Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program

Delhi Sands Flower-loving Fly (*Rhaphiomidas terminatus abdominalis*) Survey Report 2005

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NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June of 2004. The Biological Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public and the Wildlife Agencies (i.e. the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP Species Objectives for each Covered Species, the MSHCP information needs identified in Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

The primary preparer of this report was the Field Crew Leader, Adam Malisch. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the Western Riverside County Regional Conservation Authority (RCA). For further information on the MSHCP and the RCA, go to www.wrc-rca.org

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INTRODUCTION

The Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*; "DSF") is federally listed as endangered and is restricted to three Core Areas within the MSHCP Conservation Area. Species Objective 2 for DSF states that "within the MSHCP Conservation Area, Reserve Managers shall document successful reproduction at all three Core Areas ... once a year for the first five years after permit issuance" (Dudek & Associates2003). Documentation of successful reproduction is defined as "the presence/absence of pupae cases or newly emerged (teneral) individuals". Because the natural history of DSF is not satisfactorily understood, and because little is known about population densities and trends (U.S. Fish and Wildlife Service 1997) several additional survey goals have been added by the Biological Monitoring Program.

Survey Goals

A) Document successful DSF reproduction at Core Areas.
B) Develop, test, and refine surveying protocol for teneral and adult DSF within the Plan area.
C) Develop a measure of adult DSF detectability during flight season and an estimate of the density of adult DSF within the Core Areas.
D) Provide data regarding DSF resource selection and important distribution covariates.

METHODS

Protocol Development

The protocol used for surveys in 2005 was modified from the U.S. Fish and Wildlife Service's (USFWS) Interim General Survey Guidelines for the Delhi Sands Flower-loving Fly dated July 1997. Protocol adjustments were made to specifically address the above survey goals, rather than focusing on the USFWS's goal of providing a credible method for determining DSF presence-absence at a given site. The main adjustments involve using a line-distance sampling methodology to estimate DSF density and detectability and less emphasis on mapping habitats on-site.

Personnel and Training

All field observers studied pinned specimens of DSF and co-occurring winged invertebrate species, a DSF-specific training manual prepared by the Biological Monitoring Program, and relevant invertebrate field guides. Karin Cleary-Rose of the USFWS also trained all observers in the field. Emphasis was placed on the ability to recognize DSF using physical morphology and behavior and on the ability to identify all co-occurring winged insects to family. Observers were also trained to identify plant species important to DSF and how to differentiate between adult and teneral individuals. All field observers passed the USFWS Delhi sands flower-loving fly practical exam before participating in field surveys. Surveyors conducting DSF surveys in 2005 included:

- Adam Malisch, Field Crew Leader (Regional Conservation Authority)
- Shirley Bartz (Regional Conservation Authority)
- Rosina Gallego (Regional Conservation Authority)
- Christine Rothenbach (Regional Conservation Authority)
- Ricky Escobar (California Department of Fish and Game)
- Annie Bustamante (California Department of Fish and Game)
- Karin Cleary-Rose (USFWS)

Study Site Selection

The Monitoring Program was only able to survey one of three Core Areas designated by the MSHCP (Teledyne/Jurupa Hills) due to access limitations in 2005. Survey transects in the Mira Loma and Agua Mansa Industrial Center Core Areas or other conserved areas may be established in the future as access becomes available.

Transect Placement

Delhi series soils were previously identified and mapped at the Teledyne site (see USFWS 1997). We initially installed 16 transects within the mapped polygon of appropriate soils on-site, each approximately 30m apart. However, after a brief pilot study we determined that an additional 16 transects spaced between the existing transects were warranted because of low DSF detectability and a desire to increase the survey coverage of the approximately 6 ha site. Therefore, a total of 32 parallel transects were installed by driving wooden stakes approximately every 30 to 40m and flagging several shrubs or grasses between stakes so that surveyors could easily navigate directly between stakes and accurately measure the perpendicular distance between any point on the transect and any DSF observation (Figure 1). The final transects were approximately 15m apart, ranged from approximately 50 to 200m long, and were oriented in a N/NE direction (the direction of transect orientation was randomly selected prior to installation). All transect lengths sum to just over five km.

Survey Methods

Visual encounter surveys using line-distance sampling (Buckland et al. 2001; Buckland et al. 2004) were conducted along transects during appropriate weather conditions, with surveyors walking approximately 0.5 miles per hour. Although, as discussed below, appropriate weather conditions for DSF surveys are not comprehensively known, we conducted surveys in late summer, in the middle of the day, and not during precipitation events. Rarely, thick vegetation (*e.g.*, *Prunus ilicifolia* or *Rhus trilobata*) prohibited surveyors from walking directly on-transect and in these situations the impenetrable section of the transect was marked with flagging, the surveyor walked around this section, and the impenetrable section of the transect was excluded from the survey.

The USFWS protocol dictates that surveys be conducted between 1000 hrs and 1400 hrs to provide some standardization for environmental conditions under which surveys are conducted. However, some DSF surveys in 2005 extended beyond this time range because, along with date and time, the primary determinants of DSF activity are likely to be environmental

factors (temperature, cloud cover, etc.) and the appropriate ranges of these conditions during which to conduct surveys are not satisfactorily understood. The only way to gain further insight into the complete range of environmental conditions under which DSF can be observed is to expand the range of survey conditions. The coordinates of all DSF observed during the survey were recorded with a GPS unit. DSFs incidentally detected between surveys were also recorded but were not included in the detectability or density analyses.

Data collected at the start of a survey included: date, observer, time, general weather description, temperature in shade at 1m above ground, average wind speed, and cloud cover (see Appendix A). Surveyors recorded the families of co-occurring winged insect species encountered as the survey progressed. Time, general weather description, temperature in shade at 1m above ground, average wind speed, and cloud cover were also recorded one hour after the survey began, two hours after the survey began, etc. until the survey was complete, and the same data were collected at the end of a survey. Data collected when DSF was encountered included: the perpendicular distance from the original sighting location to the transect, the coordinates of the original sighting, time, sex, activity, whether or not the individual was teneral, and any other relevant notes. DSF surveys in 2005 were conducted between 19 August and 1 September.

Because we are interested in the resource selection patterns of DSF, we conducted vegetation surveys using a Relevé method at DSF observation locations. Relevés (CNPS 2002) were only conducted at observation locations made during surveys because we wanted all habitats to have an equal chance of representation and because incidental DSF observations are considered of lesser quality than focused survey data as the methods are not repeatable and only positive data are recorded. The vegetation sampling involved demarcating a 100 m^2 plot centered on DSF observation locations. We estimated the percent cover of trees, shrubs, grasses/forbs, litter, bare ground, rock, and dead standing vegetation (see Appendix B). All plants were identified to species and each species' percent cover of the plot was estimated. If on-site identifications were not possible, the minimum amount of plant material necessary for later identification was collected. Additional notes regarding disturbances on-site or further relevant information not collected during the standard Relevé procedure were recorded. The Relevé protocol we used is described more completely in the Rapid Vegetation Assessment Protocol (Appendix C).

Data Analysis

Raw data were entered into the MSHCP Biological Monitoring Program DSF Monitoring Excel database. Because of the extremely small sample size of DSF detections during surveys in 2005, no statistical analysis was appropriate. A larger dataset should allow us to estimate DSF's detection probability and density in 2006.

RESULTS

DSF transects at the Teledyne site were surveyed on eight separate days in 2005. Six adult DSF observations were made during field surveys in 2005 (Table 1). Because these observations occurred on three separate days, it is unknown whether these six observations represent six individuals, or fewer individuals observed repeatedly. An additional 16 DSF were

observed during training or preliminary pilot surveys in 2005, including at least one teneral individual at the Teledyne site, for a total of 22 DSF observations (Figure 2). As stated above, the small sample size of DSF observations in 2005, especially during surveys, precludes a valid analysis of detectability, density, resource selection, or observation covariates. However, these data will be saved and used in subsequent analyses after additional data are collected.

DISCUSSION

The first year of DSF monitoring by the Biological Monitoring Program was not expected to fully achieve all long-term goals, but to serve as a starting point for data collection in an adaptive context. We refined the USFWS's existing DSF protocol, documented several DSF observations at one Core Area, met the species objective for this site by confirming the presence of at least one teneral individual, and collected DSF resource selection data along with observation covariates. These preliminary data collection efforts were a good first step toward answering important questions about this endangered species. Most importantly, we established a survey protocol that can be used in future years to address several fundamental questions about the ecology of DSF.

REFERNCES

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., Borchers, D.L. and Thomas, L. 2001. Introduction to Distance Sampling. Oxford University Press, Oxford.

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Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSHCP, Volumes I and II. Prepared for County of Riverside Transportation and Lands Management Agency. Prepared by Dudek & Associates, Inc. Approved June 17, 2003.

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Table 1. Delhi Sands flower-loving fly observation coordinates in 2005.

Waypoint Name	Observation Method	Zone	Easting	Northing	Observation Date
DSF01	Survey	11S	457166	3765891	8/19/05
DSF02	Survey	11S	456982	3765909	8/25/05
DSF03	Survey	11S	457162	3765898	8/26/05
DSF04	Survey	11S	457126	3765923	8/19/05
DSF05	Survey	11S	456976	3765872	8/25/05
DSF06	Survey	11S	456981	3765903	8/25/05
ZDSF1	Incidental	11S	456894	3765898	8/9/05
ZDSF10	Incidental	11S	456984	3765908	8/9/05
ZDSF11	Incidental	11S	457042	3765946	7/20/05
ZDSF12	Incidental	11S	456933	3765979	7/14/05
ZDSF13	Incidental	11S	457153	3765914	8/9/05
ZDSF14	Incidental	11S	457005	3765904	7/20/05
ZDSF15	Incidental	11S	456912	3765915	7/20/05
ZDSF16	Incidental	11S	456954	3765968	7/20/05
ZDSF2	Incidental	11S	456988	3765976	7/18/05
ZDSF3	Incidental	11S	457019	3765951	7/18/05
ZDSF4	Incidental	11S	457174	3765864	8/9/05
ZDSF5	Incidental	11S	457231	3765817	8/9/05
ZDSF6	Incidental	11S	456950	3765913	7/20/05
ZDSF7	Incidental	11S	457118	3765923	7/18/05
ZDSF8	Incidental	11S	457086	3765940	7/20/05
ZDSF9	Incidental	11S	456927	3765957	7/14/05

Location coordinates are in UTMs, datum = NAD83.

Survey observations were obtained during line-distance study at the Teledyne site in 2005.
Incidental observations were obtained during training or pilot studies at the Teledyne site.

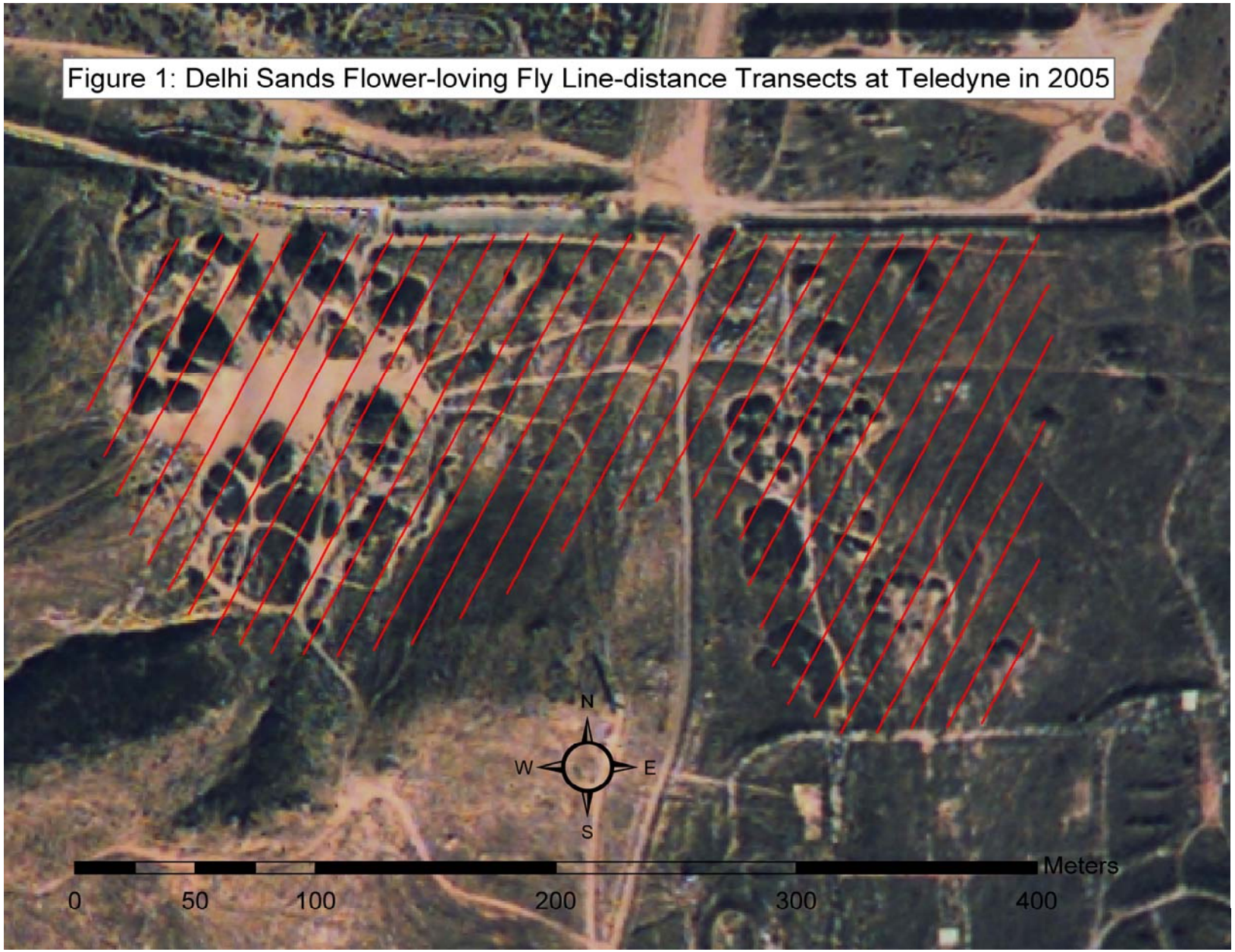
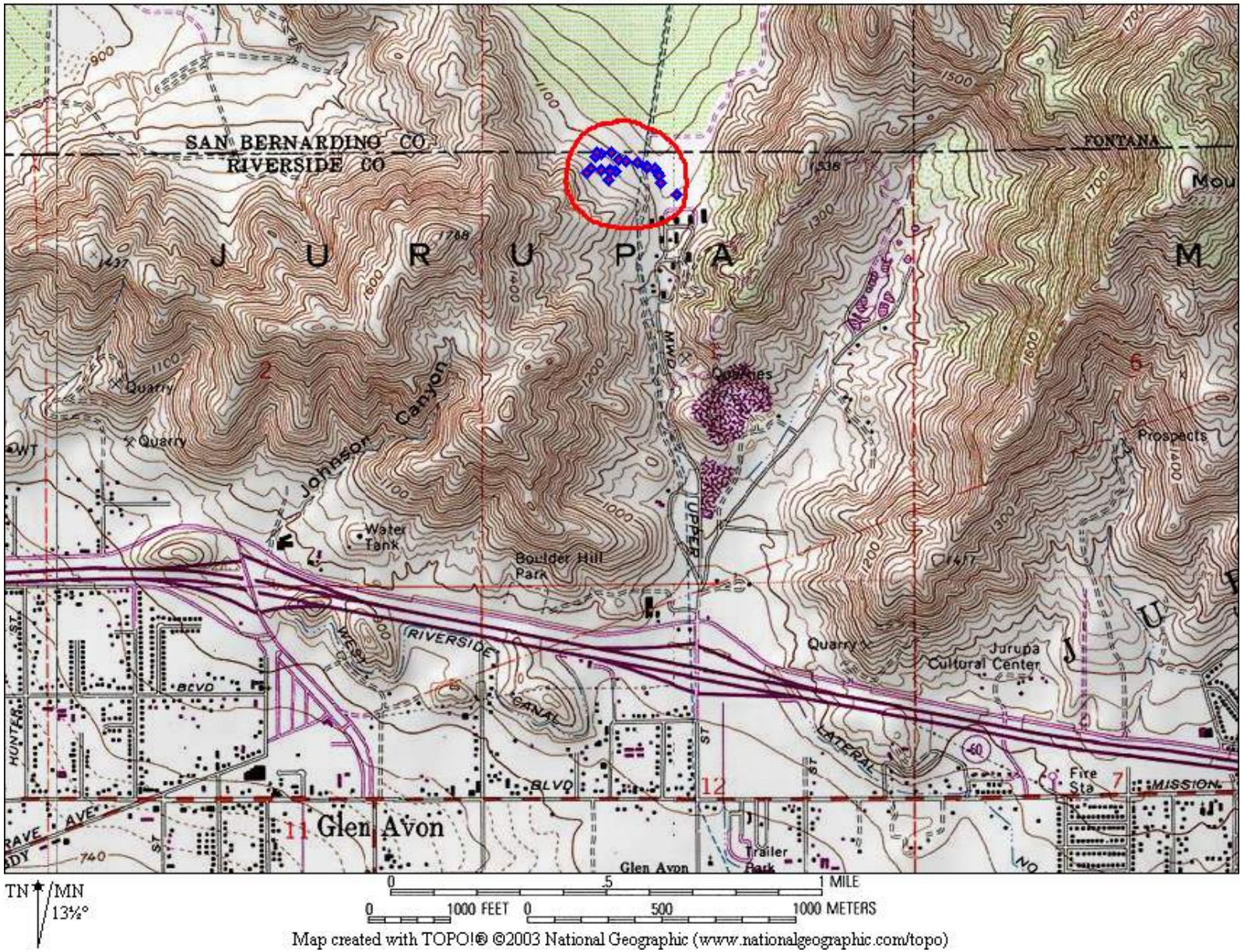


Figure 1: Delhi Sands Flower-loving Fly Line-distance Transects at Teledyne in 2005
N
W
E
S
Meters
0
50
100
200
300
400

Figure 2: Delhi Sands Flower-loving Fly Observations at Teledyne in 2005



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Appendix A:

Date _____ **Delhi Sands Flower-loving Fly** **Teledyne** _____ Data Entered/Data Proofed

Observers

Time	Temp ºC	Avg Wind*	Weather**	Cloud Cover***
Start : _____				
Hour 1: _____				
Hour 2: _____				
Hour 3: _____				
Hour 4: _____				
End : _____				

* mph

** general description

*** 0, 1-20, 21-40, 41-60, 61-80, 81-100

Activities/Behaviors

Perched: indicate substrate

Interspecific Interaction: describe interaction

Intraspecific Interaction: describe interaction

Nectaring: record plant species, or take sample

Oviposition: *describe site, record soil temp!!!*

Cruising

Mating

Age Code

1: fuzz entirely covers dorsal thorax = teneral (note wing margin wear)

2 : fuzz covers ≥ half dorsal thorax (note wing margin wear)

3 : fuzz covers < half dorsal thorax (note wing margin wear)

Transect #	Distance	UTM East	UTM North	Time	♀ or ♂	Activity	Age Code	Notes

Appendix B:

Rapid Vegetation Assessment			
Site ID:	Name(s):		Date:

Dominant Layer: Grass/Forb Shrub Tree (circle one)

	Species	Corrected ID	Cover Class	%Cover
Trees				
Shrubs				
Grasses/Forbs				

Litter:_____
Bare Ground:_____
Rock:_____
Dead Standing Veg:_____

Notes: Disturbance, Site Characteristics, et cetera

Total Vegetation Cover:
Total % Cover Grasses/Forbs:_____ Shrubs:_____ Trees:_____
Litter:_____ Bare Ground:_____ Rock:_____
Dead standing vegetation:_____
CoverClass: 1 (<1-5%); 2 (5-25%); 3 (25-50%); 4 (50-75%); 5 (75-100%)

Appendix C:
Rapid Vegetation Assessment Protocol

The purpose of the rapid assessment is to establish certain vegetation parameters for correlation with the presence of the Delhi Fly. The vegetation sampling will employ the "Relevé" method, which is suitable to the rapid assessment of large areas (California Native Plant Society 2002).

The sampling areas will be square quadrats measuring approximately 100 m^2. This can be achieved by running a meter tape through the predetermined point a total length of 14 m. That amounts to 7 m in either direction, with the midpoint (at 7 m) lying on the point at which the sampling is to occur. The lines should be laid out in the cardinal directions. Thus, from the midpoint, a flag or other marker would be placed 7m to the north, 7m to the south, 7m to the east, and 7m to the west. The 14m lines are actually the diagonals of the square. Generally, in a Relevé, only the 4 corners are laid out, though if it is helpful, a tape could be laid along the perimeter to facilitate ease of estimation.

Within each ~100 m^2 quadrat, species diversity will be noted and the percent cover will be estimated. Please review the California Native Plant Society guidelines for estimating percent cover.

1. Enter a unique identifier for the Site ID. Enter names of surveyors, and the date of the survey.
2. Choose the dominant layer, and circle either grass/forb, shrub, or tree. This is the most basic estimate of cover, and should be obvious upon approaching the site.
3. Next you will list the species present in the species column according to their life-form: tree, shrub, or grass/forb. The basic way to separate these, is that if it has woody growth, it is a shrub or a tree. If it has a trunk, it is a tree. If you are uncertain of what the plant is, enter a number that uniquely identifies it with a collection. After you have had someone identify the plant, you can enter the correct identification in the "Corrected ID" column. This list does not need to be exhaustive. The method is intended to maximize usable data within limited time. Generally the species that are most abundant are worthy of note. Those that require some searching do not need to be included. Include a percent cover estimate for litter, bare ground, and rock.
4. Include any additional observations under notes.
5. Lastly, summarize the total vegetation cover, as well as the total vegetation cover by class (classes are listed on the bottom of the data sheet). The total vegetation cover cannot exceed 100%. However, the sum of the total % cover from each individual class may well be over 100%. (Think in terms of a birds eye view, stripping away each layer as you go. In an oak woodland, you might have 60% from the trees. Stripping this away, you might have 40% shrubs, and lastly 70% herbaceous vegetation. This obviously exceeds 100%. Nevertheless, the total vegetation cover may still be *less than* 100%, especially in the case of some small scale disturbance, or patch of bare ground).

***** Additionally, the total % cover for any of the vegetation classes may or may not be the sum of the percent covers assigned above. It is possible that a quadrat may contain 30% *Encelia farinosa* and 30% *Eriogonum fasciculatum.* If there is no overlap (i.e. if the shrubs are spread

out) the total vegetation cover may be 60%. However, in the case that they are all aggregated or clustered in one area, and there is substantial overlap (intertwined branches/dense shrub layer), there may only be a total shrub layer cover of 50%. Perhaps this will be clearer if you think that within the class "shrub," the height is not uniform, and there may be a tendency for a species to shade or dominate another species, leading to overlap. Think absolute percentages in terms of each individual species. The percent cover from the last column can exceed 100% within each class (tree, shrub, forb), yet the total cover for vegetation and for each individual class (on the bottom of the page) cannot exceed 100%.