SAN BRUNO MOUNTAIN
HABITAT CONSERVATION PLAN

YEAR 2009 ACTIVITIES REPORT FOR COVERED 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 (MB), callippe silverspot (CS), and San Bruno elfin (SBE).

Of the three butterflies, only MB was monitored in 2009. The species was last monitored in 2007. Mission blue transects were monitored three times from March to May. A total of 188 MB were counted in 2009 on 13 transects. Numbers of MB seen are similar to that found in 2007. The sightings/hour recorded were higher than in 2007, as surveys in 2009 avoided the start and end of the flight season, resulting in less data reflecting the beginning and end of the bell shaped curve that represents butterfly density over the course of the flight season.

The highest performing transects continue to be found on the Southeast Ridge and South Slope. Areas where MB were seen in least density included transects on the Saddle, Dairy Ravine, the ridges of Owl and Buckeye Canyons, and the north-facing slope of the Northeast Ridge. All of these areas support landscapes of mixed scrub and grassland, with scrub encroaching on grassland habitats. Where grasslands are intact and vast, MB were seen most frequently and in greatest numbers. The next most productive area for MB is the Northeast Ridge, including the ridge line and south facing slope.

Recommendations for management at this time include continued weed control in areas of historical and restored grassland, and coastal scrub control (as funding permits) on north-facing slopes where scrub is encroaching on grassland habitat. Areas where MB are found in lower densities as described above would benefit from scrub management.

Callippe silverspot and San Bruno elfin butterflies will be monitored in 2010.

I. INTRODUCTION

This report describes the status of listed species and the results of monitoring efforts that took place on San Bruno Mountain (SBM) under Endangered Species Act Section 10(a)(1)(B) Permit PRT 2-9818 for the 2009 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.

With the implementation of the HCP, take of mission blue and callippe silverspot butterfly habitat on San Bruno Mountain (SBM) was authorized under an Endangered Species Act Section 10(a)(1)(B) Permit. As of 2009, nearly all of this take has already occurred. Although CS was a species of concern in the HCP and was one of the two primary species the HCP was designed to conserve, the butterfly was not listed under the Endangered Species Act at the time the HCP was initially prepared and the Incidental Take Permit (ITP) was issued. After the listing of the callippe as endangered in 1997, HCP permittees were required to halt activities that could result in take of CS pending receipt of take authorization for that species from the USFWS. The City of Brisbane submitted an application to amend the HCP and ITP to cover take of the CS which would allow the completion of development activities within the Northeast Ridge, an area planned for urban uses under the HCP.

In May 2009, an amendment to the HCP and ITP was approved by the U.S. Fish and Wildlife Service (USFWS) which 1) increased the area of Conserved Habitat within the Northeast Ridge, 2) provided supplemental HCP funding provisions that would allow for additional management and monitoring activities to occur throughout the Mountain, and 3) authorized incidental take of the CS within the remaining development area (USFWS, 2009). With the amendment, the housing development on Administrative Parcel 1-07 would be completed. In advance of the earthwork, to construct the final phase of the project (which is expected to begin in 2010), salvage of viola plants began after May 2009. The salvage may have resulted in take of CS by the crushing of larvae.

Special-status species that are monitored on San Bruno Mountain include the three listed butterflies. Special-status plants have been monitored on the Mountain in the past, but are not included in the current monitoring program due to funding constraints and the fact that no special-status plant species are subject to take 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 2009, mission blue were monitored.

Appendices containing data collected in 2009 are located at the end of the report. Anyone interested in reviewing field data or other information collected by TRA Environmental Sciences should contact Sam Herzberg, Park Planner with the San Mateo County Parks and Recreation Division at (650) 363-1823. Previous annual activities reports and data are also available on-line at: http://www.traenviro.com/sanbruno.

II. STATUS OF SPECIES OF CONCERN

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

The mission blue butterfly is the most widespread of the endangered butterfly species on SBM, and its distribution corresponds closely to the distribution of its host plants. The host plants for the mission blue butterfly are three perennial lupines: silver lupine (*Lupinus albifrons* var. *collinus*), summer lupine *(L. formosus* var. *formosus)*, and varied lupine (*L. variicolor*). Mission blues are limited primarily to areas where their host plants and nectar plants are concentrated. Mission blues use a variety of native and nonnative species for nectaring (especially thistles), which are found throughout the grassland and coastal scrub plant communities. Protection from wind appears to be an important habitat component for MB and often the species is detected on the leeward side of slopes, or within protected roadcut areas where host plants are present in suitable densities. Mission blues have been found to move up to approximately 0.25 miles between habitat patches

(Thomas Reid Associates, 1982), though the species is likely to move further when dispersing between habitat areas. It is unlikely that MB are capable of immigrating to, or emigrating from, San Bruno Mountain due to the urbanization barriers surrounding the Mountain.

Mission blues utilize silver lupine and summer lupine as their primary host plants, and utilize varied lupine less frequently on SBM. Silver lupine is the most widespread host plant species on the Mountain, and grows within dry habitats such as south and east-facing native and non-native grasslands, roadcuts, rock outcrops, fire breaks, ridgelines, erosion rills, and landslide scars. Summer lupine also grows within disturbed soil conditions, and colonizes roadways and landslide scars in more mesic areas, where soils are typically deeper and/or more sandy. Varied lupine grows in grasslands and along disturbed roadsides, typically within mesic exposures, and is commonly found within north and west facing grasslands. Mission blues tend to utilize larger patches of varied lupines, or when smaller patches of varied lupine are found in proximity to silver and/or summer lupine.

Typically, MB butterflies begin adult flight in March, and are most abundant in April. Observations begin to drop off by late May or early June. The timing and duration of the flight season is influenced by overall seasonal climate as well as microclimate within separate regions of the Mountain. Late spring rains can delay the onset of the flight season throughout the Mountain while hot spring conditions can shorten it. Mission blue colonies on the warmer, dryer south-facing slopes of the Mountain begin and end their flight season earlier than colonies on the cooler north-facing slopes.

In the winter of 2006/2007, 13 new transects were established on SBM for mission blue butterflies (Figure 1). In plotting out the new transects, effort was made to traverse as much MB habitat as possible. Historic habitat as well as restored or planted habitat was included. Where possible, old MB transects were incorporated into the new, longer transects. Of the 13 transects, 11 were established with the intention of being regularly monitored. Two transects (transects 2 and 3) were established as transects to be visited less frequently. Transects 2 and 3 were created to study MB usage of these sites, but these sites are not considered of highest importance in terms of measuring MB abundance on the Mountain. Transect 2 is located east of the Pointe Pacific housing development. This area was protected by elimination of a portion of the original planned development, and was dedicated as conserved habitat. Transect 3 includes a planting island on the south side of Guadalupe Canyon Pkwy between the Pkwy and Colma Creek. The newly established MB transects were monitored for the first time in 2007 and again in 2009, as discussed below.

It was recommended in 2007 that transects 4 and 5 be reconfigured. This was completed in 2009, and transect 4 now ends at the south side of Guadalupe Canyon Parkway and transect 5 connects to that portion of the old transect 4 that is on the north side of the Parkway (Figure 1). Transects were renumbered so to attain a consecutive number system. There are a total of 13 transects, of which 11 are monitored during each survey. Transect 2 and 3 are surveyed once or twice.

Survey Methodology

The transects are monitored at an interval of no less than 10 days to coincide with the average life span for adult MB, which is 7-10 days. Monitoring can only be performed during warm, calm weather (wind speeds less than 10 miles per hour), and therefore the actual timing of surveys varies. One complete survey effort is usually completed in one to two days. If weather conditions are unsuitable on the second day, completion of that survey effort is put on hold until weather conditions improve. All butterflies observed beyond a transect or in the transect vicinity during travel between transects are recorded as incidental observations. It should be noted that because of the steep slopes, various microclimates, and limited survey days, it is a challenge to monitor the butterflies on San Bruno Mountain in a consistent manner from year to year.

Air temperature, wind speed and time are recorded at the start of each transect. The surveyor then walks the length of the transect and records the duration spent walking the transect and all MB that are encountered. The location and time of each MB observed is marked on a topographic (orthophoto) map. Butterfly behavior and gender (if identifiable) are recorded. At the end of the transect, the air temperature, wind speed and time are again recorded. Temperature and wind speed are then averaged for the transect and the total time to

complete the transect is calculated.

The number of MB sightings per hour (S/H) is used for analysis. The number of MB observed on a particular transect is divided by the number of minutes to complete the transect survey.

The earliest MB observations in 2009 were made on March 17 and 19. Very few butterflies were seen on these days and presumably this marked the start of the flight season. The first formal transect survey was performed a couple of weeks into the flight season during a warm weather window on March 31 and April 1. The second survey was performed on April 20 and 21, and the third on May 12 and 13. Inclement weather conditions (primarily fog and/or cool, windy conditions) in April and May resulted in greater than 10-day gaps between transect surveys. Typically four, and sometimes five, surveys are completed in a season. However, weather on the Mountain from mid May to mid June was cold and windy, and a fourth survey was not successfully conducted. An attempt was made on June 6, however cold temperatures and wind resulted in an end to that effort. No further surveying was possible prior to the end of the MB flight season. The last recorded observation of mission blue was on June 13 during the North America Butterfly Association (NABA) count. One MB butterfly was observed over the course of a day by count participants on this date.

Results

A total of 188 MB butterflies were observed in 2009 during the three surveys combined. Figure 2 displays the locations of the 188 MB sightings. Transects 1 and 4-13 were visited during each survey. Transects 2 and 3 were visited once, during the second survey on April 20. In 2007, 200 MB butterflies were observed, and in that year, the main transects were surveyed 4 to 5 times, including during the very beginning and end of the flight season. Since the 2009 surveys avoided the very start and end of the flight season, MB were encountered more frequently than they were in 2007. 2007 was the first year in which the modified, longer transects were monitored and thus is the only year with which a direct comparison with 2009 can be made.

A discussion of what was observed on each individual transect follows. Data cited in the discussion below can be found in Appendix A. Figure 2 displays graphically the sightings/hour calculated for each transect and Figure 3 charts the sightings/hour for each transect.

On transect 1, located at the ranger's station, MB were detected during all three of the surveys, although in low numbers. A total of 5 butterflies were observed, for an average sightings/hour of 3.57. Mission blues were observed alongside the roadway that leads to the ranger's station as well as on that part of the transect that circles through coastal scrub and grassland below the ranger's station (Figure 2).

Transect 2 is a shorter transect located within the Pointe Pacific development area. This transect was visited once on April 20 and one MB was seen. No MB were observed in 2007, and finding one butterfly in 2009 provides evidence that the species is using this site, although presumably infrequently or in low numbers.

Transect 3 was also visited once on April 20. This transects includes a planting island and MB have been recorded here in the past. Three butterflies were seen in 2009, and as this is also a short transect compared to the main transects, observing 3 butterflies in a short span of time (eight minutes to walk the transect compared to an hour for longer transects such as 11 or 12) results in a sightings/hour of 22.5, the highest of any transect. This is misleading however given the short length of the transect.

No MB were seen on transect 4 in 2009. Transect 4 includes an area that was restored (planting island) in Dairy Ravine. One butterfly was observed within the planting island in 2007 for the first time, and a total of two were seen on the transect that year. As this is not a highly productive transect, it is not surprising that over the three surveys in 2009, no MB were seen. It is likely that butterflies are still infrequently visiting this site. There have been no marked changes to the habitat or visible threats other than existing weeds at the periphery of the planting island that are treated regularly.

Transect 5 supports both *L. albifrons* and *L. formosus* and is located in the Saddle, east of the intersection of Guadalupe Canyon Parkway and Carter Street. No butterflies were seen along this transect in 2009. In 2007,

one butterfly was observed on each of three surveys. Coastal scrub succession is gradually taking over the small and isolated patches of lupines in the eastern saddle, and this could be why so few butterflies are observed here.

Transect 6 is located on the Northeast Ridge in the vicinity of the lower NER Water Tank. It extends through grasslands on the east side of lower Wax Myrtle Ravine. A total of 15 mission blue butterflies were observed on transect 6 (sightings/hour equals 9.68). MB were observed more frequently on this transect in 2009 than they were in 2007. In 2007, 8 MB were seen, for a sightings/hour of 2.8. The species was observed all along the transect, with most observations being made in the vicinity of the planting island below the water tank.

Transect 7 is located on the Northeast Ridge and includes Arnold Slope and Callippe Hill. Seven MB were seen, corresponding to a sightings/hour of 6.18. This transect traverses property owned by Brookfield Homes that is planned for temporary disturbance for home development. Of the 7 MB seen, 2 were recorded within the Brookfield property.

No MB butterflies were observed on transect 8, located above the Linda Vista residential community. This site is a restoration site that was replanted with lupines in the mid-1980's. One MB was recorded here during the 2007 monitoring effort.

Nine MB were observed on transect 9 during the three surveys in 2009, for an average sightings/hour of 4.5, which is similar to the 2007 sightings/hour of 4.6. This transect is located on the east side of the NER, and follows the Transmission Line. The transect intersects a planting island above the intersection of Mission Blue Drive and Callippe Court. Several of the 2009 observations were at the southern end of the transect, where a patch of lupines is traversed. This patch of lupines is near a grove of eucalyptus trees, and continued control of tree saplings is important in preserving the adjacent butterfly habitat.

Transect 10 is located at the foot of Owl and Buckeye Canyons. Two MB were observed on April 20 at the east end of the transect where the foot of the hill is rather steep and supports a variety of host and nectar plants. The S/H on transect 10 in 2009 was 1.15. Transect 10 does not intersect a great quantity of MB host plants, although the transect does traverse grassland habitat with diverse nectar sources. Part of this transect was burned in the June 2008 fire, and *Lupinus formosus* is rapidly regenerating. No butterflies were observed in the recently burned area however. Despite the occasional lupine, no MB were seen on the east side of the transect, that runs parallel to Army Road and below the power lines. More butterflies were observed on transect 10 in 2007, with a total of 16 MB seen during three surveys and a sightings/hour average of 4.

Transect 11 is located on the Southeast Ridge and begins at a previously disturbed slope above Sisters City/Hillside Boulevard that supports lupines. The transect follows the Ridge Trail of San Bruno Mountain, and includes a portion of the Brisbane Acres. Transect 11 was the most productive transect in 2009. A total of 82 MB were seen during the three surveys, for a sightings/hour of 15.04. During the second survey on April 21, 49 MB were recorded on this transect in just under two hours. This transect was also the highest performing in 2007, with a total of 88 MB observed in that year. The locations of the MB observations on transect 12 were evenly distributed across all of the transect, excluding the lower northern segment where scrub begins to dominate the vegetation (Figure 2).

Transect 12 was the second highest performing transect in 2009 as well as 2007, with a total of 36 butterflies seen (35 were seen in 2007). This transect is located on the South Slope and follows a ridgeline from the Terrabay water tank to the Ridge Trail. The sightings/hour for this transect averaged to 14.21. Observations were recorded on both the Ridge Trail and on the south slope of the transect, with the greater number of observations on the south slope (Figure 2).

Transect 13 picks up where transect #12 ends on the Ridge Trail, and follows a ridgeline down to Hillside Blvd. Twenty-eight MB were recorded on transect 13. This is more than double the number of butterflies seen in 2007 (12). The sightings/hour for transect 13 averaged out to 13.33. Several of the MB seen were at the south end of the transect, adjacent to a mature stand of eucalyptus.

Weather Data

A weather station was installed on San Bruno Mountain in the winter of 2007/2008. The weather station is located on the southeast of the Mountain near the water tank situated beyond the terminus of Alexander Road (off of Kings Road) in the Brisbane Acres. Rain data collected at this station revealed that a total of 14.92 inches of rain fell in the winter of 2008/2009. This corresponds closely to what was recorded at the San Francisco Airport weather station (Table 1). Rainfall for the past several years has been lower than average, which reflects the three years of drought experienced across the state.

Table 1. Annual rainfall data from San Francisco Airport weather station

Rainfall Year	Total Inches
03-04	19.9
04-05	26.9
05-06	26.0
06-07	11.6
07-08	15.5
08-09	14.6

Relocation of Mission Blue to Twin Peaks

San Francisco Recreation and Park Department, Creekside Center for Earth Observations, and the U.S. Fish and Wildlife Service initiated a Recovery Action Plan for MB on Twin Peaks in San Francisco in 2009. Twin Peaks supports habitat for MB and at one time had a healthy population of the butterfly. However, recent monitoring data suggest that the population at Twin Peaks is extremely low. This decline is believed to have been caused largely by massive die-offs of silver lupine during the warm and wet El Nino year of 1998. While silver lupine has rebounded on the site, the MB population remains critically low.

The Recovery Action Plan included the relocation of gravid females from San Bruno Mountain to Twin Peaks in the spring of 2009 (Table 2). A total of 22 females were relocated to Twin Peaks from SBM. On April 22, Park Department staff noted eggs on 10 of the 13 lupines on which butterflies had been released. A total of 64 eggs on 19 plants were found across the habitat and one adult was seen flying on April 20. While it is too early to determine whether the reintroduction effort will be a long-term success, the initial relocation met the following success criteria from the Recovery Action Plan:

1) Sufficient butterflies are encountered in source populations (SBM) and captured for release.
2) Butterflies are relocated with minimal impact on individuals.
3) Eggs from caged females are deposited on lupine plants.
4) Free-flying adult butterflies observed in release areas after cage removal.
5) Successive releases, up to 22 females total.
6) Eggs are observed on additional lupine plants.

The relocation of MB from SBM to Twin Peaks is not expected to have any negative impact on the SBM population due to the small number of butterflies taken. Were a population to stabilize on Twin Peaks, this could provide a safety net for the species by enlarging a population geographically separate from SBM. It is foreseeable that the Park Department will want to relocate more MB from SBM to Twin Peaks in the future.

Table 2. Mission Blue Butterflies Observed and Relocated to Twin Peaks

Date	Males observed	Females observed	Females captured	Females transported and released at Twin Peaks

16-Apr-09	17	9	2	2
19-Apr-09	84	48	12	12
28-Apr-09	39	32	8	8

Conclusions

Mission blues are found in relatively low density (as is typical for most Lycanidae species), but are widely distributed on San Bruno Mountain. The number and distribution of mission blues observed in 2009 on San Bruno Mountain indicates that this species continues to be found in a wide variety of microclimates and slope exposures on the Mountain, although in significantly varying densities.

In general, higher sightings/hour values were recorded in 2009 than in 2007 even though the number of surveys were less (3 in 2009 versus 5 in 2007). It is believed that the higher densities recorded in 2009 are attributed to the fact that monitoring did not take place during the start or end of the flight season (Figure 4). Thus, the surveys were more centered near the peak of the flight season, resulting in a higher occurrence rate of MB. With ample budget it would be desirable to survey more often, as more data provides greater information on MB distribution and abundance. However since the 2009 effort yielded similar numbers and higher sightings/hour than was found in 2007, it is recommended that to minimize budget expenditures for monitoring, future monitoring efforts should continue to preclude surveys at the earlier and later stages of the flight season.

The highest performing transects continue to be those on the South Slope and Southeast Ridge: transects 11, 12 and 13. The South Slope contains large areas of grassland, and as this south-facing side of the Mountain is drier and warmer, coastal scrub succession is less of a threat than on the north facing slopes (such as in the vicinity of Owl and Buckeye Canyons). Mission blues are widely distributed on San Bruno Mountain, but it is only on the South Slope and Southeast Ridge that MB are consistently found in high densities.

No mission blues were seen on transects 4, 5 or 8 in 2009. All three of these transects support patches of suitable grassland habitat in what is considered more marginal (scrub or weedy) habitat. Transects 4 and 8 are both shorter transects and the areas supporting host plants are within restoration areas that are part of the ongoing weed management program implemented on the Mountain. As the habitat areas traversed by these transects are small, MB density is low and individuals may not be encountered during monitoring. Transect 5 includes more of a mosaic of grassland patches within an area that is becoming increasingly dominated by scrub. These grassland patches may diminish with the spread of coastal scrub on the Saddle. The lack of sizable grassland in the vicinity of transect 5 presumable contributes to the infrequent use by MB.

Few MB were seen on transect 10 near Owl and Buckeye Canyons. A portion of this transect burned, and this may have contributed to fewer MB. The area is quickly regenerating however, and numerous lupine were seen flourishing in the burn area. It is likely MB will begin to use this area more frequently in the next few years. The fire helped to reduce coastal scrub, which replaces grassland habitat when not managed. Wildfire has a long-term benefit to grassland dependent species by reducing woody vegetation while favoring the regeneration of grassland species, including lupines.

Mission blue habitat areas on moist, (typically north-facing) slopes are continually being lost to coastal scrub succession (TRA 2007). This process is also occurring on south-facing slopes, but at a much slower rate. As coastal scrub succession continues unchecked on the Mountain without a comprehensive grazing and/or controlled burning program, mission blue and callippe silverspot habitat will continue to slowly decline in total area on San Bruno Mountain.

Recommendations

Recommendations for management at this time include continued weed control in areas of historical and restored grassland, and coastal scrub control (as funding permits) on north-facing slopes where scrub is

encroaching on grassland habitat. Areas where MB are found in lower density and where the habitat could benefit from scrub management include the ridges and slopes between Owl and Buckeye Canyons, areas within the Saddle, lower Dairy Ravine, and the slope north of Guadalupe Canyon Parkway where transect 8 is located.

Small eucalyptus stands located at the end of transect 9 and 13 should be visited regularly to control for eucalyptus saplings.

Mission blue butterflies will be monitored again in the spring of 2011. Of particular interest at this time will be monitoring transect 10 to see how the vegetation has recovered following the fire of 2008 and to look for changes in MB density and distribution. Also, if ground disturbance and development on the Northeast Ridge has concluded, it will be important to monitor MB distribution at areas in and adjacent to the disturbed areas. Finally, those transects in which no MB were observed in 2009 shall continue to be monitored, and extra visits to these sites may be included in the 2011 monitoring if necessary in order to determine presence.

To date, most mission blue habitat areas that have been lost to coastal scrub succession have been marginal habitat areas (TRA 2007), however it is important to protect as much potential habitat (both marginal and high quality habitat) for the species as possible. Due to year-to-year weather variation, changes in herbivore pressure, and other factors, habitat quality within lupine patches fluctuates (sometimes dramatically) year to year, with high quality patches declining to marginal and marginal habitat patches becoming high quality. Therefore providing as much alternative habitat areas as possible is important to buffer the species from population declines as a result of year-to-year fluctuations in habitat quality across the mountain.

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.

Ridgelines and hilltops within grassland habitats are an important habitat component for this butterfly species, as callippes utilize these features for mate selection. Callippe silverspots use a variety of native and nonnative species for nectaring (especially thistles) that are found throughout the grassland and coastal scrub plant communities. 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. Callippe silverspots are capable of dispersing to and from San Bruno Mountain and from two adjacent open space areas, Sign Hill and McClaren Park (both are within 0.25 miles of San Bruno Mountain State and County Park). These parks have extremely limited habitat for callippe at the present time. It is likely that urbanization barriers preclude CS from immigrating or emigrating beyond these two adjacent parks.

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, callippes 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).

Callippes were not monitored in 2009, with the exception of limited monitoring within burn areas (described below). The species was last monitored in 2008 and detailed findings are provided in the 2008 annual report. In summary, the number and distribution of CS observed in 2008 indicated that the species continues to be found in similar abundance as has been found in the past eight years of transect monitoring. The number of butterflies seen on individual transects varies from year to year, but this variation does not suggest any that long-term changes in population size is occurring. No detectable change in CS distribution has been detected.

Three CS transects were surveyed in 2009 in order to assess CS usage and vegetation status within the Owl/Buckeye burn area. On June 23, 2008 a wildfire burned approximately 300 acres in Owl and Buckeye

Canyons. All of transect 9 and the east half of transect 7 were burned. On June 10 and July 2, 2009, CS transects 7, 9, and 10 were surveyed. Transect 10 was not burned, however access to the other two transects required walking up Transect 10, and therefore data was collected. Three CS were seen on transect 9 on both June 10 and July 2 for a S/H of 8.18 and 7.82 respectively. Transect 7 was walked on both dates, but high winds on fog on the Ridge Trail led to the effort being abandoned on July 2. On June 10, 6 CS were seen, for a S/H of 12.41. Four CS were seen on transect 10 on both dates, for a S/H of 8.88 and 8.57.

The data set of these surveys is too small to determine trends in CS abundance. It did appear that CS were in lower density than before the fire, which is what would be predicted. Adjacent habitat nearby these transects that did not burn support CS, and individuals will search and travel through the burned area looking for host and nectar plants. As vegetation regenerates, CS will increase their utilization of the burned area.

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

San Bruno elfin 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 sedum patches that are protected from strong winds. San Bruno elfins use a variety of nectar plants limited to the upper elevation grasslands and scrub on the Mountain. 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 SBE larvae are present and easily identifiable on sedum flower heads typically for 2-3 weeks in May and/or June.

San Bruno elfin butterflies were not monitored in 2009. The species was monitored in 2008 and monitoring details were provided in the 2008 annual report. A summary of 2008 data follows. Data collection was timed to peak Sedum bloom, however in 2008, this was after the peak in larval abundance at most of the monitoring points. The number of SBE larvae detected in mid to late May, 2008 was not significantly less than has been found in previous years. But counts performed in the last days of May and the first week of June found significantly fewer larvae. It seems that the larvae both emerged earlier than expected, and monitoring was conducted too late in the season. The habitat supporting the sedum and the sedum plants themselves appeared vigorous with no visible threats. A change in habitat quality or density would be of concern for the SBE population. As the host plant habitat is limited in quantity and distribution, a loss or degradation of habitat may negatively impact SBE and result in a population decline.

San Bruno elfin butterflies will be monitored again in 2010.

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 over 20 years. No BCB larvae or adults were observed on San Bruno Mountain by field crews while conducting biological activities and overseeing development activities in 2009. 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 2009. There have been no confirmed observations of SFGS on San Bruno Mountain in the 25 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 (CRF) shares similar aquatic habitat with SFGS. Though it was not identified as a sensitive species at the time of the HCP, CRF has since been listed as a Federally Threatened species. No CRF were observed on San Bruno Mountain by field crews while conducting biological activities and overseeing development activities in 2009. There have been no confirmed observations of CRF on San Bruno Mountain in the 25 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 2009. San Francisco campion (*Silene verecunda ssp. verecunda*) was mapped in 2007 on the American Tower property at the summit of San Bruno Mountain. Locations of San Francisco campion along with previously mapped mission blue host plants and San Bruno Mountain manzanita (*Arctostaphylos imbricata imbricata*) data was provided in the 2007 Activities Report for Covered Species.

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.

III. REFERENCES

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All TRA documents/ resources available on-line at http://www.traenviro.com/sanbruno/ *or from County of San Mateo Parks and Recreation Division.*

IV. STUDY PARTICIPANTS

Annual report prepared by Autumn Meisel of TRA Environmental Sciences.

2009 TRA Environmental Sciences Field Crew: Autumn Meisel, Aaron Gabbe, and Rebecca Sloan.

County Coordinators for San Bruno Habitat Conservation Plan: Sam Herzberg.

V. GLOSSARY

Endangered - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the class Insecta determined by the Secretary to constitute a pest whose protection under the provision of this Act would prevent an overwhelming and overriding risk to man (Federal Endangered Species Act, 1973).

Endangered Species Act - The Federal Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. Sections 1531-1543. The State of California also has an endangered species act which is referred to as the California Endangered Species Act (CESA).

Invasive Species - Non-native species of plants or animals that out-compete native species in a specific habitat.

Transect - Permanently marked transect that is surveyed year after year. Transects provide a means to compare butterfly observations from year to year at specific locations using standard statistical procedures.

Habitat Conservation Plan (HCP) - The San Bruno Mountain Area Habitat Conservation Plan as adopted by the County Board of Supervisors on September 14, 1982 (Resolution No. 43770).

Habitat Islands – Small areas of native habitat established in restoration sites. Native plantings are installed in relatively small islands where weeds can be more easily controlled. Planting islands generally range in size from 0.1 - 0.25 acres.

Host plant - Particular species of vegetation on which adult butterflies oviposit, and which provides a required food source for survival in the first stages of development after hatching.

Incidental observation - A butterfly observed outside of the transect (or point survey area) during travel between survey areas.

Incidental Take Permit (ITP) – Permit from the USFWS allowing for take otherwise prohibited, if such take is incidental to and not the purpose of the carrying out of an otherwise lawful activity (50 CFR 17.3).

Monitoring - The task, undertaken by the Plan Operator, of regular observation of biological processes, development and conservation activities on San Bruno Mountain; the purpose is to assure compliance with the HCP, and to measure the success of its implementation.

Section 10a - A section of the Endangered Species Act which authorizes the Secretary of the Interior to permit, under such terms and conditions as he may prescribe, any act otherwise prohibited by Section 9 of the Act. The acts may be permitted for scientific purposes, or to enhance the propagation or survival of the affected species (16 U.S.C. Section 1539).

Special-status species - Plants and animals that are legally protected under the federal and State Endangered Species Acts, or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing.

Permittees - Those entities requesting a Section 10(a)(1)(B) incidental take permits from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for the species and activities covered in the accompanying HCP.

Take - According to the federal Endangered Species Act (16 USC 1532 [19]), take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. According to California Fish and Game Code (California Fish and Game Code Section 86), take means to hunt, pursue, catch, capture, or kill, or to attempt to hunt, pursue, catch, capture, or kill.

FIGURES

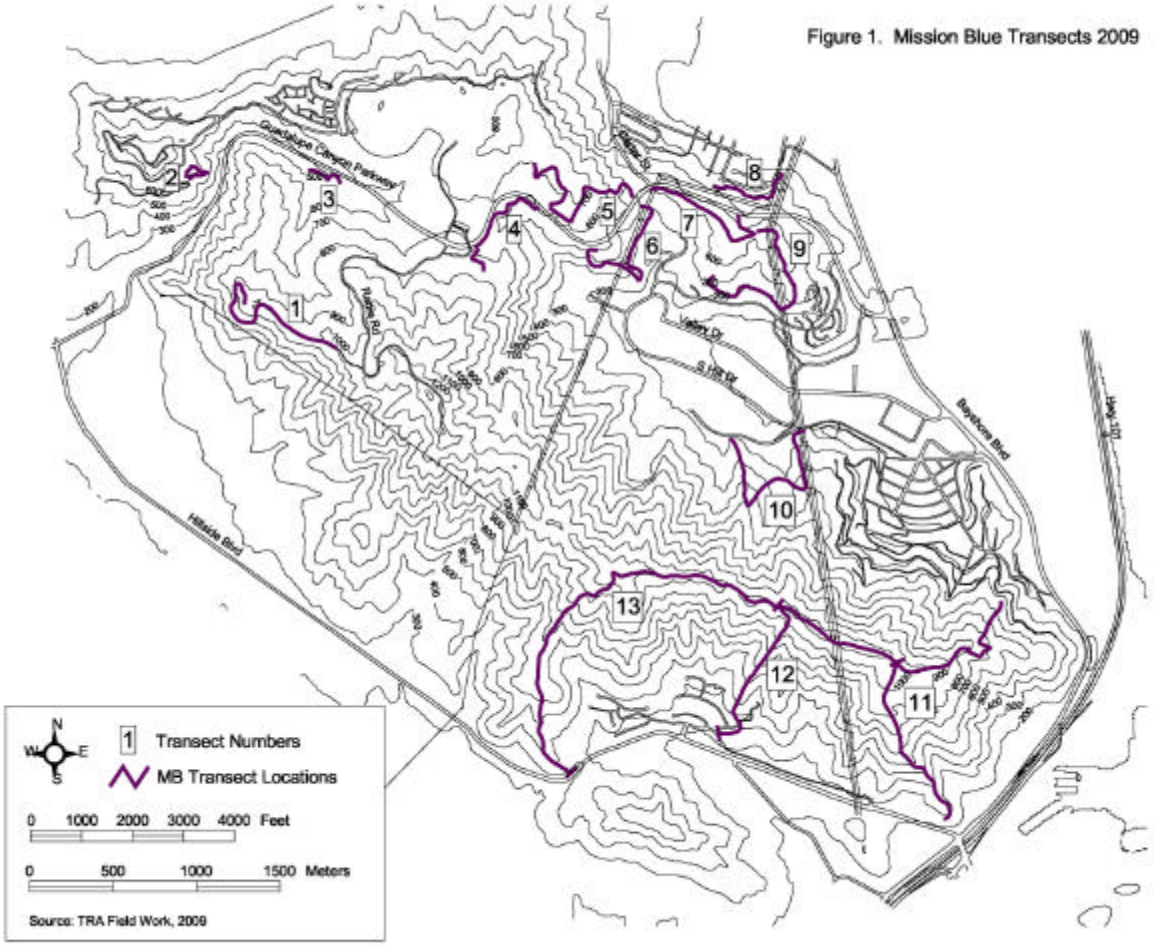

Figure 1. Mission Blue Transects

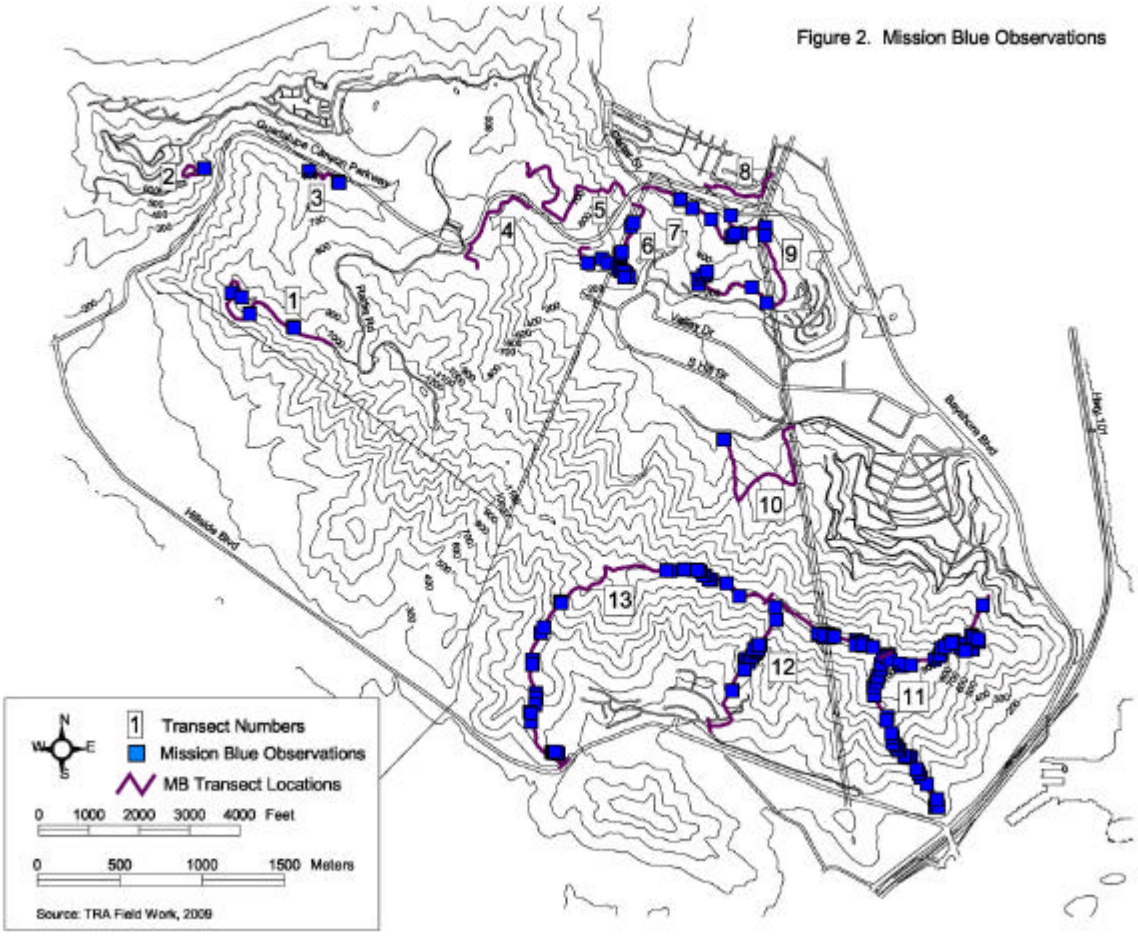

Figure 2. 2009 Mission Blue Observations

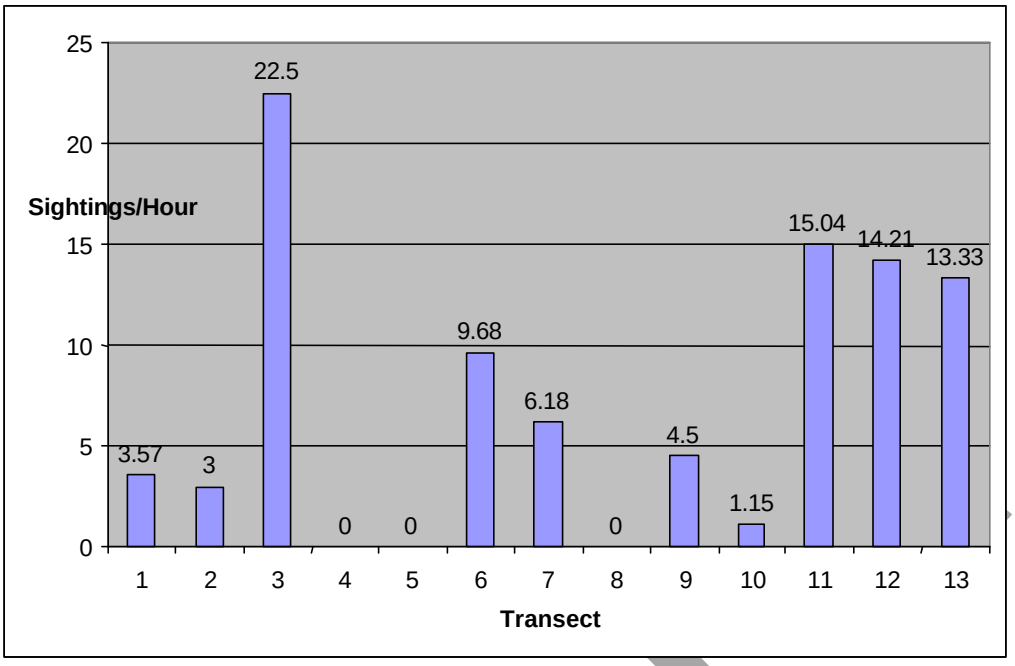

Figure 3. Mean number of MB sightings per hour for each transect in 2009

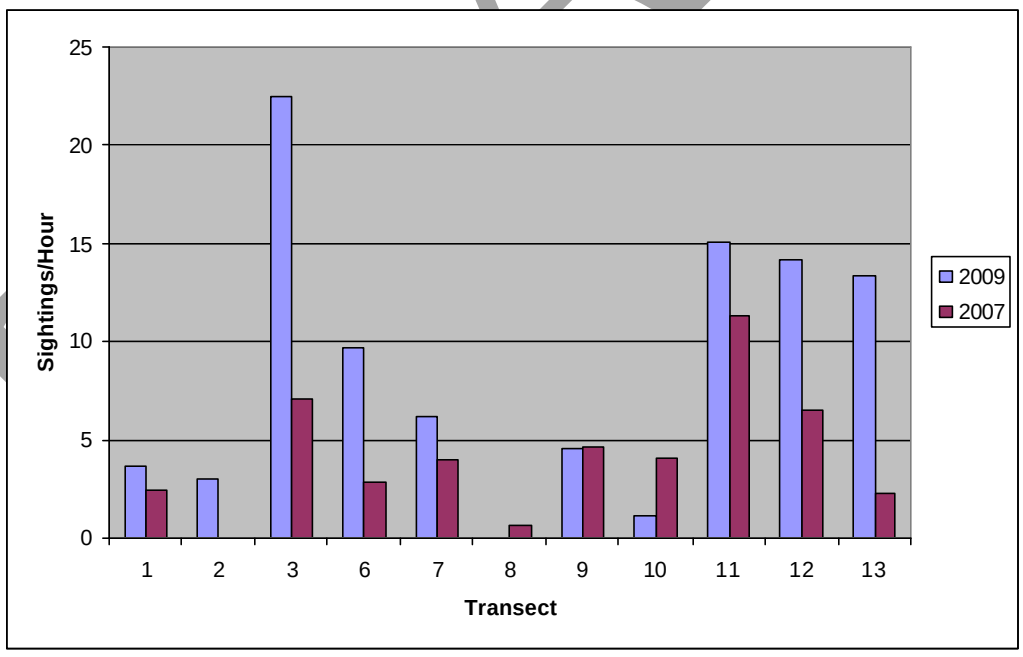

Figure 4. Mean number of MB sightings per hour for select transects, 2007 and 2009 comparison (transects 4 and 5 are not included as these transects were reconfigured in 2009 and thus can not be compared to 2007).

Appendix A. 2009 Mission Blue Summary Data

Transect	Date	MB	Minutes	S/H	Temp	Wind	Notes
1	3/31	1	24	2.50	64	2.6	
1	4/20	3	31	5.81	83	3.8	
1	5/13	1	29	2.07	63	7.0	
	total	5	84	3.57			
2	4/20	1	20	3	79	3.9	
	total	1	20	3			
3	4/20	3	8	22.5	84	3.5	
	total	3	8	22.5			
4	3/31	0	11	0	66	2.4	
4	4/20	0	13	0	88	1.7	
4	5/13	0	13	0	65	4.7	
	total	0	37	0			
5	3/31	0	61	0	65	2.7	
5	4/20	0	41	0	90	3.05	
5	5/13	0	35	0	64	6.2	
	total	0	137	0			
6	3/31	6	29	12.41	66	2.5	
6	4/20	3	31	5.80	88	3.9	
6	5/13	6	33	10.91	65	1.9	
	total	15	93	9.68			
7	3/31	1	30	2.0	69	1.3	
7	4/20	3	19	9.47	82	1.0	
7	5/13	3	19	9.47	67.5	7.0	
	total	7	68	6.18			
8	3/31	0	15	0	64	1.1	
8	4/20	0	15	0	75	3.4	
8	5/13	0	14	0	66	2.5	
	total	0	44	0			
9	3/31	3	58	3.10	71.3	2.2	
9	4/20	3	26	6.92	86	1.5	

Transect	Date	MB	Minutes	S/H	Temp	Wind	Notes
9	5/13	3	36	5.0	70	4.1	
	total	9	120	4.5			
10	4/1	0	41	0	63	5.2	
10	4/20	2	39	3.08	88	1.1	
10	5/12	0	40	0	61	8.6	
	total	2	120	1.15			
11	4/1	9	98	5.51	67	2.7	
11	4/21	49	114	25.79	80	1.4	
11	5/12	24	115	12.52	65	5.5	
	total	82	327	15.04			
12	4/1	8	48	10.0	62	2.0	
12	4/21	19	56	20.36	81	4.0	
12	5/12	9	48	11.25	59	6.0	
	total	36	152	14.21			
13	4/1	6	53	6.79	64	2.6	
13	4/21	18	54	20.0	84	4.0	
13	5/12	4	19	12.63	61	7.4	
	total	28	126	13.3			
INC MB	***total***	7					***Total CS observed: 7***

Appendix B. 2009 Mission Blue Raw Data

DATE	TRANSECT	SEX	CONDITION	BEHAVIOR
5/12/09	12	M	F	S
5/12/09	12	M	W	S
5/12/09	12	M	W	S
5/12/09	12	M	?	T
5/12/09	12	F	B	S
5/12/09	12	M	F	S
5/12/09	12	F	W	S
5/12/09	12	F	W	S/R
5/12/09	12	M	F	S
5/12/09	13	M	W	R
5/12/09	13	F	B	R
5/12/09	13	F	B	R
5/12/09	13	M	W	S
5/12/09	11	?	?	S
5/12/09	11	?	?	S
5/12/09	11	F	B	R
5/12/09	11	M	F	R
5/12/09	11	M	?	S
5/12/09	11	M	?	S
5/12/09	11	M	?	S
5/12/09	11	F	F	R
5/12/09	11	F	B	R
5/12/09	11	M	?	S
5/12/09	11	M	W	R
5/12/09	11	M	W	R
5/12/09	11	M	B	R
5/12/09	11	F	B	R
5/12/09	11	M	B	R
5/12/09	11	?	?	S
5/12/09	11	M	F	R
5/12/09	11	M	W	R
5/12/09	11	F	B	R
5/12/09	11	M	W	R
5/12/09	11	?	?	S
5/12/09	11	?	?	S
5/12/09	11	F	W	R
5/12/09	11	F	W	T
5/13/09	6	F	S/R	F
5/13/09	6	M	S	?
5/13/09	6	M	S	F
5/13/09	6	M	S/R	F
5/13/09	6	M	S/R	F

DATE	TRANSECT	SEX	CONDITION	BEHAVIOR
5/13/09	6	M	S	W
5/13/09	7	F	R/N	F
5/13/09	7	F	S	?
5/13/09	7	M	S	F
5/13/09	9	M	S	?
5/13/09	9	F	R	B
5/13/09	9	F	R	W
5/13/09	1	?	T	?
4/1/09	12	?	T	F
4/1/09	12	F	S	F
4/1/09	12	F	S/R	W
4/1/09	12	F	R	F
4/1/09	12	F	R/S	F
4/1/09	12	F	R/S	F
4/1/09	12	F	S	F
4/1/09	12	F	S/N	F
4/1/09	13	F	S/R	B
4/1/09	13	M	S	F
4/1/09	13	F	S/R	F
4/1/09	13	M	S	F
4/1/09	13	F	R	F
4/1/09	13	F	S/R	W
4/1/09	11	?	R	F
4/1/09	11	?	?	?
4/1/09	11	?	?	?
4/1/09	11	?	?	?
4/1/09	11	?	?	?
4/1/09	11	?	?	?
4/1/09	11	?	R	W
4/1/09	11	?	?	?
4/1/09	11	?	R	F
3/31/09	7	M	?	?
3/31/09	9	M	N	F
3/31/09	9	M	N	F
3/31/09	9	M	N	F
3/31/09	1	?	T	F
3/31/09	6	M	F	S/R
3/31/09	6	M	?	S
3/31/09	6	M	F	S
3/31/09	6	F	F	S/R
3/31/09	6	F	F	S/R
3/31/09	6	M	W	S
4/20/09	7	F	F	R/N
4/20/09	7	F	?	S

DATE	TRANSECT	SEX	CONDITION	BEHAVIOR
4/20/09	7	M	F	S
4/20/09	7	F	?	S
4/20/09	7	M	B	R
4/20/09	9	M	W	R
4/20/09	9	?	?	T
4/20/09	9	M	F	T
4/20/09	6	M	F	S
4/20/09	6	M	W	S/R
4/20/09	6	M	F	R
4/20/09	1	?	F	R/S
4/20/09	1	?	F	R/S
4/20/09	1	?	F	S
4/20/09	3	?	F	S/N
4/20/09	3	M	B	S/R
4/20/09	3	M	F	S
4/20/09	10	M	F	S/R
4/20/09	10	M	F	S
4/20/09	2	F	F	R
4/21/09		F	W	S/R
4/21/09	12	M	F	R
4/21/09	12	F	?	?
4/21/09	12	M	?	?
4/21/09	12	M	?	?
4/21/09	12	F	?	?
4/21/09	12	F	?	?
4/21/09	12	M	W	R
4/21/09	12	M	?	?
4/21/09	12	M	F	R
4/21/09	12	?	?	?
4/21/09	12	M	F	N
4/21/09	12	M	F	N
4/21/09	12	F	F	N
4/21/09	12	F	F	T
4/21/09	12	M	F	S/R
4/21/09	12	M	F	S/R
4/21/09	12	?	F	S/R
4/21/09	13	M	F	S/R
4/21/09	13	M	F	S/R
4/21/09	13	M	F	S
4/21/09	13	M	?	S
4/21/09	13	M	F	S
4/21/09	13	F	F	S
4/21/09	13	M	W	S
4/21/09	13	M	?	?

DATE	TRANSECT	SEX	CONDITION	BEHAVIOR
4/21/09	13	F	?	S
4/21/09	13	?	?	S
4/21/09	13	?	W	S
4/21/09	13	?	F	S
4/21/09	13	M	?	T
4/21/09	13	F	?	S
4/21/09	13	M	?	S
4/21/09	13	M	?	S
4/21/09	13	F	?	S
4/21/09	13	F	?	T
4/21/09	13	?	F	S
4/21/09	11	M	F	S
4/21/09	11	M	?	T/S
4/21/09	11	F	?	T/S
4/21/09	11	?	W	S
4/21/09	11	?	F	S/R
4/21/09	11	?	F	S
4/21/09	11	?	W	R
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	W	S/R
4/21/09	11	?	W	S/R
4/21/09	11	?	F	S
4/21/09	11	?	?	S
4/21/09	11	?	F	S
4/21/09	11	?	?	T
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	W	S
4/21/09	11	F	?	T
4/21/09	11	?	?	S

DATE	TRANSECT	SEX	CONDITION	BEHAVIOR
4/21/09	11	?	F	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	F/W	S
4/21/09	11	?	?	?
4/21/09	11	?	?	S
4/21/09	11	?	B	N
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	11	?	?	S
4/21/09	12	?	?	S

KEY: F: wings are fresh; W: wings are worn; B: wings are battered; R: resting; S: searching; T: traveling; N: nectaring; ?: observation was too quick to determine sex or condition.