EBMUD Alameda Whipsnake Trapping Effort:

Siesta Valley 2013 – 10(A)1(A) Permit Report

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Introduction

The East Bay Municipal Utility District's (EBMUD) mission is, "To manage the natural resources with which the District is entrusted; … and to preserve and protect the environment for future generations." The Districts commitment to environmental protection was demonstrated by the implementation of the EBMUD Low Effect East Bay Habitat Conservation Plan (HCP) in June 2008. The HCP identifies the conservation of the Alameda whipsnake (*Masticophis lateralis euryxanthus*) (AWS) and its habitat as a long-term management goal for the District. The California Department of Fish and Wildlife designated the Alameda Whipsnake as a threatened species on June 27, 1971. The Alameda whipsnake was federally listed as threatened on December 5, 1997 and a draft recovery plan for Chaparral and Scrub Community Species was published in November 2002 (USFWS 2002). As part of implementation of the HCP, key AWS habitat on EBMUD East Bay watershed lands has been delineated and mapped so that existing habitat may be maintained for species conservation.

The Alameda whipsnake is a slender, fast moving diurnal snake with a distinct yellow orange stripe down each side. AWS habitat consists of a mosaic of coastal scrub and chaparral community patches embedded within a matrix of other vegetation communities in the East Bay landscape (Swaim 1994 and 2001). The scrub/chaparral communities most often associated with the species are Diablan sage scrub, northern coyote brush scrub, and chamise chaparral (Swaim 1994 and 2010). Scrub and chaparral habitat communities are essential for providing the space, food, and cover necessary to sustain all life stages of the Alameda whipsnake (USFWS 2006). Low growing open shrub communities provide cover for predator avoidance and a variety of microhabitats optimal for snake thermoregulation. Primary constituent elements (known physical and biological features essential to the conservation of the species) for the Alameda whipsnake include (1) scrub/shrub communities with a mosaic of open and closed canopy, (2) woodland or annual grassland plant communities contiguous to lands containing scrub/shrub communities with a mosaic of open and closed canopy, and (3) lands containing rock outcrops, talus and small mammal burrows within or adjacent to (2) and/or (3) (USFWS 2006).

Alameda whipsnake telemetry and trapping studies have indicated that the highest frequency of use is within and adjacent to patches of scrub and chaparral communities but the species also utilizes grasslands and open woodlands (Swaim 1994). Grassland and riparian areas adjacent to scrub habitat provide important movement and connection corridors and may be part of an individual's home range (Swaim 1994). Studies conducted by Swaim (1994 and 2010) have found that areas of concentrated use occur on slopes with aspects between 90 and 270 degrees; however, snakes used all aspects within their home ranges to move between scrub patches, disperse and forage. Alvarez (2005 and 2006) also documented the use of all slope aspects by compiling data gathered from whipsnake sightings throughout the East Bay.

In 2009, EBMUD biologists contracted with Swaim Biological and WRA Environmental Consultants to accurately map vegetation cover types on EBMUD watershed lands (Figure 1). The purpose of the mapping effort was to use remote sensing to delineate scrub and chaparral communities, which have the highest expected frequency of use by AWS based on previous research. These communities are used as a surrogate for core AWS habitat for the purpose of

HCP analysis. This definition of core habitat emphasizes the importance of scrub and chaparral communities as a central component to an individual's home range, but does not capture all types of habitat that may be essential to the species long term perpetuation. Verification is necessary to determine to what extent the 3,737 acres delineated as core habitat are utilized by AWS.

The distribution of AWS on watershed lands is largely unknown and sampling is necessary to determine whether species presence correlates with the mapped core habitat areas. The long term goal of the research is to sub-sample areas identified as core habitat patches on EBMUD watershed lands to determine whether the initial habitat analysis correlates with AWS habitat utilization. A pilot study was initiated in 2012 to implement and refine a methodology for AWS sampling. The primary goal of the pilot study was to detect AWS presence using proven trapping techniques. The trapping methodology developed for the pilot study was used to successfully capture four AWS in 2012. These methods will be repeated for the remainder of the multi-year research study.

Purpose:

Research in 2013 focused on the presence/absence of AWS within HCP designated core habitat within the Siesta Valley that is actively managed by EBMUD for fire fuel reduction. In addition to validating the habitat map, research in 2013 and 2014 (or 2015) will attempt to determine the impact of vegetation thinning and removal on AWS habitat utilization. Per EBMUD's Fire Management Plan (FMP), hazardous trees and understory ladder fuels are thinned or removed along the urban interface to reduce the risk of catastrophic fires by providing defensible space for firefighting activities. The Siesta Valley Site is a high priority for EBMUD fuels reduction because of its proximity to the Berkeley Hills communities and public infrastructure. To determine the impact of fire prevention activities on the species, the Siesta Valley site will be sampled before and after vegetation removal to see if a change in AWS habitat utilization can be detected.

Site Description

Alameda whipsnake trapping was conducted in Siesta Valley located between Highway 24 and Grizzly Peak Road, approximately ¾ of a mile northwest of the California Shakespeare Theater. This site was chosen because: 1) it was identified in the EBMUD HCP AWS Core Habitat Map as providing suitable habitat; 2) there were past AWS observations in the study site and; 3) fuel reduction activities are scheduled to occur within the site.

Siesta Valley is located on the east side of the Berkeley Hills, just north of the Caldecott Tunnel (Figure 2). The Siesta Valley Watershed has a Mediterranean climate that is characterized by annual fluctuations of 50% or more in rainfall with 90% of all rain in a given year falling from October to April. Average annual rainfall for the area is 21" and summer temperatures average 48 degrees to 74 degrees (Western Region Climate Center, 2012). Hiking and horseback riding is permitted on the trails surrounding the study site however these activities are prohibited on the 1 1/4 mile fire road that bisects the site. The Siesta Valley watershed is made up of many different vegetation series with California annual grassland, coast live oak woodland, coyote scrub and mixed hardwood series being the most abundant. Vegetation at the Siesta Valley site consists of

six different vegetation alliances: Umbellularia californica, baccharis piluaris, Quercus agrifolia, Eucalyptus globulus, Stipa pulchra and Bromus hordaeceus. Elevation ranged from 1200-1600 ft within the 21.6 acre site. Soil within the site is classified as a well-drained Gilroy clay loam (USDA,2012).

Methods

Trap Design

Funnel traps and drift fences were used in a 2-arm array design to determine the presence or absence of AWS within the study site. Funnel trap arrays are commonly used in surveys that target highly mobile snakes over large areas (Reptile Biodiversity, 2011).

The funnel traps used were a modified version of those developed by Fitch and consists of an 18” X 12” X 12 1/2” wooden box frame lined on the outside with 1/8” hardware cloth (Swaim,1994). On one of the 12” X 12 ½” faces, two funnels, made out of 1/8” hardware cloth, were sewn into the trap. Each funnel was 24” long with the small opening measuring 1 ½” in diameter and the large opening measuring 12” in diameter. The funnels were mounted 1” apart from each other and parallel to the ground with the narrow end extending 4” into the trap box. A small flap of clear vinyl was attached over the small end of the funnel to allow entry but to prevent escape from the trap. A fully removable lid, held in place by a small bungee cord, was placed over the top of the trap box to facilitate the easy removal of any specimen caught. To prevent weather related mortalities and to provide refugia a 16” X 24” plywood cover board was placed on top of the trap box and a 7” X 7” X 1 ½” piece of Styrofoam insulation was placed inside the trap box (Photo #1).

The drift fence component of the trap array acts as a barrier to movement and helps direct species into the funnel traps. Each drift fence was made up of 6-7 sections of 20” X 8’ X 7/32” MDF particle board. The boards were placed end to end and held in place with wooden stakes driven into the ground. The fence boards overlapped each other by approximately 8” on each side and the lower edge of the fence was buried to prevent species from moving in between or under fence boards (Photo #1).

Each trap array consists of 2 funnel traps (4 funnels) and 6-7 fence boards (40-50’). Trap array placement was randomly selected using ArcMap10 software by overlaying an aerial photo of the site with a 94 cell grid-layer, stratified by proposed treatment and non-treatment areas. The arrays were oriented within the randomly selected 100’ by 100’ grid cells to maximize the probability of capture. In all, twenty traplines were installed within the Siesta Valley study site. Of the twenty traplines, ten were installed inside of the proposed fire fuels management area and the other ten were installed outside of the fire fuels management area. After determining the trap arrays location, the drift fence was installed and overhanging vegetation was removed to prevent movement over the fence boards. One funnel trap was placed at each of the terminal ends of the drift fence. The funnel traps were positioned so that one funnel was on each side of the fence. The large ends of the funnels were then stapled to the drift fence for stability and to ensure there were no gaps between the fence and the funnel. A layer of soil was spread over the interior floor of each funnel to make the transition from the ground to the funnel less noticeable. Finally, a

piece of Styrofoam insulation was placed inside the trap and a cover board was placed on top of the trap to provide cover and shelter for trapped species (Photo #1).

Presence/Absence Sampling

The AWS has been shown to have two annual peaks in activity. The most significant activity occurs during courtship and mating between late March and mid-June. A second, but much smaller, peak in activity occurs from August through November when juveniles hatch from eggs laid during the summer of the same year. Trapping was conducted in May and June because past research has shown that presence/absence surveys for AWS are most effective from late-march to mid-June during the greatest peak in activity (Swaim, 1994).

Trap checks were performed daily starting at 2pm to minimize the chance of heat related fatalities. Non-target specimens that were caught were identified, aged and sexed (if possible) prior to their prompt release. AWS specimens were weighed, sexed, marked and measured for total length and snout-vent length. Sexing was accomplished by inserting a blunt tipped probe into the cloaca to identify the presence or absence of a hemipene (Reptile Biodiversity, 2011). Each AWS specimen was marked by clipping a small portion off of a ventral scale. Standard scale clipping protocols and protocols for handling/measuring non-venomous snakes were strictly followed (Reptile Biodiversity, 2011). Scale clippings were retained for genetic testing by Karen Swaim. All captured specimen were released from the funnel traps promptly after data was gathered.

Vegetation Sampling

Baseline vegetation data was collected in November 2013 during the first year of the study, following the trapping effort. Recent aerial photos (2008-2013) were used to identify different vegetation communities within the study site. Polygons were generated in Arcmap10 to delineate vegetation communities by visually determining the relative boundary of adjacent communities at a scale of 1:1000. The vegetation communities within the polygons were then classified, in the field, using the Vegetation Rapid Assessment Protocol (VRAP) and *A Manual of California Vegetation* developed by Sawyer and Keeler-Wolf.

Results

Presence/Absence Survey

Presence/Absence surveys were started in the spring to coincide with AWS peak activity associated with courtship and mating. The trap arrays were activated on the morning of May 6, 2013 and remained open, Monday through Friday, until May 23, 2013. Due to unseasonably low temperatures, trap arrays were deactivated from May 24, 2013 to June 16, 2013 and activated again on June 17, 2013. Traps were activated for another 12 days until their deactivation on the morning of June 3, 2013. Five different AWS were caught during the twenty-six day trapping effort (Table 1). Figure 3 displays the location of captured individuals. AWS captures were distributed relatively evenly throughout the study area with two captures occurring within the proposed vegetation management and three occurring outside of the vegetation management area. In all, 180 individuals representing seventeen different species were caught during the

trapping effort (Table 2). Mortalities were observed in Ensatina, Microtus, Batrachoseps and Sorex species. The high percentage of Ensatina and Batrachoseps mortalities was likely due to desiccation. To prevent such losses in future trapping efforts, wetted sponges will be placed in each of the funnel traps and replenished daily (Reptile Biodiversity, 2011).

Table 1. AWS Capture Results

Mark #	Date of Capture	Trap #	Snout-Vent Length (cm)	Total Length (cm)	Weight (g)	Sex	Age	X (UTM)	Y (UTM)
1	5/20/13	4A	907	935	62	F	adult	6064990.607	2145830.544
2	6/19/13	19B	850	1200	175	F	adult	6066789.100	2145179.585
3	6/21/13	17B	670	965	72	M	adult	6066210.735	2145322.962
4	6/27/13	14A	821	1163	162	F	adult	6065974.668	2145658.406
5	6/30/13	12B	882	1172	182	F	adult	6065902.526	2145627.182

Table 2. Complete Capture Results

Common Name	Scientific Name	Individuals Caught	Mortalities
Alameda Whipsnake	*Masticophis lateralis euryxanthus*	5	0
California Alligator Lizard	*Elgaria Multicarinata Multicarinata*	23	0
California Meadow Vole	*Microtus californicus*	4	1
California Slender Salamander	*Batrachoseps attenuatus*	2	2
Coast Garter Snake	*Thamnophis elegans terrestris*	7	0
Deer Mouse	*Peromyscus sp.*	8	0
Gopher Snake	*Pituophis catenifer catenifer*	11	0
Harvest Mouse	*Reithrodontomys megalotis*	5	1
Northern Pacific Rattlesnake	*Crotalus oreganus oreganus*	3	0
Ring-necked Snake	*Diadophis punctatus*	4	0
Santa Cruz Garter Snake	*Thamnophis atratus zaxanthus*	6	0
Sharp-Tailed Snake	*Contia tenuis*	1	0
Shrew	*Sorex Trowbridgii*	5	4
Western Fence Lizard	*Sceloporus occidentalis*	67	0
Western Yellow-Bellied Racer	*Coluber constrictor mormon*	8	0
Yellow-Eyed Salamander	*Ensatina eschsholtzii xanthopica*	19	18
Wren	*Troglodytes Sp.*	2	0
	Total	**180**	**26**

Vegetation Sampling

The results of the Vegetation Rapid Assessment surveys identified six different vegetation alliances within the site (Figure 2), with the Umbellularia californica forest alliance, Quercus agrifolia wooland alliance and the Baccharis pilularis shrubland alliance representing 86.4% of the surveyed area (Table 3). Much of the baccharis shrubland is in the late seral stage of succession, characterized by mature stands of baccharis with encroaching oak and bay trees.

Table 3. Vegetation Sampling Results

Alliance	Associations	Acres	Percent
Baccharis pilularis	*Avena sp., Pure Stand, Stipa lepida, Toxicodendron diversilobium*	**4.63**	23.1%
Bromus hordeaceus	*Avena sp.*	**2.19**	11.0%
Eucalyptus globulus	*Pure Stand*	**0.27**	1.4%
Quercus agrifolia	*Umbellularia californica*	**5.20**	26.0%
Stipa pulchra	*Stipa pulchra-Avena sp.-Bromus sp.*	**0.24**	1.2%
Umbellaria californica	*Quercus agrifolia*	**7.48**	37.3%
	Total	**20.01**	100%

Discussion

The positive detection of five AWS during the twenty-six day trapping survey suggests that Siesta Valley provides suitable habitat for AWS. The detection of AWS at the site support the trapping methods utilized in the pilot study for future sampling efforts. The standard trapping protocols used by EBMUD biologists proved to be effective at determining the presence/absence of AWS without causing significant impact to the species.

Population estimates cannot be determined from this effort due to the short sampling period and small sampling size, however, the trapping effort indicates that AWS is relatively common at the site.

Vegetation removal at the Siesta Valley site is an ongoing task that is projected to be complete by May 2014. In year two of the study, baseline vegetation surveys collected in year one will be used to compare changes in habitat structure and habitat use, following the completion of fire fuel reduction activities. AWS trapping will be repeated in 2014 or 2015, using the same protocols and trap array locations to determine habitat use post fire fuels reduction.

These sampling results support the EBMUD HCP AWS Core Habitat analysis for the Siesta Valley site. Future trapping efforts will target other locations on district property where AWS presence/absence is unknown.

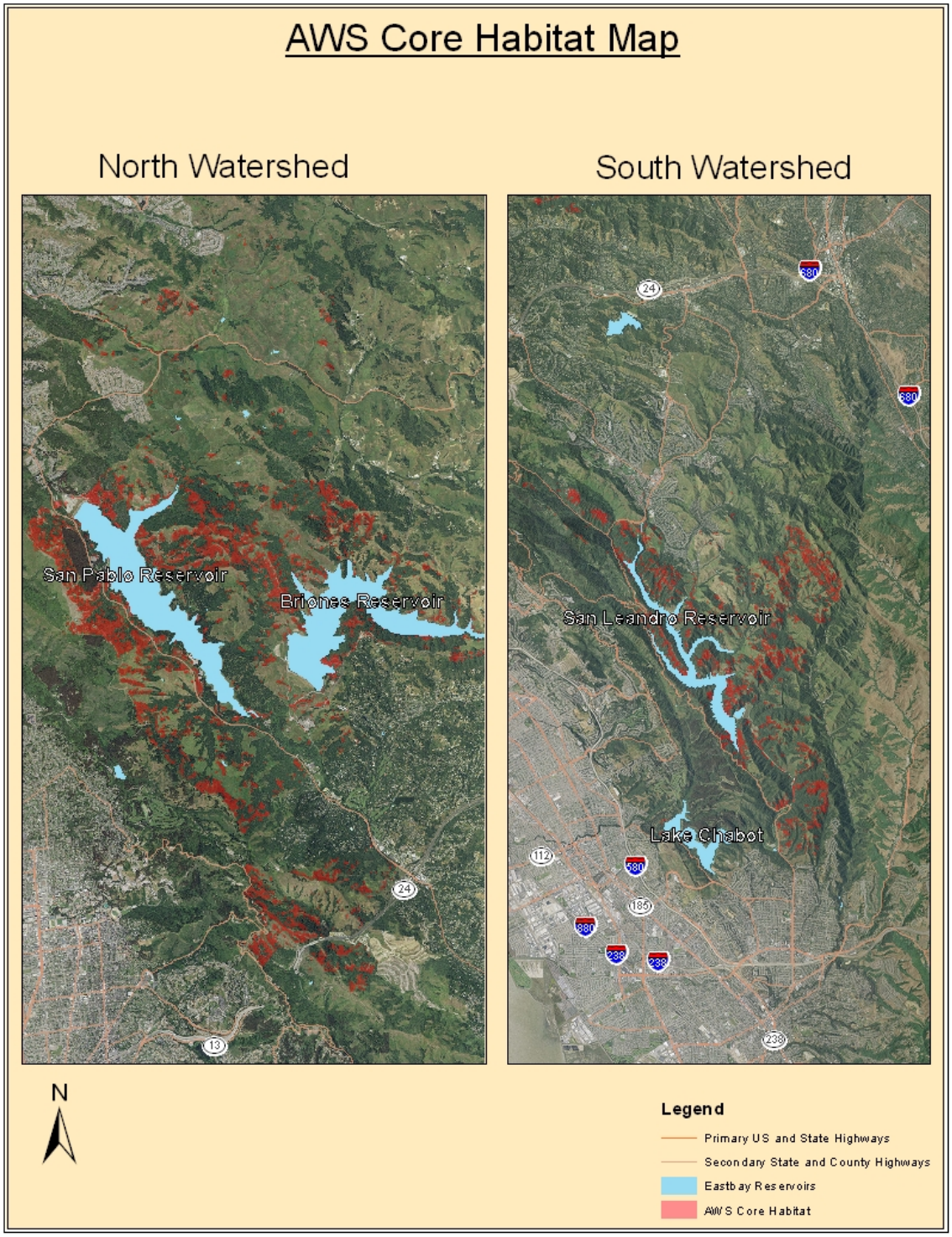

Figure 1. AWS Core Habitat Map

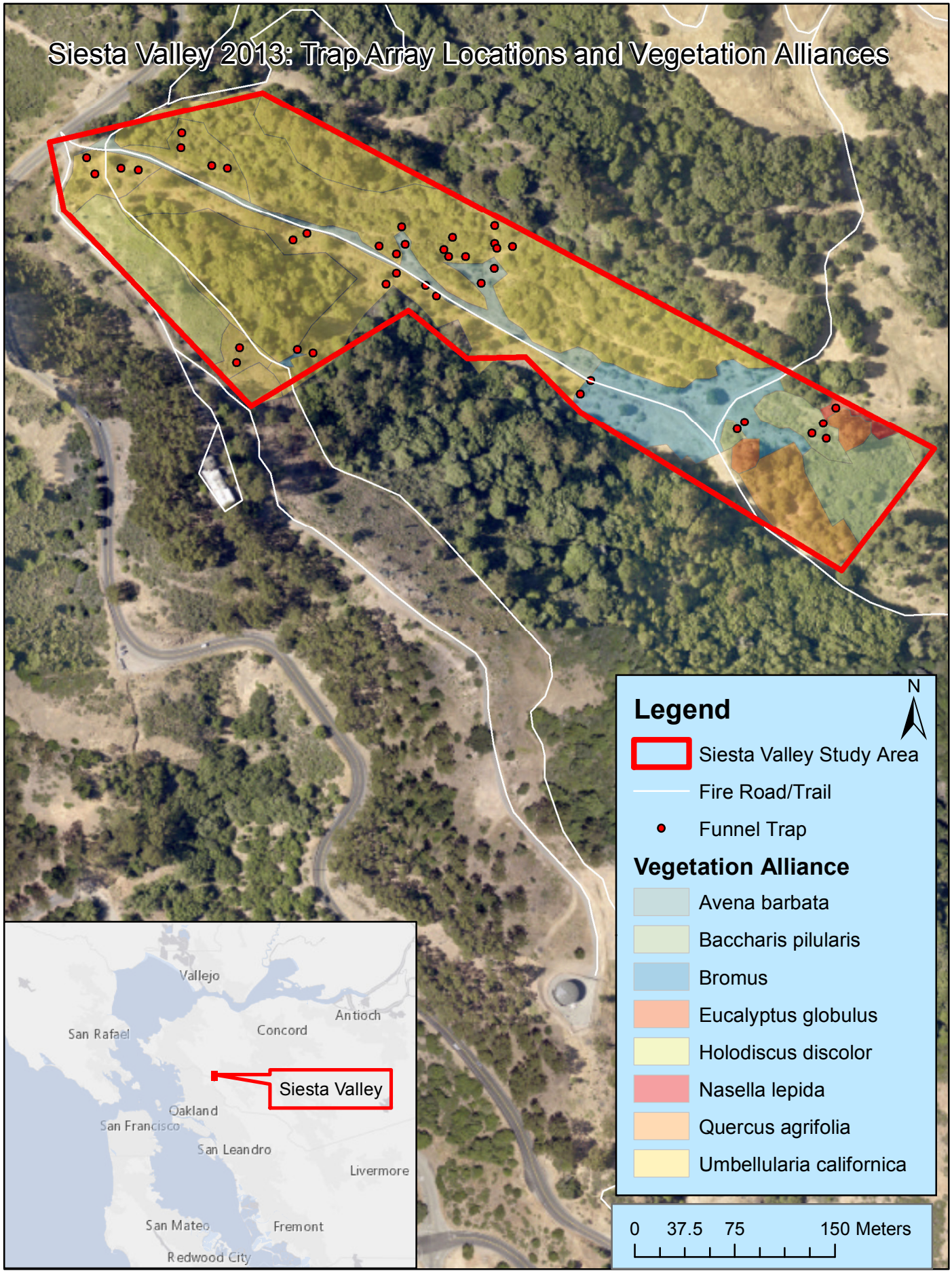

Figure 2. Site Location, Trap Locations, and Vegetation Alliances

Photo 1. Funnel Trap and Trap Array

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