

# **SAN BRUNO MOUNTAIN HABITAT CONSERVATION PLAN**



## **YEAR 2014 ACTIVITIES REPORT FOR FEDERALLY LISTED SPECIES Endangered Species Permit PRT-2-9818**

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## SUMMARY

This report describes monitoring activities and the status of species covered under the San Bruno Mountain Habitat Conservation Plan. This report is prepared on an annual basis and is prepared for the County of San Mateo for submission to the U.S. Fish and Wildlife Service. Three endangered species of butterfly are found on San Bruno Mountain and are covered under the San Bruno Mountain HCP: the mission blue, callippe silverspot, and San Bruno elfin butterflies.

In October, 2014, Creekside Science completed the draft *Assessment of the Past 30 Years of Habitat Management and Covered Species Monitoring Efforts Associated with the San Bruno Mountain Habitat Conservation Plan*, hereon referred to as “the Assessment.” The report includes recommendations on butterfly monitoring techniques, including butterfly, habitat, and host plant monitoring.

In 2014, callippe silverspot butterflies (CS) were monitored on fixed transects. Transects were surveyed for CS three times during the peak of the flight season in May and June. A total of 594 CS were counted, which is 300 more butterflies than was counted in 2012 (the last time CS were surveyed), when 294 CS were observed. Callippes were observed on 12 of the 13 transects. The total average sightings/hour (S/H) for all transects combined in 2014 was 48.6, which is considerably higher than any S/H recorded in past years.

An increase in both scrub and non-native species in the vicinity of transects 6 and 8 have made these transects more difficult to access. Transects 6 and 8 were shortened in 2012 when passage was no longer possible. In terms of transect modification, the Assessment recommends converting peripheral transect S/H surveys to presence/absence surveys to save time and effort. The Assessment further recommends that both transects 6 and 8 be monitored as presence/absence from this point forward as they support limited butterfly habitat.

Extensive grasslands with host and nectar plants are found on the South Slope and are not currently part of the monitoring program. It is recommended that a new transect be added on the South Slope, in the Hillside/Juncus area. In addition, it is recommended that surveys on the grid system be implemented on a five-year rotating basis to establish occupancy. Finally, the Assessment recommends that a viola inventory be completed in selected areas of the Mountain over the next 5 years. The Technical Advisory Committee (TAC) will need to determine when and how funds will be allocated for these efforts.

San Bruno elfin butterflies were monitored during their larval stage in the spring of 2014. A total of 98 larvae were counted during the first round of surveys, performed at six points, and 47 were counted during the second round of surveys at all eight points. These numbers are lower than the numbers counted during the last surveys in 2010, when 308 larvae were counted during the first survey, and 364 during the second survey. However, the number counted in 2014 is still within the range of variance that has been recorded on SBM. Data collection on San Bruno elfin larvae in 2014 was timed to the peak sedum bloom; however, the low number of larvae observed indicates that SBE larval abundance may have peaked prior to the sedum bloom. This phenomenon may have been influenced by the 2014 drought.

The Assessment addresses SBM monitoring. It states that SBE appear to be secure in high quality coastal scrub habitat and tracking abundance may not be worth the time and effort. The Assessment recommends establishing presence surveys at all historic sites using larval presence surveys at

appropriate times of the year (late May to early June) on a 3-4 year interval. Including a short timed search (10 person-minutes) once larvae are found would allow for a course density class to be reported as supplementary information. If agreeable to the TAC, SBE should be monitored in this fashion starting in 2016.

The Assessment recommends a recurring 5-year survey of perennial rare plants which would include the collection of demography and recruitment data. It further recommends that annual rare plants should be monitored at least once every 3 years. The TAC should consider how HCP funds might be used for rare plant surveys, or if another funding mechanism such as a grant, or using an intern or volunteers, might support this effort.

## I. INTRODUCTION

This report describes the status of federally listed species and monitoring results that took place on San Bruno Mountain under Endangered Species Act Section 10(a)(1)(B) Permit PRT 2-9818 for the 2014 calendar year. Listed butterfly species on San Bruno Mountain include the mission blue (*Icaricia icarioides missionensis*, MB), callippe silverspot (*Speyeria callippe callippe*, CS) and San Bruno elfin (*Callophrys mossii bayensis*, SBE) butterflies, all of which are listed as endangered.

The San Bruno Mountain HCP and Endangered Species Act Section 10(a) permit was adopted in November, 1982. The 30-year permit was renewed in March, 2013. Annual monitoring and reporting of federally-listed species is conducted as part of HCP implementation, and this report is presented to the U.S. Fish and Wildlife Service for review.

Federally listed species that are monitored on San Bruno Mountain include the three listed butterflies. San Bruno Mountain also supports federally listed plants, however plant monitoring is not included in the current monitoring program due to funding constraints and the fact that no federally listed plant species were taken by development allowed under the HCP. Each butterfly species is typically monitored every other year, which allows for a greater proportion of funding resources to be allocated to control of exotic vegetation in butterfly grassland habitat. In 2014, callippe silverspot and San Bruno elfin were monitored.

In October, 2014, Creekside Science completed the draft *Assessment of the Past 30 Years of Habitat Management and Covered Species Monitoring Efforts Associated with the San Bruno Mountain Habitat Conservation Plan*, hereon referred to as “the Assessment.” The purpose of the report is to “focus on the recent past and look forward to both the near term (5 years) and longer term (30 years) to plot a course that will lead to thriving populations of the covered species in conserved habitat.” The Assessment includes recommendations on butterfly monitoring techniques, including butterfly, habitat, and host plant monitoring. These recommendations are addressed in the following report.

Anyone interested in accessing raw data or other information collected by MIG | TRA Environmental Sciences should contact Ramona Arechiga, Natural Resource Manager with the San Mateo County Parks and Recreation Division at (650) 599-1375 or [trarechiga@smcgov.org](mailto:trarechiga@smcgov.org).

## II. STATUS OF SPECIES OF CONCERN

### A. Mission Blue Butterfly (*Icaricia icarioides missionensis*)

Transect monitoring of Mission blue butterflies was not conducted in 2014. Data and analysis of the 2013 MB transect monitoring data are available in the 2013 Activities Report for Covered Species (TRA 2013). In summary, a total of 133 MB were counted on the 13 transects surveyed in 2013, which is less than the number counted in previous years. Mission blue butterflies were observed on 10 of the 13 transects surveyed. No MB were seen on transects 1, 2 or 3. Coastal scrub, including poison oak, has encroached on some transects, making complete coverage of these transects difficult if not impossible. Modifications in monitoring methodology were made to transects 2, 3, and 5-8.

The highest performing MB transects (highest sightings/hour) continue to be found on the Southeast Ridge and South Slope where grasslands are intact and vast. In addition, a high sightings/hour was calculated for transect 7, located on the Northeast Ridge and adjacent to the Toll Brothers

Development. This is an increase from previous years. Areas where MB were seen in least density included transects 5 on the Saddle and transect 9 on the eastern side of the Northeast Ridge.

Mission blue transect monitoring will be conducted in the spring of 2015.

## **B. Callippe Silverspot Butterfly (*Speyeria callippe callippe*)**

The callippe silverspot distribution is similar to that of the mission blue, however CS is less frequently observed on the west side of the Mountain. Habitat for CS includes grasslands supporting its host plant, *Viola pedunculata*. *Viola* is predominately found within mesic to dry open grasslands on both north and south-facing slopes. *Viola* can also be found on disturbed roadcuts, and along the boundaries between grassland and scrub under partial shade of taller plants. CS use a variety of native and nonnative species for nectaring (especially thistles) that are found throughout the grassland and coastal scrub plant communities.

Ridgelines and hilltops within grassland habitats are an important habitat component for this butterfly species, as CS utilize these features for mate selection. The species has been shown to move up to approximately 0.75 mile between habitat patches (Thomas Reid Associates, 1982), but likely can move further in multiple movements.

The flight season for adult CS is typically from mid-May to mid-July. Due to their larger size and stronger flying ability than mission blues, CS are not as sensitive to strong winds. Often this species is detected along ridgelines and hilltops in high densities, sometimes during windy conditions (>10 mph average).

Transect monitoring of CS was conducted in the spring and summer of 2014. Survey methodology and results follow.

### Methodology

Surveys were conducted on fixed transects to provide a means with which to compare CS observations from year to year at specific locations. Fixed transect locations were not chosen randomly but were placed in habitat areas with higher butterfly densities and areas that include a variety of slope exposures, nectar plants, and soil conditions (i.e. road cuts, ravines, and natural slopes). Even within high-density habitat locations, it is sometimes difficult to observe enough butterflies for statistical comparison. For this reason, fixed transects have been located only in areas where there is a good chance of observing CS under desirable weather conditions. Transects vary in length from approximately 500 to 2100 meters and are permanently marked in the field (Figure 1). A total of 13 fixed transects were monitored in 2014.

Twelve of the 13 transects have been surveyed for CS since 2000. Transect 13, east of the terminus of Carter Street and on the north side of Guadalupe Canyon Parkway, was added in 2005. This location was chosen in order to learn more about potential CS presence and movement in grasslands north of Guadalupe Canyon Parkway.

Ideally, each transect is monitored approximately three times during the peak of the flight season, with monitoring at any individual transect spaced approximately two weeks apart. Monitoring occurs only during warm, calm weather (wind speeds less than 10 miles per hour) when CS are most active.

All butterflies observed beyond a transect or in the transect vicinity during travel between transects are recorded as incidental observations.

The duration spent walking a transect is recorded by the observer and all CS observed along the transect are noted. The location and time of the observation is recorded on a map. The number of CS sightings per hour (S/H) is used for analysis. The number of CS observed on a particular transect is divided by the number of minutes to complete the transect survey. For each year the average and maximum CS sightings per hour for all transects are used to look for upward or downward trends in CS encounter rates among and within transects. The maximum value is the highest S/H recorded on a transect in a given year. The maximum S/H found on a transect in a given year is a useful variable for analysis. By looking at only the maximum S/H, those S/H measurements captured at the beginning or end of the peak flight season that may be of lower value do not skew the data.

## Results

California experienced the third consecutive year of drought in 2014, with significantly low levels of rainfall over the 2013-2014 rainfall season. The low moisture level resulted in some native plants not germinating in 2014. *Viola pedunculata*, the host plant for CS, did emerge and bloom in 2014 and plant cover appeared similar to that seen in wetter years. No data were collected on actual plant cover or density so observations are only anecdotal. Spring temperatures were warm and mild, and transect surveys were successfully carried out in May and June.

Transect surveys were carried out during the peak of the flight season with all transects surveyed three times. Surveys were conducted on May 27 and 29, June 5 and 10, and June 17 and 19. Similar to when CS were last monitored in 2012, some transects could not be walked in entirety this year due to scrub succession, including Transects 6 and 8. In addition, Transect 3 is shorter than the original transect due to the Northeast Ridge/Toll Brothers development. As in 2012, this transect terminates at the Toll Brothers fence. Transect locations and the modifications to the length of Transects 3, 6, and 8 are shown in Figure 1 (all figures are located after Section IV).

A total of 594 CS were counted, which is 300 more butterflies than was counted in 2012 (the last time CS were surveyed), when 294 CS were observed. Butterfly observation locations are displayed in Figure 2. Callippes were observed on 12 of the 13 transects. The total average sightings/hour (S/H) for all transects combined in 2014 is 48.6, which is considerably higher than any S/H recorded in past years (Figure 3). In 2012, an overall S/H of 22.7 was recorded, and in 2010, the S/H was 16.2. Figure 3 illustrates average annual S/H on all transects combined since 2000. The overall, average S/H calculated in 2014 is more than double that recorded in any other year.

The average and maximum S/H for each transect in 2014 is displayed in Figures 4 and 5. Transect 11 on the Southeast Ridge had the greatest number of CS S/H of any transect, for both the average and maximum S/H. Transects 7, 9, 10 (Southeast Ridge and sub-ridges) and 13 (Northeast Ridge, north of Guadalupe Canyon Parkway) had the next highest maximum number of CS S/H observed. Tables 1 and 2 below show the average and maximum S/H on each individual transect from 2000 to 2014. The maximum S/H for each transect over the four most recent surveys, which includes years 2014, 2012, 2010, and 2008, is shown graphically in Figure 5. Figure 6 displays the maximum S/H recorded at each of the 13 transects over the past four surveys (2008, 2010, 2012, and 2014). From Figure 6 it is readily apparent that 2014 had exceptionally high number of CS when compared to earlier years.

**Table 1. Average S/H on each Transect from 2000 to 2014**

Year/ Transect	2000	2001	2002	2003	2004	2005	2006	2008	2010	2012	2014
1	2.3	4.2	2.5	1.4	1.2	1.6	0	4.4	2.0	0	0
2	3.2	5.0	10.2	3.2	1.7	2.4	3.0	0.5	1.0	1.8	13.4
3	16.5	21.4	31.1	32.1	23.4	23.1	12.1	14.5	3.6	23.3	57
4	12.3	26.1	16.1	7.7	11.5	5.5	3.5	11.2	13.6	32.7	24.7
5	5.2	28.7	23.9	10.0	16.7	26.2	14.7	16.9	7.7	17.8	15.3
6	1.1	1.4	9.1	6.9	0.8	4.2	1.4	2.2	0	1.3	0
7	20.4	25.1	9.8	10.9	13.0	16.6	25.4	30.5	20.2	18.1	72.5
8	18.6	10.5	17.2	7.6	5.9	11.4	4.8	12.5	3.3	5.0	12
9	5.2	24.5	16.2	1.6	5.5	19	13.7	55.6	14.6	22.5	61.5
10	11.5	37.6	13.7	5.7	6.2	21	15.1	23.0	28.6	68.1	71.9
11	25.4	79.0	14.4	18.4	8.2	37.6	37.4	35.6	38.6	23.7	111.5
12	14.2	20.1	2.0	6.8	11.4	18.9	34.2	17.2	23.9	26.7	15.4
13	N/A	N/A	N/A	N/A	N/A	5.2	0	0	0	3.3	30

**Table 2. Maximum S/H on each Transect from 2000 to 2014**

Year/ Transect	2000	2001	2002	2003	2004	2005	2006	2008	2010	2012	2014
1	4.6	12.4	7.2	8.6	2.9	6	0	10	2	0	0
2	6	13.5	19.4	7.2	3	5.5	9.6	2	1.8	7.5	20.9
3	34.3	54.3	48.5	50.3	42.2	45.6	31.3	42.5	10.6	70	73.3
4	20.5	58.5	38.7	20	30	18.3	2.9	27.7	23.6	65.7	34
5	10.3	53.6	56.5	24	31.7	62.5	50.4	57.6	11.1	30	21.8
6	3.3	4.2	16.8	16.7	2.2	16	4.1	4.3	0	5.5	0
7	47.1	51.3	20.5	20.8	28.9	24	69.5	45.8	17.1	34	113.6
8	43.6	23.6	30	25	15	35	5.5	21.8	7.5	10	24
9	9.6	60	25.2	4.7	33.6	43.5	42.4	77.4	24	34	128.6
10	23	45	25.7	17.4	24.3	47.6	19.4	42.9	39.3	86	152
11	38.4	131.1	20	34.3	18.9	77.1	132.9	63.2	62.3	49	182.1
12	28.3	33.2	6	27.4	20.9	60	88.4	34.1	35.3	66.7	30
13	N/A	N/A	N/A	N/A	N/A	15.0	0	0	0	6.7	110

Trends observed on each transect are discussed in detail below. Each transect is defined by the Management Unit (MU) that it occurs in and if it is in an Essential, Valuable, or Potential Habitat area for priority scrub management as defined in the Assessment. Defining CS as well as SBE transect locations in terms of their MU and scrub management area is useful for interpreting butterfly monitoring findings with respect to management actions and recommendations.



Since 2000, Transect 1 (aka Dairy Ravine; MU Dairy and Wax Myrtle Ravines; Valuable) has consistently had a low S/H due to the limited viola habitat along this transect. In 2014, no CS were seen on Transect 1, nor were any CS observed there in 2012. The most recent year CS were observed on Transect 1 was in 2010, when a single CS was observed during each of three surveys. Transect 1 supports primarily coastal scrub; areas of grassland habitat supporting viola are limited. No notable changes or threats to the grassland habitat were observed along Transect 1 in 2014. Callippes may still use the limited habitat located along this transect, but may not be present here every year, or may not be detected in a given year due to their low abundance.

On Transect 2 (MU Saddle; some Potential some Valuable) 15 CS were observed over the three surveys dates with a maximum S/H of 20.9. This is the greatest number of CS and highest S/H that has been recorded on this transect. All butterflies were observed on the slope below the Saddle Loop Trail and above Carter Street (Figure 2). In 2012, the maximum S/H on Transect 2 was 7.5, which is similar to the S/H calculated in previous years.

Transect 3 (MU Northeast Ridge; Essential) is located on the Northeast Ridge and includes Callippe Hill and a portion of land comprising the Toll Brothers Development (Figure 1). The maximum S/H for Transect 3 was 73.3 in 2014, which is similar to that recorded in 2012 (70.0). The average S/H was also high, with 57.0 calculated. Transect 3 used to head west from Callippe Hill and terminate across from Carter Street (Figure 1). However, as the western end of this transect is now fenced off and was under active construction during the time of the surveys, this transect was modified to end at the fence (new west transect terminus is marked in Figure 1).

Transect 4 (MU Carter Martin; some Potential some Valuable) is located on the north side of Guadalupe Canyon Parkway across from the Northeast Ridge and Callippe Hill (Figure 1). Transect 5 (MU Northeast Ridge; Essential) is located on the eastern side of the Northeast Ridge. Callippes were observed on both of these transects during all three surveys. The average and maximum S/H calculated were similar to that observed in past years (Tables 1 and 2, Figure 5). Little change in habitat quantity or quality has been observed along these transects.

Transect 6 (MU Dairy and Wax Myrtle Ravines; Essential) intersects sparse viola habitat, and consequently few CS are recorded here. In 2014 no CS were observed on Transect 6. In 2012 only 1 CS was observed and in 2010 no CS were seen during any of the surveys. The northern portion of the transect has become so dense with scrub that the this part of the transect is no longer passable. As a result this transect was shortened as shown in Figure 1. Dominant scrub species includes coyote brush (*Baccharis pilularis*), poison oak (*Toxicodendron diversilobum*), and Scotch broom (*Cytisus scoparius*). Meanwhile, Italian thistle (*Carduus pycnocephalus*) has proliferated along the east-west portion of this transect.

Transect 7 (Ridge Trail, not associated with specific MU; Essential) is located along the Ridge Trail (Figure 1). In 2014 CS were encountered at a rate greater than has been recorded in past years with an average and maximum S/H of 72.5 and 113.6. A total of 93 CS were counted on this transect over the 3 surveys.

Transect 8 (MU Devil's Arroyo; Essential) is located east of the Quarry (Figure 1) and access is made through the Quarry property. The scrub and particularly poison oak along this transect has increased significantly over the years and the upper portion of the transect is no longer passable. Therefore, as with Transect 6, this transect was shortened in 2012 as shown in Figure 1. A total of

three CS were seen on Transect 8 in 2014, for an average and maximum S/H of 12 and 24, which is higher than that recorded in the past several years (Figure 5).

Transect 9 (MU Owl and Buckeye Canyons; Essential) follows a ridgeline between Owl and Buckeye Canyons down from the Ridge Trail (Figure 1), and much of this transect was burned in a fire that occurred in the summer of 2008. Viola and nectar plants have regenerated along this transect, and the average and maximum S/H calculated was up from both 2010 and 2012 (Figure 5), with an average and maximum S/H of 61.5 and 128.6, respectively, the highest ever recorded here.

Transect 10 (MU Owl and Buckeye Canyons; Essential) is located east of Buckeye Canyon and follows an existing gravel, P&E road (Figure 1). The maximum and average S/H on this transect in 2014 were 71.9 and 152 respectively. This transect had the second highest S/H recorded in 2014. Callippes were abundant on this transect in 2012 as well. Prior to 2012 the average and maximum S/H on this transect had remained fairly static since 2000 (Tables 1 and 2).

Transect 11 (Ridge Trail, not associated with specific MU; Essential) follows the eastern portion of the Southeast Ridge (Figure 1) and has always been a high performing transect as it follows hill-topping habitat with a variety of nectar plants and adjacent grasslands supporting viola. In 2014 the average and maximum S/H recorded were 111.5 and 182 respectively. This is the highest encounter rate ever documented on this transect or on any transect since fixed transect surveys began in 2000.

Transect 12 (MU Southeast Ridge; Valuable and Essential) follows the Southeast Ridge east and downward to the mountain's base near Bayshore Boulevard (Figure 1). This transect also includes part of a subridge north toward the Brisbane Acres. In 2012 a small grass fire burned the steep slope along the southern part of the transect up to where the transect meets up with the Ridge Trail. The maximum S/H recorded in 2014 was 30, similar to that calculated in previous years (Table 2 and Figure 5).

Transect 13 (MU Carter Martin; Essential) was established in 2005 to collect data on butterfly presence as it is across from the section of the Northeast Ridge that was at that time planned for development (and currently under development). Very few butterflies have been recorded on Transect 13 in the past. During the first year this transect was surveyed (2005), an average S/H of 5.2 and a maximum of 15.0 was recorded. Then in 2006, 2008 and 2010 no CS were seen. In 2012 a single CS was recorded here. Surprisingly, in 2014 a total of 13 CS were seen on this transect over the three surveys, with an average and maximum S/H of 30 and 110 respectively. Most butterflies were observed not along Guadalupe Canyon Parkway but on the slope below the parkway.

## Discussion

Our data imply that the drought did not negatively affect Callippe silverspot butterflies. Rather CS were encountered overall at a greater rate than has been recorded in any other year since fixed transect monitoring began in 2000. As a species whose life span is completed within a year, year to year variation in population size is normal and expected. Results as found this year indicate only that environmental conditions in 2014 favored CS emergence and breeding. The species continues to be seen over most of the area surveyed.

The peak of adult CS abundance was found to be earlier than in previous years that had more rainfall. No adults CS were observed in July, although in previous years monitors have continued to see adult CS into mid if not late July. Of the three survey dates conducted in 2014 the highest CS

encounter rate (S/H) was observed during the first survey, conducted in late May. In past years, CS have been encountered at the highest rate a week or two later, in the first or second week of June. The dry weather conditions may have influenced the earlier emergence of CS.

### Recommendations

In previous reports it was recommended that transects be evaluated for continued monitoring, and that new transects be considered. In 2010 it was recommended that Transect 13 be abandoned as it was originally established in 2005 to provide data on CS distribution and movement with respect to the Brookfield Northeast Ridge development (now Toll Brothers). Transect 13 intersects limited and sparse butterfly habitat. However, Transect 13 was included in both 2012 and 2014 as no changes to the monitoring program were made. In 2014 Transect 13 was found to be one of the transects with the highest encounter rates of CS. Thus it is now recommended that Transect 13 continue to be monitored.

An increase in both scrub and non-native species in the vicinity of Transects 6 and 8 have made these transects more difficult to access; consequently both 6 and 8 were shortened in 2012 and 2014 as passage was no longer possible. These transects support only small areas of suitable habitat and few butterflies are found here, however they may still represent an important habitat patch by providing linkages to larger, nearby habitat areas. The Assessment provides several recommendations on butterfly monitoring. In terms of transect modification, the Assessment recommends converting peripheral transects to into presence/absence surveys to save time and effort. It is recommended that both Transects 6 and 8 be monitored as presence/absence from this point forward due to the fact that they are short and have only limited habitat.

Extensive grasslands with host and nectar plants are found on the South Slope and are not currently part of the monitoring program. In the past, TRA has recommended transect modifications, including potentially adding new transects and abandoning old transects. The Assessment recommends that a new transect be added on the South Slope, in the Hillside/Juncus area. If agreeable to the TAC, a new transect should be added here when CS are next monitored in 2016.

The Assessment recommends implementing presence surveys on the grid system on a five-year rotating basis to establish occupancy and to effectively track butterfly distribution throughout the Mountain. In 2012 TRA conducted occupancy surveys on the grid system for both CS and MB (TRA 2012). If a five-year schedule for grid system monitoring is approved by the TAC, the next occupancy survey window for both species would be in 2017.

The Assessment also stresses the importance of mapping and qualifying viola density, as obtaining information on habitat distribution and quality is key to increasing the connection between habitat management/restoration and butterfly response. The Assessment recommends that a viola inventory be completed in selected areas over the next 5 years. The TAC will need to determine when and how funds will be allocated for this effort.

### **C. San Bruno Elfin (*Callophrys mossii bayensis*)**

San Bruno elfin (SBE) are closely associated with their host plant, Pacific stonecrop (*Sedum spathulifolium*), which grows within higher elevation grasslands on northeast to northwest facing slopes above 500 feet elevation. Sedum often grows along transition areas between scrub and grassland. San Bruno elfins occur where there are high densities of sedum and in areas that are

protected from strong winds. On San Bruno Mountain, San Bruno elfins use a variety of nectar plants limited to the upper elevation grasslands and scrub. This species has been documented to move at least 0.15 mile between habitat patches (Arnold, 1983), and can likely move much further over the course of multiple flight movements.

The adult flight season for SBE typically occurs between early March and mid April. Third and fourth instar larvae are present and easily identifiable on sedum flower heads typically for 2-3 weeks in May and/or June. Monitoring of elfin larvae is preferred over adult surveys as they are easier to locate and count. SBE larval surveys are performed every other year.

All existing SBE butterfly habitat on San Bruno Mountain has been protected as open space within San Bruno Mountain State and County Park since 1975. Development that was approved through the San Bruno Mountain HCP did not affect this species, and therefore monitoring and management for this species and its habitat was not a requirement of the HCP permit. However, this species' habitat partly overlaps with that of the mission blue and callippe silverspot, and is composed of some of the most pristine coastal prairie and coastal scrub habitat on the Mountain. Because of the biological value of this species and its habitat on the Mountain, monitoring and management of SBE has been performed as part of the HCP's biological program.

San Bruno elfin larvae are preferable to survey over adults as they are conspicuous, less sensitive to weather, and their movement is limited to sedum flower heads. Eight fixed transect points for monitoring SBE larvae were established in 1998 and these were monitored every year from 1999 to 2003 (Figure 7). No SBE monitoring of larvae was conducted in 2004 or 2005. Monitoring was resumed in 2006 and set on a biennial schedule. SBE larvae were monitored in 2006, 2008, 2010, and 2014. In 2012, monitoring was not conducted in order to allocate funds to presence/absence surveys for CS and MB.

San Bruno elfin butterflies were monitored in the spring of 2014. Survey methodology and results follow.

### Survey Methodology

Two larvae surveys were performed in 2014. The first survey was performed on May 12 and 13 and the second survey was performed on May 17 and 18. The timing for these surveys was based on the blooming stage of the sedum. A site visit on May 10 found much of the sedum in bloom or coming into bloom, therefore the first survey was scheduled. During the second survey, most sedum was in bloom, while some flowers had yet to open and some flowers had begun to die back.

Of the eight points established in 1998, six were surveyed during the first survey window (May 12 and 13). Two points could not be located during the first survey due to changes in vegetation growth along the access routes to the points. Patrick Kobernus of Coast Ridge Ecology and former SBM project manager assisted TRA biologists with finding these "lost" points in time for the second survey. All eight points were included in the second survey (Figure 7). All points were mapped with a Trimble Juno GPS so that they can be found easily in the future.

Surveys were conducted within a 25-meter radius around each point. Every sedum was searched for larvae. No time limit was placed on the survey effort due to the high variation in sedum density at each point. As much time was taken as needed at each point to allow for inspection of all sedum plants within the 25-meter radius. Locations of the 8 SBE monitoring points are presented in Figure

7.

## Results

As discussed under CS monitoring results above, 2014 was a drought year, altering the emergence of some plants and animals. In 2014 the sedum on SBM bloomed at a similar time as it had in previous years. However, the SBE larvae appear to have emerged earlier than the sedum flowers, with peak emergence occurring prior to the peak of the sedum bloom. This may have been influenced by the dry weather conditions.

A total of 98 larvae were counted during the first round of surveys, performed at six points, and 47 were counted during the second round of surveys at all eight points (Table 3). The second round corresponded most closely to the peak of the sedum flower bloom. These numbers are notably lower than the numbers counted during the last surveys in 2010, when 308 larvae were counted during the first survey, and 364 during the second survey. However, the number counted in 2014 is still within the range of variance that has been recorded on SBM, with fewer larvae recorded in 3 of the survey years (1999, 2000, and 2008), and more larvae recorded in 5 of the survey years (Table 4). It should be noted that in 2008, only 77 larvae were counted as monitoring occurred after the peak of sedum bloom and larvae abundance, and many larvae had already pupated.

**Table 3. San Bruno Elfin Larvae 2014 Point Data**

Round 1 (May 12-13)			Round 2 (May 17-18)	
Transect	MU; Scrub management area	# of Larvae	Transect	# of Larvae
6	Devil's Arroyo; None	N/A	6	3
7	Devil's Arroyo; Valuable	24	7	7
8	Devil's Arroyo; Potential	27	8	11
13	Devil's Arroyo; None	9	13	8
15	Dariy and Wax Myrtle; None	N/A	15	4
16	Dariy and Wax Myrtle; Valuable	1	16	4
17	Dariy and Wax Myrtle; None	18	17	4
19	April Brook; None	19	19	6
<b>TOTAL</b>		<b>98</b>	<b>TOTAL</b>	<b>47</b>

**Table 4. Total SBE Larvae Counted at all 8 Points, 1999-2014**

<b>Year</b>	<b>Total Larvae Counted</b>
1999	140
2000	115
2001	253
2002	291
2003	281
2006	373
2008	77
2010	364
2014	145

It is unclear if fewer SBE actually emerged in 2014, or if the lower numbers reflects emergence prior to peak sedum bloom and before surveys took place. The later is supported by the monitoring data which shows that only half the number of larvae were seen during the second survey (47) as opposed to the first survey (98) despite all 8 points being surveyed the second round. Results indicate that by the second survey the larvae had mostly pupated, and that the peak of larval emergence may have been in early May.

The condition of the habitat at and around the 25-meter points was evaluated and any threats to habitat were noted. The sedum and associated vegetation all appeared vigorous and no threats were observed. The rocky outcrops that support sedum tend to be within coastal scrub or thin-soiled grassland habitat that is more resistant to weed invasion than the grassland habitat where callippe silverspot and mission blue butterflies are found. No recommendations for vegetation management are identified at this time.

### Conclusions

Data collection on San Bruno elfin larvae in 2014 was timed to the peak in sedum bloom; however, the low number of larvae observed indicates that SBE larval abundance peaked prior to the sedum bloom. This may have been influenced by the 2014 drought, which resulted in a variety of plants and animals having temporal shifts or modified behavior. As discussed above, the peak of the CS butterfly flight season was found to be one to two weeks earlier than that observed in wetter years. Alternatively, there may have been a smaller population size of SBE in 2014. There is natural variation in the population size of butterflies, and 2014 may have been a year of low abundance. No visible threats to the sedum or its habitat were noted.

### Recommendations

San Bruno elfin monitoring is addressed in the Assessment. As SBE appear to be secure in high quality coastal scrub habitat, tracking abundance every other year may not be worth the time and effort. Rather, it is recommended in the Assessment that presence surveys be established at all monitoring points. The surveys would be conducted at appropriate times of the year (late May to early June) on a 3-4 year interval. This recommendation should be considered by the TAC, and if agreeable, should be begin in 2016.

#### **D. Bay Checkerspot Butterfly (*Euphydryas editha bayensis*)**

A small population of the Bay checkerspot butterfly (BCB) was present near the summit of San Bruno Mountain up until the mid-1980's. This species has not been observed on SBM in almost 30 years. No BCB larvae or adults were observed on San Bruno Mountain by field crews while conducting biological activities and overseeing development activities in 2014. In October 2000, the U.S. Fish and Wildlife Service (USFWS) proposed critical habitat for the BCB, followed by a Final Rule issuance on the critical habitat designation in April 2001. The critical habitat designation includes the historic BCB habitat on the main ridge of San Bruno Mountain. This species must be taken into account when planning any activities that could impact BCB habitat.

#### **E. San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*)**

The San Francisco garter snake (SFGS) was identified in the San Bruno Mountain HCP (1982) as having potential habitat on San Bruno Mountain. No SFGS were observed on the Mountain by field crew while conducting biological activities and overseeing development activities in 2014. There have been no confirmed observations of SFGS on San Bruno Mountain in over 30 years of the HCP monitoring program. Based on the lack of significant ponds and other aquatic habitats, this species is unlikely to be present.

#### **F. California Red-legged Frog (*Rana aurora draytonii*)**

The California red-legged frog (CRLF) shares similar aquatic habitat with SFGS. Though it was not identified as a sensitive species at the time of the HCP, CRLF has since been listed as a Federally Threatened species. No CRLF were observed on San Bruno Mountain by field crews while conducting biological activities and overseeing development activities in 2014. There have been no confirmed observations of CRLF on San Bruno Mountain in over 30 years of the HCP monitoring program. Based on the lack of significant ponds and other aquatic habitats on San Bruno Mountain, it is unlikely this species is present.

#### **G. Plants of Concern**

Several rare and listed plant species are found on San Bruno Mountain, however, no rare plants were monitored with HCP funds in 2014. In previous years, colonies of listed plants or rare plants with a status of CNPS List 1B or higher (i.e. *Arctostaphylos imbricata imbricata*, *Lessingia germanorum*, *Silene verecunda* ssp. *verecunda*, and *Helianthella castanea*) were mapped using GPS. See previous annual reports (1999-2007) for maps showing the distribution of these rare plants on San Bruno Mountain.

The Assessment recommends a recurring 5-year survey of perennial rare plants which would include the collection of demography and recruitment data. It further recommends that annual rare plants should be monitored at least once every 3 years. The TAC should consider how HCP funds might be used for rare plant surveys, or if another funding mechanism such as a grant, or using an intern or volunteers, might support this effort.

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Thomas Reid Associates, 1982. Endangered Species Survey San Bruno Mountain. Biological Study 1980-1981. Prepared for San Mateo County.

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*All TRA documents/ resources available from MIG | TRA Environmental Sciences Inc. or the County of San Mateo Parks and Recreation Division.*

## **III. STUDY PARTICIPANTS**

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County Coordinators for San Bruno Habitat Conservation Plan: Sam Herzberg and Ramona Arechiga



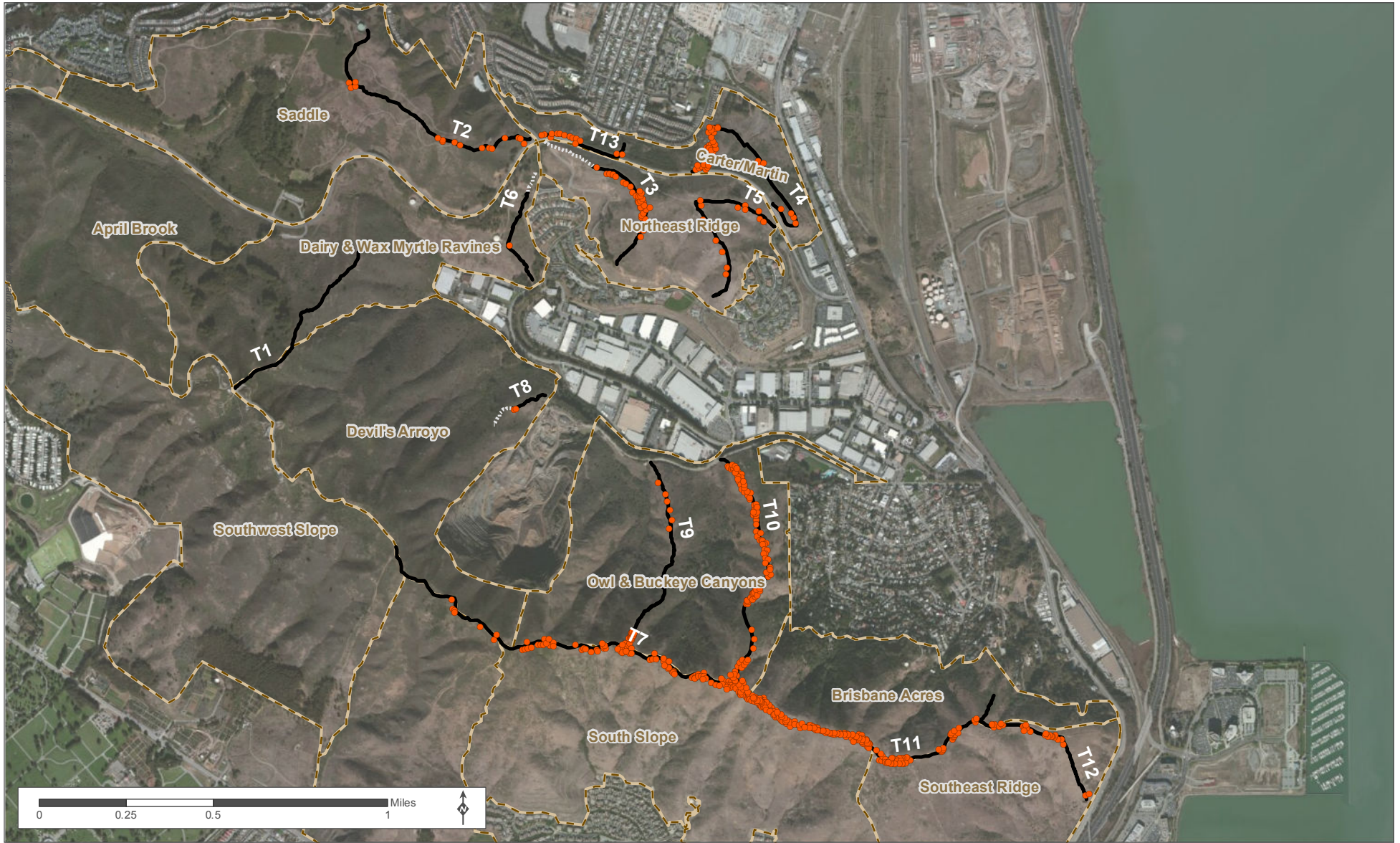


Source: TRA field work 2014

- Unsurveyed Portion of Callippe Transect
- Surveyed Portion of Callippe Transect

**Figure 1** Callippe Silverspot Transect Locations

*San Bruno Mountain Habitat Conservation Plan: Year 2014 Activities Report for Federally Listed Species*

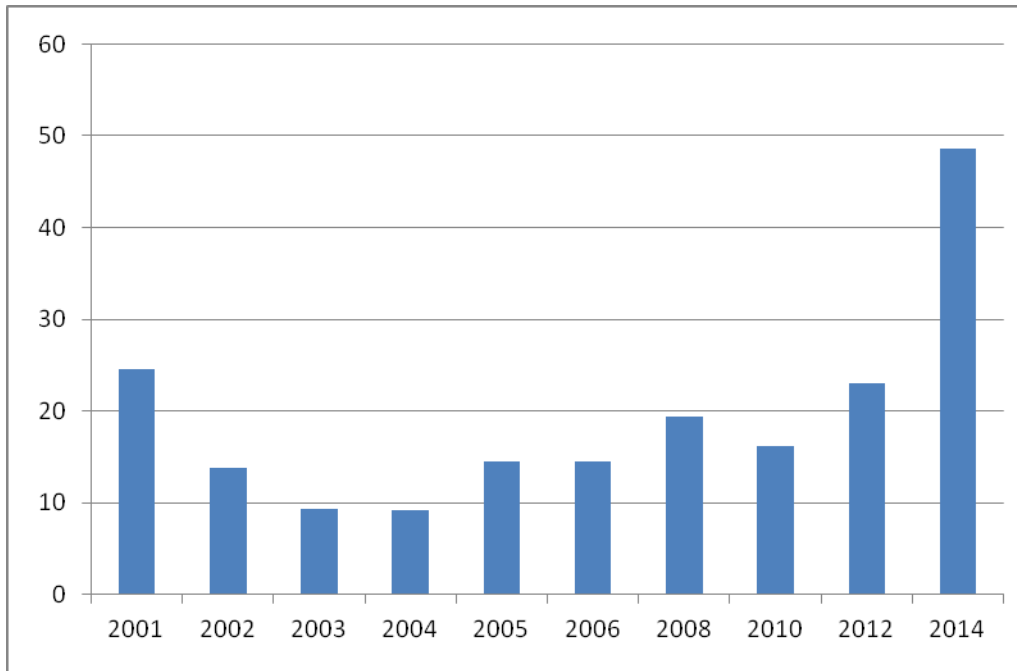


Source: TRA field work 2014

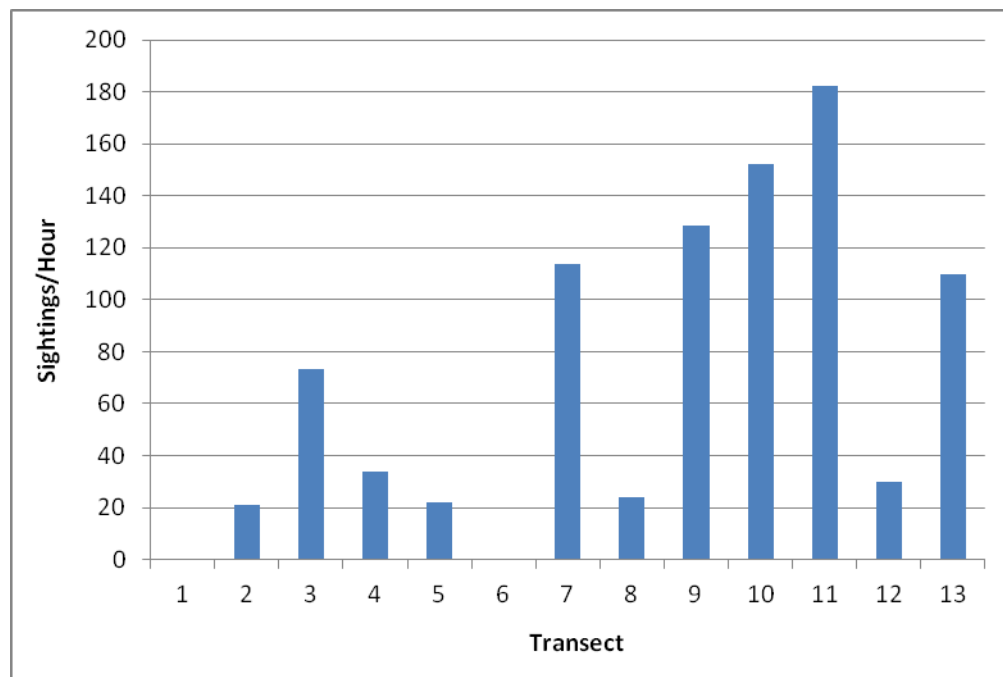
- Callippe Observation
- Unserved Portion of Callippe Transect
- Served Portion of Callippe Transect

**Figure 2** Callippe Silverspot Observations 2014

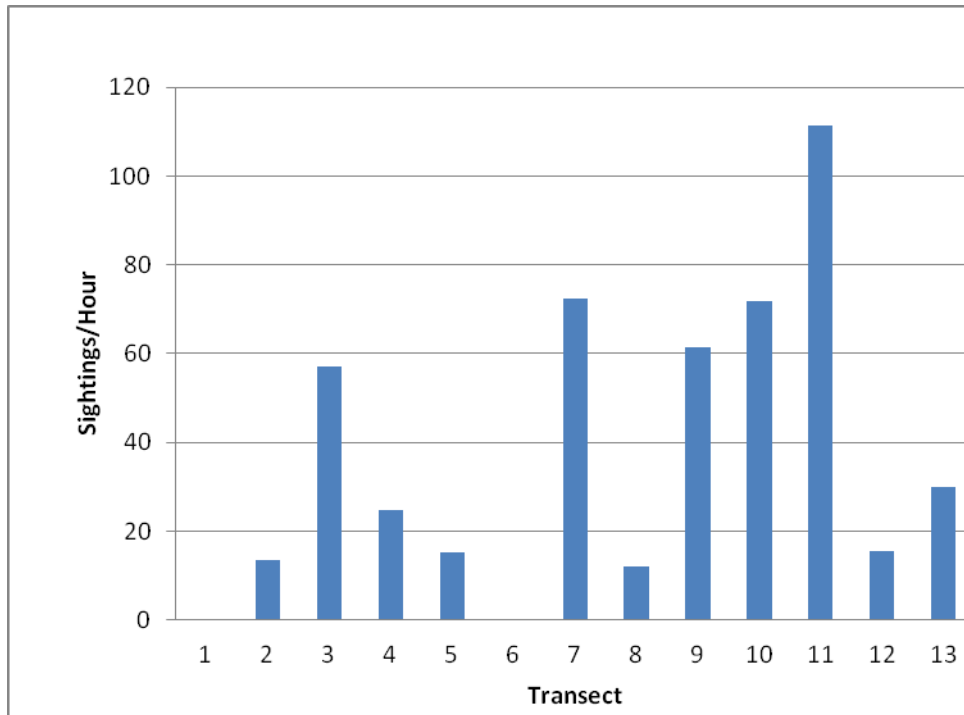
*San Bruno Mountain Habitat Conservation Plan: Year 2014 Activities Report for Federally Listed Species*



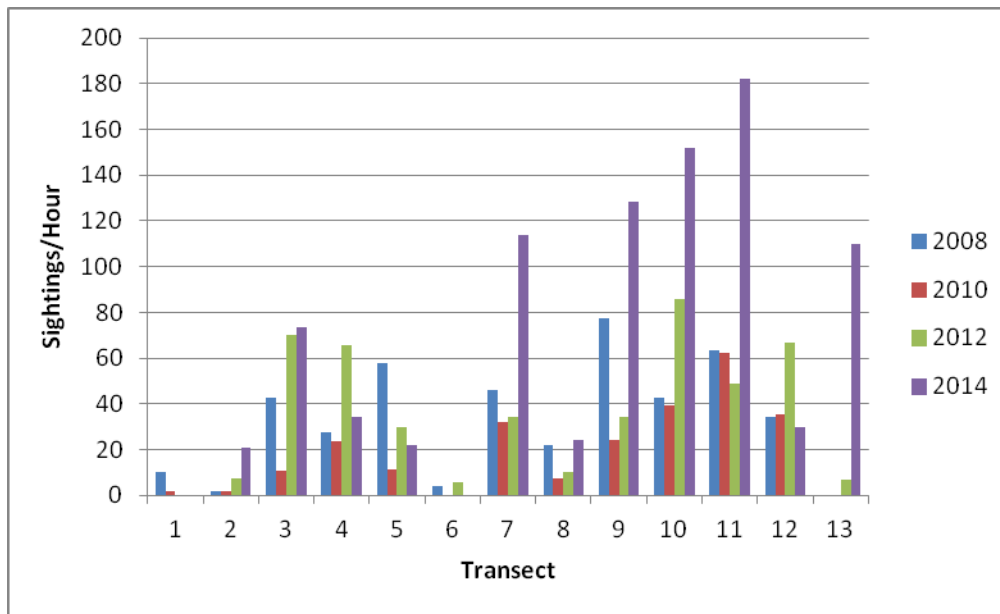
**Figure 3. Average CS Sightings/Hour across all transects, 2000-2014**



**Figure 4. Maximum number of CS sightings per hour for each transect in 2014**



**Figure 5. Average number of CS sightings per hour for each transect in 2014**



**Figure 6. Maximum number of CS sightings per hour for each transect, comparing last four surveys (2008, 2010, 2012, and 2014)**



Source: TRA field work 2014

○ San Bruno Elfin Monitoring Transect

**Figure 7 San Bruno Elfin Transect Locations**

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