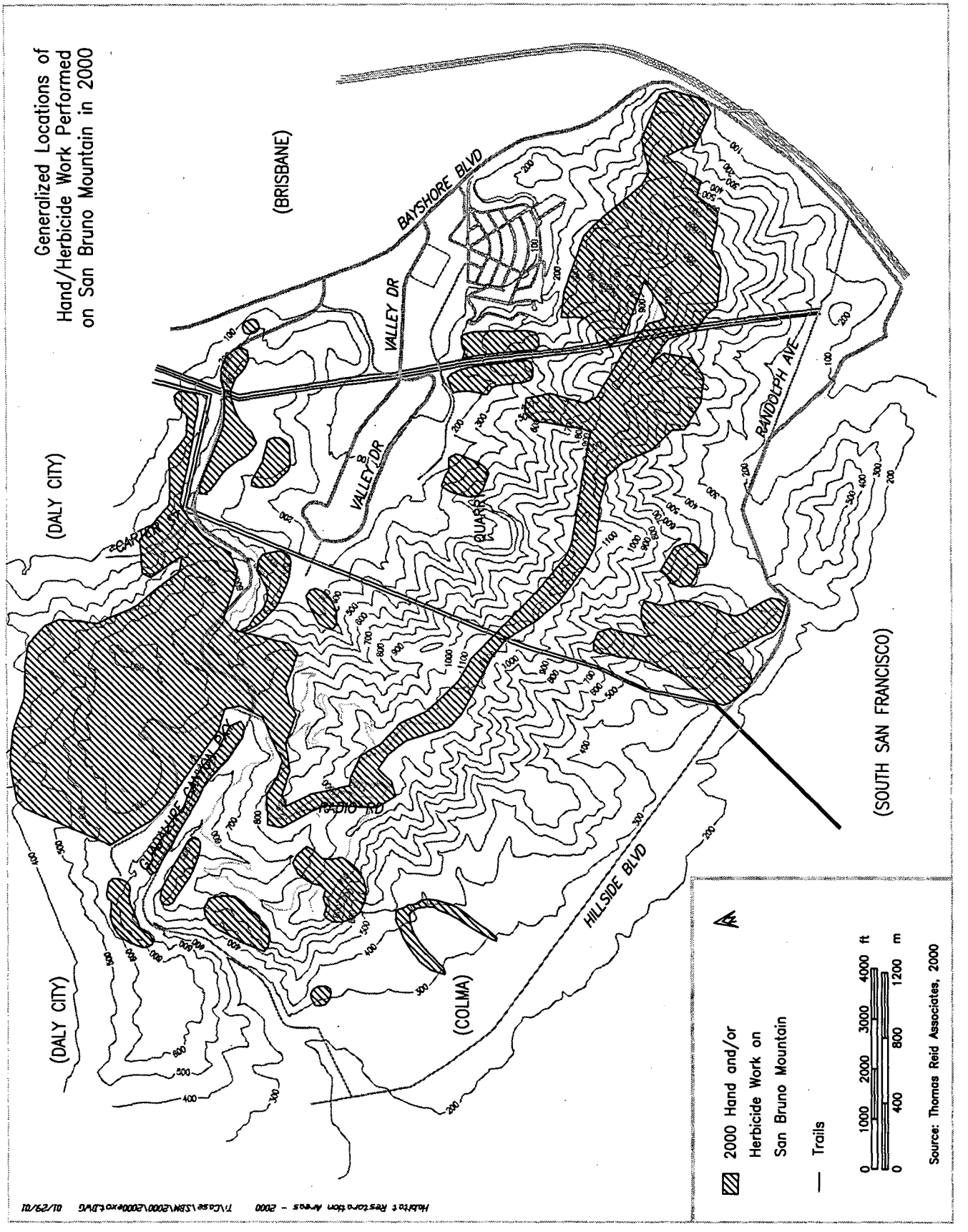

Figure 11— Locations of Mission Blue/ Callippe Silverspot/ San Bruno Elfin Habitat Restoration Islands— 2000

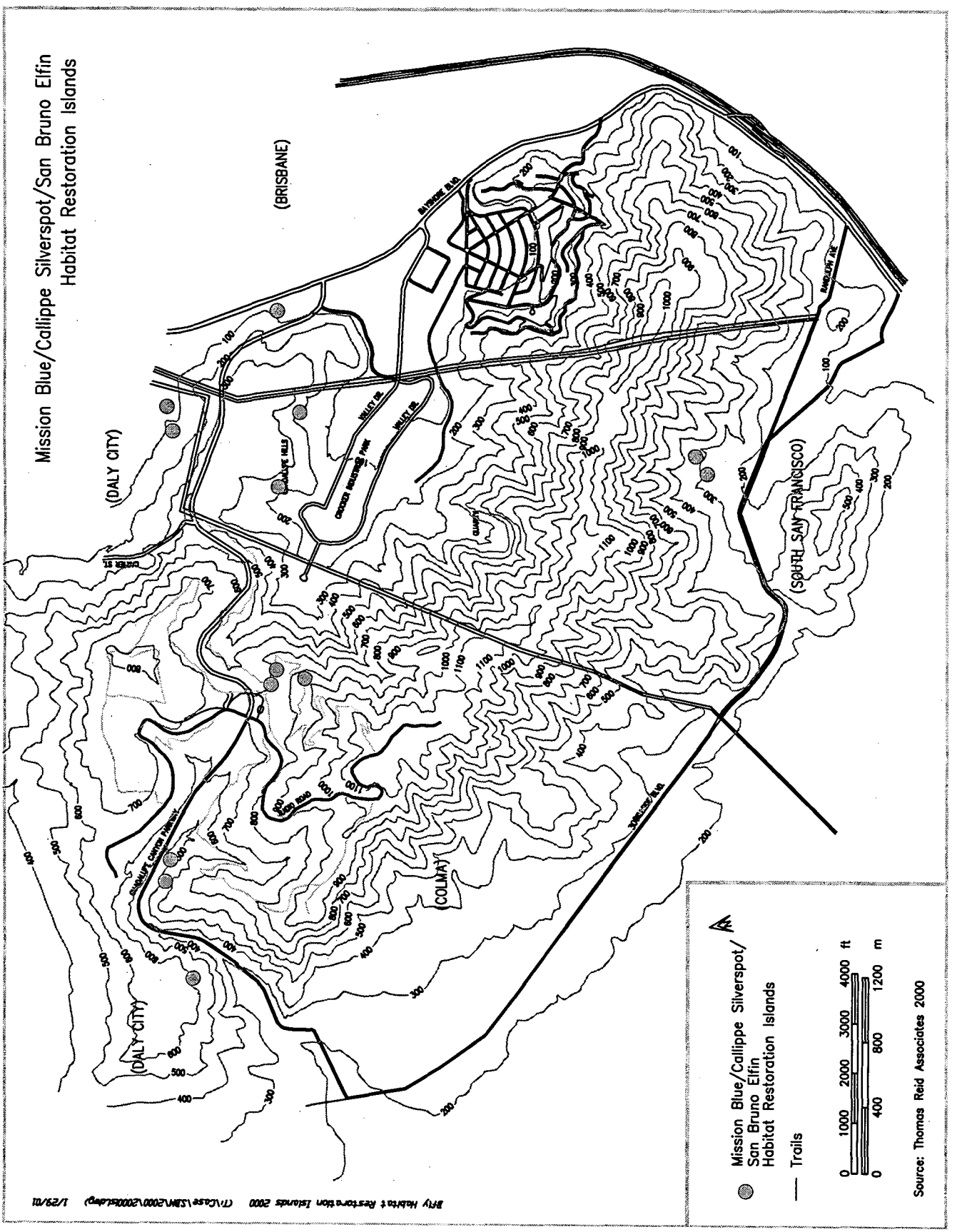

FIGURE 12. Restored bunchgrass grassland on slopes above Mission Blue Drive, Northeast Ridge. Planned area for restoration of callippe silverspot habitat. Photo Date: 1/25/01.

FIGURE 13. Planting island with *Sedum spathulifolium*, Botanic Garden of San Bruno Mountain. Photo date: 1/26/01.

FIGURE 14. Restored patch of *Lupinus albifrons*, Northeast Ridge. Photo date: 1/26/01.

FIGURE 15. Restored patch of *Lupinus albifrons, L.formosus, L.variicolor*, and *Eriogonum latifolium* on Linda Vista slopes (Rio Verde). Mission blue monitoring transect #24. Photo date 1/25/01.

TABLE A-1. MISSION BLUE BUTTERFLY WANDERING SURVEY DATA –2000

DATE	LOCATION	ELAPSED TIME	NUMBER OBSERVED	WEATHER CONDITIONS
4/19	NER/GH - Brisbane Water Tank	1.75	15	Temp: 18.2-24.7 C Wind: 1.7-6.2 mph average
4/19	Saddle	1.25	1	Temp: 22.5 C Wind: 6.6 average
4/20	Owl/Buckeye	2.5	10	Temp: 24.1-25.7 C Wind: 1.8-3.1 mph average
4/25	SE Ridge	2.75	24	Temp: 20.8 C Wind: 5.2 mph average
5/3	Above Terrabay	2.0	17	Temp: 22.4-26.2 C Wind: 7.2-4.7 mph average
5/11	Above Colma	1.75	1	Temp: 17.2 C Wind: 4.8 mph average
5/11	South Slope/Juncus	2.0	4	Temp: 21.3 C Wind: 3.1 mph average
5/12	Above Terrabay	2.0	2	Temp: 20.0 C Wind: 3.9 - 8.5 mph average
5/18	Owl/Buckeye	2.75	26	Temp: 22.4 C Wind: 0.9 mph average
5/18	NER	0.75	4	Temp: low to mid 20s C Wind: windy
5/18	Hillside	1.5	8	Temp: 22.7 C Wind: 3.8 mph average
5/18	Above Colma	0.75	1	Temp: ? (estimate mid 20s C) Wind: ? (could estimate medium)
5/19	NER/GH - Brisbane Office Park	4.0	39	Temp: 21.3 C Wind: 3.0 mph average
5/22	Radio Ridge	2.5	19	Temp: very warm Wind: light
5/23	Above Terrabay	2.0	5	Temp: ? Wind: ?
5/30	SE Ridge	4.5	13	Temp: ? Wind: ?
5/30	NER	2.0	9	Temp: 19.4 C Wind: 1.7 mph average
6/1	West of Quarry (inc. to Callippe survey))	0.0	1	Temp: 30.6 C Wind: 0.6 mph average
6/1	West of Quarry (inc. to Callippe survey)	0.25	3	Temp: 30.6 C Wind: 0.6 mph average
6/14	SE Ridge (inc. to Callippe survey))	0.0	1	Temp: 33.2 C Wind: 1.6 mph average
TOTAL	ALL AREAS	37.0000	203	5.5 = Sightings Per Hour

TABLE A-2. MISSION BLUE BUTTERFLY FIXED TRANSECT DATA – 2000

Transect Number	Transect Attempts and Sightings	Incidental Sightings	Total Mission Blue Sightings	Location
1	0,0,0,0,3	1	4	Northeast Ridge- road
2	5,4,4,2,1,0	1,2,5,1,4, 2	31	Northeast Ridge- Arnold Slope
3	0,0,3,6,4	2	15	Brisbane Office Park
4	0,0,0,0		0	Devil's Arroyo
5	0,0,0,4,5		9	Owl Canyon
6	0,0,1,2,0		3	Owl/ Buckeye subridge
7	0,0,0,0,1	2,4	7	Buckeye Canyon
12	0,0,0,0,0		0	Southslope, Skypark/Parkridge
13	0,1,1,0,0		2	Southslope, Skypark
14	0,0,0,0,0,0		0	Hillside
17	6,9,4,7,2	2,1,2,2	35	West Peak
18	0,0,1,0,0,1		2	Nike Road
21	1,1,0,1		3	Colma Creek
22	0,1,5,1,2,2		11	Brisbane Water Tank-road
23	0,0,5,0,0,0		5	Brisbane Water Tank-slope
24	0,0,0,0,3,3		6	Linda Vista restored slope
25	0,3,1,0,0	3,1,1	9	East Saddle Above Carter Street
26	0,0,0,0,0,0		0	Pointe Pacific Lower
27	1,0,3,3,0,0		7	Pointe Pacific Upper
28	0,5,4,3,4,1		17	Wax Myrtle Ravine
TOTAL			**166**	

TABLE A-3. CALLIPPE SILVERSPOT BUTTERFLY WANDERING SURVEY DATA –2000

DATE	LOCATION	ELAPSED TIME	NUMBER OBSERVED	WEATHER CONDITIONS
5/19	Linda Vista/NER	2.00	4	Temp: 21.3 C Wind: 3.0 mph average
5/22	Southeast Ridge, Above Brisbane	2.50	17	Temp: very warm Wind: slight breeze
5/30	Southeast Ridge, Above Terrabay III	4.50	31	Temp: ?? Wind: ??
6/1	West of Quarry	0.25	7	Temp: 30.6 C Wind: 0.6 mph average
6/1	Redtail Canyon	0.25	0	Temp: 30.6 C Wind: 0.6 mph average
6/20	Radio Ridge above Quarry	0.25	6	Temp: 25.1 C Wind: 2.2 mph average
6/21	SE Ridge	2.5	15	Temp: 24.9 C Wind: 2.2 mph average
6/23	Hillside - above school	1.25	3	Temp: 26.3 C Wind: 3.0 mph average
6/26	West Peak	0.5	1	Temp: 21.7 C Wind: 1.5 mph average
6/26	Above Terrabay	0.5	3	Temp: 21.7-25.0 C Wind: 1.5-6.9 mph average
7/10	Saddle	.25	0	Temp: 21.5 C Wind: 2.4 mph average
TOTAL	ALL AREAS	13.000	80	= 6.2 Sightings Per Hour

TABLE A-4. CALLIPPE SILVERSPOT BUTTERFLY FIXED TRANSECT DATA -- 2000

Location	Time Min/hours	Sightings	S/H
1. Dairy Ravine	72/1.2	2	1.7
2. Saddle	120/2.0	7	3.5
3. NER, W of TL	153/2.55	50	19.6
4. Levinson	114/1.9	24	12.6
5. NER, E of TL	129/2.15	12	5.6
6. Brisbane Water Tank	76/1.26	2	2.3
7. SE Ridge, Above Quarry	178/2.96	66	22.2
8. Hill N of Quarry	54/0.9	20	22.2
9. Owl Canyon	166/2.76	15	5.4
10. Buckeye Canyon	185/3.1	40	13.0
11. SE Ridge, Above Brisbane	136/2.26	67	29.6
12. SE Ridge, Above Bayshore	67/1.11	20	18.0
TOTAL	1450/24.2	325	13.4

TABLE A-5. SAN BRUNO ELFIN ADULT AND LARVAL OBSERVATIONS –2000 BY DATE AND POINT # (point/incidental)

POINT #	MAR 1	MAR 3	MAR 11	MAR 12	MAR 13	MAR 15	MAR 17	MAR 22	MAR 29	APR 3	TOTAL (P/I) L=LARVAE
1	0/0	0/0	0/0					0/1	0/0		0/1
2	2/3		2/0					4/2	1/2		8/7
3	0/1		2/1					0/0	0/0		2/2
4											
5	0/0		0/1					0/0	0/0		0/1
6	0/0	0/0	0/0			1/2		2/0		0/1	3/3, L-45
7	0/0			0/0		2/0		1/1		0/0	3/1, L-13
8		0/0				0/4		2/5		0/0	2/9, L-18
9		0/0				0/0	3/4	1/0		1/0	5/4, L-54
10		0/0					0/0				0/0
11											
12											
13		0/0		2/0		0/0	3/2	4/0		0/0	9/2, L-21
14				0/0							0/0
15		0/0				2/2		0/0		0/1	2/3, L-5
16		0/0			0/0	1/0		0/0			1/0, L-9
17		0/0			0/0	0/1				0/0	0/1
18											
19		0/0				1/0		2/0			3/0, L-4
20		0/0				0/0	0/0	0/0			0/0
21							0/0				0/0
22		0/0				0/1					0/1
TOTAL	2/4	0/0	4/2	2/0	0/0	7/10	6/6	16/9	1/2	1/2	38/35=73 L-169

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
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