

ATTACHMENT I

Draft Alameda Whipsnake Mitigation and Monitoring Plan

DRAFT:

**TO BE SUBMITTED TO RESOURCE AGENCIES, AS MAY BE REVISED
BY THE CITY COUNCIL, IF THE CITY COUNCIL APPROVES THE
PROJECT**

**ALAMEDA WHIPSNAKE MITIGATION
AND MONITORING PLAN
OAKLAND ZOO CALIFORNIA PROJECT
OAKLAND, CALIFORNIA**

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1.0 INTRODUCTION

1.1 Background

The purpose of this document is to describe a plan to mitigate impacts to the Alameda whipsnake (*Masticophis lateralis euryxanthus*) resulting from the expansion of the Oakland Zoo in Knowland Park, Oakland, Alameda County, California. Presence of the Alameda whipsnake in the project area was documented during focused trapping surveys in 2010 (Swaim Biological 2011), where a single male snake was re-trapped three different times (See Appendix A). The Alameda whipsnake (AWS) is listed as a state and federally threatened species. None of the project site is within the current Critical Habitat for the Alameda whipsnake (U. S. Fish and Wildlife Service, 2006).

This document is intended to serve as the Mitigation and Monitoring Plan (MMP) for the project and partially implements City Planning Commission adopted Mitigation Measure 14C (Appendix B) and the Habitat Enhancement Plan (HEP) (Environmental Collaborative 2011).

The Oakland Zoo is located at the western edge of Knowland Park and has an approved Master Plan that allows the zoo to expand to the east of the existing zoo. The project site (i.e. the expansion area) is located just east of the existing Oakland Zoo and lies within Knowland Park, just east of Interstate 580 at the Golf Links Road intersection. The Oakland Zoo is proposing to expand the Zoo to include a new Veterinary Medical Hospital and a new California Exhibit which will exhibit native California species from the past and present and provide education on conservation of native California species. The California Exhibit is located to the east of the existing zoo and will only be accessed by the public via an aerial gondola. An existing dirt road would be paved to provide emergency and maintenance access to the new California Exhibit (Figure 1).

The project will obtain appropriate authorizations from the resource agencies to address the habitat loss and the incidental take of AWS which will include a Permit for Management of a rare or threatened species pursuant to Fish and Game Code 2081 and Section 7 of the Endangered Species Act, as called for under the City's Standard Condition of Approval (SCA) BIO-10 (see Appendix B). The resource agencies will need to review and approve the MMP during the consultation phase of project planning.

1.2 Project Description

The project sponsor proposes to amend the Master Plan for the Oakland Zoo, which was approved by the City of Oakland in 1998. The proposed Master Plan amendment would refine and make certain changes to the site plan, including (1) replacement of the previously approved loop road and shuttle bus system to transport zoo visitors from the existing zoo to the California Exhibit with an electric aerial gondola people-moving system; (2) reconfiguration of the

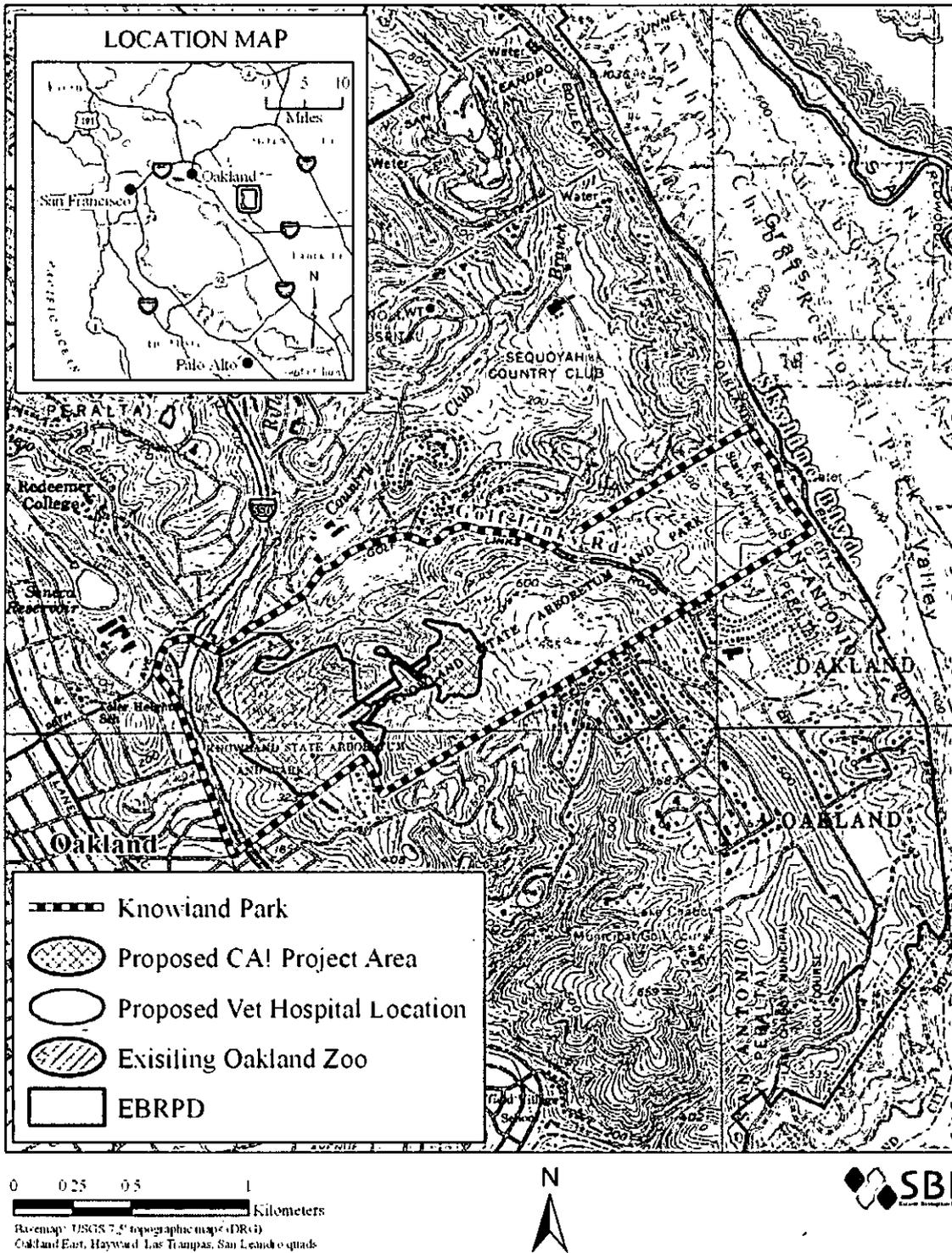


Figure L Project Site Location.

previously approved animal exhibits within the California Exhibit; (3) relocation of the previously approved California Interpretive Center within the California Exhibit area to a site approximately 300 feet northwest of the previously approved location, and redesign of the center; (4) elimination of the previously approved off-site breeding activity, with incorporation of this area into the California Exhibit; (5) replacement of the existing veterinary medical hospital with the construction of a proposed new Veterinary Medical Hospital located immediately to the east of the existing zoo parking lot on a portion of the previously approved California Exhibit area; (6) a new overnight camping area located to the northwest of the California Exhibit area; (7) establishment of the specific location of the proposed perimeter fence with modifications from the previously approved general location; (8) improvement of the existing emergency vehicle access road off Snowdown Avenue; and (9) provision of a public walking path located to the southeast and outside of the California Exhibit to provide public access between existing fire roads and knolls in Knowland Park.

1.3 Vegetation Community Distribution

The distribution of the vegetation communities mapped is shown in Figure 2. A brief description of the community types mapped and brief evaluation of the habitat value/frequency of use by AWS for each community are provided below. Knowland Park is a valuable example of how, under existing conditions in the East Bay, Alameda whipsnake habitat is being lost through natural succession combined with the lack of natural periodic disturbance (e.g. fire).

Grassland (Non-Native and Native)

This grassy vegetation type is dominated by introduced annual grasses and herbs, but continues to support relatively high quality stands dominated by native grasses and forbs. This natural community is being rapidly replaced by non-native French broom scrub in the project area and in other parts of Knowland Park. Needle grass grassland, a natural community, is still a visible component embedded within the non-native grasslands in the project area, but is also under threat of invasion by French broom.

Northern Coyote Brush Scrub

This natural community is dominated by a single species, coyote brush (*Baccharis pilularis*), although several other shrubby species are present, such as poison-oak (*Toxicodendron diversilobum*), bush monkeyflower (*Mimulus aurantiacus*), coffeeberry (*Rhamnus californica*), elderberry (*Sambucus mexicana*), and coastal sagebrush (*Artemisia californica*). Northern coyote brush scrub encroaches into grasslands in the absence of fire or browsing by large herbivores. Knowland Park has not had significant fires or large scale grazing in decades, but goats have been used in recent years in select locations as a method to reduce fire fuel loads and appear to be having some influence on the extent of brush cover. During the trapping survey in fall of 2009 a small fire (1 – 2 acres) burned some brush/grassland habitat north of the project area.

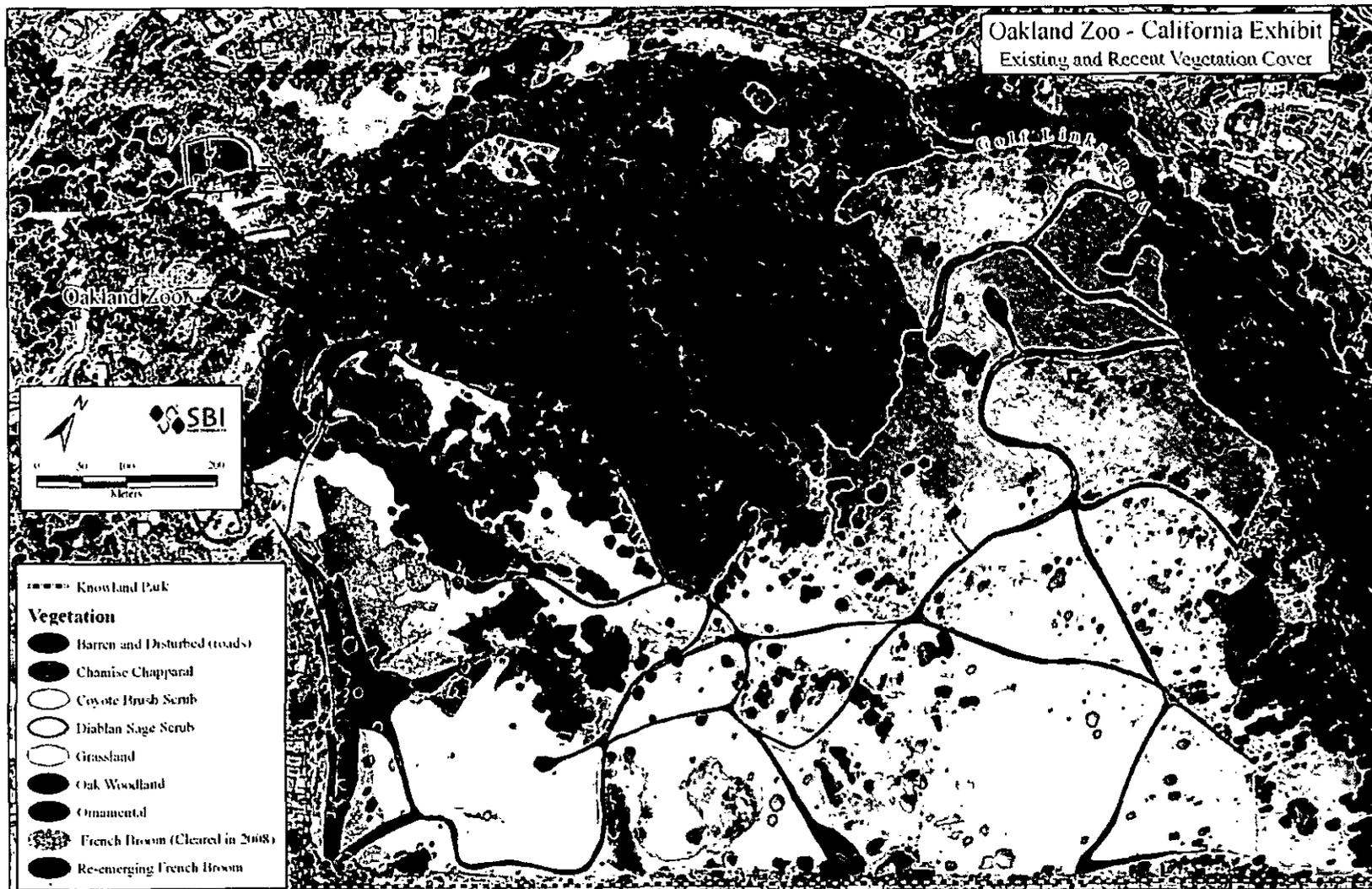


Figure 2. Project Area Vegetative Cover Types.

Natural succession tends to result in coast live oaks (*Quercus agrifolia*) and California bay (*Umbellularia californica*) invading coyote brush scrub in moister sites, deeper soils, and in the absence of other disturbance such as fire and sustained grazing. Northern coyote brush scrub is on many parts of the upper elevations of the site and Knowland Park.

Diablan Sage Scrub

Diablan sage scrub is dominated by coastal sagebrush, poison-oak, bush monkeyflower, and occasional coyote brush. Coastal sage scrub is typically confined to relatively steep, rocky, often south-facing slopes, as it is in the study area. There is much intergradation of Diablan sage scrub and northern coyote brush scrub, since the predominant of one natural community is almost always found in the other, though in lesser amounts. Intermediate or transitional vegetation was mapped as Diablan sage scrub because it is generally a higher quality of habitat for the Alameda whipsnake and is important for other wildlife.

Chamise Chaparral

This natural community is dominated by chamise (*Adenostoma fasciculatum*), growing in tall (up to 10 feet or more), dense stands. In the study area, several other woody species were found in chamise chaparral: on the more shaded slopes with deeper soil, silktassel (*Garrya elliptica*), brittle manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), coyote brush, poison-oak and coast live oak occur. On more exposed slopes, often in particularly rocky places, small patches or isolated individuals of coastal sagebrush and bush monkeyflower are found. There is little understory in this natural community within the study area. Chamise chaparral is a natural community adapted to repeated fires due to its ability to stump sprout. In the study area, however, the stands do not appear to have experienced fire in many decades. Despite the shrubs being tall, they still provide high quality habitat for the Alameda whipsnake. Chamise chaparral is found on the slopes of the upper part of the study area. French broom is invading areas of chamise on the site.

French Broom Scrub

This vegetation type is dominated by a non-native shrub, French broom (*Genista monspessulana*), that invades natural communities, occupies extensive and increasing acreage in the coastal regions of California. French broom invades grassland, coyote brush scrub and open oak savanna, out competing much of the understory. Soil disturbance greatly encourages the spread of French broom. French broom is distributed in many large stands throughout the East Bay Hills and it is present in every natural community within the study area. Over the course of the survey work for AWS at Knowland Park, the distribution of French broom has been dynamic, due to natural and human related actions. Given its variability in the study area, no attempt was made to map the distribution of French broom in Figure 2, with the exception of large stands within the existing zoo. Large areas of broom that were present in 1998-1999 within existing animal exhibits and areas adjacent to the existing zoo were removed from the project area by contractors (See Appendix A, Swaim Biological 2011 showing 2007 and 2009 Google

Earth Photos of broom removal areas). Subsequently new areas have been invaded by broom and it is spreading in nearly all of the native communities in Knowland Park. The spread of broom and conversion of native habitats to stands of broom, poses a significant threat to the quality of the site for AWS. Efforts are being made to reduce the spread from areas of high quality AWS habitat on lands owned and managed by the East Bay Regional Park District.

Coast Live-oak Woodland

This natural community varies from an open savanna with herbaceous or shrubby understory to a closed-canopy woodland. It is dominated by coast live oak. The second most frequently occurring tree is California bay. Other species that occur occasionally in the study area are California buckeye (*Aesculus californica*) and elderberry. The understory of this community varies. When the oaks have an open canopy, the understory is much the same as the adjacent grassland or open Northern coyote brush scrub. When coast live oak woodland exists as a closed-canopy woodland, the understory is more diverse with herbs and shrubs, including poison-oak, hazelnut (*Corylus cornuta* var. *californica*), gooseberry (*Ribes* spp.), snowberry (*Symphoricarpos albus* var. *laevigatus*), and blackberry (*Rubus* spp.). Coast live oak woodland occurs throughout the study area on shaded slopes, primarily with a north- or east-facing aspect. Coast live oak woodland habitats with a more open canopy and on aspects facing southerly and easterly, are generally used more frequently by AWS.

Barren/Disturbed

This category is primarily the existing fire roads, turn around areas where fire roads terminated and the barren portion of the compost pile area where the veterinary hospital is proposed. Vegetation is generally absent or consists of non-native grasses and forbs that quickly recolonize the roadway edges.

Ornamental

Eucalyptus and pine trees are the two mapped ornamental tree species. Eucalyptus is not prevalent in the study area and occurs in only small isolated patches with a few large trees. These stands may slightly reduce the habitat value, but are not large enough to present any kind of barrier or deterrent of movement between better habitat areas. In some areas of the Oakland-Berkeley Hills, Eucalyptus stands are a major factor in habitat loss. Pine trees occur in a small clump near the upper end of the study area.

2.0 PROJECT IMPACTS

2.1 DIRECT IMPACTS

2.1.1 Permanent Loss or Potential Reduction in Habitat Value.

The project will permanently affect 16.6 acres of habitat potentially of value to the AWS (Table 1). Swaim Biological made a conservative estimate that removal of the Amphitheatre, agreed to

as part of the mitigation for the project, would reduce the impact acreage by a minimum of 0.23 acres. All acreages in Table 1 reflect this change. Habitats considered of value to the AWS on the site include: chamise chaparral, Diablan sage scrub, coyote brush scrub, oak woodland, and grassland. Habitat types affected but not considered in the impact acreage calculations include French broom scrub, ornamental trees, and existing barren fire roads (Table 2). French broom is an invasive plant that negatively affects AWS habitat and control of this vegetation is part of the overall habitat enhancement plan for that site that will benefit AWS and other native fauna and flora on the site (Environmental Collaborative 2011).

The project will impact 8.96 acres of potential habitat, to the extent that it is a permanent total loss to AWS, consisting of the hardscape animal exhibits, interpretive center, other features within the main pedestrian walking path for visitors and area permanently lost through paving of the access road to the California Exhibit (Figure 3). A total of 7.46 acres of potential habitat will be within enclosures that will be managed to retain natural vegetative cover, are outside of the area that visitors will access, and will be inhabited by native California species (e.g. wolf, bison, jaguar). These enclosures will provide significant habitat value for the AWS (Figure 3) and are considered a permanent affect but not a total loss of habitat.

2.1.2 Temporary Impacts to Potential AWS Habitat During Construction.

Temporary impact to 2.6 acres of potential AWS habitat will result from the project grading associated with the Veterinary Medical Hospital service road and access road construction, and installation of the perimeter fence (Table 1). The portions of habitat impact attributed to the Veterinary Medical Hospital are only the more undisturbed types (e.g. grassland) that surround the barren area slated for use as a compost area.

2.1.3 Direct Mortality

Grading and other construction activities may result in direct injury or mortality of AWS. On-going activity on the site (service vehicles) may also result in direct mortality.

2.1.4 Impacts Due to Fuel Mitigation Needs

Fuels management will be required in proximity to buildings constructed for the project (such as the California Interpretive Center). The area that will need to be in compliance adjacent to the building will be from 30 – 100 feet, in accordance with the City of Oakland Wildfire Prevention District. Some methods used to treat these wildfire prevention zones, such as mowing, blading, and complete removal of vegetation, may potentially impact the AWS and/or AWS habitat in this zone. Heavy machinery could cause direct mortality and complete loss of vegetation would significantly reduce habitat quality and function for AWS.

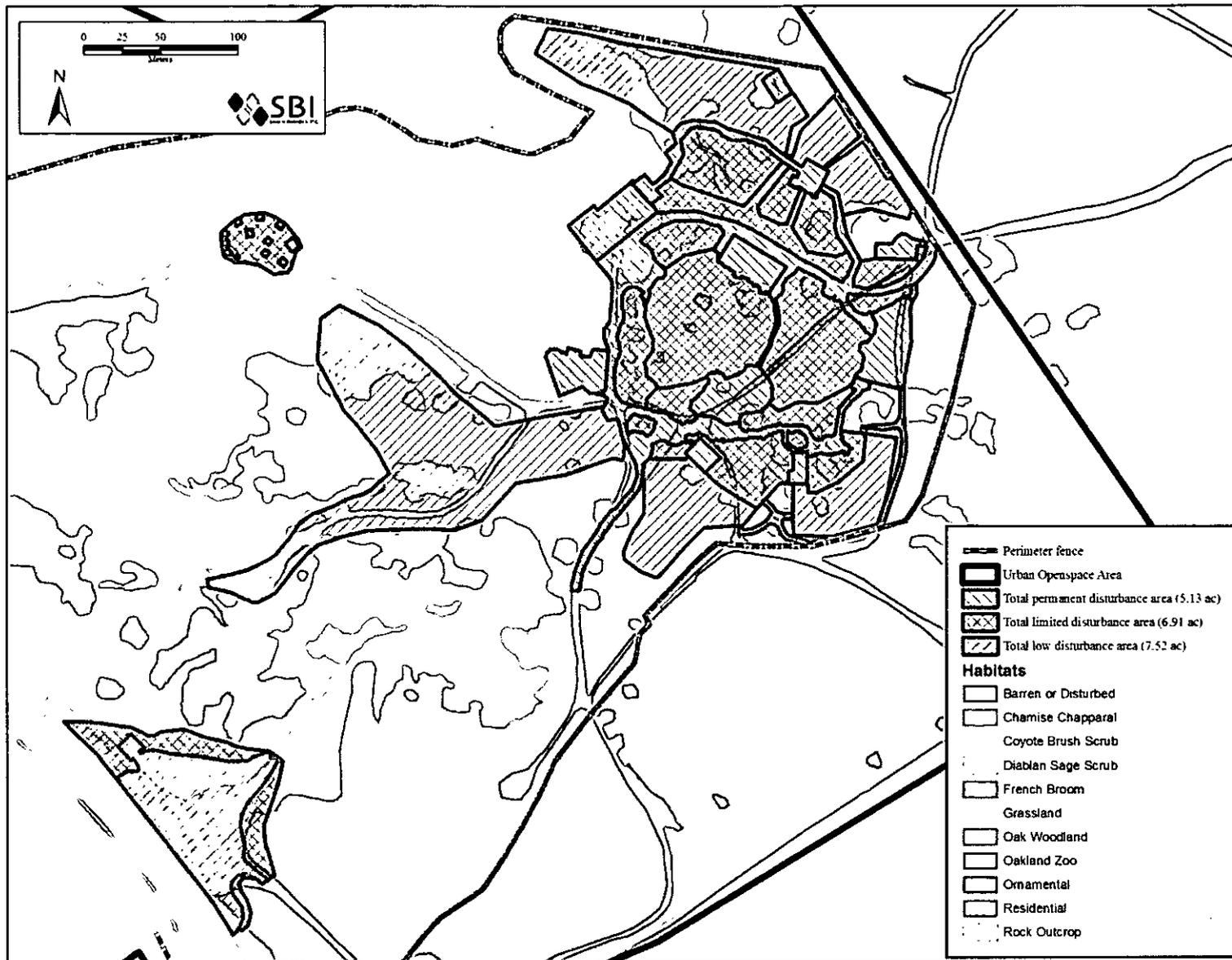


Figure 3. Vegetation Types Impacted by the Project.

Table 1. Potential AWS Habitat Affected by the Project.

Permanent Impacts						
Habitat Type Affected	CC	DSS	CBS	GSL	OW	Total
Permanent Limited	0.11	0.00	4.25	3.79	0.79	8.94
Service Road-permanent	0.00	0.00	0.00	0.20	0.00	0.20
Permanent Full Loss						8.96
Permanent Low disturbance	0.32	0.00	2.82	3.17	1.15	7.46
Total Permanent	0.43	0.00	7.07	7.16	1.94	16.60

Temporary Impacts

Habitat Type Affected	CC	DSS	CBS	GSL	OW	Total
Veterinary Medical Hospital	0.00	0.00	0.03	0.24	0.00	.27
Service Road to California	0.00	0.01	0.04	0.71	0.00	0.76
Emergency Vehicle Access (EVA) Road to Edgemont?	0.00	0.00	0.00	0.13	0.00	0.13
Joint Utility Trench	0.00	0.00	0.01	0.31	0.00	0.32
Perimeter Fence						1.12
Total Temporary	0.00	0.01	0.08	1.39	0.00	2.6

CC=Chamise Chaparral DSS=Diablan Sage Scrub CBS= Coyote Brush Scrub
 GSL=Grassland OW= Oak Woodland

Table 2. Vegetation/Areas Not Considered AWS Habitat Affected by the Project.

Acreage Affected by Project- Permanent Impacts				
Habitat Type Affected	FBS	BOD	ORN	Total
Permanent + Limited	0.17	1.53	0.02	1.72
Low disturbance	0.00	0.54	0.00	0.54
Veterinary Medical Hospital	0.50	0.33	0.00	0.83
Service Road	0.00	0.59	0.02	0.61
Total	0.67	2.99	0.04	3.70

Acreage Affected by Project- Temporary Impacts				
Veterinary Medical Hospital	0.48	0.58	0.00	1.06
Services Road	0.00	0.95	0.07	1.02
Emergency Vehicle Access (EVA) Road	0.00	0.63	0.00	0.63
Joint Utility Trench	0.06	0.15	0.00	0.21
Perimeter Fence	0.00	0.00	0.00	0.00
Total	0.54	2.31	0.07	2.92

FBS= French Broom Scrub
 ORN= Ornamental

BOD= Barren or Disturbed (existing fire/access roads)

2.2 INDIRECT IMPACTS

2.2.1 Potential Alteration of AWS Movement

AWS may alter movement patterns to avoid hardscape portions of the project footprint. Grazing, digging and trampling within the bison enclosure may affect the extent of existing vegetative Cover. This could potentially reduce the likelihood AWS would move across this enclosure if there are large bare portions.

3.0 MITIGATION MEASURES

3.1 DIRECT IMPACTS

3.1.1 Permanent Loss or Potential Reduction in Habitat Value.

Avoidance:

Documentation of AWS on the site, resulted in project refinements aimed at avoidance of the chamise chaparral, the highest quality AWS habitat within the project area. This was accomplished by elimination of the Amphitheatre from the project completely, shifting of the upper gondola station and Interpretive Center away from the chamise chaparral by a minimum of 10 feet, and incorporating special features into several of the animal exhibits to minimize the loss of value they will have for AWS. Specifically the following is required in the Bison/Tule Elk Extension Exhibit:

1. Limit number of animals housed in the exhibit to 20 bison and 20 Tule elk.
2. Irrigate the pasture area and enhance the grassland and open areas of the ground in the exhibit by placement of rock outcrops, fallen logs or a combination of the two to provide cover for AWS.

The overall Perimeter Fence shall be permeable to allow the passage of any AWS on the project site unrestricted. If any decorative wall type features are in the designs and coincide with the expansion perimeter but not an animal exhibit, holes near the base of the walls can be used to allow passage, but not affect the visual integrity.

Mitigation Measure 14C allows (1) mitigation on site, (2) at another restoration location with an AWS habitat restoration plan approved by the USFWS and CDFG, (3) through the purchase of mitigation credits at a mitigation bank within the East Bay region or (4) some combination of these options. These options are discussed below.

Habitat Preservation:

Per the City of Oakland, the project applicant shall provide compensatory mitigation for impacts no less than 1:1, subject to increase in the ratio that may be required by the resource agencies. In order to mitigate for permanent total loss of 8.96 acres of potential habitat and permanent potential reduction of quality of 7.46 acres of AWS habitat of potential habitat (Table 1), the project will permanently preserve AWS habitat in a permanent conservation easement (Table 3). Mitigation ratios for these impacts based on previous resource consultation are up to 3:1 for permanent losses resulting from the California Exhibit, up to 2:1 for habitats where there is a potential for a reduction in habitat value within animal enclosures remaining as native vegetation. Using these upper ratios, the area conserved to mitigate for these impacts would be up to 42.34 acres (Table 3)

3.1.2 Temporary Impacts to Potential AWS Habitat

To mitigate for the anticipated temporary impacts at a mitigation ratio of 1:1, an additional 2.60 acres of AWS habitat, will be set aside in a permanent conservation easement (Table 3).

Table 3. Project Maximum Mitigation Ratios and Acreages.

Habitat Type Affected	CC	DSS	CBS	GSL	OW	Total	Mitigation Ratio	Mitigation Acreage
AWS Habitat Acreage Affected By Proposed Project-								
Permanent + Limited	0.11	0.00	4.25	3.79	0.78	8.94	3	26.82
Service Road-Permanent	0.00	0.00	0.00	0.20	0.00	0.20	3	0.60
Low disturbance Permanent Reduction	0.32	0.00	2.82	3.17	1.16	7.46	2	14.92
Total	0.43	0.00	7.07	7.16	1.94	16.62		42.34
AWS Habitat Acreage Affected by Project- Temporary Impacts								
Veterinary Medical Hospital	0.00	0.00	0.03	0.24	0.00	0.27	1	0.27
Service Road to CA	0.00	0.01	0.04	0.71	0.00	0.76	1	0.76
Emergency Vehicle Access (EVA) Road	0.00	0.00	0.00	0.13	0.00	0.13	1	0.13
Joint Utility Trench	0.00	0.00	0.01	0.31	0.00	0.32	1	0.32
Perimeter Fence						1.12	1	1.12
Total Acreage	0.00	0.01	0.08	1.39	0.00	2.60		2.60
TOTAL PROJECT MITIGATION ACREAGE (Maximum Needed)								44.94

CC=Chamise Chaparral
GSL=Grassland

DSS=Diablan Sage Scrub
OW= Oak Woodland

CBS= Coyote Brush Scrub

Conservation Easement Options:

On-Site Conservation Easement:

If the on-site conservation easement is selected, collectively, up to of 44.94 acres will be preserved on-site and managed for AWS habitat under the conservation easement, addressing both permanent and temporary impacts of the project (Figure 4). The total estimated available habitat near the California Exhibit is about 77.5 acres, which is more than enough to satisfy even the upper range of the mitigation ratios which totaled 44.94 acres. Habitat within the area proposed for conservation is the highest quality AWS habitat in Knowland Park and includes a large stand of open canopy chamise chaparral, where thin rocky soils and southerly aspects are expected to deter succession of the habitat to woodland. Habitat proposed for the conservation easement is located primarily within the perimeter fence (30.02 acres) and to the north of the perimeter fence in rugged terrain away from the developed areas and areas where future trails may be feasible (14.92 acres). The Easement will be in accordance with Standard Conditions of Conservation Easements authorized by USFWS and CDFG and may contain the following elements:

- The easement is located within Knowland Park north of the California Exhibit (Figure 4).
- No new roads or trails will be constructed in the conservation easement area
- No new structures will be placed in the Conservation Easement,
- The easement will be managed for the benefit of the AWS.
- Access to the most of the easement by the general public will be prevented by the new perimeter fence, the remainder will be restricted by signage, lack of trail access, and steep terrain. Access for interpretive programs associated with the Overnight Experience will be only with trained Zoo personnel at limited times and only the existing trail to the camp area.
- The resource agencies will have access to the easement for inspection of habitat conditions and compliance with easement provisions and restrictions.
- An endowment for the management of the easement will be established.
- Timing and methods for invasive species removal, controls on herbicide application, and worker training programs are detailed in the Habitat Enhancement Plan (Environmental Collaborative 2011) and will be incorporated in the Easement Provisions.

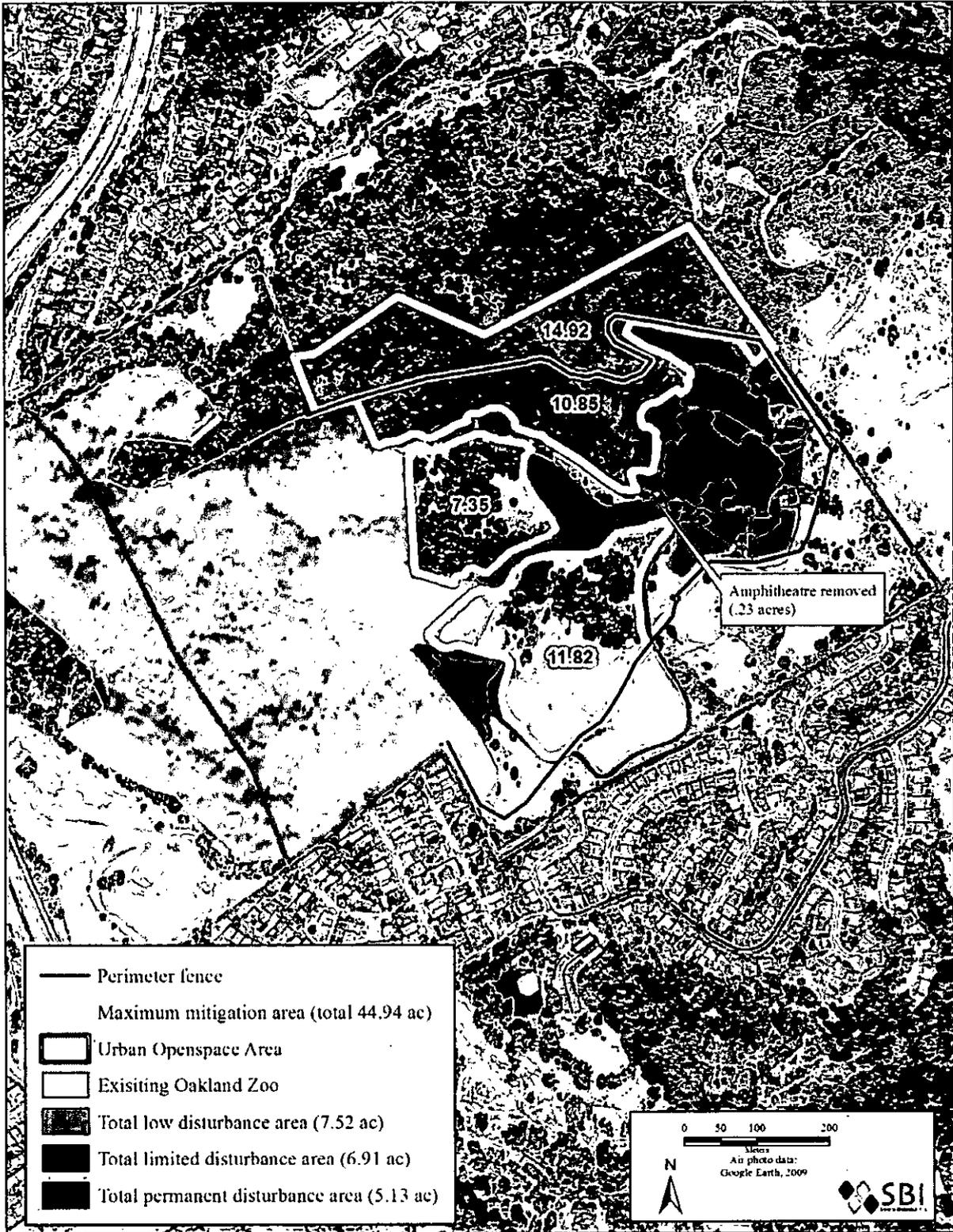


Figure 4. Maximum Mitigation Area Needed (On-Site Easement Option).

- Habitat restoration within the easement will be through control of non-natives that are detrimental to AWS habitat quality. These efforts are detailed in the Habitat Enhancement Plan (Environmental Collaborative 2011) and will be incorporated in the Easement Provisions. This will result in an increased function and value of the area for AWS.

If natural disturbances (fire, slumps) occur within the easement that require efforts to restore cover, only native species of local area vegetation will be used and the same community type will be restored. Surveys for AWS will be conducted immediately prior to restoration, and during restoration work that could result in take of AWS.

- Success Criteria: Continual reduction of the distribution of several not native shrubs and trees that negatively impact the quality of vegetative cover for the AWS will be the primary criteria for success of the mitigation. As indicated in the HEP, initial efforts for control of invasive plants/communities will focus in the Ecological Recovery Area (within the perimeter fence) and portions of Knowland Park west of Golf Links Road. Monitoring of the progress of invasive plant control and reduction will be accomplished through field mapping, photo monitoring stations that record results over time. Areas not currently invaded by broom and other invasive non-native shrubs will also be monitored to ensure they remain free of these invasive plants.

Off-Site Habitat Preservation Option:

As noted above, as an alternative to the on-site conservation, the project may do off-site restoration or preservation at a location approved by the USFWS and CDFG, or through the purchase of mitigation credits at a mitigation bank within the East Bay region or some combination of these options. The acreage to be restored/purchased off-site would be equal to the on-site requirements.

Additional Conservation Measures

Regardless of whether the easement is on or off-site the project area and the Urban Open Space Area and Knowland Park west of Golf Links Road will also be subject to the Habitat Enhancement Plan (Environmental Collaborative 2011).

3.1.3 Direct Mortality

In order to avoid and minimize the potential for direct injury or mortality, standard take avoidance measures appropriate to this project have been included (See Appendix B).

3.1.4 Impacts due to Fuels Management Needs

In order to prevent project compliance with the City's Wildfire Prevention District from adversely impacting the AWS, all maintenance of the shrub community will be done manually using chain saws and clippers with a biological monitor present during the activities. The shrub community will be thinned for a distance of up to 100 feet from buildings (such as the California Interpretive Center) to be in compliance. No stumps will be removed and cut shrubs will be removed from the area. Thinning will reduce shrub cover to no less than 25% cover to keep the area as high quality AWS habitat. Thinning will be done as needed, but not more frequently than on an annual basis. Thinning beyond the 100' perimeter using manual methods may also be completed if recommended by the project biologist and approved in consultation with the USFWS and CDFG. Thinning of shrubs is beneficial to the AWS in many situations where lack of natural disturbance results in dense closed canopy communities.

Consistent with the above avoidance measures, the other measures will be implemented as part of the project, based on the City of Oakland Standard Conditions of Approval and proposed Mitigation Measures, as detailed in Appendix B.

3.2 INDIRECT IMPACTS

3.2.1 Potential Alteration of AWS Movement

To minimize the potential for AWS movements to be altered, the project exhibit area will be made as permeable as possible and entrapment hazards minimized (e.g. pit falls, mesh entanglement hazards). Within the bison exhibit irrigation and bison exclusion zones will be a part of the project design to minimize the potential for avoidance by AWS.

4.0 MONITORING

Annual reports will be submitted to the City, the East Bay Zoological Society, and Resource Agencies summarizing the results of monitoring during construction phase(s) and the results of vegetation management and monitoring associated with invasive species control. The report will include all observations of AWS, if any, made during each monitoring year and any recommendations on adaptive management that may benefit the value of the Conservation Easement for the AWS.

Post construction monitoring will focus on documenting habitat conditions for the AWS in the area protected in a permanent conservation easement as well as the geographic extent of the area covered in the Habitat Enhancement Plan (Environmental Collaborative 2011). Documentation will include photo stations and mapping that details areas where invasive species have been removed or controlled and report on the success of removal of non-native shrubs and trees.

Photo stations will be established prior to any construction on the site and used for comparison with photos obtained after construction and through the life of the monitoring plan.

5.0 LITERATURE CITED

Environmental Collaborative 2011. Habitat Enhancement Plan For Knowland Park, Oakland, California. Prepared for East Bay Zoological Society and Community and Economic Development Agency. February 2011, as Revised. 19 pages.

Swaim Biological, Inc. 2011. Status of the Alameda Whipsnake (*Masticophis lateralis euryxanthus*) in Knowland Park for the Proposed Expansion of the Oakland Zoo City of Oakland, Alameda County, California. Prepared for the East Bay Zoological Society 3 January, 2011, 23 pages.

APPENDIX A

Status of the Alameda Whipsnake (*Masticophis lateralis euryxanthus*) in Knowland Park for the Proposed Expansion of the Oakland Zoo City of Oakland, Alameda County, California

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1.0 INTRODUCTION

The purpose of this report is to present the results of live trapping surveys conducted for the Alameda whipsnake (*Masticophis lateralis euryxanthus*) in Knowland Park, City of Oakland, Alameda County, California and to discuss the impacts associated with the proposed expansion of the Oakland Zoo and a proposal for a mitigation plan. The Oakland Zoo is located at the western edge of Knowland Park and has an approved Master Plan that allows the zoo to expand to the east of the existing zoo. The project site (i.e. the expansion area) is located just east of the existing Oakland Zoo and lies within Knowland Park, just east of Interstate 580 at the Golf Links Road intersection. The Oakland Zoo is proposing to expand the Zoo to include a new 17,000 square foot Veterinary Medical Hospital and a new California Exhibit which will exhibit native California species from the past and present and provide education on conservation of native California species. The California Exhibit is located to the east of the existing zoo and will only be accessed by the public via a gondola. An existing dirt road would be paved to provide emergency and maintenance access to the new California Exhibit.

The Alameda whipsnake (AWS) is listed as a state and federally threatened species. None of the project site is within the current Critical Habitat for the Alameda whipsnake (U. S. Fish and Wildlife Service, 2006), but is within the former critical habitat for the Alameda whipsnake (U.S. Fish and Wildlife Service 2000). The undeveloped portion of Knowland Park east of the existing zoo, is within the Oakland-Las Trampas Recovery Unit established by the U.S. Fish and Wildlife Service (2002) Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California.

Two separate surveys have been conducted for the Alameda whipsnake on the project site. The first was conducted in 1998 and 1999 due to the presence of potential whipsnake habitat in the project area. The second was conducted in fall 2009/spring 2010 due to the amount of time that had lapsed and changes to the survey protocol for determining the status of the species.

The surveys were conducted under the authority of a federal recovery permit (TE-815537) issued by the U.S. Fish and Wildlife Service (USFWS) and a Memorandum of Understanding from the California Department of Fish and Game (CDFG).

2.0 Ecology of the Alameda Whipsnake

2.1 Description

The Alameda whipsnake is a slender, fast moving, diurnal snake with a narrow neck and relatively broad head (Slebbins 2003). The dorsal color is sooty-black with wide yellow-orange dorso-lateral stripes (Riemer 1954). The anterior portion of the stripes and ventral surface of the snake are heavily pigmented with orange-rufous coloration. The Alameda whipsnake and the chaparral whipsnake (*Masticophis lateralis lateralis*) make up the two subspecies of the California whipsnake (*Masticophis lateralis*) (U.S. Department of Interior, 2000). Adults can reach up to five feet in length (Swaim 1994).

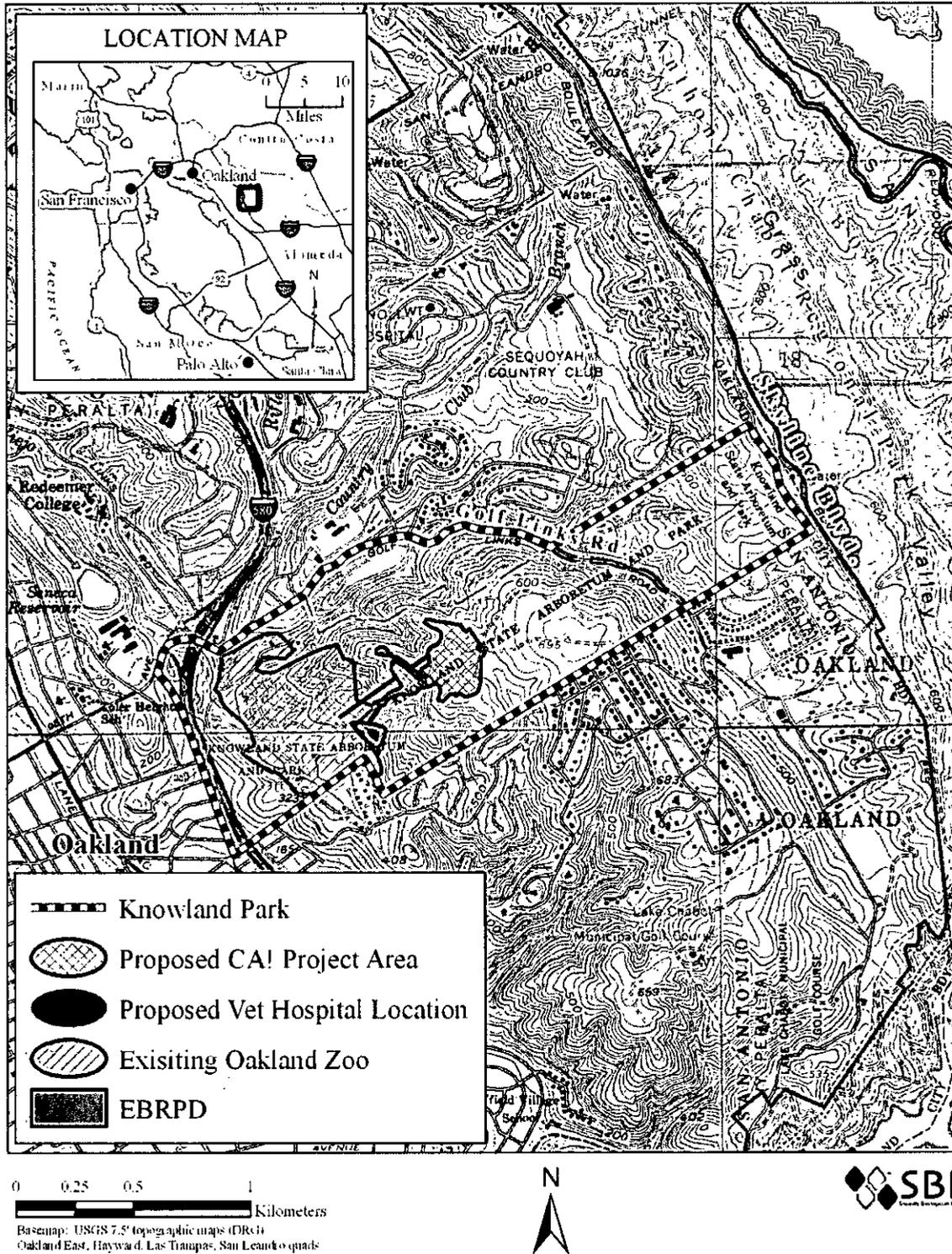


Figure 1. Regional Location Map

2.2 Habitat Use and Spatial Ecology

The Alameda whipsnake uses the mosaic of habitats found in the East Bay, with the highest frequency of use in and near scrub and chaparral habitats including chamise chaparral, Diablan sage scrub, northern coyote brush scrub, and riparian scrub (Swaim 1994). Swaim (1994) also found that there was extensive use of grassland and oak woodland/savanna adjacent to chaparral and scrub communities by Alameda whipsnakes equipped with radio transmitters. The home ranges of six radio-equipped whipsnakes were centered on scrub communities. Core areas (areas of concentrated use) were on east, south, southeast, southwest-facing slopes with open or partially open canopy scrub or chaparral communities. Protection and conservation of core type habitats and the communities/undeveloped areas that connect them is critical to avoiding significant impacts to Alameda whipsnake populations.

Chamise chaparral and Diablan sage scrub communities have a measurably higher carrying capacity for AWS populations than coyote brush scrub. AWS are typically the dominant snake species in chamise chaparral. This is likely due in part to the higher carrying capacity for most lizard prey species in these communities and a tendency for slow (or no) succession or conversion to less suitable habitat.

Whipsnakes monitored with telemetry ranged into the surrounding grassland for distances of greater than 500 feet (Swaim 1994). Whipsnakes remained in the grassland for periods ranging from a few hours to several weeks at a time (Swaim 1994). Grassland habitats were used by male whipsnakes most extensively during the mating season in spring (Swaim 1994). Female whipsnakes used grassland areas most extensively after mating, possibly in their search for suitable egg-laying sites (Swaim 1994). Anecdotal information also indicates Alameda whipsnakes can be found even greater distances from scrub and chaparral habitats (up to approximately four miles) in grassland and oak savannah (Swaim 2000a, 2000b, 2000c, 2003a, 2003b).

Rock outcrops can enhance the habitat for Alameda whipsnake because they provide cover and promote abundant lizard populations. However, rock outcrops are not present at all study areas where whipsnakes have been documented. We did not map the distribution of rock outcrops in the study area for this reason.

2.3 Distribution in the Project Vicinity

The closest records of the Alameda whipsnake in the project vicinity include recent observations (2006) from Chabot Regional Park approximately 1.62 miles northeast of the site and 1.75 miles east of the site (Table 1). Several other observations are known from within three miles of the site and are outlined below with a general location, distance and direction from the site, year of observation and source of the data record. Habitat with significant areas of core habitat remains in pockets to the north and south of Knowland Park, but have not been surveyed for AWS (e.g. Leona Quarry, open space west of the Chabot Municipal Golf Course).

Table 1. Alameda whipsnake records in the project vicinity.

Location	Distance (miles) and direction from Site	Year of Observation	Source
Chabot Regional Park	1.62 /NE	2006	CNDDDB
Chabot Regional Park	1.75/ E	2006	CNDDDB
USLRW	2.35/NE	2008	CNDDDB
USLRW	2.44/NE	2008	CNDDDB
Merit College Area	2.8/NW	1940s	MVZ
Leona Heights Park	3.0 /N	1953	CNDDDB

CNDDDB= California Natural Diversity Data Base.

MVZ= Museum of Vertebrate Zoology (Berkeley Collections).

USLRW= Upper San Leandro Reservoir Watershed.

The historic distribution of the Alameda whipsnake and potential habitat in the region suggests that the area was contiguous with occupied habitat to the north and south prior to large scale development in the area. The study area has physically suitable habitat and appears to have an adequate lizard prey base. Chamise chaparral is typically a habitat type where AWS is the dominant snake species. However, development in the project vicinity has likely significantly reduced connectivity of the site to other occupied areas of habitat. The site is a relatively narrow island of habitat (between 0.3 and 0.5 miles wide) that has been virtually isolated for several decades by the residential development to the north and south and the existing Oakland Zoo to the west. To the east, a major road (Golf Links Road) bisects Knowland Park into two areas. This road does not function as a complete barrier to movement, but likely is a significant deterrent. The potential for whipsnakes moving into the site from the closest known occupied habitat to the east is limited by the need to cross both Golf Links Road and Skyline Boulevard further to the east. The potential for AWS to come to the site via other routes has not been specifically analyzed.

3.0 MATERIALS AND METHODS

3.1 Vegetation Community Mapping

SBI biologists mapped vegetation using GIS and aerial photography from several years to capture the dynamic changes in distribution and reemergence of one community (French broom scrub) over time. Naming of vegetation communities generally follows Holland (1986). Vegetative communities present in the study area include grassland (non-native and native needle grass grassland), Diablan sage scrub, French broom scrub, northern coyote brush scrub, chamise chaparral, coast-live oak woodland, barren and disturbed (roads/turn outs), and ornamental (*Eucalyptus* sp. and non-native pine).

3.2 Alameda Whipsnake Habitat Modeling

We created and overlaid an aspect layer onto the vegetation layer to identify the location of core type habitats of the AWS. This allowed us to meaningfully evaluate the potential impacts to Alameda whipsnake associated with the proposed project.

3.3 Field Trapping Surveys

1998-1999 Survey Periods

Trapping surveys in 1998-1999 were conducted from April 16, 1998 through July 17, 1998 and May 21 through June 21, 1999. Although 90 days of trapping were conducted during 1998, as required by the survey protocol at that time, a total of 25 to 30 days during the survey period were lost due to rainy and/or cold foggy weather the San Francisco Bay Area experienced during the spring of 1998. The period of trapping during 1999 was conducted to make up for the days of trapping lost during 1998. A total of 21 traplines were placed in the areas with the highest

quality potential whipsnake habitat in the California 1820 (now called the California Exhibit) study area as planned at that time (Figure 2). These areas included open and partially open canopy stands of chamise chaparral, coyote brush scrub, Diablan sage scrub, rock outcrops and the ecotone of scrub and grassland communities (Figure 2). Trapline placement was slightly different in 1998 versus 1999 (Figure 2).

2009-2010 Surveys

In 2009-2010 a second status survey was conducted due to time elapsed since the first survey and changes to the status survey protocol, which added a 45-day fall trapping component to the survey methods. In addition several project features had changed or been eliminated. A total of 35 traplines were distributed in areas of optimal habitat in Knowland Park for this survey and the placement of traplines differed slightly from the 1998-99 survey (Figure 2). Trapping periods for this survey included a fall component from September 5, 2009 –October 27, 2009. We completed 45 active trapping days in this period. For eight of the days in this time period, the traps were deactivated due to extreme heat or rain events. The spring component was conducted from April 13, 2010 through July 23, 2010 and a total of 90 trap days were completed during that period.

General Trapping Methods for all Surveys

A trapline consists of an approximately 50-foot length of drift fence with a double-funnelled trap at each end. Drift fences were constructed with 1/8 inch thick hardboard and were a minimum of 14 inches high (above the surface) with approximately two inches buried in the ground (Figure 3). Where slopes were particularly steep drift fences were 20-22 inches in height. Traps consisted of a wooden frame with large panels of 1/8 inch wire mesh during the 1998 survey. During the 1998 survey period, the traps used measured 12 inches wide, 12 inches high, and 16 inches long (Figure 3). During the 1999 survey, minnow traps constructed of 1/4 inch hardware cloth supported by a metal frame were used. Written permission from the California Department of Fish and Game and the U.S. Fish and Wildlife Service to use the 1/4 inch wire mesh is on file at Swaim Biological Consulting. The traps used in 1999 measured 8 inches high and wide and 16 inches long. A piece of wire mesh was attached to the outside edge of each trap so that the total width of the entrance funnel measured 12 inches (Figure 3). Traplines were checked at least every other day during the study period. Each time the traps were monitored vertebrate species captured and the location of capture were recorded. Most snake species were measured and marked for individual recognition by clipping a certain ventral scale. Traps were checked daily in 2009-2010, regardless of weather conditions.

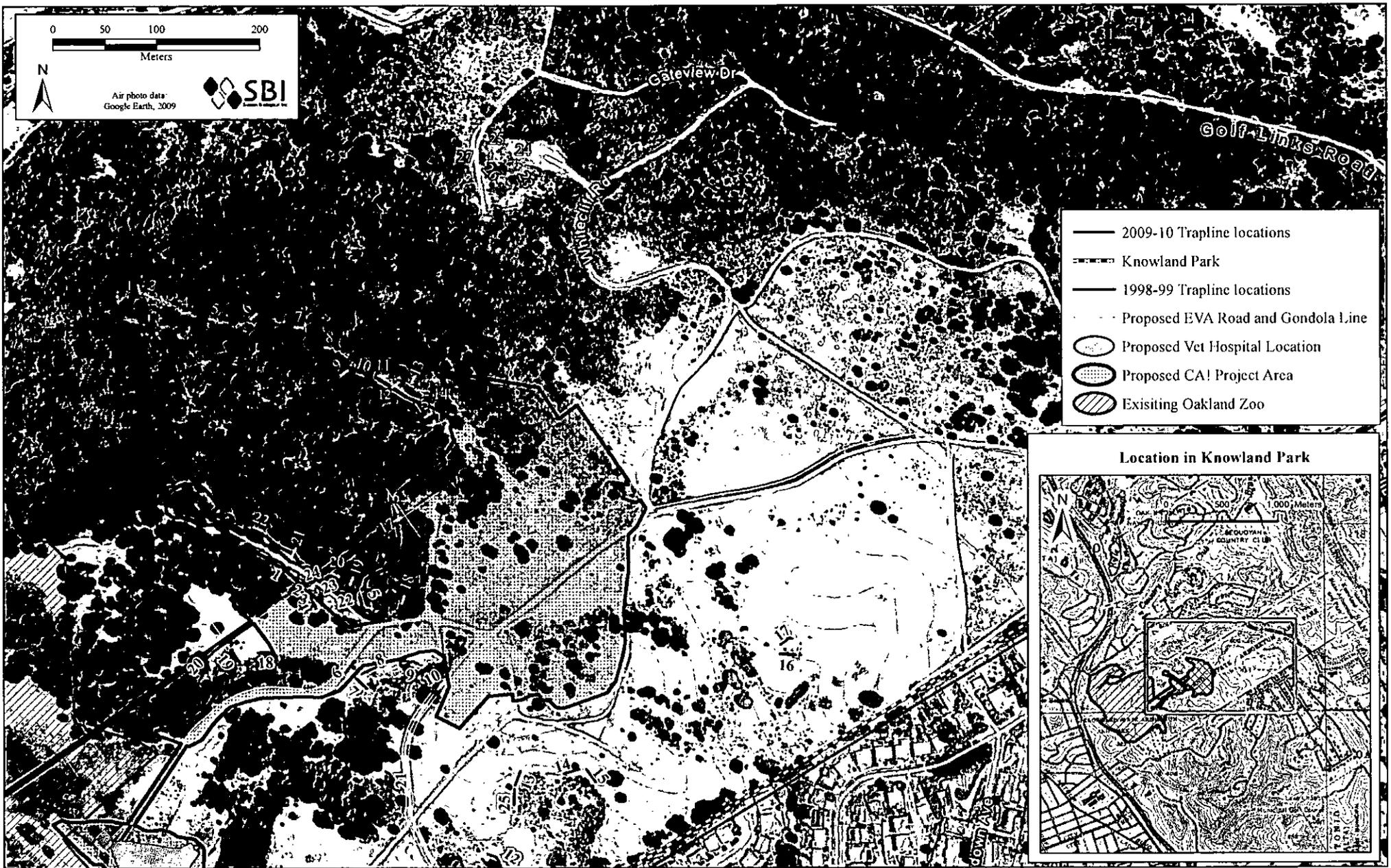
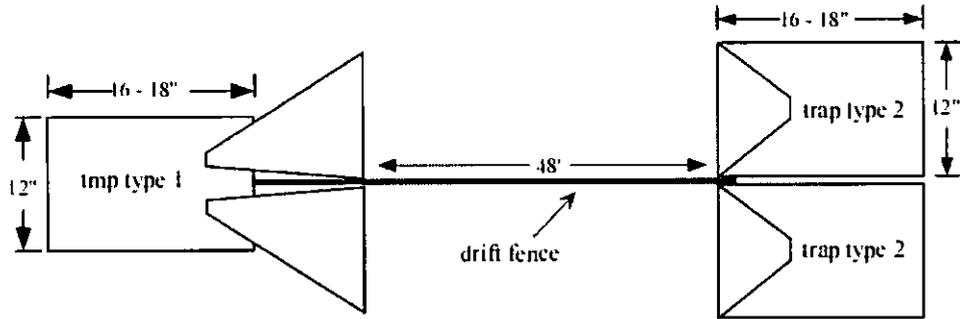
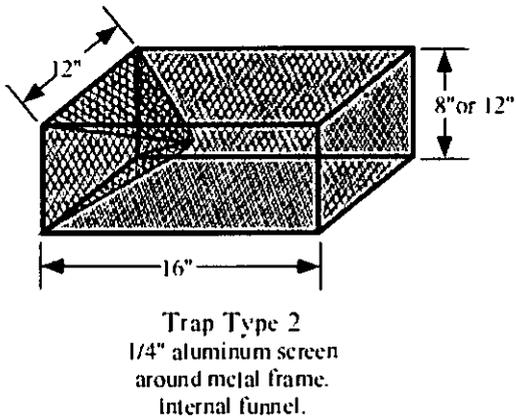
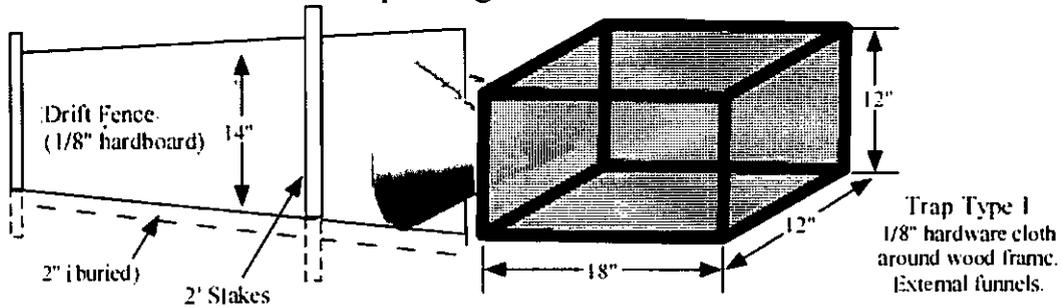


Figure 2. Trapline Locations 1998-1999 and 2009-2010 with an outline of the current project component configuration

Trapline Schematic (plane view)



Trapline Schematic (oblique view)
Snake Trap Design and Dimensions



Example of actual trapline set up.



Figure 3. Trapline Schematic and Trap Designs- Metal traps were only used in 1998-1999.

4.0 RESULTS

4.1 Vegetation Community Mapping

4.1.1 Vegetation Community Distribution

The distribution of the vegetation communities mapped is shown in Figure 4. A brief description of the community types mapped and brief evaluation of the habitat value/frequency of use by AWS for each community are provided below. Knowland Park is a valuable example of how, under existing conditions in the East Bay, Alameda whipsnake habitat is being lost through natural succession combined with the lack of natural periodic disturbance (e.g. fire).

Grassland (Non-Native and Native)

This grassy vegetation type is dominated by introduced annual grasses and herbs. This natural community is being rapidly replaced by non-native French broom scrub in the project area and in other parts of Knowland Park. Needle grass grassland, a natural community, is still a visible component embedded within the non-native grasslands in the project area. No mapping distinction could be made to distinguish these grassland communities.

Northern Coyote Brush Scrub

This natural community is dominated by a single species, coyote brush (*Baccharis pilularis*), although several other shrubby species are present, such as poison-oak (*Toxicodendron diversilobum*), bush monkeyflower (*Mimulus aurantiacus*), coffeeberry (*Rhamnus californica*), elderberry (*Sambucus mexicana*), and coastal sagebrush (*Artemisia californica*). Northern coyote brush scrub encroaches into grasslands in the absence of fire or browsing by large herbivores. Knowland Park has not had significant fires or large scale grazing in decades. During the trapping survey in fall of 2009 a small fire (1 – 2 acres) burned some brush/grassland habitat north of the project area.

Natural succession tends to result in coast live oaks (*Quercus agrifolia*) and California bay (*Umbellularia californica*) invading coyote brush scrub in moister sites, deeper soils, and in the absence of other disturbance such as fire. Northern coyote brush scrub is on many parts of the upper elevations of the site and Knowland Park.

Diablan Sage Scrub

Diablan sage scrub is dominated by coastal sagebrush, poison-oak, bush monkeyflower, and occasional coyote brush. Coastal sage scrub is typically confined to relatively steep, rocky, often south-facing slopes, as it is in the study area. There is much intergradation of Diablan sage scrub and northern coyote brush scrub, since the predominant of one natural community is almost always found in the other, though in lesser amounts. Intermediate or transitional vegetation was mapped as Diablan sage scrub because it is generally a higher quality of habitat for the Alameda whipsnake and is important for other wildlife species in general.



Figure 4. Vegetative Cover Map for Oakland Zoo Expansion Area.

Chamise Chaparral

This natural community is dominated by chamise (*Adenostoma fasciculatum*), growing in tall (up to 10 feet or more), dense stands. In the study area, several other woody species were found in chamise chaparral: on the more shaded slopes with deeper soil, silktassel (*Garrya elliptica*), brittle manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), coyote brush, poison-oak and coast live oak occur. On more exposed slopes, often in particularly rocky places, small patches or isolated individuals of coastal sagebrush and bush monkeyflower are found. There is little understory in this natural community within the study area. Chamise chaparral is a natural community adapted to repeated fires (Holland 1986) due to its ability to stump sprout. In the study area, however, the stands do not appear to have experienced fire in many decades. Despite the shrubs being tall, they still provide high quality habitat for the Alameda whipsnake. Chamise chaparral is found on the slopes of the upper part of the study area. French broom is invading areas of chamise on the site.

French Broom Scrub

This vegetation type is not described by Holland (1986), although it occupies extensive and increasing acreage in the coastal regions of California. It is dominated by a non-native shrub, French broom (*Genista monspessulana*) which forms a nearly pure stand. French broom invades grassland, coyote brush scrub and open oak savanna, out competing much of the understory. Soil disturbance greatly encourages the spread of French broom. French broom is distributed in many large stands throughout the East Bay Hills and it is present in every natural community within the study area. Over the course of the survey work for AWS at Knowland Park, the distribution of French broom has been dynamic, due to natural and human related actions. Large areas of broom that were present in 1998-1999 within existing animal exhibits and areas adjacent to the existing zoo were removed from the project area by contractors (Appendix A, 2007 and 2009 Google Earth Photos). Subsequently new areas have been invaded by broom and it is spreading in nearly all of the native communities in Knowland Park. The spread of broom and conversion of native habitats to stands of broom, poses a significant threat to the quality of the site for AWS. Efforts are being made to reduce the spread and eliminate it from areas of high quality AWS habitat on lands owned and managed by the East Bay Regional Park District.

Coast Live-oak Woodland

This natural community varies from an open savanna with herbaceous or shrubby understory to a closed-canopy woodland. It is dominated by coast live oak. The second most frequently occurring tree is California bay. Other species that occur occasionally in the study area are California buckeye (*Aesculus californica*) and elderberry. The understory of this community varies. When the oaks have an open canopy, the understory is much the same as the adjacent needlegrass grassland or open Northern coyote brush scrub. When coast live oak woodland exists as a closed-canopy woodland, the understory is more diverse with herbs and shrubs, including poison-oak, hazelnut (*Corylus cornuta* var. *californica*), gooseberry (*Ribes* spp.), snowberry (*Symphoricarpos albus* var. *laevigatus*), and blackberry (*Rubus* spp.). Coast live oak woodland occurs throughout the study area on shaded slopes, primarily with a north- or east-facing aspect. Coast live oak woodland habitats with a more open canopy and on aspects facing southerly and easterly, are generally used more frequently by AWS.

Barren/Disturbed

This category is primarily the existing fire roads, turn around areas where fire roads terminated and the barren portion of the compost pile area where the veterinary hospital is proposed.

Ornamental

Eucalyptus and pine trees are the two mapped ornamental tree species. Eucalyptus is not prevalent in the study area and occurs in only small isolated patches with a few large trees. These stands may slightly reduce the habitat value, but are not large enough to present any kind of barrier or deterrent of movement between better habitat areas. In some areas of the Oakland-Berkeley Hills, Eucalyptus stands are a major factor in habitat loss. Pine trees occur in a small clump near the upper end of the study area.

4.2 Alameda Whipsnake Habitat Modeling

Habitat modeling was used to generally define the core areas on the site where the frequency of use for any AWS on the site would be highest and contain essential habitat features such as most egg laying sites, winter retreats, and high quality foraging areas. They contain the majority of components that are essential for supporting viable resident populations of AWS and are used at a very high frequency although habitat use is not limited to core areas. **Figure 5** shows the aspect for all scrub and chaparral habitat types in the project area. In addition we included two zones of habitat regularly used by AWS when adjacent to scrub and/or chaparral based on telemetry data, trapping data, and opportunistic observations of free ranging AWS. This graphic indicates that there is a mosaic of core habitats that are spaced at close enough distances that any AWS on site would use/incorporate several of these core habitats within their home range and that if an AWS population were present, it would use most if not virtually all of the study area to varying degrees.

4.3 Field Trapping Surveys

A single Alameda whipsnake was captured during the entire study period. A small adult male AWS was captured on June 3, 4, and 27 in three different traplines (**Figure 5** and **Figure 6**). The exact location of AWS captures is not shown. No other AWS were captured or observed during the study.

A total of at least twenty-five vertebrate species were captured including six amphibian species, three lizard species, six snake species, eight small mammal species, two bird species identified and at least one unidentified species of bird. The common and scientific name and number of captures for each species during each trapping session is summarized in Table 1. The most commonly captured snake species was the western yellow-bellied racer (*Coluber constrictor mormon*). Like the Alameda whipsnake, this species is more visually oriented and generally prefers higher ambient temperatures than the other snake species captured on the site.

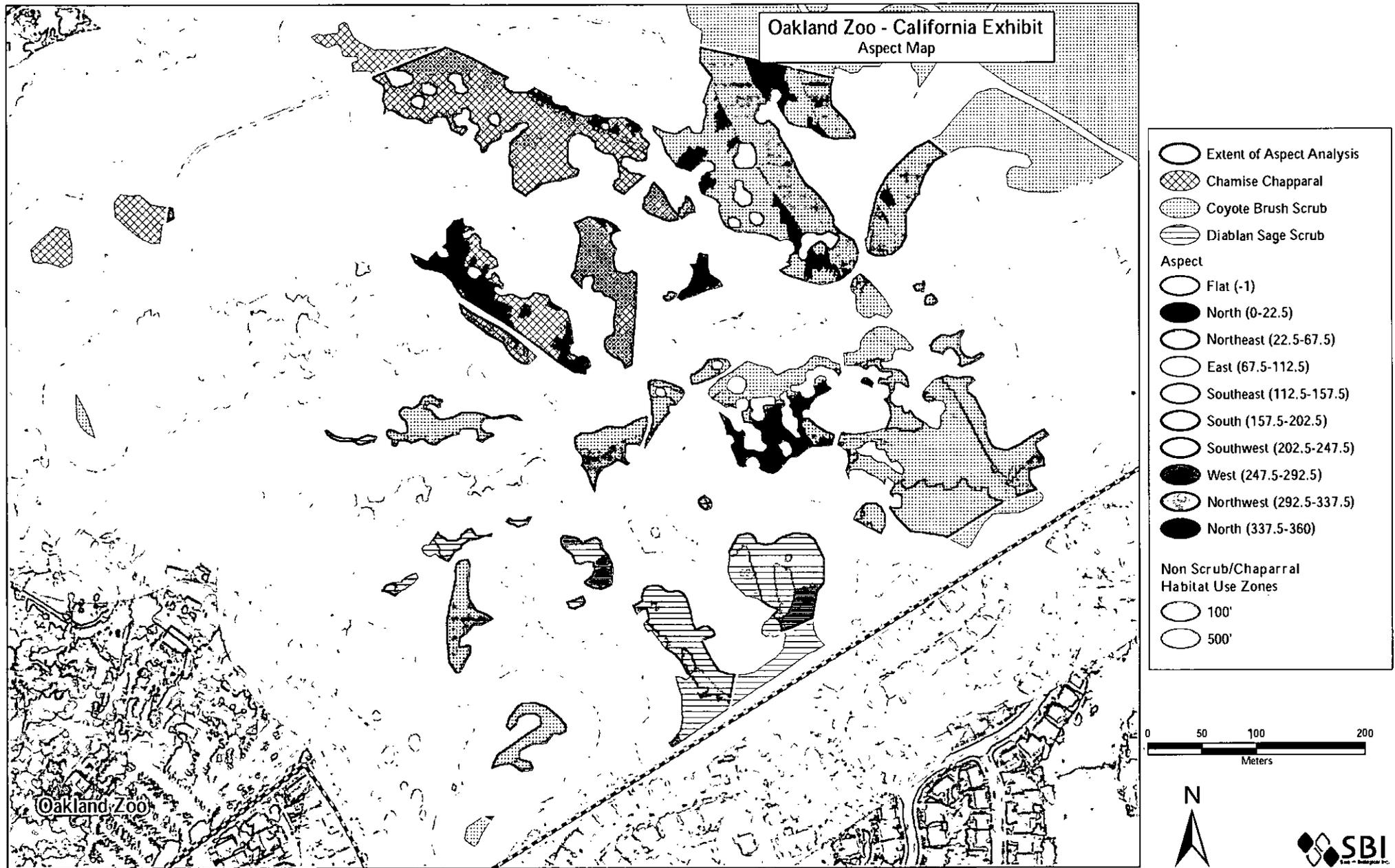


Figure 5. Aspect of scrub and chaparral habitats in the project area.

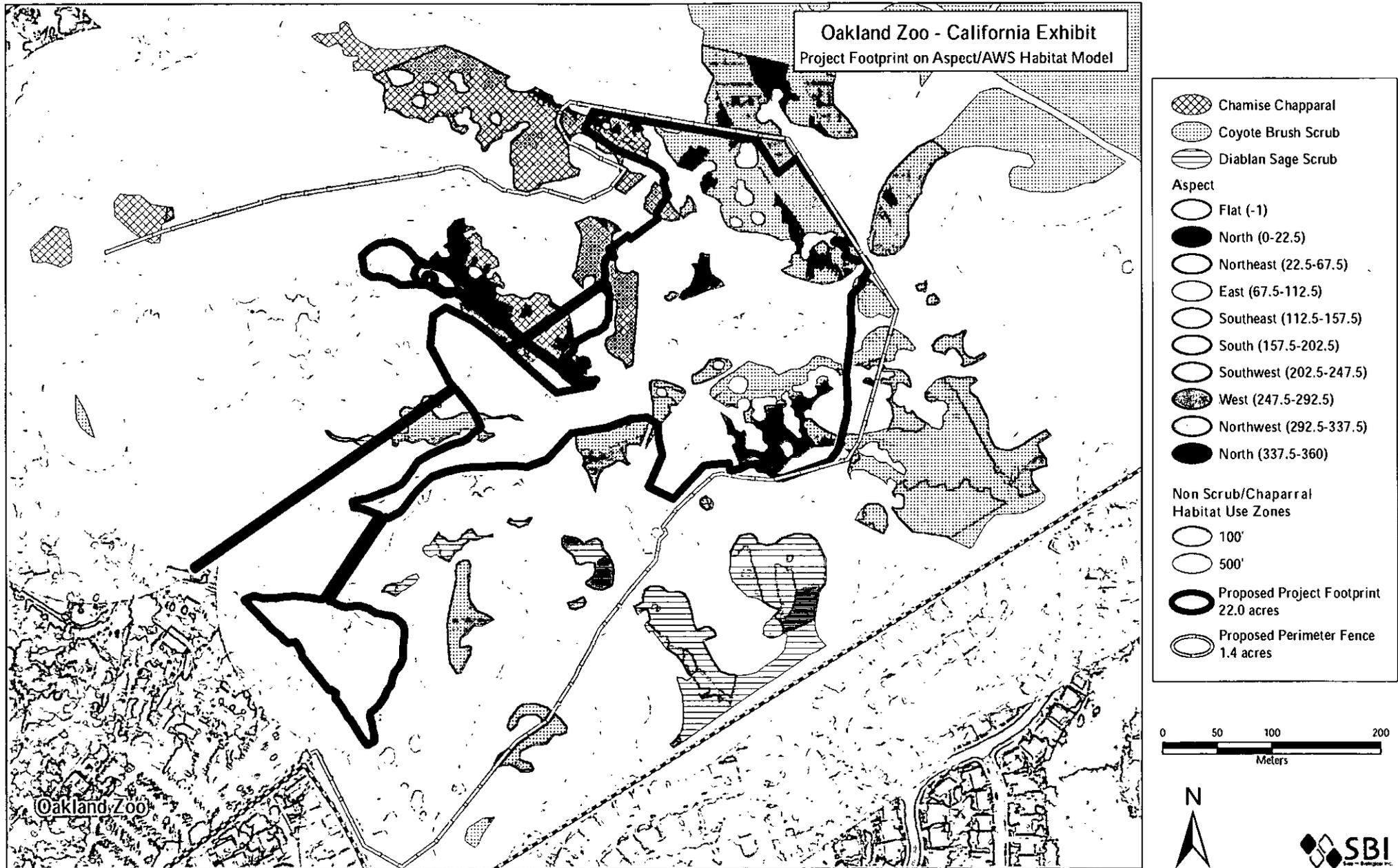


Figure 6. Project Footprint on AWS Habitat Model.

Table 2. Vertebrate Species Captured in Knowland Park.

Common Name	Scientific Name	Total Captures (Includes Recaptures)			
		Spring 1998	Spring 1999	Fall 2009	Spring 2010
Arboreal Salamander	<i>Aneides lugubris</i>	8	1	20	20
California Slender Salamander	<i>Batrachoseps attenuatus</i>	42	0	145	223
Yellow-eyed Salamander	<i>Ensatina eschscholtzii xanthoptica</i>	?	?	55	26
Coast Range Newt	<i>Taricha torosa torosa</i>	45	8	19	406
Rough-skinned Newt	<i>Taricha granulosa</i>	?	?	19	2
Pacific Chorus Frog	<i>Pseudacris regilla</i>	2	1	1	0
California Alligator Lizard	<i>Elgaria multicarinata multicarinata</i>	205	48	24	143
Skilton Skink	<i>Eumeces skiltonianus skiltonianus</i>	160	6	31	101
Western Fence Lizard	<i>Sceloporus occidentalis</i>	725	195	316	544
Western Yellow-bellied Racer	<i>Coluber constrictor mormon</i>	44	11	2	28
Alameda Whipsnake	<i>Masticophis lateralis euryxanthus</i>	0	0	0	3
Sharp-tailed Snake	<i>Contia tenuis</i>	10	0	8	12
Pacific Gopher Snake	<i>Pituophis catenifer catenifer</i>	18	11	26	40
Ring-necked Snake	<i>Diadophis punctatus</i>	9	0	9	34
California Kingsnake	<i>Lampropeltis getula</i>	4	2	?	?
Broad-handed Mole	<i>Scapanus latimanus</i>	?	?	0	1
Shrew	<i>Sorex sp.</i>	?	?	1	2
Audubon's Cottontail	<i>Sylvilagus audubonii</i>	0	0	0	1
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	75	6	23	57
Black Rat	<i>Rattus rattus</i>	1	0	0	0
California Meadow Vole	<i>Microtus californicus</i>	78	30	2	18
Deer Mouse	<i>Peromyscus spp.</i>	45	12	42	125
Botta's Pocket Gopher	<i>Thomomys hottae</i>	1	0	27	8
Dark-eyed Junco	<i>Junco hyemalis</i>	0	0	0	1
Bewick's Wren	<i>Thyromanes bewickii</i>	0	0	1	4
Unknown Bird		0	0	3	2

5.0 DISCUSSION

5.1 California Exhibit

Based on the survey findings, the site must be considered occupied by the Alameda whipsnake. The proposed project will have a significant impact on the core AWS habitat and possibly the species. It would result in direct loss of core type habitat areas, fragmentation of core areas and other habitat (Figure 7), potential for invasion of French broom into previously undisturbed areas, and potentially direct take of individual AWS.

Prior to listing by USFWS, CDFG mitigation requirements were as follows:

- **5:1** for scrub/chaparral impacts
- **5:1** for habitat within 100 feet of chaparral and scrub habitat.
- **1:1** for the habitat zone between 100 through 500 feet from scrub/chaparral.

When the snake was listed under the Federal ESA mitigation took on a more stringent requirement in the sense that it was recognized in the data that habitat use extended beyond 500 feet from scrub/chaparral. The general rule of 3:1 has been applied to most projects SBI has been directly involved with in consultations, but USFWS has recommended higher ratios in some instances recently. The 3:1 ratio applied to blocks of habitat and application to non-scrub/chaparral habitats greater than 500 feet is optimal for conservation in some cases. However, it is not as optimal for the conservation of the small population (viable or not) in Knowland Park, because it does not provide incentive for the zoo to avoid the core habitat.

Based on current findings, it is unclear whether the project area or Knowland Park does or could support a viable long term population. The project area includes large areas of physically suitable core type habitat, but two years of trapping only resulted in a single capture of an adult male. When high quality core habitat is present and Alameda whipsnakes are detected they are usually relatively abundant and the dominant snake species. During the same time period using the same methodology in the 1998-1999 studies, six captures of Alameda whipsnakes were made during a survey conducted by Swaim Biological, Inc. at a site on the Walpert Ridge in the Hayward Hills (Swaim Biological 2000). Five of the whipsnake captures at the Hayward site were from scrub habitat and one was from grassland habitat. The Oakland Zoo survey actually had more traplines in the scrub than the Hayward Hills survey (21 traplines at Oakland versus 15 at the Hayward site). Trapping comparisons for the spring 2010 work at the zoo include surveys Swaim Biological conducted on East Bay Municipal Utility District Property north of Orinda, where three AWS were captured in the first three days of trapping at the site. AWS are not difficult to detect in core type habitat when a resident breeding population is present. They also do not appear to be "trap-shy" as evidenced by the recapture of the same AWS three times on the site in three different traplines.

The population viability in the project area may also be limited by the poor level of connectivity to other occupied or potentially occupied habitat. In 2003 and 2004, live trapping surveys were conducted for

the Alameda whipsnake at Anthony Chabot Regional Park for the EBRPD. These surveys produced negative results (Swaim Biological, Inc. 2003b, 2004). This survey was part of a larger research project investigating the effects of vegetation management practices on Alameda whipsnake. The study area was on the western edge of the park, the urban – wildland interface, adjacent to Skyline Blvd . The Chabot surveys were split into two seasonal trapping efforts to coincide with spring and fall peaks of Alameda whipsnake activity. The 2003 spring season ran from May 19th to August 1st, and the fall season spanned September 10th to October 11th. The 2004 spring season ran from May 12th to July 16th, and the fall season spanned September 10th to October 11th. Traps were active for 96 day (64 fin the spring and 32 in the fall) in 2003 and 91 days (60 days in the spring and 31 days in the fall) in 2004. A total of 27 vertebrate species were captured. Like the project site, the most commonly captured snake species was the western yellow-bellied racer. As described above, the high capture rate of this species (197 in 2003 and 52 in 2004) indicate that the traplines were functioning well. Chabot Regional Park appears to be the most contiguous undeveloped area adjacent to Knowiand Park.

5.2 Veterinary Medical Hospital

The chances of an AWS encountering the construction area footprint of the Veterinary Medical Hospital is low and not expected because of the low number of AWS likely to inhabit the site. Several factors indicated the Veterinary Medical Hospital can be constructed without significantly impacting AWS habitat or taking of an individual AWS with implementation of avoidance and minimization measures. These include the small size of the grading limit and hospital footprint, the bare and/or highly disturbed nature of much of the Veterinary Medical Hospital project area, its location immediately adjacent to the zoo parking lot away from core lype habitat, and the results of the trapping surveys which indicate an extremely low number of AWS in the entire project area.

6.0 CONCLUSIONS AND RECOMMENDATIONS

1. The capture of the Alameda whipsnake dictates that the project area is considered occupied by the Alameda whipsnake. We recommend that measures be included in the project to avoid, minimize, and mitigate for potential significant impacts to AWS and its habitat
2. Project modifications can reduce impacts to core habitat and potential habitat fragmentation. Following are suggested modifications:
 - (a) Amphitheater: Remove from the project;
 - (b) Interpretative Center: Moved 10 feet to the east and limit grading to within 10 feet of the edge of the building.
 - (c) Bison/Tule Elk Extension Exhibit: Limit number of animals housed in the exhibit to 20 bison and 20 Tule elk. Irrigate the pasture area and enhance the grassland through placement of rock outcrops, fallen logs or a combination of the two (existing and proposed areas);
 - (d) Perimeter Fence: Install a perimeter fence that is permeable to allow the passage of any AWS on the project site.
3. Potential impacts to AWS during construction shall be minimized by the clearing of construction areas prior to ground disturbing activities, the installation of exclusionary fencing around all construction areas, and the presence of a biological monitor on site during all work which could impact AWS habitat. Construction workers will be trained regarding the potential presence of AWS and how to respond to any wildlife encountered.
4. The project should mitigate at a final ratio or package through consultation with the USFWS and CDFG.
5. The project should set aside in a USFWS and CDFG approved permanent conservation easement an acreage approved by CDFG and USFWS in either an on-site area surrounding the project or off-site as determined in consultation with the Agencies.
6. The project should mitigate impacts to AWS habitat by conducting habitat enhancement in the Upper Knowland Park. The habitat enhancement should be focused on controlling and where feasible, eradicating highly invasive non-native species which continue to spread in the area and severely compromise existing habitat values. Target invasive species include: French broom, sweet fennel, blue gum eucalyptus, acacias, and other exotic plants. The enhancement efforts will include implementation of an effective Integrated Pest Management Plan (IPM) program. The IPM will include measures to remove the target species and to prevent resprouting or reestablishment of these species. Management measures may include hand pulling, cutting followed by topical application of appropriate herbicide, use of livestock and removal and burning of cut plant materials. Annual monitoring will be conducted. The enhancement efforts will also include the planting of native grassland, riparian and woodland species where native

cover types have been displaced by non-native species. The recommended area of enhancement is the area below Golf Links Road. This will ensure a contiguous block with Golf Links providing some level of a barrier to introduction of target species from the area above Golf Links back into the enhancement area.

7. Construction of the Veterinary Medical Hospital could be accomplished with no take of AWS or their habitat. Avoidance measures would include placement of exclusion fencing around the construction area prior to ground disturbance, removal of vegetation with a mower and monitoring during construction.

8. Incorporate specific educational exhibits/public education regarding conservation of California native wildlife, including the Alameda whipsnake and into the project. Exhibits could educate visitors on conservation ethics, such as decreasing the spread of non-native flora and fauna and using in-fill areas for development to keep open space in large blocks with the smallest urban edge possible to maintain species diversity and connectivity between native habitat areas.

If the above referenced mitigation measures are incorporated, the proposed project will not result in any significant impacts to AWS.

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APPENDIX A – WHIPSNAKE AND SITE PHOTOS

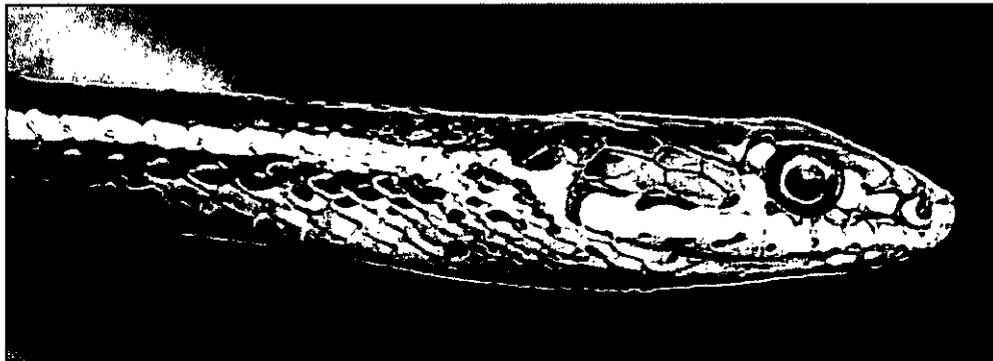
Photo montage of Alameda whipsnake #1
First capture date: 3 June 2010, Trapline 13



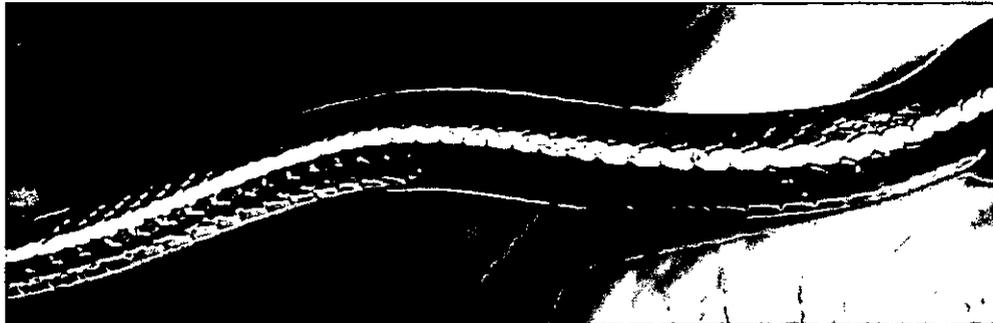
Dorsal view of entire snake.



Close up view of chin showing degree of black spotting.



Close up view of right side of head and neck.



Close up view of dorsolateral stripe.

Photo montage of capture locations of Alameda whipsnake #1



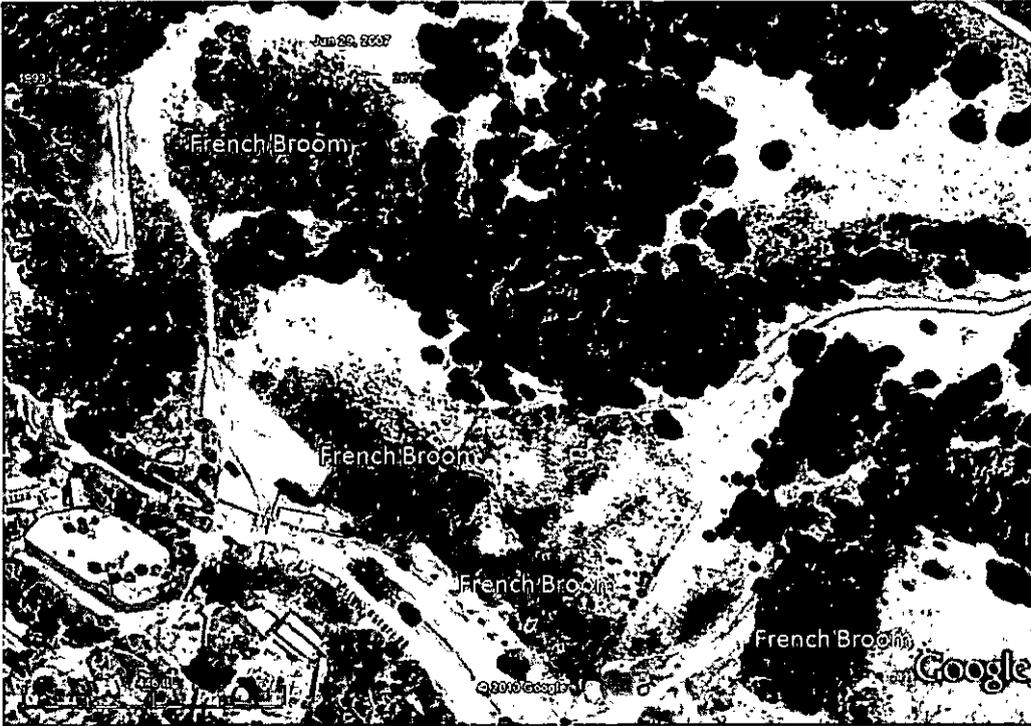
Chamise habitat near trapline 13 - Location of first capture: 3 June 2010



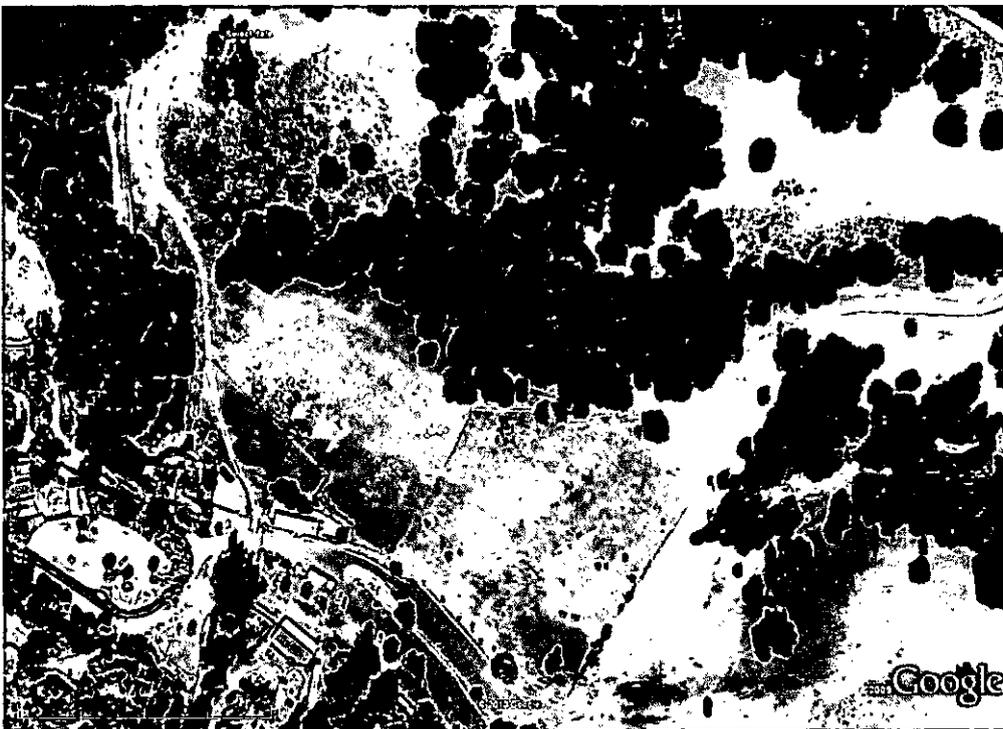
Trapline 12 - Location of second capture: 4 June 2010



Oakland Zoo AWS Survey **Trapline 21 - Location of third capture: 27 June 2010**



2007 Google Earth Image showing the distribution of large French broom stands



2009 Google Earth Image showing the results of removal efforts by the Oakland Zoo

APPENDIX B
CITY PLANNING COMMISSION ADOPTED STANDARD CONDITIONS OF APPROVAL
AND MITIGATION MEASURES RELATED TO ALAMEDA WHIPSNAKE

MITIGATION MEASURES

- 13c) The service road shall be a maximum of 15 feet in width and designed to accommodate crossing by Alameda whipsnake and other wildlife, where necessary, to reduce potential impacts to the Alameda whipsnake.
- 14c) Obtain appropriate authorizations from resource agencies to address possible incidental take and a Permit for Management of a rare or threatened species pursuant to Fish and Game Code Section 2081 and Section 7 of the Endangered Species Act, as called for under SCA-BIO-10. The project applicant shall provide compensatory mitigation for impacts to Alameda whipsnake habitat. Such mitigation shall be provided at a ratio of no less than 1:1 (at least one acre for every acre of impact), subject to any increase in this ratio that may be required by the resource agencies. There is adequate area within Knowland Park to achieve this mitigation ratio. Subject to the approval of the resource agencies, mitigation shall be achieved through habitat restoration and enhancement within the California Exhibit boundaries, the Ecological Recovery Zone, and other locations within Knowland Park, at another restoration location with an Alameda whipsnake habitat restoration plan area approved by the U.S. Fish and Wildlife Service and the California Department of Fish and Game, through the purchase of mitigation credits at a mitigation bank within the East Bay region, or some combination of these options. The project applicant shall retain a qualified biologist to prepare an Alameda whipsnake Mitigation and Monitoring Plan in connection with the application for an incidental take authorization and Management Permit. The Mitigation and Monitoring Plan will be subject to approval by the California Department of Fish and Game and the U.S. Fish and Wildlife Service. The Mitigation and Monitoring Plan shall include (a) a habitat restoration/creation performance standard of no net loss of habitat functions and values; (b) location of the mitigation site(s); (c) a detailed habitat restoration/creation plan for the mitigation site(s); (d) provisions for timing and methods for invasive species removal, controls on herbicide application, and worker training programs that, at a minimum and subject to the requirements of the resource agencies, meet the applicable requirements of the Invasive Species Control Element of the HEP; (e) provisions that include cover requirements, methods of installation and maintenance, a tracking system, a record of source and species of plant materials used in revegetation; and (f) success criteria to be used to evaluate whether the restoration/creation efforts have achieved the identified goals of the Mitigation and Monitoring Plan.

The proposed California Exhibit shall be modified to incorporate recommendations from the 2011 Status Report (Swaim Biological, Inc. 2011), which include removing the amphitheater from the stand of chamise-chaparral; restricting the California Interpretive Center ten feet to the east and limiting grading to within ten feet of the edge of the building; modifying and establishing controls to the bison/tule elk extension exhibit, and ensuring that the perimeter fence is permeable to allow for unrestricted movement of Alameda whipsnake through the area. Controls associated with the bison/tule elk exhibit shall include limiting the number of animals housed to 20 bison and 20 tule elk, maintaining protective cover by creating irrigated pasture outside woodland habitat, and placing rock outcrops and logs to serve as refugia for dispersing snakes. The location of the California Interpretive Center shall be adjusted to the northeast away from the stand of chamise-chaparral, if required by the California

APPENDIX B
CITY PLANNING COMMISSION ADOPTED STANDARD CONDITIONS OF APPROVAL
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Department of Fish and Game and/or the U.S. Fish and Wildlife Service, to provide for appropriate defensible space for tire fuel management as required by the Oakland Fire Department.

- 14d) All removal of scrub or chaparral habitat shall be done by hand with axes or machetes. Chain saws could be used for larger shrubs.
- 14e) A biologist qualified to handle Alameda whipsnakes shall monitor all scrub or chaparral removal and all construction activities which may impact the Alameda whipsnake.
- 14f) Alameda whipsnake habitat shall be preserved in perpetuity on property owned by the East Bay Zoological Society and/or the City of Oakland and contiguous to the east of the California 1820 Exhibit area. Numerous large areas of scrub and/or chaparral habitat are present in the proposed mitigation area and these appear to provide an adequate amount of habitat to offset impacts within the project site. The amount of habitat preserved shall be in accordance with current requirements of the California Department of Fish and Game.
- 14g) To reduce the potential for mortality on the service road to a level less than significant, a maximum speed of ten miles per hour shall be required and all personnel driving will be instructed to watch for and yield to all wildlife. Specially designed "snake crossings" under the service road may also be required.
- 14h) Measures will be taken to prevent the spread of French broom on the site and to remove as much French broom from the site as possible in order to keep it from degrading higher quality whipsnake habitat.

STANDARD CONDITIONS OF APPROVAL

SCA-BIO-5: Whipsnake Habitat, Biological Monitor

Prior to issuance of a demolition, grading, or building permit and ongoing throughout demolition, grading, and/or construction

If the project is located within confirmed Alameda Whipsnake Habitat area, the project applicant shall hire an on-site biological site biological monitor shall instruct the project superintendent and the construction crews (primarily the clearing, demolition and foundation crews) of the potential presence, status and identification of Alameda Whipsnakes. The biological monitor shall also provide information to the Planning and Zoning Division on the steps to take if a whipsnake is seen on the project site, including who to contact, to ensure that whipsnakes are not harmed or killed, as regulation by the federal Endangered Species Act.

APPENDIX B
**CITY PLANNING COMMISSION ADOPTED STANDARD CONDITIONS OF APPROVAL
AND MITIGATION MEASURES RELATED TO ALAMEDA WHIPSNAKE**

SCA-BIO-6: Whipsnake Habitat, Placement of Debris

Prior to issuance of a demolition, grading, or building permit and throughout construction

If the project is located within confirmed Alameda Whipsnake Habitat area, the project applicant shall ensure that the placement of construction debris is limited to the area immediate adjacent to the foundation of the proposed buildings or and to the area between the foundation and the street. Install flexible construction fencing at the limit of work line (approximately ten feet beyond the foundation of the proposed building other than in the direction of the street). Such construction fencing shall limit the placement of construction materials and construction debris to inside the fencing.

SCA-BIO-7: Whipsnake Habitat, Barrier Fence

Prior to issuance of a demolition, grading, or building permit and throughout construction

If the project is located within confirmed Alameda Whipsnake Habitat area, the project applicant shall install a solid fence to prevent whipsnakes from entering the work site. The snake barrier shall be constructed as follows and shall remain in place throughout the entire construction period:

- a) Plywood sheets at least three feet in height above ground. Heavy duty geotextile fabric approved by U.S. Fish and Wildlife Service and California Department of Fish and Game may also be used for snake exclusion fences;
- b) Buried four to six inches into the ground;
- c) Soil back-tilled against the plywood fence to create a solid barrier at the ground;
- d) Plywood sheets maintained in an upright position with wooden or masonry stakes;
- e) Ends of each plywood sheet overlapped to ensure a continuous barrier; and
- f) An exclusion fence shall completely enclose the work site or construction area or approved traps shall be installed at the ends of exclusion fence segments to allow capture and relocation of Alameda whipsnake away from the construction area by a qualified biologist.

SCA-BIO-8: Whipsnake Habitat, Downsloping Lots

Prior to issuance of a demolition, grading, or building permit and throughout construction

If the project is located within confirmed Alameda Whipsnake Habitat area, the project applicant shall install erosion control devices, such as hay bales, at the downhill limit of construction line to prevent rocks and soil from moving downhill. No erosion control materials with plastic or nylon monofilament netting shall be used.

SCA-BIO-10: Regulatory Permits and Authorization

Prior to issuance of a demolition, grading, or building permit within vicinity of the creek

The project applicant shall obtain all necessary regulatory permits and authorizations from the U.S. Army Corps of Engineers (Corps), Regional Water Quality Control Board (RWQCB), California Department of Fish and Game, and the City of Oakland, and shall comply with all conditions issued by applicable agencies. Required permit approvals and certifications may include, but not be limited to the following:

**APPENDIX B
CITY PLANNING COMMISSION ADOPTED STANDARD CONDITIONS OF APPROVAL
AND MITIGATION MEASURES RELATED TO ALAMEDA WHIPSNAKE**

- a) U.S. Army Corps of Engineers (Corps): Section 404. Permit approval from the Corps shall be obtained for the placement of dredge or till material in Waters of the U.S., if any, within the interior of the project site, pursuant to Section 404 of the federal Clean Water Act.
- b) Regional Water Quality Control Board (RWQCB): Section 401 Water Quality Certification. Certification that the project will not violate state water quality standards is required before the Corps can issue a 404 permit, above.
- c) California Department of Fish and Game (CDFG): Section 1602 Lake and Streambed Alteration Agreement. Work that will alter the bed or bank of a stream requires authorization from CDFG.