APPENDIX A

Biological Diversity Baseline Report for the Hellhole Canyon Preserve County of San Diego

Biological Diversity Baseline Report

for the

Hellhole Canyon Preserve

County of San Diego

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Executive Summary

Technology Associates International Corporation (TAIC), assisted by the San Diego Natural History Museum, conducted baseline biological surveys at Hellhole Canyon Preserve on behalf of the County of San Diego Department of Parks and Recreation. The purpose of these baseline surveys is to provide the County with information on existing biological conditions to develop a Resource Management Plan (RMP) including Area Specific Management Directives (ASMDs). The Preserve is located approximately six miles northeast of Escondido in Valley Center, east of Valley Center Road and north of Santee Lane in San Diego County, California, and is owned and managed by the County of San Diego.

Baseline surveys were conducted in the winter, spring, and summer of 2008. Biologists conducted the following surveys to assess the current status of biological resources onsite: (1) mapping of vegetation communities, (2) a floral inventory including rare plant surveys, (3) checklist butterfly surveys, (4) pitfall trapping to sample amphibians, reptiles, and small mammals, (5) focused arroyo toad surveys, (6) aquatic herpetofauna surveys, (7) diurnal avian point count surveys, (8) nocturnal avian surveys, (9) acoustic sampling and roost and foraging surveys for bats, (10) small mammal trapping using live Sherman traps, and (11) track and camera station surveys for medium and large mammals. Due to a series of drought years and recent wildfires that have burned much of the Preserve, results of these surveys may under-represent the diversity of plant and wildlife species that occupy the Preserve.

Nine vegetation communities were mapped within the Preserve and consist of southern coast live oak riparian forest, Diegan coastal sage scrub, southern mixed chaparral, mafic southern mixed chaparral, non-native grassland, coast live oak woodland, eucalyptus woodland, disturbed habitat, and urban/developed. The most abundant vegetation community on the Preserve is southern mixed chaparral. Floristic surveys documented 337 plant taxa occurring in the nine vegetation communities. These include both native and non-native species along with seven sensitive plant species: Brewer's calandrinia, Humboldt's lily, Cleveland's bush monkey flower, felt-leaved monardella, Fish's milkwort, Robinson's pepper-grass, and Engelmann oak.

A total of 150 animal species were documented from the Preserve during the 2008 baseline surveys. These include 16 species of butterflies, three species of amphibians, 16 species of reptiles, 78 species of birds, and 37 species of mammals. No federally or state listed species were detected; however, 13 non-listed sensitive species were detected during baseline surveys.

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1.0 INTRODUCTION

1.1 Purpose of the Report

The purpose of this report is to document biological baseline data collected by Technology Associates (TAIC) and the San Diego Natural History Museum (SDNHM) for the County of San Diego's Hellhole Canyon Preserve (Preserve). Biological surveys were conducted on behalf of the County of San Diego (County) in 2008 to establish baseline habitat and species data. The Preserve is managed by the County of San Diego Department of Parks and Recreation (DPR), and the information will be used to direct future preserve management and monitoring and the development of a Resource Management Plan (RMP) including Area Specific Management Directives (ASMDs).

1.2 Project Location

The 1,850.9-acre[1] Preserve is located approximately six miles northeast of Escondido in Valley Center, east of Valley Center Road and north of Santee Lane (Figure 1-1 – 1-3). It is situated within the USGS 7.5' Oceanside/Borrego Valley Quadrangle, Township 11 South, Range 1 West, Sections 11-15 and Township 11 South, Range 1 East, Section 7. On the south, the Preserve is bounded by the community of Valley Center and the San Pasqual Indian Reservation, and on the north by Bureau of Land Management (BLM) land and the Rincon Indian Reservation.

The Preserve is comprised of the following Assessor's Parcel Numbers (APN): 188-100-39, 189-080-57, 189-080-58, 189-052-31, 188-310-02, 189-080-02, 189-080-25, 189-080-26, 191-060-19, and 189-081-24. Access to the Preserve occurs from the main staging area (north of Santee Lane) near the southeast boundary of the Preserve and near the southwest boundary of the Preserve via City of Escondido Water Authority property.

1.3 Project Description

The Preserve was acquired by the County in 1973 and will be included in the North County Multiple Species Conservation Program (MSCP) preserve system, once this plan has been finalized. The Preserve consists of valuable native habitats, as well as areas that have been marginally impacted by human activities. The County proposes to manage the

[1] The County assessor's parcel data list the Preserve to be 1,906.96 acres; however, calculations generated from the SanGIS parcel database show the Preserve as 1,850.9. Therefore, this report references the Preserve as 1,850.9 acres.

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Hellhole Canyon Preserve Baseline Surveys

PARKS AND RECREATION
COUNTY OF SAN DIEGO

Basemap Legend

- Freeway
- River
- Lake/Reservoir/Lagoon

N

Miles

0 11

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Regional Location Map

Figure 1-1

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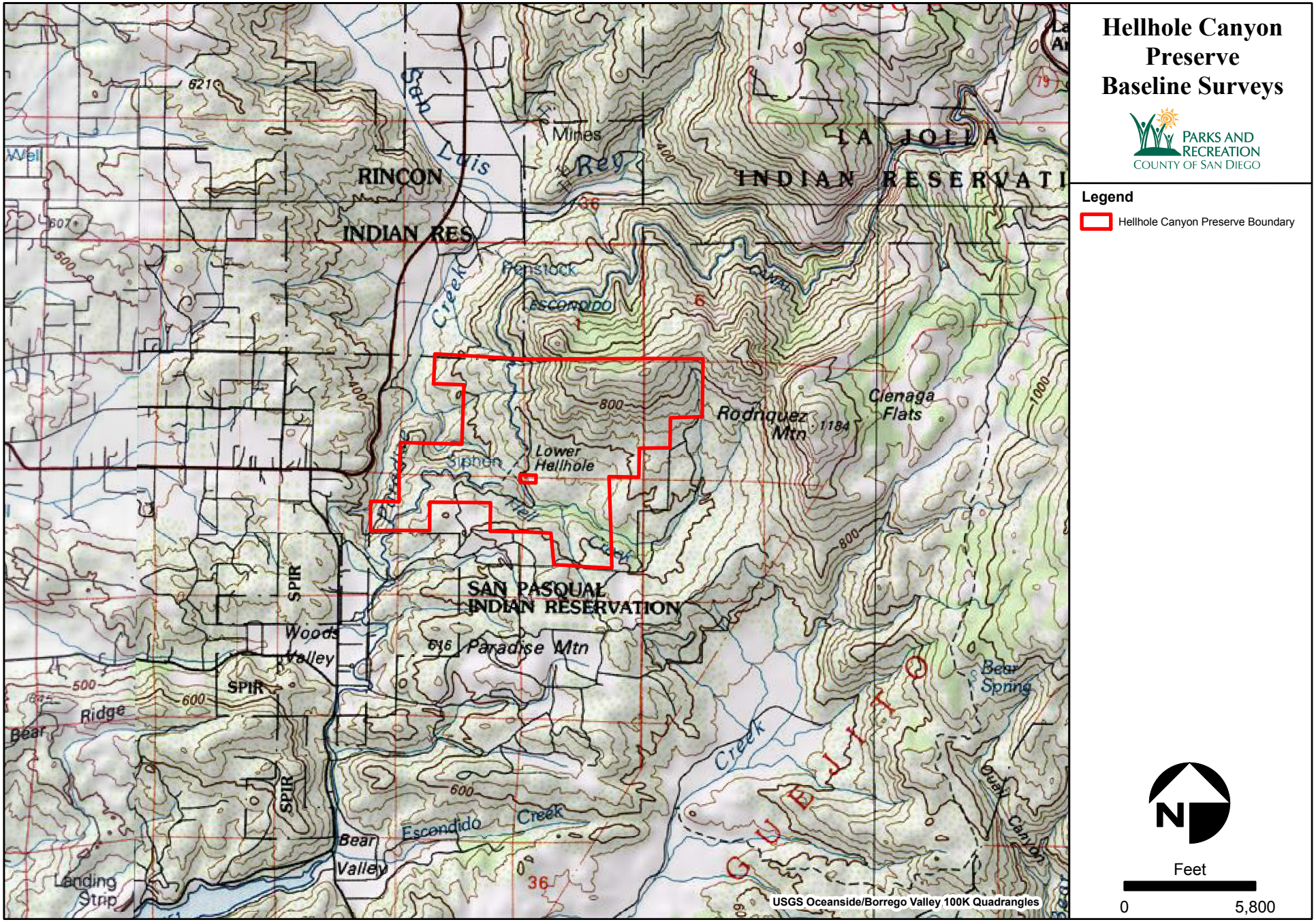

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USGS Topographic Quadrangle Map

Figure 1-2

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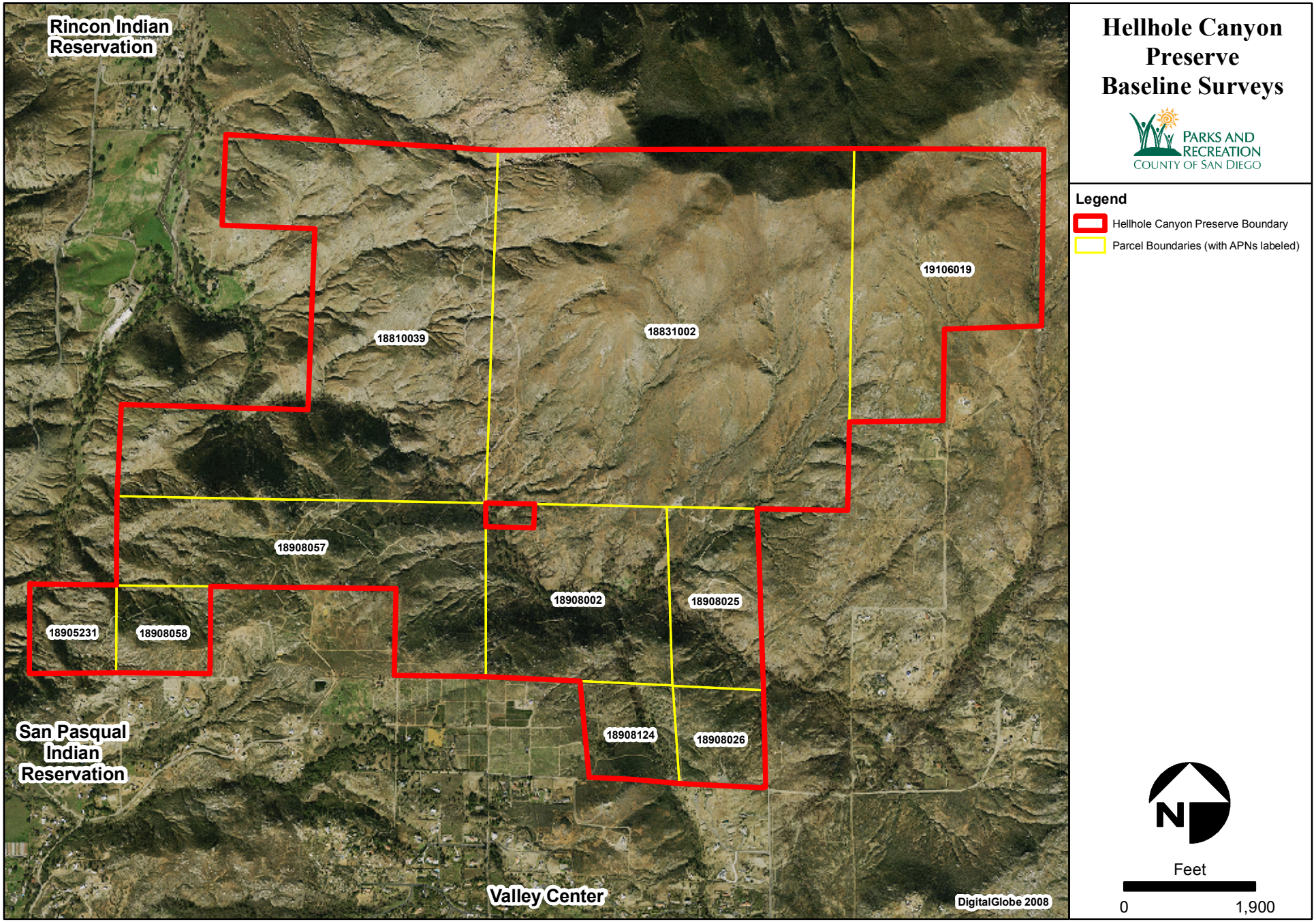

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Site Map

Figure 1-3

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Preserve in accordance with ASMDs that will be prepared based upon the baseline biological survey information established in this report.

2.0 STUDY AREA

2.1 Geography

The Preserve is located in northeastern San Diego County in the Peninsular Geomorphic Range. The Preserve ranges in elevation between approximately 1,900 and 3,200 feet (580-975 meters) above mean sea level (msl) with the highest elevation occurring at the ridge of an unnamed peak located near the northern edge of the Preserve, east-northeast of Rodriguez Mountain.

2.2 Geology and Soils

According to the Natural Resource Conservation Service's (NRCS) Web Soil Survey (WSS), 12 different soil types are present throughout the Preserve (Figure 2-1). The WSS provides soil data and information produced by the National Cooperative Soil Survey and provides access to the largest natural resource information system in the world. A brief description of each soil type is provided in the text below.

Acid Igneous Rock Land (AcG) – Acid igneous rock land soil is found in rough broken terrain. The topography ranges from low hills to steep mountains. Large boulders and rock outcrops of granite, quartz diorite, gabbro, basalt, and other rock types cover greater than 50 percent of the total area. The soil material is very shallow consisting of loam to loamy course sand textures over decomposed granite or basic igneous rock. In some locales, pockets of deep soils may be present between the rocks. Many areas are practically barren and have very rapid runoff. The vegetation for this soil type varies by elevation and climate. In the foothills and mountains, acid igneous rock land supports various chaparral vegetation communities. In the foothills, the dominant vegetation species on this soil type are laurel sumac (*Malosma laurina*), sugarbush (*Rhus ovata*), chamise (*Adenostoma fasciculatum*), and ceanothus (*Ceanothus* spp.). In the mountains the dominant species are chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* spp.), red shank (*Adenostoma sparsifolium*), lilac (*Ceanothus* spp.), and scrub oak (*Quercus berberidifolia* or *Q. xacutidens*). On the Preserve this soil type supports southern mixed chaparral.

Bonsall Sandy Loam, 9 to 15 percent slopes, eroded (BlD2). The Bonsall Sandy Loam, 9 to 15 percent slopes, soil type is a moderately well drained, shallow to

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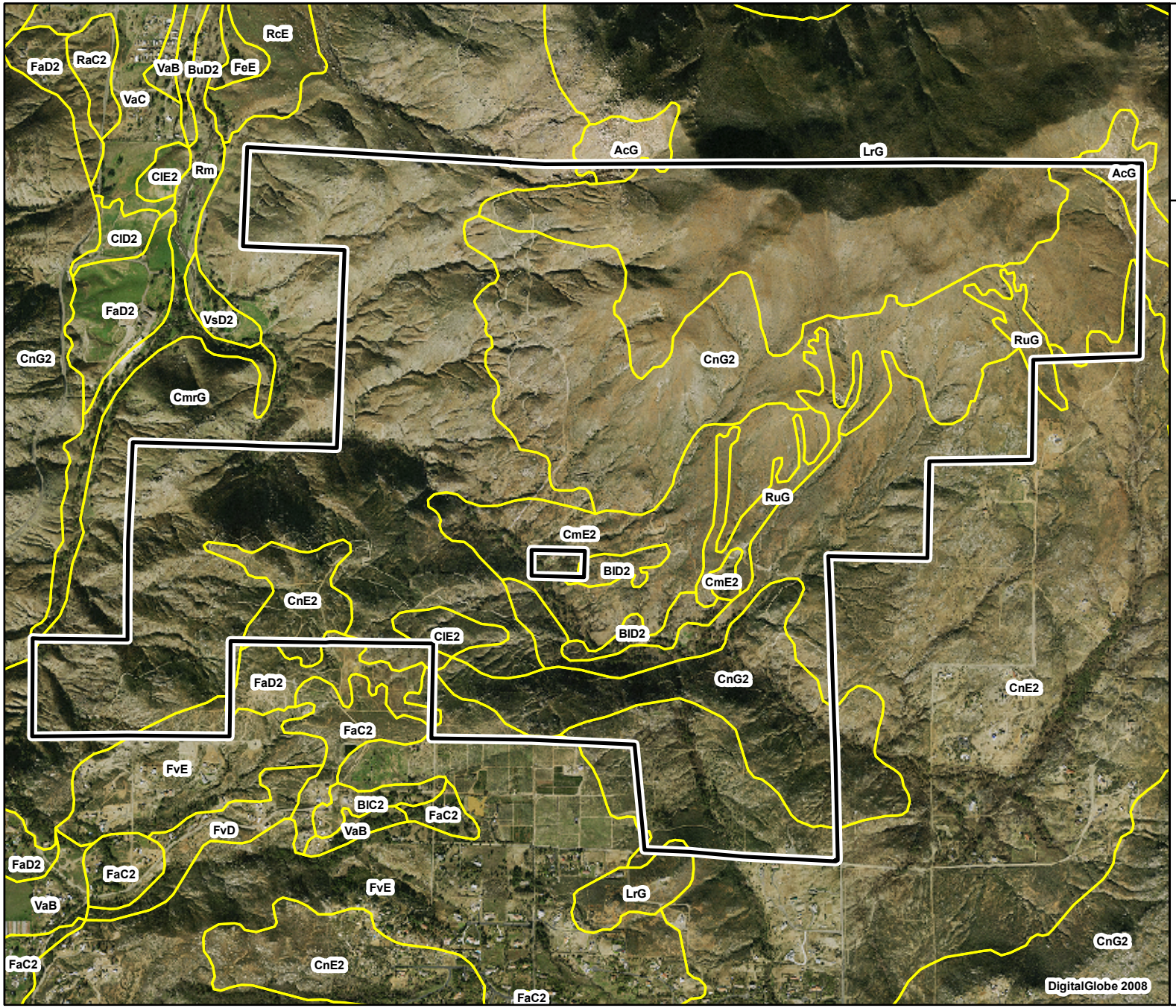

Hellhole Canyon Preserve Baseline Surveys

PARKS AND RECREATION
COUNTY OF SAN DIEGO

Legend

Code	Soil Type
AcG	Acid igneous rock land
BlC2	Bonsall sandy loam, 2 to 9 percent slopes,
BlD2	Bonsall sandy loam, 9 to 15 percent slopes, eroded
BuD2	Bull Trail sandy loam, 9 to 15 percent slopes, eroded
ClD2	Cieneba coarse sandy loam, 5 to 15 percent slopes, eroded
ClE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, eroded
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded
CmrG	Cieneba very rocky coarse sandy loam, 30 to 7 percent slopes
CnE2	Cieneba-Fallbrook rocky sandy loam,9 to 30 percent slope,eroded
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes
LrG	Las Posas stony fine sandy loam, 30 to 65 percent slopes
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded
RcE	Ramona gravelly sandy loam, 15 to 30 percent slopes
Rm	Riverwash
RuG	Rough broken land
VaB	Visalia sandy loam, 2 to 5 percent slopes
VaC	Visalia sandy loam, 5 to 9 percent slopes
VsD2	Vista coarse sandy loam, 9 to 15 percent slopes, eroded

Basemap Legend

Hellhole Canyon Preserve Boundary

N

Feet

0 1,900

Technology Associates International Corporation

Soils

Figure 2-1

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moderately deep sandy loam with a heavy clay loam subsoil. This soil type occurs on strongly sloping terrain and is frequently cut by shallow gullies. Fertility is medium and permeability is very slow. Runoff is medium and the erosion hazard is moderate. This soil type supports rangeland/grazing land uses and can be found in association with seven vegetation communities on the Preserve, including: (1) coast live oak woodland, (2) southern coast live oak riparian forest (3) disturbed coastal sage scrub, (4) nonnative grassland, (5) southern mixed chaparral, (6) disturbed habitat, and (7) developed/urbanized land.

Cieneba Coarse Sandy Loam, 15 to 30 percent slopes, eroded (ClE2). Cieneba Coarse Sandy Loam, 15 to 30 percent slopes, is an excessively drained, very shallow to shallow coarse sandy loam formed from material weathered in place from granitic rock. This soil type occurs on hilly terrain located in uplands. Fertility is low and permeability is rapid. Runoff is medium to rapid and the erosion hazard is moderate to high. This soil type can support wildlife habitat, recreation, and incidental grazing. It is often associated with chaparral and chamise. Within the Preserve this soil type supports southern mixed chaparral and disturbed habitat.

Cieneba Rocky Coarse Sandy Loam, 9 to 30 percent slopes, eroded (CmE2). This soil type is similar in origin, texture, runoff/drainage, permeability, and erosion hazard to Cieneba Coarse Sandy Loam, 15 to 30 percent slopes. In contrast to Cieneba Coarse Sandy Loam, 15 to 30 percent slopes, this soil type generally occurs in rolling to hilly terrain and has more emergent rock outcrops. This soil type can support wildlife habitat, recreation, and incidental grazing. This soil type is often associated with chaparral and chamise. Seven vegetation communities occur within this soil type on the Preserve, including: (1) coast live oak woodland, (2) southern coast live oak riparian forest, (3) disturbed coastal sage scrub, (4) nonnative grassland, (5) southern mixed chaparral, (6) disturbed habitat, and (7) developed/urbanized land.

Cieneba Very Rocky Coarse Sandy Loam, 30 to 75 percent slopes (CmrG). This soil type is similar in origin, texture, and permeability, to Cieneba Coarse Sandy Loam, 15 to 30 percent slopes. Cieneba Very Rocky Coarse Sandy Loam, 30 to 75 percent slopes, is excessively drained, very shallow to shallow, coarse sandy loam formed from material weathered in place from granitic rock. This soil type occurs on steep to very steep terrain. Fertility is low. Runoff is rapid to very rapid, and the erosion hazard is high to very high. This soil type has poor overall productivity but supports wildlife habitat, recreation, and incidental grazing. Within the Preserve this soil type supports five vegetation communities: (1) coast live oak woodland, (2) southern coast live oak riparian

forest, (3) southern mixed chaparral, (4) disturbed habitat, and (5) developed/urbanized land.

Cieneba – Fallbrook Rocky Sandy Loam, 9 to 30 percent slopes, eroded (CnE2). This complex is a mixture of two discrete soil mapping types containing approximately 55 percent Cieneba Course Sandy Loam and 40 percent Fallbrook Sandy Loam with 5 percent rock outcrops. This complex occurs in uplands between 200 and 3,000 feet (60 to 915 meters) above mean sea level. This complex displays the geophysical characteristics of both of is constituent sources. The Cieneba course sandy loam component of this complex is excessively drained, permeability is moderately rapid, and fertility is low. The Fallbrook sandy loam component is well drained, permeability is moderately slow, and fertility is medium. The runoff for both soils is medium to rapid and the erosion hazard is moderate to high with sheet erosion and gully erosion classified as moderate. This soil type supports wildlife habitat, recreation, and managed grazing. It supports a wide range of vegetation on the Preserve, including: (1) coast live oak woodland, (2) southern coast live oak riparian forest, (3) disturbed coastal sage scrub, (4) eucalyptus woodland, (5) nonnative grassland, (6) southern mixed chaparral, (7) row crops, (8) disturbed habitat, and (9) developed/urbanized land.

Cieneba – Fallbrook Rocky Sandy Loam, 30 to 65 percent slopes, eroded (CnG2). This complex is similar in origin, texture, runoff/drainage, permeability, and erosion hazard to Cieneba – Fallbrook Rocky Sandy Loam, 9 to 30 percent slopes, eroded. This complex is a mixture of two discrete soil mapping types containing approximately 55 percent Cieneba Course Sandy Loam and 40 percent Fallbrook Sandy Loam with 10 percent rock outcrops and 10 percent large boulders. The Cieneba course sandy loam component of this complex is low in fertility, excessively drained, and moderately to rapidly permeable. Fallbrook Sandy Loam is medium in fertility, well drained, and slowly to moderately permeable. For both constituent soils included in this complex runoff is rapid to very rapid and the erosion hazard is high to very high. Sheet and gully erosion are classified as moderate. This soil type supports wildlife habitat, recreation, and incidental grazing. Six vegetation communities occur within this soil type on the Preserve, including: (1) coast live oak woodland, (2) southern coast live oak riparian forest, (3) eucalyptus woodland, (4) southern mixed chaparral, (5) disturbed habitat, and (6) developed/urbanized land.

Fallbrook Sandy Loam, 5 to 9 percent slopes, eroded (FaC2). Fallbrook Sandy Loam, 5 to 9 percent slopes (eroded) is a well drained, moderately deep to deep sandy loam formed in material weathered in place from grandiorite. This soil type is similar in origin, texture, runoff/drainage, permeability, and erosion hazard to Fallbrook Sandy

Loam, 5 to 9 percent slopes, with slightly different water holding capacities. As described for the series, and Fallbrook Sandy Loam, 5 to 9 percent slopes, in particular, these soils are located on gently sloping terrains in uplands. Fertility is medium, and permeability is moderate. Runoff is slow to medium and the erosion hazard is slight to moderate. Sheet and gully erosion are characterized as moderate. This soil type supports grazing and production of irrigated avocados, citrus, truck crops and non-irrigated small grain and hay. Within the Preserve, row crops and disturbed habitat occur in conjunction with this soil type.

Fallbrook Sandy Loam, 9 to 15 percent slopes, eroded (FaD2). This soil type occurs on strongly sloping terrain over rock. This soil type is similar in origin, texture, and permeability to Fallbrook Sandy Loam, 5 to 9 percent slopes, eroded. Runoff is medium and erosion hazard is moderate. Sheet and gully erosion are characterized as moderate. Like other soils of the Fallbrook series, this soil type supports grazing and production of irrigated avocados, citrus, truck crops and non-irrigated small grain and hay. This soil type supports four vegetation communities on the Preserve, including: (1) southern mixed chaparral, (2) row crops, (3) disturbed habitat, and (4) developed/urbanized land.

Fallbrook-Vista Sandy Loam, 15 to 30 percent slopes, eroded (FvD). This complex is a mixture of two discrete soil mapping types containing approximately 50 percent Fallbrook Sandy Loam and 40 Percent Vista Sandy Loam. This complex occurs in uplands between 200 and 3,000 feet (60 to 915 meters) above mean sea level and is formed on weathered granitic rock. Both constituent soils are well drained. Fertility is medium. Runoff is medium, and the erosion hazard is moderate. Vista sandy loam is moderately rapidly permeable while Fallbrook Sandy Loam is moderately permeable. This soil type supports grazing and production of avocados, citrus, and other crops. This soil type supports four vegetation communities on the Preserve, including: (1) southern mixed chaparral, (2) row crops, (3) disturbed habitat, and (4) developed/urbanized land.

Las Posas stony fine sandy loam, 30 to 65 percent slopes (LrG). Las Posas stony fine sandy loam, 30 to 65 percent slopes, is a well drained, moderately deep, stony, fine sandy loam with a clay subsoil. It occurs on steep to very steep terrain in uplands. Fertility is medium. Permeability is moderately slow in the subsoil, and water holding capacity is 4 to 6 inches. Runoff is rapid to very rapid, and erosion hazard is high to very high. This soil type supports incidental grazing and wildlife habitat. On the Preserve, this soil type supports three vegetation communities: (1) southern mixed chaparral, (2) disturbed habitat, and (3) developed/urbanized land. The substratum in this series is a gabbro soil.

Gabbro Soils. Gabbro soils are a rare soil type in San Diego County and are present on the Preserve in the form of Las Posas soils. These mafic soils, derived from course-grained, igneous, gabbroic rock, are chemically similar to the more familiar fine-grained basalt. Gabbro soils contain high levels of magnesium and iron relative to other soil types. On the opposite side of the spectrum are felsic rocks (e.g. granite) with high silica levels and lower levels of metals such as iron and magnesium and the granitic soils which they form. Gabbro soils are found in various locales in the northern and northeastern parts of the County in areas such as Fallbrook and Pala. These soils support unique southern mixed chaparral communities which often include several species of limited distribution known almost exclusively from sites underlain by gabbro soils such as cismontane beargrass (*Nolina cismontane*), Parry's tetracoccus (*Tetracoccus dioicus*), and Gander's butterweed (*Senecio ganderi*).

Rough Broken Land (RuG). Rough Broken Land is made up of well drained to excessively drained, steep to very steep land dissected by many narrow "V-shaped" valleys and canyons. Areas of exposed raw sediments are common and there are few areas of very shallow soils. Runoff is rapid to very rapid and erosion is very high. Vegetation mostly consists of sparse, woody shrubs. Generally, lands dominated by this soil type are not suitable for farming or ranching operations. Four vegetation communities occur within this soil type on the Preserve, including: (1) coast live oak woodland, (2) southern mixed chaparral, (3) disturbed habitat, and (4) developed/urbanized land.

2.3 Climate

San Diego County and Southern California have a Mediterranean climate characterized by mild wet winters and arid summers. The growing season is generally considered to be 365 days per year in this area. Temperature data recorded at a weather station in Valley Center (N 33° 12' 6"; W 116° 56' 13") from 2005 to 2007 are presented in Table 2-1 (Weather Underground 2008). Precipitation data recorded at the Western Regional Climate Center (WRCC 2007) Valley Center 6N and Valley Center 2 NNE sampling stations (the closest sampling stations to the Preserve) are presented in Tables 2-2 and 2-3, respectively.

Table 2-1. Monthly Average High and Low Temperatures (2005-2007) for Valley Center, California (N 33° 12' 6''; W 116° 56' 13'')

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High Temperature (°F)	62.4	65.3	66.2	69.2	74.6	79.3	88.3	86.4	81.5	74.8	72.1	64.4
Average Low Temperature (°F)	44.6	48.1	47.4	49.3	55.2	59.2	66.6	63.0	61.3	56.4	51.8	46.1

Table 2-2. Monthly Average Total Precipitation (1961-1990) for the Valley Center 6 N, California Weather Station (049228)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Total Precipitation (in.)	1.70	1.95	2.01	1.62	0.33	0.12	0.04	0.08	0.45	0.47	2.79	2.53	14.08

Table 2-3. Monthly Average Total Precipitation (1971-2000) for the Valley Center 2 NNE, California Weather Station (049232)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Total Precipitation (in.)	2.56	3.12	3.40	1.34	0.44	0.14	0.02	0.16	0.57	0.53	1.59	2.25	16.12

The climate data shown in Tables 2-1 through 2-3 highlights the generally arid precipitation regime characteristic of the region. Higher elevations in the Preserve have cooler temperatures on average than the lower elevation and during winter months may infrequently receive some precipitation in the form of snowfall. Higher elevations generally receive more precipitation than lower elevations from weather systems which, upon colliding with cooler air masses such as those over the mountains, may drop several inches of precipitation in a rather short period of time. Higher elevations may also receive occasional summer rains and moisture from tropical weather systems. In addition to differing precipitation patterns, temperatures at higher elevations within the Preserve may drop below 32^{o}F for extended periods of time, resulting in freezing soil conditions, thereby limiting winter growth.

2.4 Fire Cycles

Wildfire is a natural disturbance cycle which has historically shaped the Preserve and the surrounding region. Plant species found in local vegetation communities (i.e. chaparral communities) have developed the ability to survive naturally spaced recurrent fires by producing seeds that require a fire-related cue to stimulate germination and/or by stump

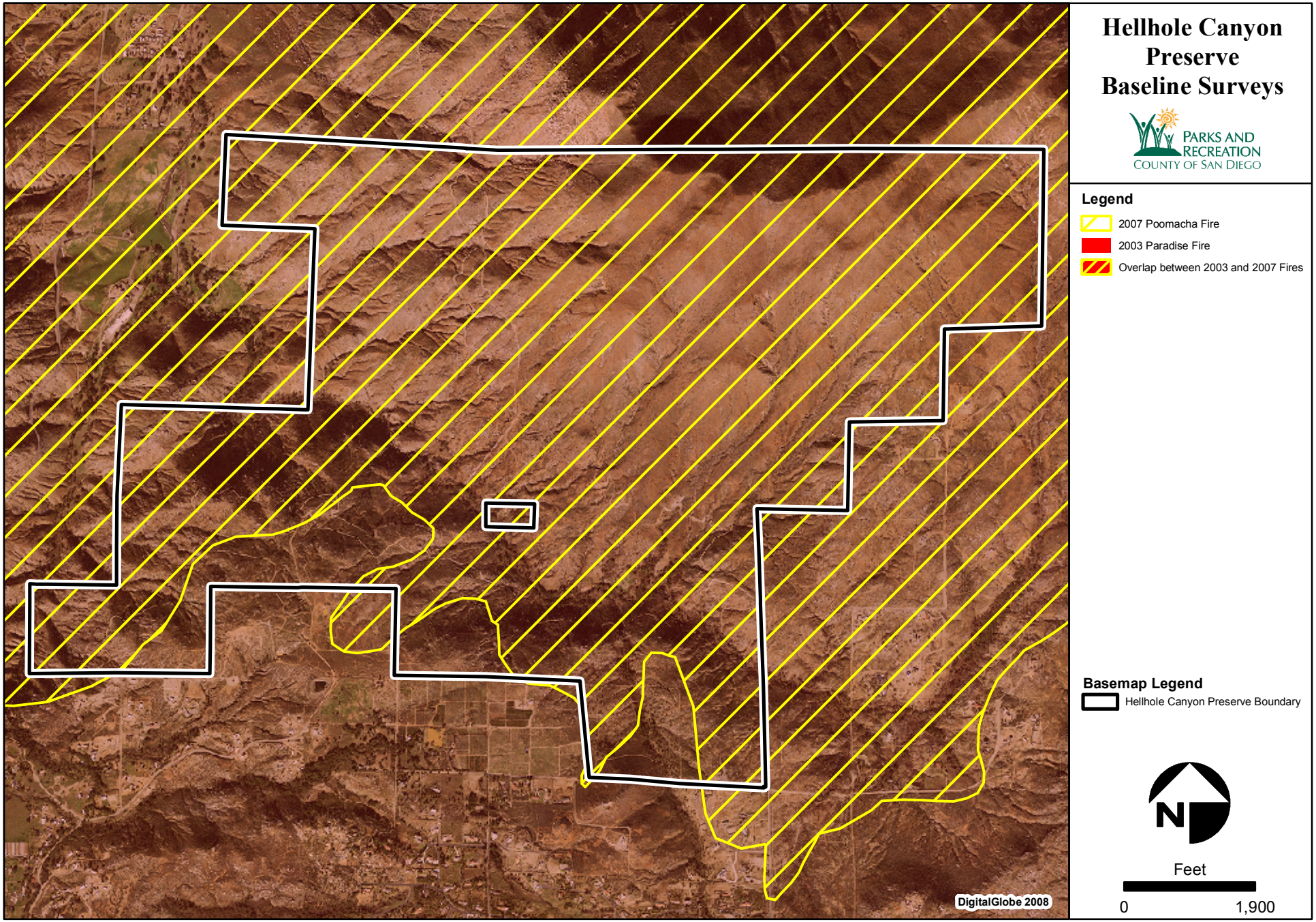
sprouting after being burned. The return frequency of wildfire on the Preserve is not well known, because in recent years the return cycle has increased due to human-caused fires exacerbated by Santa Ana wind conditions. A majority (99 percent) of the recent firestorms in San Diego County has been human-caused; in addition, the sources of wildfires have shifted over time, and the effects (including size and intensity) of these fires have increased compounded by drought and Santa Ana wind conditions. Historically, fires have occurred more frequently in more populated coastal environments, where the climate is moister and Santa Ana winds don't proliferate. However, population in the County's interior has increased, and recent fires have ignited in the dryer eastern parts of the County, where they burned vast areas east to west driven by Santa Ana winds.

Recent noteworthy wildfires have been recorded on the Preserve in 2003 (Paradise Fire) and the 2007 (Poomacha Fire) (SDSU 2008). The 2003 Paradise Fire consumed the entire Preserve, while the Poomacha wildfire in October 2007 only affected the riparian corridor and a small portion of the Preserve (Figure 2-2).

In San Diego County, most of the shrublands in the foothills have recently experienced more fires than historically was the case. In these areas, specifically those hard hit and double-burned by the 2003 and 2007 wildfires (including the Preserve, see Figure 2-2), fire frequency has exceeded the threshold of tolerance for native ecosystems and resulted in type conversion from these shrublands to non-native grasslands. Fire recovery within the Preserve from the recent 2003 and 2007 fires has not yet progressed to the point where conclusions can be drawn, given that no quantitative fire recovery data are available for the Preserve.

2.5 Hydrology

The entire Preserve is located within the watershed of the San Luis Rey River. The majority of the precipitation that falls within the Preserve drains first to Hell Creek, an intermittent blue-line stream that originates to the east of the Preserve and courses roughly east-west across the center of the Preserve. Near the western edge of the Preserve, Hell Creek converges with Paradise Creek, another intermittent blue-line stream that runs roughly from south to north along the western edge of the Preserve. Downstream (north) of the confluence of Hell Creek, Paradise Creek continues north off the Preserve for approximately five miles before draining into the San Luis Rey River on the Rincon Indian Reservation (Figure 1-2). The San Luis Rey River is an intermittent streambed which continues west after converging with Paradise Creek, ultimately draining to the Pacific Ocean near Oceanside, CA.



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Recent Fire History

Figure 2-2

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3.0 METHODS

3.1 Background Literature Review

Prior to conducting biological field surveys, potentially occurring sensitive biological resources were identified through a review of the following species databases: California Natural Diversity Database (CNDDB), MSCP Species Database, U.S. Fish and Wildlife Service (2004), California Department of Fish and Game (2004), California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular Plants (CNPS 2004), the SDNHM Plant, Bird, and Mammal Atlas, and the SD Herbarium databases.

In addition, wildlife data collected on the Preserve were provided by Kristine Preston, Ph.D., University of California Riverside and former officer of the Friends of Hellhole Canyon. Dr. Preston's research focused on breeding blue-gray gnatcatcher (*Polioptila caerulea*), wrentit (*Chamaea fasciata*), and western scrub-jay (*Aphelocoma californica*) populations on the Preserve. The data provided by her included a comprehensive list of incidental wildlife observations made during her research effort from 1999 to 2001. Volunteers with the Friends of Hellhole Canyon Preserve periodically collect plant and wildlife inventories of the Preserve and post these lists on their website: http://www.hellholecanyon.org/Plants,%20Species.htm. This information was also used to complement the field-collected data.

3.2 Biological Field Surveys

Biological field surveys were conducted by qualified biologists of TAIC and SDNHM during the appropriate time of year ideal for detection and identification, as described in more detail below. Baseline surveys were conducted in the winter, spring, and summer of 2008 (Table 3-1 details survey personnel and schedules). Biologists conducted the following surveys to assess the current status of biological resources onsite: (1) mapping of vegetation communities, (2) a floral inventory including rare plant surveys, (3) checklist butterfly surveys, (4) pitfall trapping to sample amphibians, reptiles, and small mammals, (5) focused arroyo toad surveys, (6) aquatic herpetofauna surveys, (7) diurnal avian point count surveys, (8) nocturnal avian surveys, (9) acoustic sampling and roost and foraging surveys for bats, (10) small mammal trapping using live Sherman traps, and (11) track and camera station surveys for medium and large mammals.

3.2.1 Vegetation Communities Mapping

Mapping of vegetation communities was conducted by qualified biologists within the Preserve on January 17 and 28, 2008 (Table 3-1). Vegetation communities were mapped within the Preserve boundaries plus a 100-foot buffer pursuant to survey guidelines published by the County of San Diego (2007). The presence or absence, and/or percent cover of indicator plant species were used to determine the vegetation type.

Table 3-1. Schedule of Biological and Habitat Assessment Surveys

Survey Type	Dates	Personnel[1]
Vegetation Communities Mapping	January 17, 2008	JA, RH
	January 31, 2008	JA, RH, MH, MR
Flora Surveys	March 6, April 3, May 1, 14, and 28, 2008	MM, JR
Lepidoptera Surveys	March 6, April 3, May 1 and 14, 2008	MW
Terrestrial Herpetofauna Surveys	March 24-28, 2008	MR, MA
	April 21-25, 2008	DS
	May 12-16, 2008	DS
	June 9-June 13, 2008	MR, MA
Aquatic Herpetofauna Surveys	April 14 and May 7, 2008	DS, MR
Arroyo Toad Surveys	April 14 and May 7, 2008	DS, MR
Avian Surveys	January 29 and 30, 2008	PU
	February 26 and 27, 2008	PU
	March 25 and 26, 2008	PU
	April 29 and 30, 2008	PU
	May 27 and 28, 2008	PU
	June 25 and 27, 2008	PU
Bat Surveys (Passive)	March 4-7, 2008 and June 3-6, 2008	DS
Bat Surveys (Active)	July 18 and 23, 2008	DS
Small Mammal Surveys	April 5-10, 2008	DH, DS
	April 29- May 5, 2008	DH
	June 17-19, 2008	DH
Medium and Large Mammal Surveys	April 5-10, 2008	DH, DS
	April 29- May 5, 2008	DH
	June 17-19, 2008	DH

[1] TAIC Personnel: JA=Jonathan Appelbaum, RH=Rosanne Humphrey, MH=Marissa Hedman, MR=Mark Roll, MA=Michael Anguiano;
SDNHM Personnel: MM=Margie Mulligan, JR=Jon Rebman, PU=Philip Unitt, DS=Drew Stokes, DH=Dana Hogan, MW=Michael Wall.

The boundaries of vegetation communities were drawn onto a 200-scale (1" = 200') 2007 color aerial photograph. The natural vegetation community classification used in this report follows the Oberbauer (2006) modified Holland (1986) Vegetation Classification System.

3.2.2 Floristic Surveys

Floristic surveys consisted of surveying the Preserve to record common, readily detectable rare plants, and invasive non-native plant species for the purpose of future monitoring. A stratified sampling approach was employed in order to best characterize species occurrence and distribution within the Preserve. Survey sites were selected based upon accessibility, vegetation community, soil type, burn history, known rare plant locations, and other environmental factors such as slope, aspect, and unique geological features. By selecting sites based on these variables it was possible to focus efforts in areas with a greater potential to encounter high plant species diversity and interesting rare and/or previously undocumented species.

Survey efforts were temporally spaced to allow for maximizing rare plant sightings in a one year period (Table 3-1). Emphasis was placed on collecting during the growing and flowering season for most species in the coastal areas of San Diego County (March through May). It should be noted that conditions in the field and the amount and timing of seasonal precipitation may have influenced the number of rare plants encountered.

All federal, state, and local special-status species encountered during surveys were mapped with a Garmin Rino 130 Global Positioning System (GPS) Unit with less than 20 feet accuracy. Invasive non-native plant species or areas of high concentrations of non-natives (such as old homesteads) encountered were also mapped using a GPS unit.

A voucher-based species list was compiled for all reproductive species found in the Preserve, including the sensitive species and invasive non-native species. Plants were collected and identified by Masters or Ph.D. level botanists. Following preliminary identification, all plant specimens were verified by Dr. Jon Rebman, Curator of Botany at the San Diego Natural History Museum (SDNHM). Plant specimens were then deposited in the SD Herbarium, located at SDNHM. The SD Herbarium is the primary repository in San Diego County of voucher specimens documenting plant diversity in the County. All species collections were submitted through the Plant Atlas Project, a multi-year program designed to improve scientific knowledge of regional plants through better documentation of the flora of San Diego County. Collection supplies and guidelines for collecting, pressing, mounting, and storing of specimens are found in Appendix A, prepared by the SD Herbarium.

3.2.3 Lepidoptera Surveys

Butterfly surveys were conducted as checklist surveys. Checklist surveys employ targeted walks that focus on habitat diversity for optimal detectability of butterfly

species. It is an opportunistic method that is difficult to standardize. However, for butterflies checklist surveys have proven to be most efficient for maximizing diversity in preliminary diversity assessments (Royer et al. 1998).

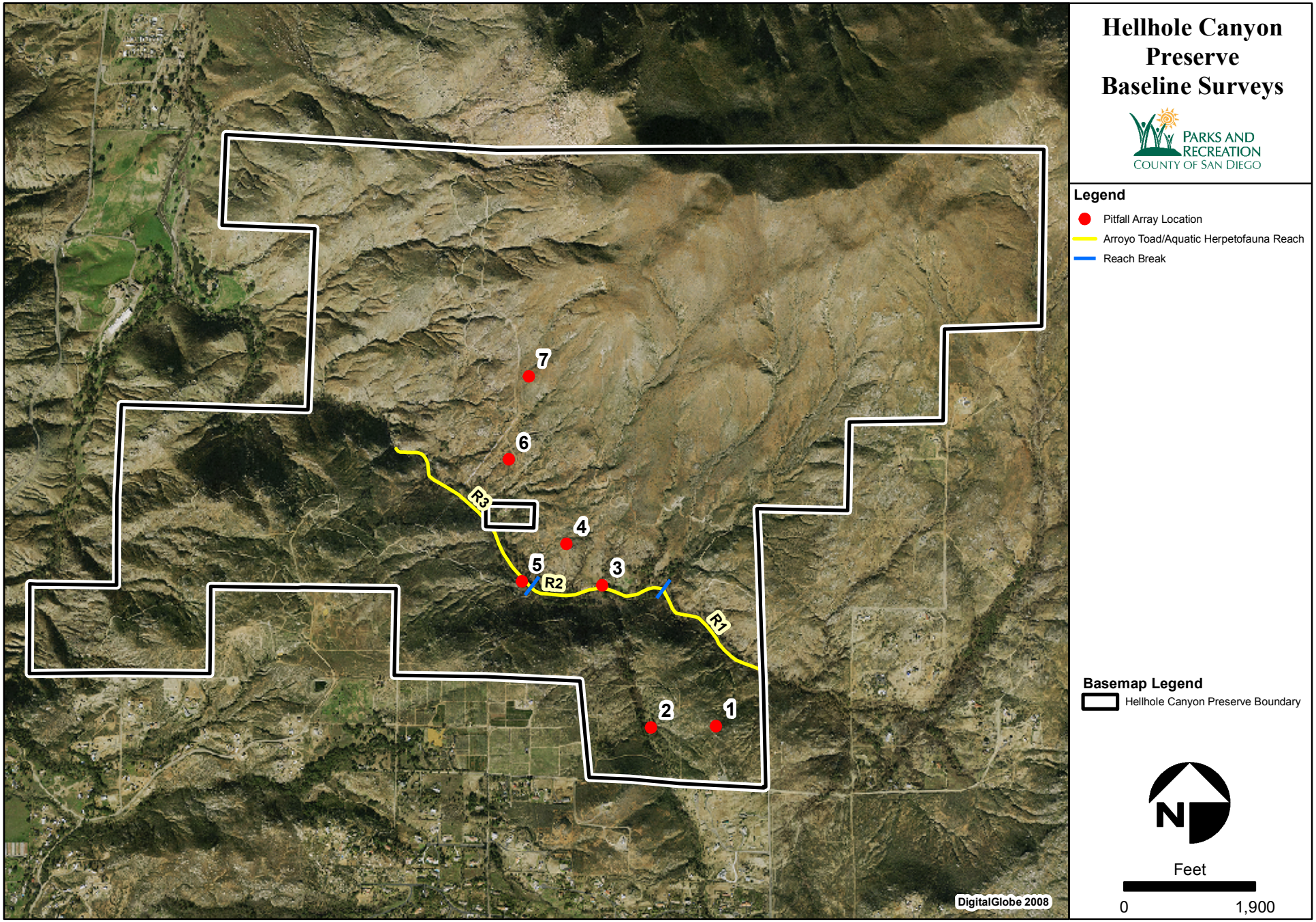
Surveys were conducted on four dates including March 6, April 3, May 1, and May 14, 2008 (Table 3-1). Targeted walks were performed in all major vegetation areas within the Preserve to fully capture the diversity of the butterfly fauna. This included both native vegetation and areas dominated by non-natives. Attention was also focused on ridges and hilltops to take advantage of butterflies' tendency to congregate in these areas (Baughman et al. 1988). Walks were generally over six hours in length. Most butterflies were identified on sight. Some individuals were netted to confirm identification. Data were collected in the field using a field notebook and GPS.

The survey method used maximizes diversity in initial biodiversity assessments. Because the survey method is opportunistic, repeatability for statistical purposes is limited. Weather can impact survey success. For instance, April 3, 2008 was overcast and cool through much of the day. In this case butterfly activity was low and few observations were made of animals in flight. Finally, the large size of the Preserve made a more comprehensive survey impossible.

3.2.4 Herpetofauna Surveys

3.2.4.1 Terrestrial Herpetofauna Surveys

Pitfall trap arrays have been widely used to obtain data on amphibians and reptiles throughout southern California (Fisher and Case 2000). For this study, seven pitfall arrays were constructed within the Preserve following a modified U.S. Geological Survey (USGS) protocol for herpetological monitoring using pitfall trapping (Atkinson et al. 2003). Each pitfall array consisted of four 5-gallon buckets and three box funnel (12" x 8" x 18") traps connected by shade cloth drift-fences (15 m x 30 cm). Each array was created around a center bucket (pitfall) with three arms of drift fence extending out 15 meters forming a Y-shape. In addition to the center bucket, each arm of the "Y" had a bucket placed in the middle and a box funnel trap placed at the end. Each box funnel trap and bucket contained a piece of PVC pipe to provide shelter for captured animals, and was covered with boards and/or lids to protect animals captured from the heat of the sun (Appendix B). Arrays were strategically placed in representative areas within the Preserve to fully capture the diversity of the herpetofauna, including rock outcroppings and ravines (Figure 3-1).



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Pitfall Array and Arroyo Toad/Aquatic Herpetofauna Survey Reaches

Figure 3-1

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Four 5-day sampling periods were conducted in March, April, May, and June of 2008 (Table 3-1). Traps were opened on day one and checked every morning for four consecutive mornings. Traps were closed on the last day of each sample period. All reptiles and amphibians captured were identified, age classed, sexed, measured (snout to vent), weighed, and released. Small mammals captured were not sexed, measured, or weighed. Data were collected in the field using personal digital assistants (PDAs).

The survey method described above is the most widely used method for sampling amphibians and reptiles. The number of sampling periods, timing of sampling periods, and number of pitfall arrays play an important role in an accurate inventory. Surveys were limited to one week per month in March, April, May, and June 2008. The surveys may have missed some species, including salamanders, which are more active during wetter months. Confounding the issue of limited sampling periods are the low capture rates of most herpetofauna species. Finally, although arrays were placed in representative areas, multiple arrays per land cover type are generally preferred to capture habitat variances.

For the purposes of establishing a baseline herpetofauna species list, the use of mark/recapture methods was not necessary.

3.2.4.2 Arroyo Toad Surveys

Focused surveys were conducted for the arroyo toad (*Bufo californicus*) within the Preserve along Hell Creek following modified guidelines of the U.S. Fish and Wildlife Service (1999), augmented with recommendations from USGS (USGS 2003; amendment in progress). One daytime survey was performed on April 14, 2008 and two nighttime surveys were conducted on April 14 and May 7, 2008 (Table 3-1).

The purpose of the daytime survey was to assess overall habitat suitability for the arroyo toad. This habitat assessment was conducted within the Preserve along Hell Creek by searching for habitat features known to be associated with suitable arroyo toad habitat (i.e. low gradient drainages, predominant sandy substrate and adjacent banks, and terraces composed of friable soil types), as identified by USGS (2003). The survey area along Hell Creek was divided into three reaches based on obvious habitat changes or landmarks (Figure 3-1). Each reach was scored and received a habitat quality rating (High, Good, Marginal, Poor Quality), as described by USGS (2003), based on the three habitat factors mentioned above. In addition to this habitat assessment, biologists searched for physical evidence of arroyo toad life stages such as egg masses or tadpoles.

Nighttime surveys were conducted along reaches of Hell Creek identified as supporting high or good quality habitat as determined during the daytime habitat assessment. These surveys included searching along Hell Creek for all life stages of the arroyo toad by visual or aural detections and were started approximately one hour after sunset during appropriate weather conditions. Data were collected on data forms (Appendix C) to document air and water temperature, habitat conditions, water velocity, and species observed. Biologists used headlamps, flashlights, and a Coleman lantern to assist with nighttime surveys.

3.2.4.3 Aquatic Herpetofauna Surveys

Aquatic herpetofauna surveys were conducted on April 14 and May 7, 2008 (Table 3-1) concurrently with arroyo toad surveys. Diurnal and nocturnal surveys were performed by two biologists walking meandering transects along Hell Creek. All visual/aural observations were recorded using data forms developed for arroyo toad surveys, including physical habitat parameters as described above.

The methods used for aquatic herpetofauna surveys were restricted to visual encounters and aural observations. Due to time and budget constraints, dip netting, a common method for sampling aquatic herpetofauna, was not used. This method is effective in capturing small fish, all amphibian life stages, large macroinvertebrates, and reptiles (Heyer et al. 1994, Warburton et al. 2002). Also, the far western portion of Hell Creek was inaccessible. Aquatic species such as the western pond turtle and possibly the red-legged frog may occupy this portion of Hell Creek. Surveying this area would require specialized equipment for safe travel though the stream corridor, including rock climbing gear.

3.2.5 Avian Surveys

3.2.5.1 Diurnal Point Count Surveys

Avian surveys were conducted at the Preserve primarily by timed 10-minute unlimited-distance point counts (Ralph et al 1993). The survey points were selected to cover the range of habitat types within the Preserve and for their location to maximize detections of birds: the ideal position is in a natural amphitheatre where birds can be heard over a wide radius. Each point was a minimum 5-minute walk from other points or positioned so that small birds detected at one point had little or no chance of being the same as those detected at another point. For large soaring birds such minimization of overlap was not possible.

A total of 27 point count locations were established in the Preserve (Figure 3-2). Thirteen of these were in the west half of the Preserve and covered from the west access point on Canal Road. Fourteen were in the east half of the Preserve and covered from the public entrance to the Preserve on Santee Lane. Seven points (4, 10, 11, 12, 16, 17, and 18) sampled the woodland along Hell Creek; the others were on the chaparral-covered slopes, some of them burned in the Poomacha wildfire of 2007 as well as the 2003 Paradise Fire.

Surveys were conducted two days per month, from January to June 2008 (Table 3-1). Birds were counted at the points from dawn to mid-morning, with the surveys normally concluding by 10:30 AM. Additional species observed between the points were noted.

The point-count method prescribed for this survey is designed for use in evaluating densities and trends. It is not the ideal method for an exhaustive inventory of species, nor is it appropriate for assessing which species are migrants and which are local breeders. Each morning, a set of points needs to be counted before the heat of the day arrives, depressing bird activity. At the Preserve, with its access points along the southern boundary, this precluded coverage of the highest ridge along the northern boundary of the Preserve; covering this area would have required a morning dedicated to it alone. As a result of this limitation, the mountain quail may have been missed, but no other species previously recorded from the Preserve was likely restricted to this area.

3.2.5.2 Nocturnal Surveys

Nocturnal surveys were conducted on June 26, 2008 in the Preserve beginning at dusk and continuing to approximately 11:00 PM. Nocturnal surveys were focused on either the west or east half of the Preserve (Figure 3-2). At the west half, the surveys extended from the Canal Road entrance along the road to the siphon intake on the north side of Hell Creek and emphasized the woodland along Hell Creek, the most likely habitat for owls, though also covering chaparral that could support the lesser nighthawk (*Chordeiles acutipennis*) and common poorwill (*Phalaenoptilus nuttallii*). At the east half of the Preserve, surveys extended from the public access point along the trail to the trail junction on the north side of Hell Creek. Along these routes the calls of the lesser nighthawk, common poorwill, great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and long-eared owl (*Asio otus*) were broadcast regularly, followed by pauses to listen and watch for responses. Birds visiting the Preserve in migration are represented poorly in the survey's results.

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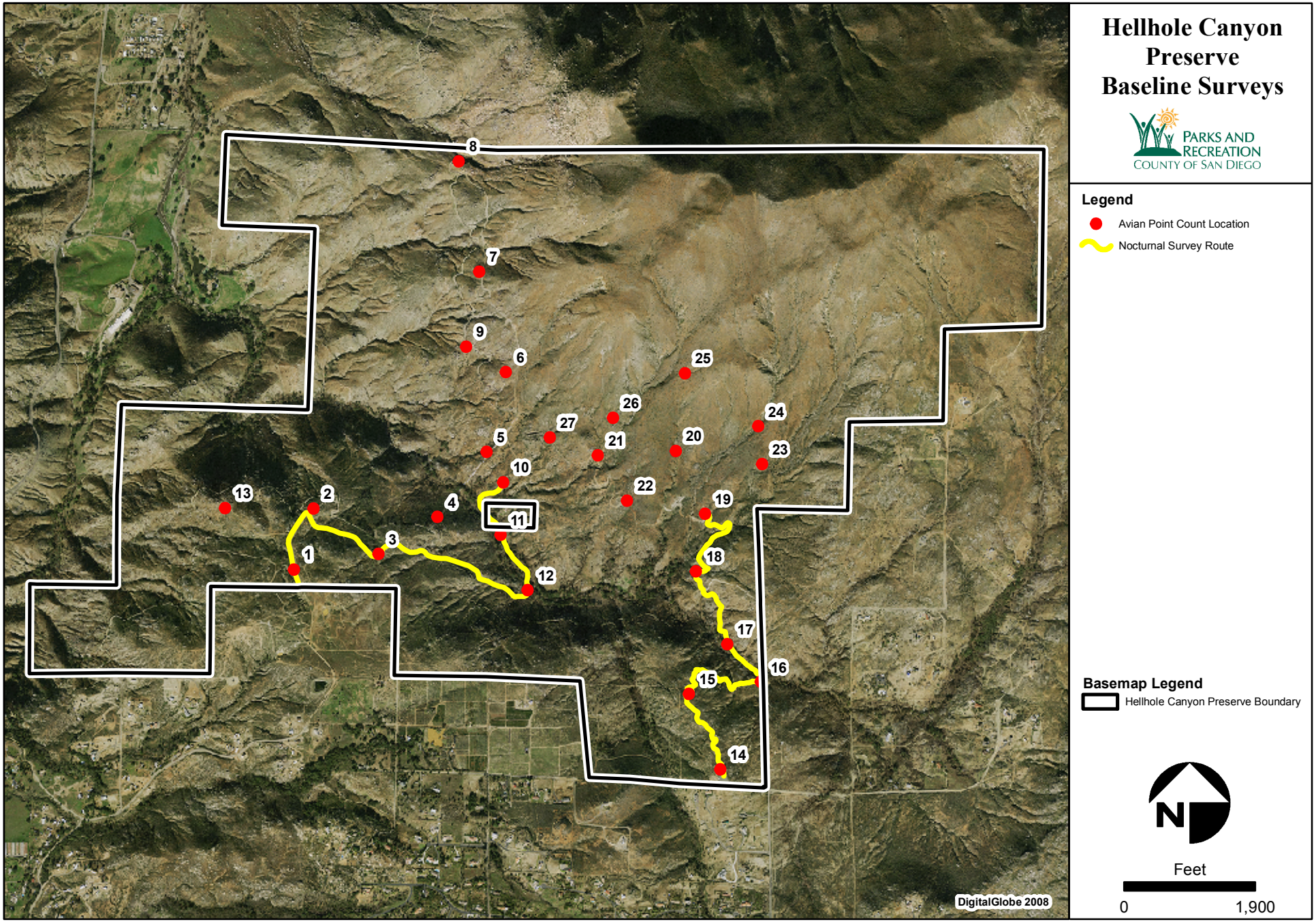

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Avian Point Count Locations and Nocturnal Survey Routes

Figure 3-2

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3.2.6 Mammal Surveys

3.2.6.1 Bats

Multiple bat survey techniques are needed to thoroughly document a diversity of bat species during an inventory study (Pierson 1993). For the baseline surveys two types of bat surveys were performed, passive and active, and used a combination of techniques including acoustic surveys, mist-netting, and roost surveys.

3.2.6.1.1 Passive Surveys

Passive surveys using Anabat II bat detectors (Titley Electronics, New South Wales, Australia) were conducted within the Preserve. Anabat II bat detectors (simply called Anabats) are utilized to detect and record bat echolocation signals (O'Farrell et al. 1999). These calls are then analyzed and most can be identified to the species level by a biologist experienced with bat vocalization identification. Passive Anabats are designed to automatically turn on and off at set times (i.e. sunset and sunrise), and automatically record bat echolocation signals to a compact flash card. Bat echolocation calls are then downloaded from the compact flash card to a computer and analyzed in the laboratory using specialized software designed for the Anabat system called 'Analook' (version 3.3q). An attempt was made to identify all recorded bat echolocation calls and an index of relative bat activity was generated.

Passive Anabats were used to survey for bats in the Preserve during two monitoring sessions: winter 2008 and summer 2008 (Table 3-1; Appendix D). During the winter monitoring sessions, a total of six passive Anabat units were placed at various locations in the Preserve for three consecutive nights (Figure 3-3). During the summer session three passive units were used for three consecutive nights (Figure 3-3).

3.2.6.1.2 Active Surveys

One active foraging bat survey was conducted using mist-nets and an Anabat bat detector on July 18, 2008 (Table 3-1). Mist-nets are made of fine nylon mesh and are used to capture bats in flight. Mist-nets are placed in areas where they are likely to intercept flying bats, such as over relatively small bodies of surface water and in vegetation flyways (Kunz et al. 1996). Five mist-nets of three different lengths (6 x 2 meters, 9 x 2 meters, and 12 x 1 meters) set along Hell Creek and in vegetation flyways feeding in to Hell Creek near the east end of the Preserve (Figure 3-3). The nets were actively

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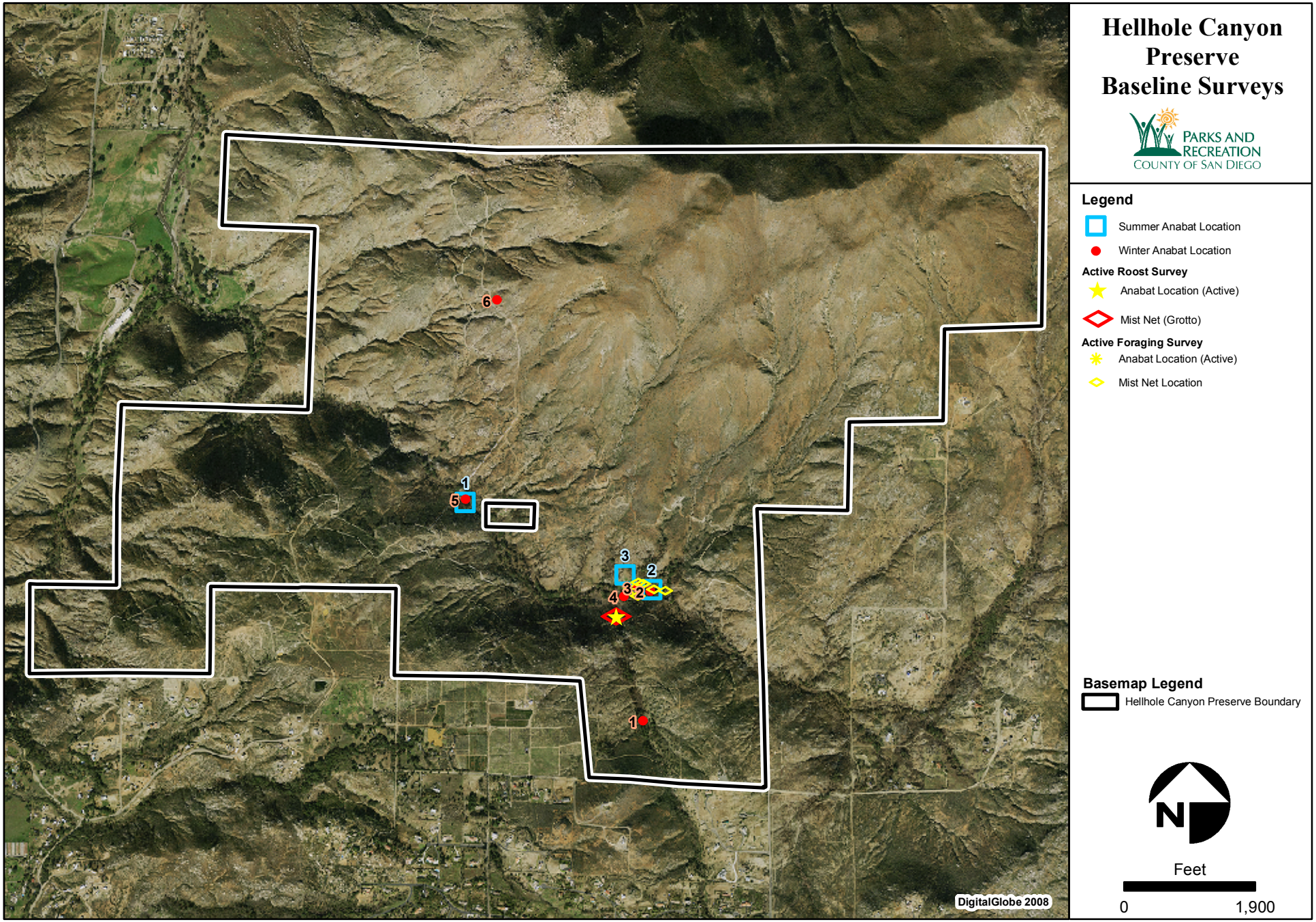

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Bat Survey Locations

Figure 3-3

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monitored from 2030 hours to 2330 hours. One Anabat unit was set up to actively monitor bat echolocation calls during the same time duration (Figure 3-3).

One active roost survey was conducted at a small natural cave/grotto located near the east end of the Preserve using an Anabat bat detector and listened for audible bat calls in an attempt to document bats that might be roosting on the Preserve (Figure 3-3). One 6-meter mist-net was placed in front of the potential roost to capture bats trying to exit and/or access the roost (Figure 3-3). The active roost survey was conducted on July 23, 2008 (Table 3-1).

Not all bat species are equally detectable using Anabats. Certain species such as the Townsend's big-eared bat (*Corynorhinus townsendii*) and long-eared myotis (*Myotis evotis*) appear to use low-intensity echolocation calls and therefore may go undetected or may be underrepresented using acoustic monitoring techniques (O'Farrell et all 1999). Pallid bats (*Antrozous pallidus*) do not always use echolocation and sometimes rely on passively listening for arthropods in leaf litter and therefore may also go undetected acoustically, or may be underrepresented (Orr 1982).

3.2.6.2 Small Mammals

Survey methods for small mammals included the use of Sherman and pit-fall traps. Both were utilized to assess the presence of all small mammal species. All major habitat types in the Preserve were sampled to ensure that all species were detected.

3.2.6.2.1 Sherman Live Trap Surveys

Survey plots consisted of 30 trapping stations, with one 12" model Sherman live trap per station. Traps were placed in two parallel transects of 15 stations each. Transects were separated by 10 meters (33 ft), and traps within transects were separated by 7 (23 ft) meters. Transects were oriented to best fit the habitat (Wilson et al. 1996) and GPS coordinates were recorded. A total of 20 survey plots were established in the Preserve to maximize coverage of the property (Figure 3-4).

Two sampling sessions occurred in the spring and one in the summer of 2008 (Table 3-1). Each sampling session consisted of three mornings of trapping. Traps were opened in the late afternoon on day one and baited with baked sunflower (to avoid germination) and checked and closed early the following morning for three consecutive mornings. Captured animals were identified to species and sexual characteristics were noted. Plot 5 was re-sampled once in order to ensure identification of the brush mouse (*Peromyscus*

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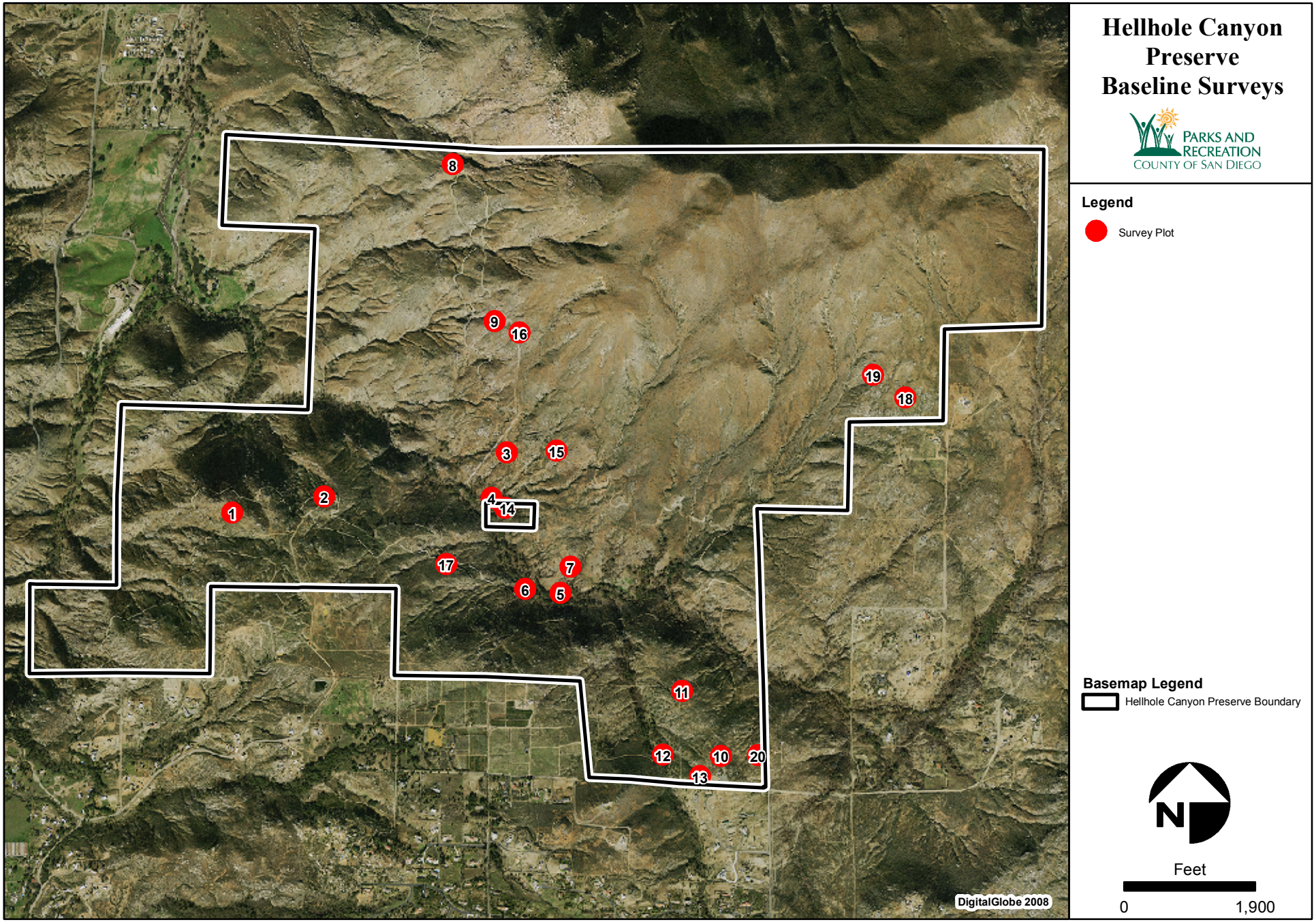

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Small Mammal Survey Plots

Figure 3-4

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boylii) which can be difficult to distinguish from the California mouse (*Peromyscus californicus*).

The number of surveys and timing play an important role in an accurate inventory. The inventory undertaken during the 2008 survey season was very successful and the data should be treated as nearly complete.

3.2.6.2.2 Pitfall Trap Surveys

Pitfall traps installed for the herpetology component of this study were also used for the mammal inventory. Certain mammal species are not normally captured in Sherman live traps but are often captured with pitfall traps (Wilson et al. 1996). Target species for pitfall traps are the southern grasshopper mouse (*Onychomys torridus*), California vole (*Microtus californicus*), desert gray shrew (*Notiosorex crawfordi*), ornate shrew (*Sorex ornatus*), western harvest mouse (*Reithrodontomys megalotis*), and Botta's pocket gopher (*Thomomys bottae*). For these species, pitfall trapping followed the methods outlined in the herpetofauna survey section (Section 3.5.1).

3.2.6.3 Medium and Large Mammals

Motion-sensing cameras (Wilson et al. 1996) trained on baited lures are an effective method to assess presence of medium to large mammals and answer important research questions about population dynamics (Cutler and Swann 1999). This method, combined with track plots, was deployed throughout the Preserve. Given the public use of the Preserve, all track plots were set off trail so they were not easily visible. However, a few cameras were placed adjacent to well used trails to detect the potential use of the trail as a wildlife movement corridor. Plots were distributed throughout the Preserve in order to record medium-to-large mammals and possibly yield data on their movement patterns (Figure 3-5 and 3-6).

Most stations consisted of one digital camera and two track plots within a 200-meter line transect. Both the camera's focal area and two track plots were baited with a scent lure suitable for multiple carnivore species (Carman's Pro-Choice) or for deer. The scent was placed on a pipe cleaner wrapped around the upper portion of a 12-inch metal stake. The scent was applied to the pipe cleaner with a toothbrush. There are two reasons for setting up the bait in this way: first, placing the bait on a removable stake prevents the scent from remaining on the plot after the survey; second, using a toothbrush to apply the lure to a pipe cleaner leaves a consistent amount of lure at each plot. Additionally, animals often rub against the stake, leaving hairs on the pipe cleaner. With each hair sample collected,

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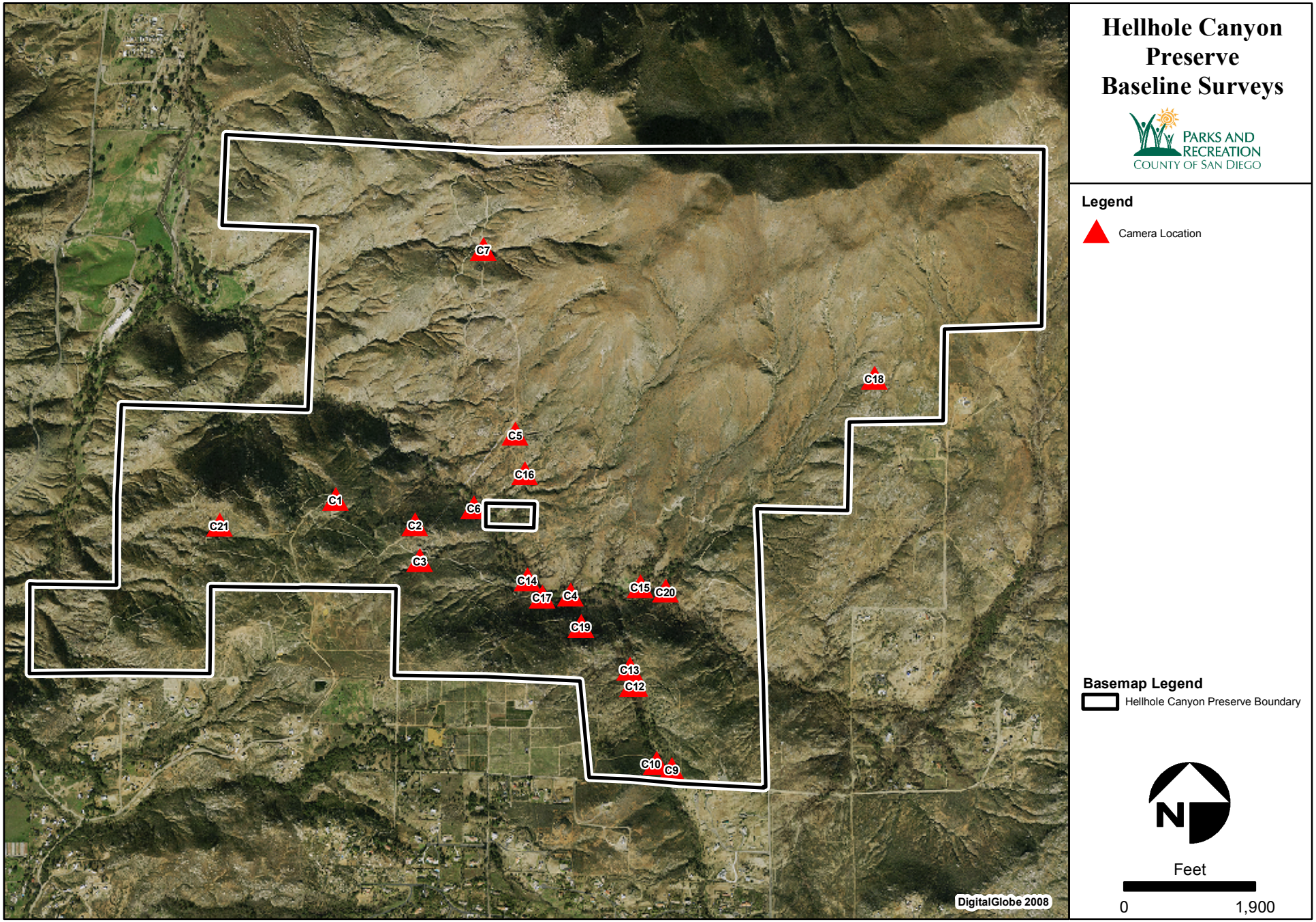

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Medium and Large Mammal Camera Locations

Figure 3-5

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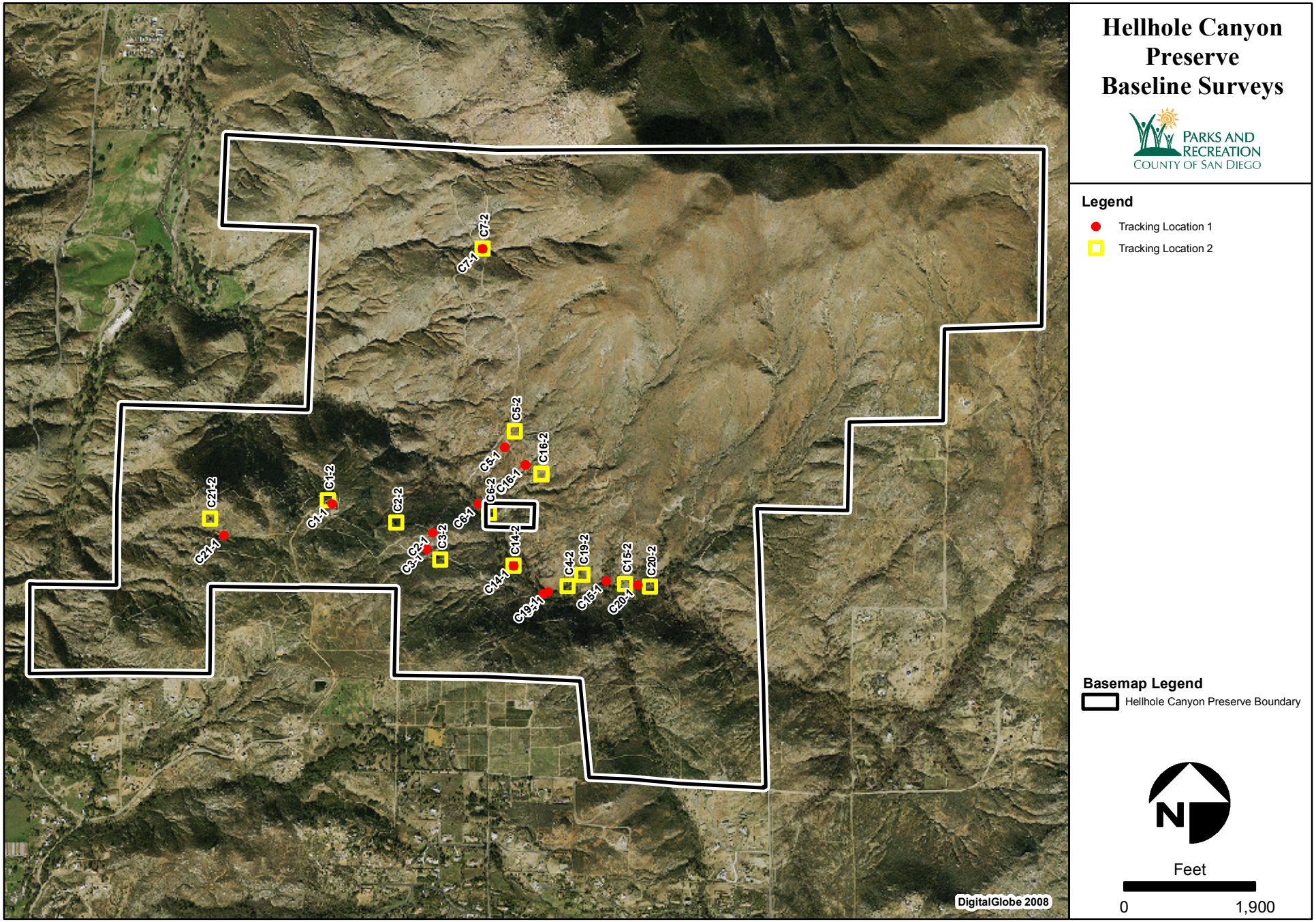

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Medium and Large Mammal Tracking Locations

Figure 3-6

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the stake could be easily cleaned and the pipe cleaner replaced. A motion-sensing digital camera was placed approximately 1–2 meter (3.3-6.6 ft) from the lure and 20 centimeter (8 in.) off the ground. Track plots consisted of a 1-meter (3.3 ft) -diameter circle of 1-centimeter (0.4 in) -deep gypsum powder with scent lure placed in the center. Track plots were checked every day for three consecutive days, and the species visiting them were identified by their tracks. Photographs were taken of each track as vouchers. Track plots were reset every day by smoothing the gypsum powder, and bait was added every day.

Surveys occurred in the spring and the summer of 2008 (Table 3-1). These surveys were usually run concurrently with the surveys for small mammals using Sherman live traps. A total of 21 survey plots were located in potential wildlife corridors and high use areas (e.g., near water sources, drainages, ridgelines, etc.). All survey locations were mapped using GIS technologies. Along with measurements and photos, each observation included a confidence level for the identification of the track.

4.0 RESULTS AND DISCUSSION

4.1 Vegetation Communities

The Preserve is generally an ecotonal system lacking clear boundaries between vegetation communities. Ecotonal systems are generally characterized by multiple vegetation types (in this case southern mixed chaparral and Diegan coastal sage scrub) that intergrade or co-occur locally depending on soil moisture conditions and exposure. These systems form a heterogeneous mixture or mosaic within a landscape with its constituent communities becoming indistinguishable from one another at larger scales. Using dominant plant associations as an indicator, nine vegetation communities were identified within the Preserve during the 2008 surveys (Table 4-1; Figure 4-1).

Within the Preserve, the most abundant vegetation type, southern mixed chaparral, is located on much of the xeric (drier), more exposed southern and western facing slopes, as well as on open, northern facing slopes where soil moisture is limited by steep slopes and little shading. Smaller patches of Diegan coastal sage scrub vegetation, which requires greater amounts of moisture, occur on level areas within the Preserve and within various mesic (wetter) uplands.

Within the shadier, more protected box canyons of the Preserve, such as within Hell Creek and its intermittent tributaries, mature stands of recovering (post-fire) southern coast live oak riparian forest are more common. In some parts of the narrower canyons as well as on some of the steeper north facing slopes, where the soils lack adequate

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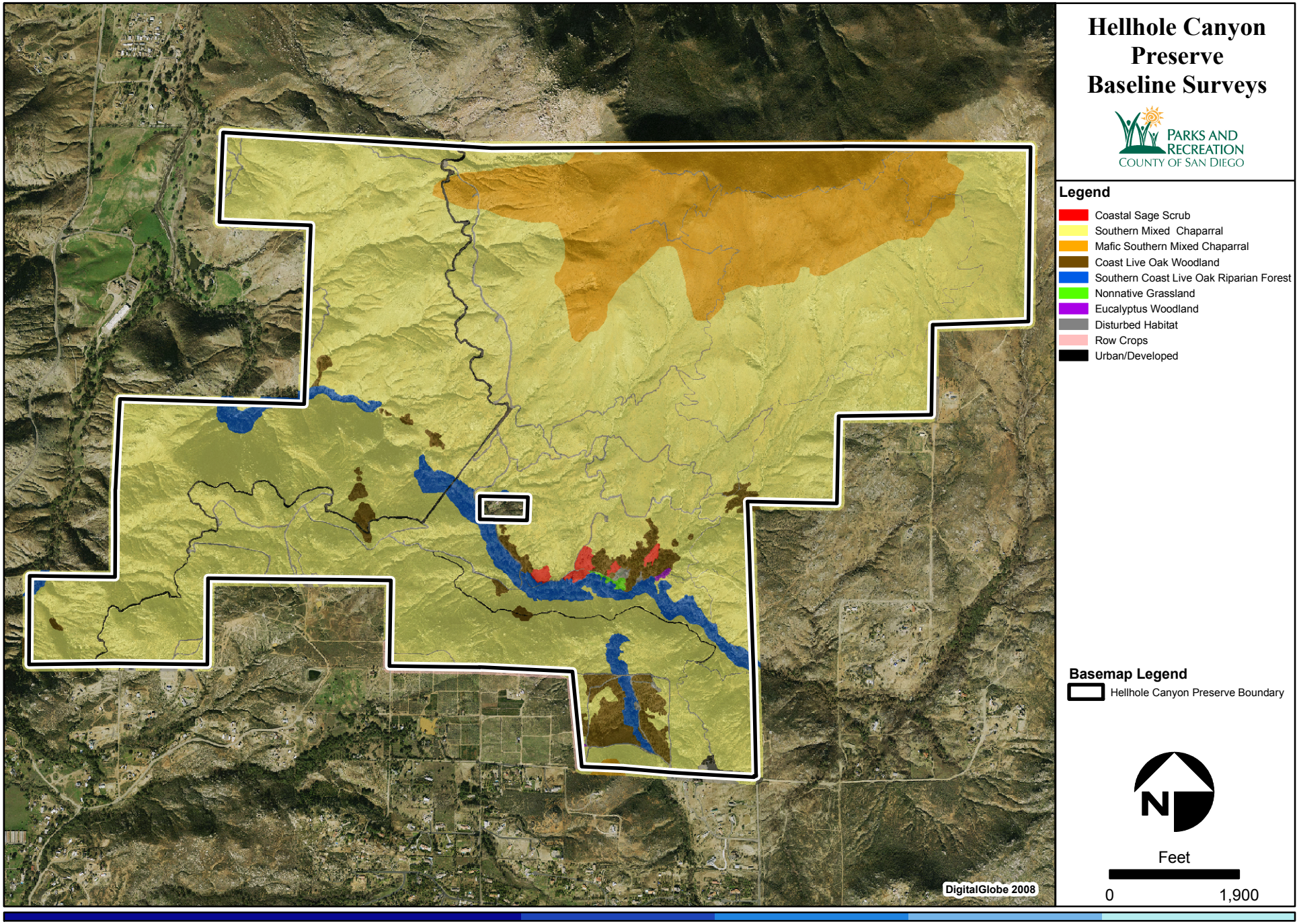

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Vegetation Communities

Figure 4-1

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moisture to support many of the riparian species usually found within this association, southern coast live oak riparian forest often transitions to coast live oak woodland. Coast live oak woodlands are more open woodlands which require less moisture and have less understory development.

In addition to the natural communities within the Preserve, many human altered habitats are also present. Remnants of historical orchards occur in the southern parts of the Preserve along with disturbed habitats consisting of unpaved trails and other largely unvegetated areas and areas of soil disturbance. Finally, developed areas occur within the Preserve surrounding existing structures, paved roads, landscaped areas, water and gas pipelines, the foundations of burnt homesteads destroyed by recent wildfires. A brief description of each vegetation community is provided below.

Table 4-1. Vegetation Communities within the Preserve

Vegetation Community[1]	Acres[2]
RIPARIAN/WETLAND COMMUNITIES	
Southern Coast Live Oak Riparian Forest (61310)	50.7
UPLAND COMMUNITIES	
Diegan Coastal Sage Scrub (32500)	5.0
Southern Mixed Chaparral (37120)	1,438.0
Mafic Southern Mixed Chaparral (37122)	274.7
Non-native Grassland (42200)	0.9
Coast Live Oak Woodland (71160)	43.6
Eucalyptus Woodland (11100)	0.5
Disturbed Habitat (11300)	25.4
Urban/Developed (12000)	12.2
TOTAL	**1,850.9**

[1] Holland code in parenthesis.
[2] Acres within the Preserve boundaries. Acreages do not include vegetation within the 100 ft. mapped buffer around the Preserve.

4.1.1 Diegan Coastal Sage Scrub (32500)

Diegan coastal sage scrub (CSS) is an endemic, fire-adapted drought-deciduous community. CSS is typically low in stature and occurs on steep, xeric slopes or on clay soils that are slow to release stored water. Formerly widely distributed in the region, CSS has lost much of its historic range to residential development and agricultural conversion. CSS frequently intergrades with chaparral vegetation communities at higher elevations. Within the Preserve, CSS is moderately to highly disturbed and of marginal quality. Much of the CSS onsite intergrades with the surrounding chaparral communities; CSS covers approximately 5.0 acres on the Preserve (Table 4-1).

Dominant species within the CSS community on the Preserve included California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), black sage (*Salvia mellifera*), and California sagebrush (*Artemisia californica*). Other CSS constituent species included white sage (*Salvia apiana*), laurel sumac (*Malosma laurina*), and our-lord's candle (*Hesperoyucca whipplei*). Among the species occurring within the CSS communities on the Preserve, black sage, laurel sumac, and California buckwheat were also observed co-occurring within the surrounding chaparral communities but were sub-dominants within those communities.

4.1.2 Southern Mixed Chaparral (37120)

As described by Holland (1986), southern mixed chaparral is a dense, relatively short, shrub-dominated community widely distributed on arid landscapes in coastal southern California. Southern mixed chaparral is the dominant vegetation community on the Preserve. Present throughout most of the Preserve, southern mixed chaparral occurs on north- and south-facing slopes, ridges, and canyons and covers approximately 1,438.0 acres on the Preserve (Table 4-1).

Southern mixed chaparral frequently intergrades with other shrub-dominated vegetation communities such as Diegan and Venturan coastal sage scrub. Mountain mahogany (*Cercocarpus minutiflorus*), Eastwood's manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), mission manzanita (*Xylococcus bicolor*), chamise (*Adenostoma fasciculatum*), and lilac (*Ceanothus* spp.) are co-dominant in the southern mixed chaparral present on the Preserve. Other species characteristic of this association present within the Preserve include holly-leaved cherry (*Prunus ilicifolia*), scrub oak (*Quercus xacutidens*), big-berry manzanita (*Arctostaphylos glauca*), and hoary-leaved ceanothus (*Ceanothus crassifolius*). Common coastal sage scrub species such as laurel sumac, black sage (*Salvia mellifera*), and California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*) are also present in this association onsite, but at sub-dominant levels.

4.1.3 Mafic Southern Mixed Chaparral (37122)

The overall composition of mafic southern mixed chaparral is similar to southern mixed chaparral (37120), but is dominated by chamise and Cleveland sage (*Salvia clevelandii*). This vegetation community is found on mafic (gabbro), metavolcanic, or metasedimentary derived soils (Las Posas and Boomer soils) in the coastal region. These soils can have a very red or dark brown appearance. Mafic southern mixed chaparral is present in the northeast portion of the Preserve and covers approximately 274.7 acres (Figure 4-1). The area that supports this vegetation community recently burned.

Therefore, indicator species such as San Diego reedgrass (*Calamagrostis koelerioides*) may have been temporarily displaced. As the area recovers, these indicator plants may re-establish. However, Cleveland sage, chamise, and felt-leaved monardella (*Monardella hypoleuca* ssp. *lanata*), all indicator species of this vegetation community, were common on the gabbro soils of the Preserve. In addition, there is moderate potential for Parry's tetracoccus (*Tetracoccus dioicus*) and Gander's butterweed (*Packera ganderi*), two sensitive species found within this vegetation community.

4.1.4 Non-Native Grasslands (42200)

Patches of non-native grasslands are present within the Preserve on the terraces above Hell Creek. The constituent species present within the non-native grasslands include a mixture of invasive annual grasses such as various bromes (*Bromus* spp.), oats (*Avena* spp.), and ryegrasses (*Lolium multiflorum*), and forbs such as short-pod mustard (*Hirschfeldia incana*), cheeseweed (*Malva parviflora*), tocalote (*Centaurea melitensis*), and red-stem filaree (*Erodium cicutarium*). Small to moderate amounts of native forbs such as telegraph weed (*Heterotheca grandiflora*), fascicled tarweed (*Deinandra fasciculata*), miniature lupine (*Lupinus bicolor*), and various bulb species such as wild onion (*Allium* spp.), common goldenstar (*Bloomeria crocea*), mariposa lily (*Calochortus* spp.) and wild hyacinth (*Dichelostemma capitatum*) are also present within non-native grassland communities within the Preserve. Approximately 0.9 acre of this community occurs on the Preserve (Table 4-1).

4.1.5 Southern Coast Live Oak Riparian Forest (61310)

Hell Creek, a perennial/intermittent stream, supports a substantial amount of mature/recovering riparian woodland habitat growing in association with its main channel. Southern coast live oak riparian forest is the dominant vegetation community comprising the riparian habitat along the banks of (surrounding) Hell Creek. This community covers approximately 50.7 acres on the Preserve (Table 4-1).

Southern coast live oak riparian forest is a large, dense, closed-canopy riparian forest community dominated by coast live oak (*Quercus agrifolia* var. *agrifolia*). In addition to coast live oak, scattered western sycamore (*Platanus racemosa*), red willow (*Salix laevigata*), and black willow (*Salix gooddingii*) trees and patches of invasive giant reed (*Arundo donax*) occur within this community but are sub-dominant components of the community. Understory species present within the southern coast live oak riparian forest communities in the Preserve include Douglas mugwort (*Artemisia douglasiana*), western poison oak (*Toxicodendron diversilobum*), cattails (*Typha domingensis*), rushes (*Juncus* xiphioides, *J. dubius*, and *J. arcticus* var. *balticus*), bulrushes (*Scirpus microcarpus* and

Schoenoplectus acutus var. *occidentalis*) and nutsedges (*Cyperus eragrostis*). In addition, greater periwinkle (*Vinca major*), a non-native species, was an abundant species of the understory of this community in the Preserve.

4.1.6 Coast Live Oak Woodland (71160)

Coast live oak woodland is a large, dense, closed-canopy woodland community dominated by coast live oak (*Quercus agrifolia* var. *agrifolia*). Coast live oak woodland is characterized by poor understory development and low species diversity. Within the Preserve, the understory of coast live oak woodlands consists mostly of non-native grasses (*Bromus* spp., *Avena* spp., etc.) and forbs and open, unvegetated areas covered with a thick layer of leaf litter. Within the Preserve, coast live oak woodland occurs on or above the flood terraces of Hell Creek and within several smaller canyons above Hell Creek where water availability is more limited than within Hell Creek itself. Approximately 43.6 acres of this community occur on the Preserve (Table 4-1).

4.1.7 Eucalyptus Woodland (11100)

As described by Holland (1986), eucalyptus woodland is typically characterized by dense monotypic stands of eucalyptus trees (*Eucalyptus* spp.). Plants in this genus, imported primarily from Australia, were originally planted in groves throughout many regions of coastal California as a potential source of lumber and building materials for their use as windbreaks, and for their horticultural novelty. They have increased their cover through natural regeneration, particularly in moist areas sheltered from strong coastal winds. Gum trees naturalize readily in California and, where they form dense stands, tend to completely supplant native vegetation, greatly altering community structure and dynamics.

Within the Preserve, a small patch of eucalyptus woodland occurs as a planted windrow corridor along the southern central edge of the Preserve adjacent to a neighboring agricultural parcel. Approximately 0.5 acre of eucalyptus woodland composed of *Eucalyptus camaldulensis* occurs on the Preserve within this patch (Table 4-1).

4.1.8 Disturbed Habitat (11300)

Disturbed habitat is any land on which the native vegetation has been significantly altered by agriculture, construction, or other land-clearing activities, and the species composition and site conditions are not characteristic of the disturbed phase of one of the plant associations within the study region. Such habitat is typically found in vacant lots, roadsides, construction staging areas, or abandoned fields, and is dominated by non-native annual species and perennial broadleaf species. Mostly, disturbed habitat within

the Preserve comprised well worn unvegetated trails. However disturbed habitat was also observed to be present on and around utility easements (e.g. telephone poles and power lines) and in areas reclaimed for erosion control. Disturbed habitat covers approximately 25.4 acres on the Preserve (Table 4-1).

Dominant plant species observed within the disturbed areas of the Preserve included short-pod mustard (*Hirschfeldia incana*), sweet fennel (*Foeniculum vulgare*), pigweed (*Amaranthus albus*), common lambsquarters (*Chenopodium album*), Russian thistle (*Salsola tragus*), tree tobacco (*Nicotiana glauca*), African fountain grass (*Pennisetum setaceum*), tocalote (*Centaurea melitensis*), and wild radish (*Raphanus sativus*). In addition, the disturbed habitat within the Preserve supported occasional mature eucalyptus (*Eucalyptus camaldulensis*) and cultivated avocado (*Persea americana*).

4.1.9 Urban/Developed (12000)

Urban/Developed areas are found where habitat has been altered by human activities to a state beyond the potential for recovery to a natural state. In general, free standing structures and surrounding areas that are paved, armored, or landscaped are considered developed. Within the Preserve, developed areas include the foundations of two burnt homes and their associated outbuildings, paved and unpaved maintenance roads, driveways, parking and staging areas, and concrete-lined aqueducts and pipelines. Developed areas within the Preserve include discrete areas of ornamental landscaping around the burnt homes and homesteads. These areas include lawns, gardens, and non-native shade trees and ornamental shrubs planted by previous inhabitants including assorted eucalyptus trees (*Eucalyptus* spp.), acacia (*Acacia* spp.), oleander (*Nerium oleander*), Peruvian pepper (*Schinus molle*), and jade plant (*Crassula ovata*). Approximately 12.2 acres of Urban/Developed areas cover the Preserve (Table 4-1).

4.2 Flora

A total of 337 plant taxa were observed in the Preserve during the 2008 surveys. Eighty-nine of these are non-native species, many of which are grasses. The remaining species (about 74 percent) consist of a diverse array of native aquatic, riparian, and upland plants that occur in natural assemblages as described below. A full inventory of plant species observed during the 2008 surveys is included in Appendix E at the end of this report.

4.2.1 Sensitive Plant Species

For the purpose of this report, sensitive plant species are those species listed as endangered, threatened, or rare, or identified as a candidate for listing pursuant to the Federal or State Endangered Species Acts (FESA, CESA). In addition, plant species

considered being of special status by one or more special interest groups are also considered to be sensitive. These include plant species listed on the CNPS Inventory of Rare and Endangered Vascular Plants of California with a designation of 1, 2, 3, or 4 or included on the County's Sensitive Plant list (Group A, B, C, or D listed plants). Finally, species proposed for coverage under the North County MSCP are also included in this discussion. This plan has not yet been finalized; however, an anticipated covered species list has been developed. Coverage for 63 plant and animal species is being pursued under this plan.

4.2.1.1 Observed Sensitive Plant Species

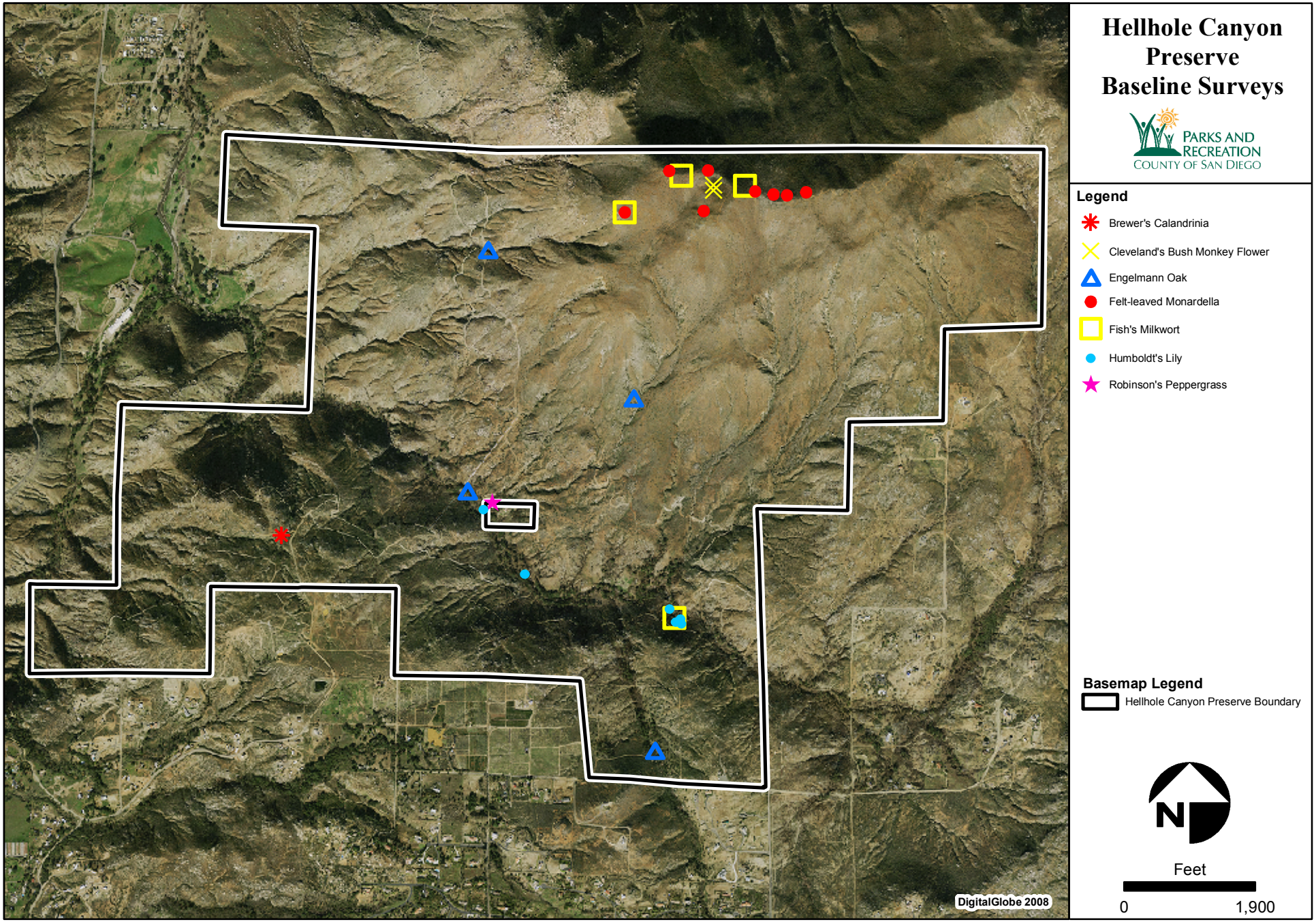
Seven sensitive plant taxa were observed within the Preserve during 2008 baseline surveys (Table 4-2; Figure 4-2). These include Brewer's calandrinia (*Calandrinia breweri*), Humboldt's lily (*Lilium humboldtii* ssp. *ocellatum*), Cleveland's bush monkey flower (*Mimulus clevelandii*), felt-leaved monardella (*Monardella hypoleuca* ssp. *lanata*), Fish's milkwort (*Polygala cornuta* var. *fishiae*), Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*), and Engelmann oak (*Quercus engelmannii*). Engelmann oak has also been previously documented from the Preserve (Figure 4-3). A brief species account for each sensitive species observed during 2008 surveys is provided below.

Table 4-2. Sensitive Plant Species Observed on the Preserve during 2008 Baseline Surveys

Common Name	Scientific Name	Listing Status (Federal/State/ CNPS/County)[1]	Draft North County MSCP Proposed Covered (Y/N)[2]
Brewer's calandrinia	*Calandrinia breweri*	--/--/4.2/D	No
Cleveland's bush monkey flower	*Mimulus clevelandii*	--/--/4.2/D	No
Engelmann oak	*Quercus engelmannii*	--/--/4.2/D	Yes
Felt-leaved monardella	*Monardella hypoleuca* ssp. *lanata*	--/--/1B.2/A	No
Fish's milkwort	*Polygala cornuta* var. *fishiae*	--/--/4.3/D	No
Humboldt's lily	*Lilium humboldtii* ssp. *ocellatum*	--/--/4.2/D	No
Robinson's pepper-grass	*Lepidium virginicum* var. *robinsonii*	--/--1B.2/A	No

[1] Listing Status: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare. California Native Plant Society (CNPS): List 1B – Plants rare, threatened, or endangered in California and elsewhere, List 2: Plants rare, threatened, or endangered in California, but more common elsewhere, List 3 – Plants about which we need more information, List 4 – Plants of limited distribution (a watch list). County List: List A – plants rare, threatened, or endangered in California and elsewhere; List B – plants rare, threatened, or endangered in California but more common elsewhere; List C – plants which may be quite rare, but need more information to determine their true rarity status; List D – plants of limited distribution and are uncommon, but not presently rare or endangered.

[2] The North County MSCP has not yet been finalized. Species identified as covered are those species expected to be pursued for coverage under the plan.



Technology Associates International Corporation

Sensitive Plant Species Observed during 2008 Baseline Surveys

Figure 4-2

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Date: Oct 13, 2008

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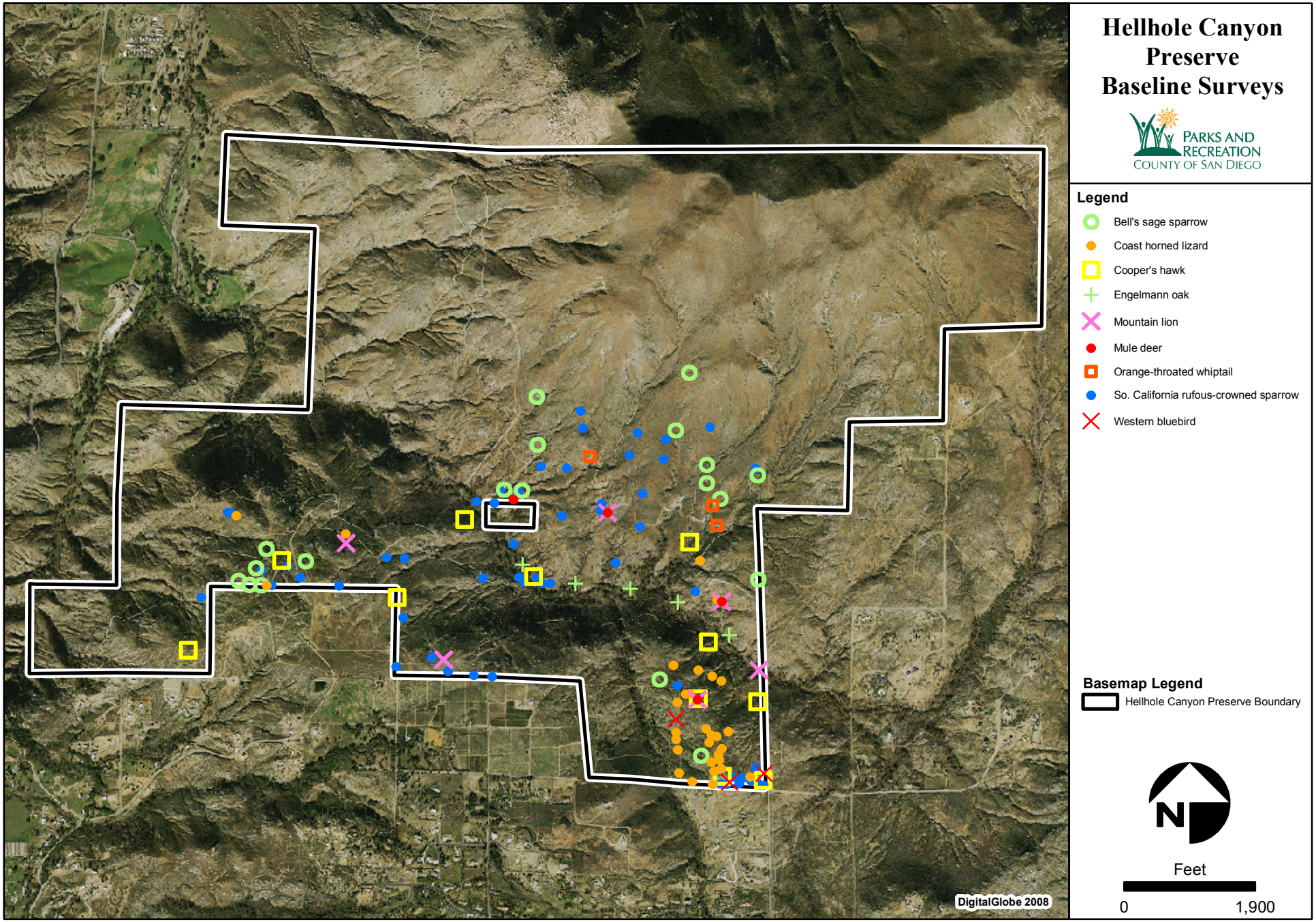

Technology Associates International Corporation

Historic Locations for Sensitive Species Documented during 2008 Baseline Surveys

Figure 4-3

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Date: Oct 13, 2008

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Brewer's calandrinia – *Calandrinia breweri*
Federal Status: None
State Status: None
CNPS List: 4.2
County List: D
Draft North County MSCP: Not Covered

In California, Brewer's calandrinia is found in San Diego, Los Angeles, San Bernardino, Contra Costa, Mendocino, Monterey, Mariposa, Marin, Napa, Santa Barbara, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Sonora, and Ventura counties (Reiser 1994). The species is a fire-follower typically reported in areas of recently burned chaparral and coastal sage scrub (Reiser 1994) on sandy or loamy soils (CNPS 2008). Brewer's calandrinia is apparently rare in Southern California and its populations are presumed to be declining due to loss of habitat along the coast (Reiser 1994). Approximately ten individuals were reported in the southwestern portion of the Preserve (Figure 4-2).

Humboldt's lily – *Lilium humboldtii* ssp. *ocellatum*
Federal Status: None
State Status: None
CNPS List: 4.2
County List: D
Draft North County MSCP: Not Covered

Humboldt's lily occurs in San Diego, Los Angeles, Ventura, Santa Barbara, San Bernardino, Riverside, San Luis Obispo, and Orange counties and on Santa Cruz and Santa Rosa islands (Reiser 1994). This species is associated with riparian corridors in lower montane coniferous forest and coastal chaparral below 1,691 meters (5,500 ft) (RCIP 2005). The species typically occurs on lower stream benches, but can occur on shaded, dry slopes beneath dense, closed canopy within coniferous forests and cismontane oak woodlands (Boyd and Banks 1995, CNPS 2001). According to the CNPS (2008), the species occurs within chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and open riparian habitats between 30 and 1,800 meters (100-5,900 ft). Within San Diego County, this species grows along streamsides in lower montane coniferous forests and coastal chaparral (Reiser 1994). Populations are threatened by collection of showy flowers or bulbs (Reiser 1994). Within the Preserve, over 500 individuals were reported along Hell Creek (Figure 4-2).

Cleveland's bush monkey flower – *Mimulus clevelandii*
Federal Status: None
State Status: None
CNPS List: 4.2
County List: D
Draft North County MSCP: Not Covered

Cleveland's bush monkey flower occurs in San Diego, Orange, and Riverside counties and in Baja California, Mexico in chaparral and lower montane coniferous forest habitats (Reiser 1994). In general, microhabitat consists of open locales in xeric chaparral dominated by chamise, with exposed rock nearby and shallow soils (Reiser 1994). According to the CNPS (2008) the species is known to occur between 815 and 2,000 meters (2,700-6,500 ft) in chaparral and cismontane woodlands and lower montane coniferous forests on open, gabbroic, rocky soils. Within Riverside County, the species is known to occur mostly above 914 m (3,000 ft) in chaparral and lower montane coniferous forests, especially on peaks and ridgelines (Boyd and Banks 1995), while within San Diego County, the species appears to strictly follow metavolcanic and gabbroic soils (Reiser 1996). This species is often found near the summits of mountain peaks and may have some limiting temperature requirements (Reiser 1994). Hundreds of individuals were recorded along the ridge in the northern portion of the Preserve (Figure 4-2).

Felt-leaved monardella – *Monardella hypoleuca* ssp. *lanata*
Federal Status: None
State Status: None
CNPS List: 1B.2
County List: A
Draft North County MSCP: Not Covered

Felt-leaved monardella occurs in San Diego and Orange counties and in Baja California, Mexico (Reiser 1994). This perennial typically occurs in chaparral or cismontane woodland habitats between 300 and 1,575 meters (1,000-5,000 ft) (CNPS 2008) and often grows beneath mature stands of chamise in xeric situations (Reiser 1994). Although populations are presumed stable in San Diego County, the species is threatened by vehicles and all substantial populations should be protected (Reiser 1994, CNPS 2008). Over 200 individuals were reported from along the ridge in the northern portion of the Preserve (Figure 4-2).

Fish's milkwort – *Polygala cornuta* var. *fishiae*
Federal Status: None
State Status: None
CNPS List: 4.3
County List: D
Draft North County MSCP: Not Covered

Fish's milkwort occurs in cismontane southern California and northwestern Baja California, Mexico (RCIP 2005). The species is known from records in San Diego, Orange, Los Angeles, Riverside, and Ventura counties and Baja California, Mexico (Riser 1994). This species occurs at elevations between 100 and 1,000 meters (330-3,300 ft) (CNPS 2008) and is often associated with shaded areas within cismontane woodland and riparian woodlands with coast live oak, although it also occurs in xeric and mesic chaparral habitats (Reiser 1994, CNPS 2001, Munz 1974, Boyd and Banks 1995). The species can be missed during plant surveys and may be more widespread than suspected (Reiser 1994). Thirty-six individuals were observed along the ridge in the northern portion of the Preserve and one individual was found along Hell Creek (Figure 4-2). This individual probably washed down from ridge.

Engelmann oak – *Quercus engelmannii*
Federal Status: None
State Status: None
CNPS List: 4.2
County List: D
Draft North County MSCP: Covered

Engelmann oak occurs in San Diego, Orange, and Riverside counties, on Santa Catalina Island, and in Baja California, Mexico (Reiser 1994). In general, this species of oak grows in oak woodlands and southern mixed chaparral (Reiser 1994). More specifically, the species occurs in two types of oak woodland habitats within foothill landscapes; southern oak woodlands, where canopy covers from ten to fifty percent of the landscape; and riparian/oak woodlands, where there is a closed canopy of mixed hardwood species along canyon bottoms and watercourses (Scott 1990). The species is often associated with alluvial fans, interior valleys, and occasionally slopes with mesic aspect (Roberts 1995). Poor reproduction is an apparent problem with this species and overgrazing, herbivory, browsing from deer, and a need for specific weather conditions for seedling establishment exacerbate this issue (Reiser 1994). Within the Preserve, four individuals were reported from scattered locations (Figure 4-2).

Robinson's pepper-grass – *Lepidium virginicum* var. *robinsonii*
Federal Status: None
State Status: None
CNPS List: 1B.2
County List: A
Draft North County MSCP: Not Covered

Robinson's pepper-grass occurs in San Diego, Riverside, Orange, Los Angeles, San Bernardino, and Santa Barbara counties, on Santa Cruz Island, and in Baja California, Mexico (Reiser 1994). Robinson's pepper-grass occurs in chaparral and coastal scrub habitats between 1 and 885 meters (3-3,000 ft) in elevation (CNPS 2008). This annual herb grows in openings in chaparral and coastal sage scrub, generally well away from the coast in Southern California in foothill landscapes. Typically sites where this species is observed are relatively dry, exposed locales, rather than beneath a shrub canopy or along creeks (Reiser 1994). Within the Preserve, one individual was collected west of the private homestead and east of the flume crossing over Hell Creek (Figure 4-2).

4.2.1.2 Potentially Occurring Sensitive Plant Species: Based on Habitat and Distribution

Potentially occurring sensitive plant species based on habitat presence and distribution were identified by searching species databases (see Section 3.1 for list of databases). Potentially occurring plant species are those; (1) with occurrence data outside of, but within three kilometers (1.8 mi) of the Preserve, and/or (2) whose habitat preferences are consistent with available habitat within the Preserve. Thirty sensitive plant taxa were identified as occurring within the region (Table 4-3); however, most of them are not expected to occur on the Preserve because the site lacks suitable habitat. Ten of these 30 taxa have been identified as having low, moderate, or high potential for occurrence in the Preserve.

Table 4-3. Potentially Occurring Sensitive Plant Species at the Preserve Based on Habitat and Distribution.

Common Name	Scientific Name	Listing Status (Federal/State/ CNPS/County)[1]	Potential to Occur
California adolphia	*Adolphia californica*	-/-/2.1/B	Not expected. Out of species range.
Del Mar manzanita	*Arctostaphylos glandulosa* ssp. *crassifolia*	E/-/1B.1/A	Not expected. Out of range and no suitable habitat on site.
Encinitas baccharis	*Baccharis vanessae*	T/E/1B.1/A	Not expected. Out of species range.
Gander's butterweed	*Packera ganderi*	-/-/1B.2/A	Moderate. Suitable habitat and soils present on mountain ridge.
Lakeside ceanothus	*Ceanothus cyaneus*	-/-/1B.2/A	Not expected. Out of species range.
Little mousetail	*Myosurus minimus*	-/-/3.1/C	Not expected. No suitable habitat present.

Table 4-3. Potentially Occurring Sensitive Plant Species at the Preserve Based on Habitat and Distribution *continued*

Common Name	Scientific Name	Listing Status (Federal/State/ CNPS/County)[1]	Potential to Occur
Nevin's barberry	*Berberis nevinii*	E/E/1B.1/A	Not expected. Out of species range.
Nuttall's scrub oak	*Quercus dumosa*	-/-/1B.1/A	Not expected. Just out of species range.
Orcutt's brodiaea	*Brodiaea orcuttii*	-/-/1B.1/A	Not expected. No suitable habitat present.
Orcutt's spineflower	*Chorizanthe orcuttiana*	E/E/1B.1/A	Not expected. No suitable habitat present and out of range of species.
Parry's tetracoccus	*Tetracoccus dioicus*	-/-/1B.2/A	Moderate. Suitable habitat on mountain ridge.
Peninsular bear grass	*Nolina cismontana*	-/-/1B.2/A	Moderate. Suitable habitat on mountain ridge.
Rainbow manzanita	*Arctostaphylos rainbowensis*	-/-/1B.1/A	Low. Edge of species range.
Ramona horkelia	*Horkelia truncata*	--/--/1B.3/A	High. Suitable habitat and soils along ridgeline.
San Diego ambrosia	*Ambrosia pumila*	E/-/1B.1/A	Low. Potential in flood zone, clay benches above Hell Creek.
San Diego barrel cactus	*Ferocactus viridescens*	-/-/2.1/B	Not expected. Out of species range.
San Diego button celery	*Eryngium aristulatum* var. *parishii*	E/E/1B.1/A	Not expected. No suitable habitat present.
San Diego marsh-elder	*Iva hayesiana*	-/-/2.2/B	Not expected. Out of species range.
San Diego goldenstar	*Bloomeria clevelandii*	-/-/1B.1/A	Not expected. Out of species range.
San Diego sagewort	*Artemisia palmeri*	-/-/4.2/D	Moderate. Potential in Hell Creek.
San Diego thornmint	*Acanthomintha ilicifolia*	T/E/1B.1/A	Not expected. No suitable habitat present.
San Miguel savory	*Satureja chandleri*	-/-/1B.2/A	Moderate. Suitable habitat may be present on mountain ridge.
Southern tarplant	*Centromadia parryi* ssp. *australis*	-/-/1B.1/A	Not expected. No suitable habitat present.
Southwest spiny rush	*Juncus acutus* var. *leopoldii*	-/-/4.2/D	Moderate. Potential in wet areas along Hell Creek.
Spreading navarretia	*Navarretia fossalis*	-/-/1B.1/A	Not expected. No suitable habitat present.
Sticky dudleya	*Dudleya viscida*	-/-/1B.2/A	Not expected. Out of species range.
Summer holly	*Comarostaphylis diversifolia* ssp. *diversifolia*	-/-/1B.2/A	Not expected. Out of species range.
Thread-leaved brodiaea	*Brodiaea filifolia*	T/E/1B.1/A	Not expected. No suitable habitat present.
Wart-stemmed ceanothus	*Ceanothus verrucosus*	-/-/2.2/B	Low. Just out of species range.
Variegated dudleya	*Dudleya variegata*	-/-/1B.2/A	Not expected. No suitable habitat present.

[1] Listing Status: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare. California Native Plant Society (CNPS): List 1B – Plants rare, threatened, or endangered in California and elsewhere, List 2: Plants rare, threatened, or endangered in California, but more common elsewhere, List 3 – Plants about which we need more information, List 4 – Plants of limited distribution (a watch list). County List: List A – plants rare, threatened, or endangered in California and elsewhere; List B – plants rare, threatened, or endangered in California but more common elsewhere; List C – plants which may be quite rare, but need more information to determine their true rarity status; List D – plants of limited distribution and are uncommon, but not presently rare or endangered.

4.3 Fauna

A total of 150 wildlife species were observed in the Preserve during the 2008 baseline surveys. Three of these are non-native species with the remaining species (98 percent) being native. A full inventory of wildlife species observed during the 2008 surveys is included in Appendix E at the end of this report. The following subsections describe the results of each survey conducted within the Preserve.

4.3.1 Lepidoptera

4.3.1.1 Observed Lepidoptera

Surveys conducted in March – May 2008 resulted in 28 observations representing 16 species of butterflies (Appendix E). These include three species of the Family Hesperiidae, four species of the Family Lycaenidae, three species of the Family Nymphalidae, two species of the Family Papilionidae, four species of the Family Pieridae, and one species of the Family Riodinidae. The common (checkered) white (*Pieris protodice*) and painted lady (*Cynthia cardui*) were the most frequently observed species (4 observations each) in the Preserve. Table 4-4 shows all butterfly species detected and the number of detections.

Table 4-4. Butterfly Species Detected within the Preserve

Common Name	Scientific Name	Number of Observations
Hesperiidae		
Funereal duskywing	*Erynnis funeralis*	3
Large white skipper	*Heliopetes ericetorum*	1
Lycaenidae		
Silvery (Southern) blue	*Glaucopsyche lygdamus australis*	2
Acmon blue	*Plebejus acmon acmon*	2
Western elfin	*Incisalia augustinus iroides*	1
Bramble hairsteak	*Callophrys dumetorum dumetorum*	1
Nymphalidae		
Buckeye	*Junonia coenia*	1
Painted lady	*Cynthia cardui*	4
West Coast lady	*Cynthia annabella*	1
Papilionidae		
Anise swallowtail	*Papilio zelicaon*	2
Western tiger swallowtail	*Papilio rutulus*	1
Pieridae		
Common (Checkered) white	*Pieris protodice*	4
Sara orangetip	*Anthocharis sara sara*	2
California white	*Pieris sisymbrii sisymbrii*	1
California dogface	*Colias eurydice*	1
Riodinidae		
Behr's metalmark	*Apodemia mormo virgulti*	1

The observed butterfly species composition is reflective of the vegetation communities comprising the Preserve. Most of the observed species use hosts that are relatively abundant in the chaparral and riparian communities common in the Preserve. However, the common (checkered) whites present probably benefit from the presence of non-native mustards at the site.

4.3.1.2 Potentially Occurring Lepidoptera: Previously Documented

The Harbison's dun skipper (*Euphyes vestris harbisoni*), a species being pursued for coverage under the Draft North County MSCP, was not detected during 2008 surveys. However, it has previously been documented within the Preserve (Dudek 1993). This species occurs in partially shaded riparian oak woodlands that provide adequate water to support San Diego sedge (*Carex spissa*), the larval host plant (USFS 2008) obligatory to this species of butterfly. Hell Creek provides suitable habitat for the species and supports San Diego sedge; therefore, the species is likely to occur there and focused survey specific to this species should be conducted.

4.3.1.3 Potentially Occurring Lepidoptera: Based on Habitat and Distribution

Potential habitat for the Quino checkerspot butterfly (*Euphydryas editha quino*) is also present on the Preserve. This species is generally associated with sage scrub, open chaparral, grassland, and vernal pool habitats (USFWS 2002). Within these habitats the species is usually observed in open or sparsely vegetated areas (including trails and dirt roads), and on hilltops and ridgelines (USFWS 2002). Larval host plants including dot-seed plantain (*Plantago erecta*), Coulter's snapdragon (*Antirrhinum coulterianum*), and purple owl's-clover (*Castilleja exserta* ssp. *exserta*) were observed during floristic surveys. No nectar plants were observed during the baseline surveys.

4.3.2 Terrestrial Herpetofauna

4.3.2.1 Observed Herpetofauna

A total of 267 herpetofauna captures representing 17 species were recorded during the four pitfall sampling months (March – June 2008). These include one amphibian species, eight species of lizards, and eight species of snakes (Appendix E and F). No non-native herpetofauna species were captured during pitfall sampling.

Lizard species accounted for the majority of the herpetofauna captures (82.4%). Of the eight lizards captured, the western whiptail (*Cnemidophorus tigris*) and western fence lizard (*Sceloporus occidentalis*) were the two most captured species (79 and 45 captures respectively). Both of these species also represent the most widely distributed species of lizards, being captured at all arrays. Other species of lizards captured included the orange-throated whiptail (*Cnemidophorus hyperythrus*) (28 captures), southern alligator lizard (*Elgaria multicarinata*) (7 captures), western skink (*Eumeces skiltonianus*) (1 capture), coast horned lizard (*Phrynosoma coronatum*) (22 captures), granite spiny lizard (*Sceloporus orcutti*) (1 capture), and side-blotched lizard (*Uta stansburiana*) (37 captures).

Snake and amphibian species accounted for far less of the herpetofauna captures (16.5% and 1.1% respectively). The western toad (*Bufo boreas*) was the only amphibian captured, with all three captures recorded at array 6 (Figure 3-1). Of the eight snake species captured, the California whipsnake (*Masticophis lateralis*) was the most captured (25 captures) and widely distributed (all arrays) snake species. Other species of snake captured included the common kingsnake (*Lampropeltis getula*) (4 captures), gopher snake (*Pituophis catenifer*) (3 captures), two-striped garter snake (*Thamnophis hammondii*) (2 captures), western patch-nosed snake (*Salvadora hexalepis*) (5 captures), western rattlesnake (*Crotalus viridis*) (1 capture), ringneck snake (*Diadophis punctatus*) (2 captures), and long-nosed snake (*Rhinocheilus lecontei*) (2 captures).

Arrays 4 and 6 had the most herpetofauna captures with 76 and 46 total captures, respectively. In addition, both of these arrays captured the greatest number of herpetofauna species (10 species each). These arrays were located in relatively flat, open chaparral habitat and were expected to have the most number of captures. Array 5 had the fewest herpetofauna captures (23 captures) and number of herpetofauna species (5 species). This array was located in riparian habitat where herpetofauna diversity and activity are expected to be low. Table 4-5 shows the species captured and total captures for each array.

The species detected during pitfall sampling represent the majority of species expected to occur on the Preserve and commonly found in those habitat types present on the Preserve. The methods used for the 2008 pitfall sampling were successful in developing a preliminary herpetofauna inventory.

4.3.2.2 Potentially Occurring Herpetofauna: Previously Documented

Several other herpetofauna species not captured during the 2008 pitfall sampling effort have been previously detected on the Preserve. Dr. Preston observed five additional species from 1999-2001 during her dissertation research at Hellhole Canyon. These species include the silvery legless lizard (*Anniella pulchra pulchra*), speckled rattlesnake (*Crotalus mitchellii*), red diamond rattlesnake (*Crotalus ruber*), Gilbert's skink (*Eumeces gilberti*), and western spadefoot (*Spea hammondii*). An incidental observation of the western spadefoot was made outside the boundaries of the Preserve. During an investigation of a pond south of the Preserve boundary, a dead spadefoot was found along the bank of the pond. Unidentified amphibian eggs were observed in this pond and it potentially supports breeding western spadefoots. It is likely that adult spadefoots use

Table 4-5. Terrestrial Herpetofauna Captures at the Preserve

Common Name	Scientific Name	Array							
		1	2	3	4	5	6	7	Total
California whipsnake	*Masticophis lateralis*	2	1	3	1	5	5	8	**25**
Coast horned lizard	*Phrynosoma coronatum*	5	5	4	2		5	1	**22**
Common kingsnake	*Lampropeltis getula*		2		1			1	**4**
Gopher snake	*Pituophis catenifer*			3					**3**
Granite spiny lizard	*Sceloporus orcutti*				1				**1**
Long-nosed snake	*Rhinocheilus lecontei*							2	**2**
Orange-throated whiptail	*Cnemidophorus hyperythrus*	1	1	3	10		8	5	**28**
Ringneck snake	*Diadophis punctatus*					2			**2**
Side-blotched lizard	*Uta stansburiana*	4			21		7	5	**37**
Southern alligator lizard	*Elgaria multicarinata*		3			4			**7**
Two-striped garter snake	*Thamnophis hammondii*				1		1		**2**
Western fence lizard	*Sceloporus occidentalis*	15	6	4	11	5	3	1	**45**
Western patched-nosed snake	*Salvadora hexalepis*	2			1		1	1	**5**
Western rattlesnake	*Crotalus viridis*						1		**1**
Western skink	*Eumeces skiltonianus*			1					**1**
Western toad	*Bufo boreas*						3		**3**
Western whiptail	*Cnemidophorus tigris*	10	14	3	27	7	12	6	**79**
	Total	**39**	**32**	**21**	**76**	**23**	**46**	**30**	

uplands surrounding this pond and within the Preserve boundaries. It should be noted that this pond is heavily impacted by off-road activity which makes long-term persistence of amphibian breeding in this pond unlikely.

4.3.2.3 Potentially Occurring Herpetofauna: Based on Habitat and Distribution

Other species expected but not captured during baseline surveys include the lyresnake (*Trimorphodon biscutatus*), rosy boa (*Lichanura trivirgata*), California glossy snake (*Arizona elegans*), western yellow-bellied racer (*Coluber constrictor*), night snake (*Hypsiglena torquata*), coachwhip (*Masticophis flagellum*), black-headed snake (*Tantilla planiceps*), western banded gecko (*Coleonyx variegatus*), garden slender salamander (*Batrachoseps major*), and arboreal salamander (*Aneides lugubris*). It is possible that these species, along with the species detected by Dr. Preston, are currently present onsite. However, because of generally low capture rates of reptile and amphibian species and the timing of this initial sampling effort, these species may have been missed.

4.3.3 Aquatic Herpetofauna

Herpetofauna species detected during aquatic herpetofauna and arroyo toad surveys included three species of amphibians, including the Pacific treefrog (*Pseudacris regilla*), California treefrog (*Pseudacris cadaverina*), and western toad (*Bufo boreas*) (Appendix E). California treefrog tadpoles and adults were detected in all three reaches of Hell

Creek (Figure 3-1). Pacific treefrog adults were also detected in all three reaches and tadpoles were detected in Reach 3 (Figure 3-1). Western toad tadpoles were detected in Reach 1 and 2 of Hell Creek, and adults were detected in Reach 2 (Figure 3-1).

Three pools along Hell Creek were identified as supporting high numbers of tadpoles. The first pool was located near the eastern boundary of the Preserve, along Reach 1. During the daytime surveys, approximately 100 tadpoles (approximately 50 California treefrog and 50 western toad) were detected within this pool. The second pool was located just west of the access road crossing, along Reach 3. Approximately 50-100 tadpoles (the majority being California treefrog and only few Pacific treefrogs) were detected within this pool during the daytime survey. Finally, the third pool was located under the flume crossing, along Reach 3. More than 100 Pacific treefrog tadpoles were detected in this pool.

Breeding California and Pacific treefrogs were observed (in amplexus) during aquatic herpetofauna surveys in reaches 2 and 3, respectively, during the first nighttime survey.

Hell Creek appears to support a healthy riparian system. Exotic aquatic species such as the American bullfrog (*Rana catesbeiana*), red swamp crayfish (*Procambarus clarkii*), and African clawed frog (*Xenopus laevis*) were not observed in the Preserve. These exotic species can have detrimental effects on native aquatic populations by preying on all life stages of these species. Absence of these species has likely allowed western toad and treefrog populations to thrive. In addition, non-native plant densities were low. The majority of Hell Creek supports a diverse array of native riparian and aquatic plant species. Non-native vegetation can lead to degradation of riparian and aquatic systems.

During the time of aquatic surveys, the vegetation within and along Hell Creek was relatively open. Increased vegetative growth was observed during each consequent visit. It is likely that Hell Creek is recovering from the 2007 wildfire and that it typically supports denser vegetation than what was observed during 2008 baseline surveys.

Finally, aquatic insect diversity appeared to be high. Although a focused effort to collect/identify aquatic insects was not conducted, biologists noted the presence of several native aquatic invertebrates. Aquatic invertebrate diversity may serve as an indicator of overall health of riparian and aquatic systems.

4.3.4 Arroyo Toad

Three reaches were identified along Hell Creek based on obvious habitat changes or landmarks. One section (Reach 2) of Hell Creek was determined to contain good quality habitat to support arroyo toad (Figure 3-1). The majority of Reach 2 supported a sandy streambed and uplands with friable soils. Additionally, braiding of the creek was observed along this reach, suggesting a low stream gradient. One daytime and two nighttime surveys were conducted along Reach 2. Significantly more vegetative growth was observed in and adjacent to the streambed during the second nighttime survey. This survey was conducted about one month later and vegetative growth was expected. Additionally, Hell Creek is recovering from the 2007 wildfire and vegetation is starting to re-establish. No arroyo toads were detected in Reach 2.

Reaches 1 and 3 were determined to support marginal to poor habitat quality and, therefore, only surveyed once. Reach 1 contained a sandy streambed, no braiding, and areas of large boulders and small waterfalls. Reach 3 contained a silty and rocky streambed, no braiding, and a series of small waterfalls. No arroyo toads were detected in either of these two reaches.

Significant arroyo toad populations exist along the San Luis Rey River. Specifically, high numbers of the arroyo toad exist near Rincon Casino, approximately 5 miles (8.05 km) upstream of the Hell Creek and Paradise Creek confluence. In addition, arroyo toads were relocated along Paradise Creek as part of the Rincon Arroyo Toad Translocation Project (Varanus Biological Services 2004). Arroyo toads were relocated into Paradise Creek, between East Paradise Creek Lane and the confluence of Paradise Creek and San Luis Rey River. Nevertheless, it is unlikely that movement (upstream or overland) from these areas into Hell Creek and the Preserve will occur. Upstream movement is unlikely due to the lack of suitable habitat between the end of Reach 3 and the confluence of Hell Creek and Paradise Creek. This stretch of Hell Creek is steep and rocky, with a series of waterfalls. Overland movement is also unlikely due the steep topography. Therefore, if an arroyo toad population were to occur in the Preserve, this population would likely be isolated from other populations and need to be self-sustaining. Arroyo toad breeding habitat appears to minimal and, therefore, a self-sustaining population on the Preserve would be unlikely.

4.3.5 Avifauna

4.3.5.1 Observed Avifauna

A total of 1,435 avian observations representing 76 species were made during diurnal point count surveys conducted from January through June 2008 (Appendix E). Point locations with the greatest number of observations include location 4 (80 observations), location 12 (85 observations), and location 18 (88 observations). Point locations with the fewest number of observations include location 7 (33 observations), location 8 (29 observations), location 25 (30 observations), and location 26 (33 observations). Point locations with the greatest number of species observed include location 11 (33 species), location 12 (34 species), and location 18 (36 species). Point locations with the fewest number of species observed include location 7 (14 species), location 20 (15 species), and location 25 (13 species). Point locations with the greatest number of observations and number of species observed were located in woodland habitat along or near Hell Creek, where high species diversity is expected. In contrast, locations with the fewest number of observations and number of species observed were located in areas of chaparral that burned in 2007 as well as in 2003.

Species most frequently observed during point count surveys include the California towhee (*Pipilo crissalis*) (89 observations), lesser goldfinch (*Carduelis psaltria*) (86 observations), and spotted towhee (*Pipilo maculatus*) (105 observations), all characteristic of southern California chaparral. All three of these have been found to respond positively to fire elsewhere in San Diego County, the spotted towhee after a lag of two to five years (P. Unitt unpubl data). These species were also three of the most widely distributed species, being observed at 26, 27, and 27 of the 27 point locations, respectively. In addition to these species, the common raven (*Corvus corax*) and Lazuli bunting (*Passerina amoena*), both of which respond positively to fire, were also observed at all 27 point locations. Species least frequently observed during point count surveys include 11 species observed only once: the American robin (*Turdus migratorius*), Brewer's blackbird (*Euphagus cyanocephalus*), burrowing owl (*Athene cunicularia*), Cassin's vireo (*Vireo cassinii*), cliff swallow (*Petrochelidon pyrrhonota*), downy woodpecker (*Picoides pubescens*), greater roadrunner (*Geococcyx californianus*), hermit warbler (*Dendroica occidentalis*), hooded oriole (*Icterus cucullatus*), Lincoln's sparrow (*Melospiza lincolnii*), and red-shouldered hawk (*Buteo lineatus*). All of these species were also the least widely distributed species, being observed at one location. All are migrants or nonbreeding visitors to the Preserve, except for the roadrunner, an inconspicuous species occurring at low densities and affected negatively by fire. Mammalogist Drew Stokes also reported another incidental observation of the roadrunner

during other surveys. In addition, the turkey vulture (*Cathartes aura*) and common yellowthroat (*Geothlypis trichas*) were both observed at only one location.

Nocturnal surveys resulted in the detection of two additional species, the western screech owl (*Megascops kennicottii*) and great horned owl (*Bubo virginianus*). The western screech owl was detected once near point count station 16 and once near point count station 17. The great horned owl was detected once along Hell Creek, near point count station 17. The common poorwill, a target species for nocturnal surveys, was expected but not detected. One individual was detected during field work related to the San Diego Natural History Museum Bird Atlas on June 6, 1998 (Unitt pers. comm.). This species may have been negatively impacted by the 2007 Poomacha wildfire.

The invasive, parasitic brown-headed cowbird (*Molothrus ater*) was detected nine times during avian point count surveys at six point locations (1, 4, 12, 16, 17, 18), primarily in the woodland along Hell Creek, where suitable hosts such as the song sparrow and yellow warbler were concentrated. Brown-headed cowbirds are brood parasites and are known to parasitize more than 220 host species (Muehter 2008). Expansion of the species has resulted in range-wide declines in populations of susceptible songbirds, including the willow flycatcher, Bell's, Cassin's and warbling vireos, blue-gray gnatcatcher, and yellow warbler (Unitt 2004).

Three species characteristic of riparian woodland were noted during the 2008 surveys, the downy woodpecker (*Picoides pubescens*), yellow warbler (*Dendroica petechia*), and common yellowthroat (*Geothlypis trichas*). The downy woodpecker, of which only a single individual was noted on one survey, is probably only a sporadic visitor. But the yellow warbler and common yellowthroat were noted repeatedly, and singing territorially, so apparently a few pairs of each occupy the Preserve as breeding summer residents.

4.3.5.2 Potentially Occurring Avifauna: Previously Documented

A number of bird species have been documented in the Preserve that were not detected during 2008 surveys. These include 42 species that were detected by Dr. Preston during research conducted on the Preserve from 1999-2001. Most of these are migrants, sporadic visitors, or typical of habitats not represented in the Preserve, probably recorded as occasional dispersers. Those that may have occurred more regularly are discussed below.

The birds recorded at the Preserve are largely those typical of chaparral and oak woodland, with a few characteristic of riparian woodland. The fires of 2003 and 2007

were presumably responsible for shifts in abundance of many species. Of the 12 species recorded most numerously on point counts, 10 have been found to prefer burned over unburned habitat in one or more studies of the effects of the Pines and Cedar fires elsewhere in San Diego County.

Almost all resident species known from the area before the fire continued to occur after the fire. Two species affected negatively (on the basis of studies elsewhere in San Diego County), the acorn woodpecker (*Melanerpes formicivorus*) and wrentit (*Chamaea fasciata*), even ranked 5 and 8 of all species of birds recorded on point counts (the conspicuousness of the acorn woodpecker doubtlessly inflated its place in the ranking relative to its true resident numbers). Two species on which the negative effect of fire is severe, and have recovered poorly since, persist at the Preserve in small numbers: the California thrasher (*Toxostoma redivivum*) and Hutton's vireo (*Vireo huttoni*). One species negatively affected by fire and recorded at the Preserve before the fire, however, was missed in 2008: the ruby-crowned kinglet (*Regulus calendula*). Relative to those expected in mature chaparral or unburned oak woodland, the low numbers in 2008 of the red-shouldered hawk, roadrunner (*Geococcyx californianus*), black-chinned hummingbird (*Archilochus alexandri*), bushtit (*Psaltriparus minimus*), and black-headed grosbeak (*Pheucticus melanocephalus*), and, as winter visitors, hermit thrush (*Catharus guttatus*) and fox sparrow (*Passerella iliaca*) are presumably due to the fire and reflect patterns observed in fire-affected areas elsewhere in San Diego County.

Canyon wren (*Catherpes mexicanus*) and white-throated swift (*Aeronautes saxatalis*), two species of large rocky outcrops and cliffs both recorded on the Preserve before the 2007 fire were not sighted during the 2008 surveys. The effect of fire on these species is not well documented, but since they are essentially independent of vegetation (and the swift is highly dispersive), they seem unlikely to be seriously affected.

Three species found to respond positively to fire elsewhere in San Diego County were missed during 2008 surveys. One of these species included Lawrence's goldfinch (*Carduelis lawrencei*), which feeds preferentially on seeds of herbs of the family Boraginaceae, many of which proliferate after fires. In chaparral and woodland burned by the Pines and Cedar fires large numbers moved in the first year after the fire, then dwindled away in following years. The absence of Lawrence's goldfinch at the Preserve in 2008 contradicts the pattern observed elsewhere. The loggerhead shrike (*Lanius ludovicianus*) responded positively to the Pines and Cedar fires but is also suffering general population decline in coastal southern California. The mountain quail (*Oreortyx pictus*) is at the edge of its elevational range in the Preserve. Only the highest ridge along the northern edge of the Preserve reaches its preferred elevational range above about 680

meters (2,200 ft), an area not covered in the 2008 surveys, owing to the constraints of the point-count method.

Another species not noted during 2008 surveys is the golden eagle (*Aquila chrysaetos*). One of the eagle's traditional nest sites is on Rodriguez Mountain just east of the Preserve. The site was used at least until the study period for the San Diego County bird atlas (1997–2001) (Unitt 2004).

Three nocturnal birds were missed, the barn owl, common poorwill, and lesser nighthawk, in spite of effort with broadcast recordings of these species' calls. The effect of fire on nocturnal birds is poorly known. Where they occur in low density they are difficult to detect, and many repeated surveys may be necessary. Thus, the proper conclusion is not that these three species are absent but that if present they are not common.

The Preserve has hardly any habitat that can be construed as grassland. The largest is on the gentler south-facing slope near count point 20. Nevertheless, two characteristically grassland species were recorded from the Preserve before the fire. The white-tailed kite (*Elanus leucurus*) nests in dense-canopied oak woodland or orchards and forages in nearby grassland. The burning of the oak woodland in 2003 removed the dense canopy and made the oaks less attractive as nest sites, if the species had nested in the area previously. The grassy area around point 20 was searched for grasshopper sparrows (*Ammodramus savannarum*) in 2008 with no result. The extent of the habitat may be too small to attract the species. During field work for the San Diego County bird atlas two grasshopper sparrows were noted on June 12, 1999 just south of the Preserve's parking lot on adjacent private land.

Species previously reported and undetected during the 2008 survey may occur again during follow-up monitoring of the Preserve.

4.3.6 Bats

A total of 14 bat species were detected based on both passive and active bat surveys (Tables 4-6 – 4-9; Appendix E). The most active species included the big brown bat (*Eptesicus fuscus*), pocketed free-tailed bat (*Nyctinomops femorosaccus*), and Yuma myotis (*Myotis yumanensis*). Rare bat detections included the pallid bat (*Antrozous pallidus*), western yellow bat (*Lasiurus xanthinus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). Mist-netting during active surveys resulted in the capture of two bat species (also detected with Anabats); the California myotis (*Myotis californicus*)

and small-footed myotis (*Myotis ciliolabrum*). The captured California myotis was a post-lactating female indicating possible breeding by at least this species on site.

The active roost survey at the small grotto (Figure 3-3, Active Roost Survey Location) resulted in observations of 2-3 individual bats that appeared to exit from small rock cavities and crevices around the grotto entrance. Although several species were recorded with the Anabat in front of the grotto, most of these individuals were thought to be simply flying nearby the grotto rather than roosting in it. A small-footed myotis was captured in a mist-net placed across the grotto entrance. It is possible this bat was using the grotto as a roost.

Table 4-6. Bats Detected at the Preserve Using Passive Anabats

Common Name	Scientific Name	Relative Activity Index[1]		Average Activity Index[2]
		Winter	Summer	
Big brown bat	*Eptesicus fuscus*	nd[3]	112.22	56.11
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	3.89	33.33	18.61
Yuma myotis	*Myotis yumanensis*	2.78	31.11	16.94
California myotis	*Myotis californicus*	6.67	21.11	13.89
Western red bat	*Lasiurus blossevillii*	1.67	25.56	13.61
Mexican free-tailed bat	*Tadarida brasiliensis*	3.33	22.22	12.78
Hoary bat	*Lasiurus cinereus*	12.78	4.44	8.61
Western pipistrelle	*Parastrellus hesperus*	1.67	13.33	7.50
Small-footed myotis	*Myotis ciliolabrum*	0.56	12.22	6.39
Long-eared myotis	*Myotis evotis*	nd[3]	2.22	1.11
Western mastiff bat	*Eumops perotis*	nd[3]	2.22	1.11
Townsend's big-eared bat	*Corynorhinus townsendii*	0.56	nd[3]	0.28
Western yellow bat	*Lasiurus xanthinus*	0.56	nd[3]	0.28

[1] Number of bat passes per Anabat night multiplied by 10

[2] Average of seasonal measures of relative activity for each bat species detected

[3] nd = not detected

Table 4-7. Bats Detected at the Preserve During Summer 2008 Active Foraging Survey

Common Name	Scientific Name	Detection Method
Big brown bat	*Eptesicus fuscus*	Anabat
California myotis	*Myotis californicus*	Anabat, Mist-net capture
Mexican free-tailed bat	*Tadarida brasiliensis*	Anabat
Pallid bat	*Antrozous pallidus*	Anabat
Small-footed myotis	*Myotis ciliolabrum*	Anabat
Western pipistrelle	*Parastrellus hesperus*	Anabat
Yuma myotis	*Myotis yumanensis*	Anabat

Table 4-8. Bats Detected at the Preserve During Summer 2008 Active Roost Survey

Common Name	Scientific Name	Detection Method
Big brown bat	*Eptesicus fuscus*	Anabat
California myotis	*Myotis californicus*	Anabat
Pallid bat	*Antrozous pallidus*	Anabat
Small-footed myotis	*Myotis ciliolabrum*	Anabat, Mist-net capture
Western pipistrelle	*Parastrellus hesperus*	Anabat

Table 4-9. Bats Captured at the Preserve in Mist-nets During Active Surveys

Common Name	Scientific Name	Age	Sex	Reproductive Status	Forearm (mm)	Ear (mm)	Foot (mm)	Weight (g)
California myotis	*Myotis californicus*	Adult	Female	Post-lactating	32	11	5	5.5
Small-footed myotis	*Myotis ciliolabrum*	Adult	Male	Testes abdominal	32.5	13.5	5.5	4.5

Seasonal trends in bat activity included a suite of species detected only during the summer surveys; the big brown bat, long-eared myotis (*Myotis evotis*), and western mastiff bat (*Eumops perotis*), and two species detected only during the winter surveys; the Townsend's big-eared bat and western yellow bat.

The Preserve is supporting a high number of bat species including several of the rarer types such as the Townsend's big-eared bat, long-eared myotis, and pallid bat. All three foliage roosting bat species (bats of the genus *Lasiurus*) found in San Diego County were detected on site. Crevice and cave roosting species were detected as well. The variety of bat species with diverse ecological needs detected on site indicates the property is quite supportive of bats in general. This is likely due to the presence of a diversity of undisturbed habitats on site that bats are known to utilize in southern California (Krutzsch 1948, Stokes et al 2005). These habitats include riparian woodland, oak woodland, exposed rocky outcrops, cliffs, boulder caves, scrub-covered hillsides and ridges, and a near-perennial water source (Hell Creek).

4.3.7 Small Mammals

4.3.7.1 Observed Small Mammals

A total of 194 small mammal captures representing 10 species were recorded during three trapping sessions (April 5 - April 10 2008; April 29 – May 5 2008; June 17 - June 19 2008) using 12" Sherman live traps (Appendix E and F). Of the 11 species captured

using Sherman traps, the California mouse (*Peromyscus californicus*), deer mouse (*Peromyscus maniculatus*), and Dulzura kangaroo rat (*Dipodomys simulans*) were the most frequently captured species (44, 32, and 35 captures respectively). In addition to these species, other captures included the brush mouse (*Peromyscus boylii*) (19 captures), cactus mouse (*Peromyscus eremicus*) (18 captures), California pocket mouse (*Chaetodipus californicus*) (6 captures), San Diego pocket mouse (*Chaetodipus fallax*) (18 captures), desert woodrat (*Neotoma lepida*) (12 captures), large-eared woodrat (*Neotoma macrotis*) (7 captures), and California ground squirrel (*Spermophilus beecheyi*) (3 captures). Table 4-10 shows the species captured and total captures for each plot.

The California mouse was the most widely distributed species, being captured at 12 of the 20 plots. The large-eared woodrat was the least distributed species, being captured at 4 of the 20 plots. Plots 1, 9, and 19 captured the greatest number of species (each with 6 species) while plots 12 and 17 captured the least number of species (each with 1 species). The greater diversity is probably due to proximity to rock outcrops and the Witch Creek Fire. Multiple rodent species tend to find shelter under large rocks after a fire; prior to a fire burrows are often found at the base or near vegetation. Both structures provide escape cover from predators. Plot 12 was established within the oak woodland at the south-central edge of the Preserve. This habitat type is preferred to only a few species including the California mouse (*Peromyscus californinicus*) and brush mouse (*Peromyscus boylii*). Plot 17 consisted mainly of non-native grasses, not preferred by native rodents.

Plots 7 and 10 had the most number of captures with 20 captures each, while plot 17 had the fewest number of captures with one capture. Plot 7 was established in a burn area and appears previously to be chaparral that is now resprouting. The twenty captures include only two species, the Dulzura kangaroo rat (*Dipodomys simulans*) and the deer mouse (*Peromyscus maniculatus*). Both of these species prefer open and disturbed habitat. They are also known to readily return to traps on successive nights. Plot 10 was also chaparral but included low density scrub oak. This plot burned in both the 2007 Poomacha Fire and 2003 Paradise Fire. The numerous captures are probably due to recolonization. The majority of those captures were of the Dulzura kangaroo rat. For this species the rate of increase in abundance over time increases with herb cover (Diffendorfer et al. 2007). Plot 17 consisted mainly of non-native grasses, not preferred by native rodents.

Table 4-10. Small Mammal Captures at the Preserve

Common Name	Scientific Name	Small Mammal Trapping Plot																				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Total**
Brush mouse	*Peromyscus boylii*	1			2	2	10								4							**19**
Cactus mouse	*Peromyscus eremicus*	6	2				1		4	2							1			2		**18**
California mouse	*Peromyscus californicus*	3	6	10	1					2	3	3	10	3		1				1	1	**44**
California pocket mouse	*Chaetodipus californicus*	1	1											2			1			1		**6**
Deer mouse	*Peromyscus maniculatus*	2		3				11	4	3	2				5		1		1			**32**
Desert woodrat	*Neotoma lepida*	3	2			1			1	2					2					1		**12**
Dulzura kangaroo rat	*Dipodomys simulans*							9			15						2		4	1	4	**35**
Large-eared woodrat	*Neotoma macrotis*				1							1		2		3						**7**
San Diego pocket mouse	*Chaetodipus fallax*						1		2	2						2	10			1		**18**
California ground squirrel	*Spermophilus beecheyi*									1				2								**3**
Total Captures		**16**	**11**	**13**	**4**	**3**	**12**	**20**	**11**	**12**	**20**	**4**	**10**	**10**	**11**	**6**	**15**	**1**	**5**	**7**	**5**	

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One additional species, the broad-footed mole (*Scapanus latimanus occultus*), was visually detected during the first trapping session (April 5 - April 10, 2008). This individual was found dead in Hell Creek near plot 5.

Small mammal species were also captured during terrestrial herpetofauna pitfall sampling. A total of 27 small mammal captures representing nine species were recorded during the four pitfall sampling months (March – June 2008). Of these nine species, three species were captured only during pitfall sampling. These species include the western harvest mouse (*Reithrodontomys megalotis*), desert gray shrew (*Notiosorex crawfordi*), and Botta's pocket gopher (*Thomomys bottae*). These species are either too small to trip shut Sherman traps, prefer foods items not used as bait in Sherman traps, or are not regularly active above ground.

The small mammal inventory for the Preserve appears to be very successful. The species list represents nearly all the species that would be expected for the habitat types present. Only two species were not detected, the ornate shrew (*Sorex ornatus*) and California vole (*Microtus californicus*). Effects of the Witch Creek Fire of 2007 on the small mammal community are not evident. The diversity of small mammals captured here is high for a relatively short sample period. Most rodents and insectivores, except for the woodrats and voles, are not immediately impacted by the fires. Deep burrows allow them to escape from fire; however the lack of food will eventually impact populations in the burn areas. Given time populations may decrease. Fortunately, the unburned edge is within the property allowing fast recolonization as the vegetation regrows.

4.3.7.2 Potentially Occurring Small Mammals: Previously Documented

Observational data obtained from Dr. Preston included two species of small mammals not captured or observed during the small mammal surveys, including the Merriam's chipmunk (*Tamias merriami*) and western gray squirrel (*Sciurus griseus*).

The ornate shrew was not detected during the pitfall trapping sessions. This species is usually captured only in pitfall traps. This species prefers chaparral and coastal sage scrub but appears to occupy a microhabitat within those.

The California vole was also not detected. It is another species that is mostly captured in pitfalls. This species spends most of it's time above ground and is highly affected by fire.

4.3.8 Medium and Large Mammals

4.3.8.1 Observed Medium and Large Mammals

Four target and a number of non-target mammal species were detected using two types of survey methods (scent station surveys and camera station surveys) for medium and large mammals (Appendix E and F). Target species for these surveys include native medium and large carnivores (i.e. bobcat, mountain lion, coyote) and mule deer (*Odocoileus hemionus*). Non-target species include human associated animals such as the domestic dog (*Canis lupus familiaris*) and horse (*Equus caballus*). The results of each survey type are reported independently below.

Four target mammal species were detected in the Preserve during scent station surveys. Target species observed include the bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and coyote (*Canis latrans*). In addition, one unidentified carnivore track was detected. Of the target species, the raccoon was the most frequently detected (3 detections) species, followed by the striped skunk (2 detections), bobcat (1 detection), and coyote (1 detection). A number of non-target species were also detected during scent station surveys. These include the domestic dog and unidentified small mammal and rabbit species.

All target mammal species detected during scent station surveys, with the exception of the striped skunk, were detected in the Preserve during camera station surveys. During camera station surveys, the coyote was the most frequently detected species (6 detections), followed by the bobcat and raccoon (4 and 3 detections, respectively). The coyote was detected at camera stations 1, 2, 4, 11, 15, and 20. The bobcat was detected at camera stations 4, 11, 15, and 19. The raccoon was detected at camera stations 4, 7, and 20.

Two additional non-target species were also detected during camera station surveys that were not detected during scent station surveys. These include the domestic horse (*Equus caballus*) and unidentified woodrat species.

In addition to the species detected during the surveys, incidental observations (i.e. visual encounter, scat, track) of mule deer and spotted skunk (*Spilogale putorius phenax*) were made in the Preserve. Mule deer sign (i.e. tracks and scat) was found throughout the Preserve. The desert cottontail (*Syvilagus audubonii*) was often observed on the Preserve. The brush rabbit (*Sylvilagus bachmani*) was not detected during these surveys.

The mountain lion was not directly detected during baseline surveys. However, during one survey, biologists were alerted by County park rangers that they recently sighted a mountain lion on the Preserve. The main prey of mountain lion is mule deer, and since mule deer sign was frequently observed on the Preserve, it is anticipated that mountain lion occur on this property.

The medium to large mammal surveys produced a nearly comprehensive species list of expected species. The number of detections was less than anticipated, possibly due to the Witch Creek Fire of 2007. This fire burned approximately 75% of the Preserve. The proximity of the burn to unburned habitat within and outside the Preserve allows for eventual recolonization.

The presence of carnivores at multiple camera stations was expected. In a similar study (Diffendorfer et al. 2007) of the Cedar Fire in the Cleveland National Forest there was no evidence that fire affected occupancy patterns or colonization patterns for any carnivore species detected at the camera stations. The carnivores were capable of persisting in both unburned and burned chaparral.

Fire is an important component of mule deer habitat preference. Frequent fires restore the habitat and improve the food sources for mule deer. The absence of fire results in older and less nutritious plants. Mule deer are often seen foraging for immediate growth within several weeks of a burn. In addition, mule deer scat and track were observed throughout the Preserve.

4.3.8.2 Potentially Occurring Medium and Large Mammals: Previously Documented

Data obtained from Dr. Preston included four species of medium to large mammals that were not detected during the 2008 surveys. These include the opossum (*Didelphis virginiana*), gray fox (*Urocyon cinereoargenteus*), and long-tailed weasel (*Mustela frenata*). The long-tailed weasel was not detected during these surveys but was observed by Dr. Preston in the years preceding the Witch Creek Fire. The long-tailed weasel is not commonly seen, but is often present within a few miles from water. Sightings of this species throughout the County have increased dramatically since 2006.

4.3.8.3 Potentially Occurring Medium and Large Mammals: Based on Habitat and Distribution

The ringtail (*Bassariscus astutus octavus*) was not observed or detected during baseline surveys. It is expected that they occur on the Preserve since the type locality (Hall 1981) is 2.2 miles northeast of the Preserve. At other occupied sites in San Diego County they

are often found near vertical granitic cliff faces and within a few miles from a water source. Potential habitat is found in the north-central section of the Preserve. This species is listed as a fully protected species by the California Department of Fish and Game.

4.3.9 Sensitive Wildlife Species

This section discusses the sensitive wildlife species that have been documented from or have the potential to occur in the Preserve. For the purposes of this report, sensitive wildlife species refers to both listed and non-listed sensitive species. Listed wildlife species are those species listed as endangered, threatened, or rare, or identified as candidates for listing pursuant to the Federal or State Endangered Species Acts (FESA, CESA). Non-listed sensitive species include those species with the status "State Species of Special Concern" (SSC) and/or "Fully Protected Species". In addition, non-listed sensitive wildlife species include those species on the CDFG watch list. These species were either previously a SSC or do not meet the criteria for SSC. Nonetheless, there is concern for these species and additional data is needed to clarify the species' status. Finally, species proposed for coverage under the North County MSCP are also included in this discussion. This plan has not yet been finalized; however, an anticipated covered species list has been developed. Coverage for 63 plant and animal species is being pursued under this plan.

4.3.9.1 Observed Sensitive Wildlife Species

No state- or federally-listed wildlife species were detected during the 2008 baseline surveys. However, a total of 19 non-listed sensitive wildlife species were observed across the Preserve during these surveys (Table 4-11; Figure 4-4 – 4-7). These included six species of birds, nine species of mammals, and four species of reptiles. In addition, some of these observed species have been previously documented from the Preserve (Figure 4-3). A brief species account for each sensitive species observed during 2008 baseline surveys is provided below.

Table 4-11. Sensitive Wildlife Species Observed at the Preserve during 2008 Baseline Surveys

Common Name	Scientific Name	Listing Status (Federal/State/ County)[1]	Draft North County MSCP Proposed Covered (Y/N)[2]
Reptiles			
Coast horned lizard	*Phrynosoma coronatum*	--/SSC/2	Yes
Orange-throated whiptail	*Cnemidophorus hyperythrus*	--/SSC/2	Yes
Two-striped garter snake	*Thamnophis hammondii*	--/SSC/1	No
Western patch-nosed snake	*Salvadora hexalepis*	--/SSC/2	No
Birds			
Bell's sage sparrow	*Amphispiza belli*	--/WL/1	Yes
Burrowing owl	*Athene cunicularia*	--/SSC/1	Yes
Cooper's hawk	*Accipiter cooperii*	--/WL/1	Yes
Southern California rufous-crowned sparrow	*Aimophila ruficeps*	--/WL/1	Yes
Western bluebird	*Sialia mexicana*	--/--/2	Yes
Yellow warbler	*Dendroica petechia*	--/SSC/2	No
Mammals			
California pocket mouse	*Chaetodipus californicus*	--/SSC/2	No
Desert woodrat	*Neotoma lepida*	--/SSC/2	No
Mountain lion[3]	*Felis concolor*	--/--/2	Yes
Mule deer[4]	*Odocoileus hemionus*	--/--/2	Yes
Northwestern San Diego pocket mouse	*Chaetodipus fallax*	--/SSC/2	No
Pallid bat	*Antrozous pallidus*	--/SSC/2	No
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	--/SSC/2	No
Townsend's big-eared bat	*Corynorhinus townsendii*	--/SSC/2	No
Western mastiff bat	*Eumops perotis*	--/SSC/2	No
Western red bat	*Lasiurus blossevillii*	--/SSC/2	No

[1] Listing Status: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare, SSC – species of special concern, FP – fully protected, WL – watch list. County List: List 1 – Species with a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met; List 2 – Species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

[2] The North County MSCP has not yet been finalized. Species identified as covered are those species expected to be pursued for coverage under the plan.

[3] The mountain lion was not directly observed during 2008 surveys. However, reports made by park rangers suggest the species is currently occupying the Preserve.

[4] The mule deer was not directly observed during 2008 surveys. However, mule deer sign (track and scat) was detected throughout the Preserve.

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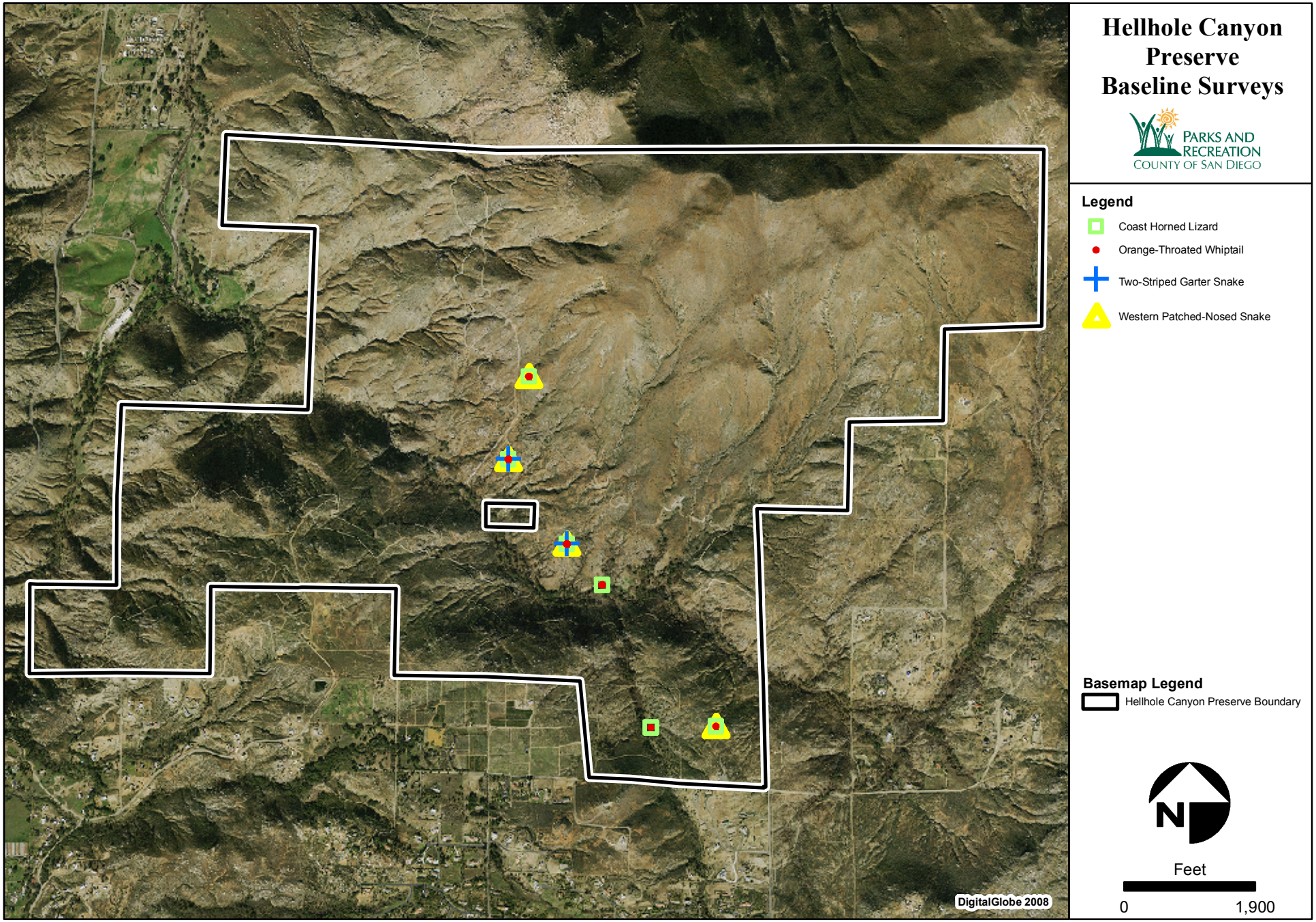

Technology Associates International Corporation

Sensitive Reptile Species Observed during 2008 Baseline Surveys

Figure 4-4

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Date: Oct 13, 2008

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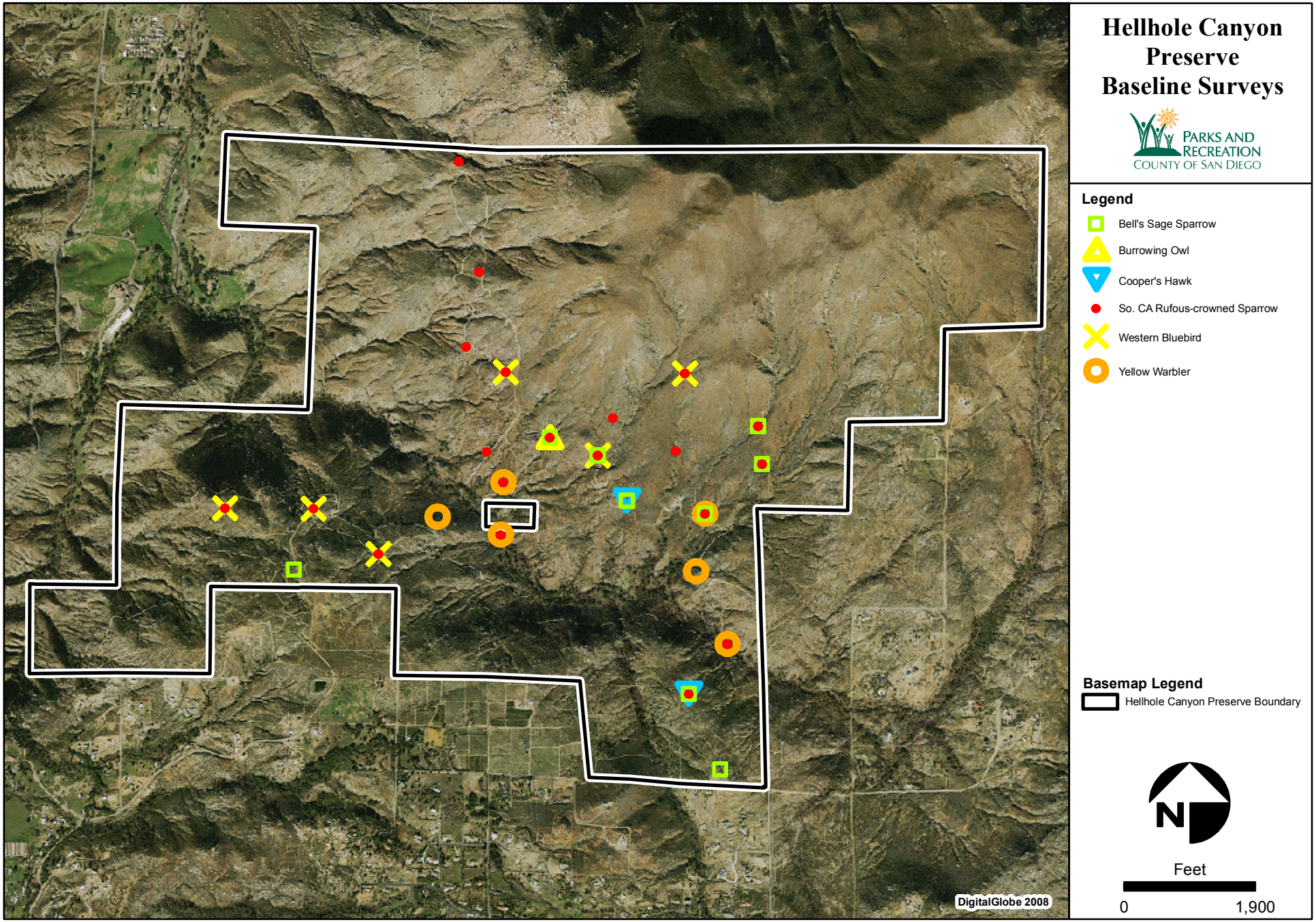

Technology Associates International Corporation

Sensitive Bird Species Observed during 2008 Baseline Surveys

Figure 4-5

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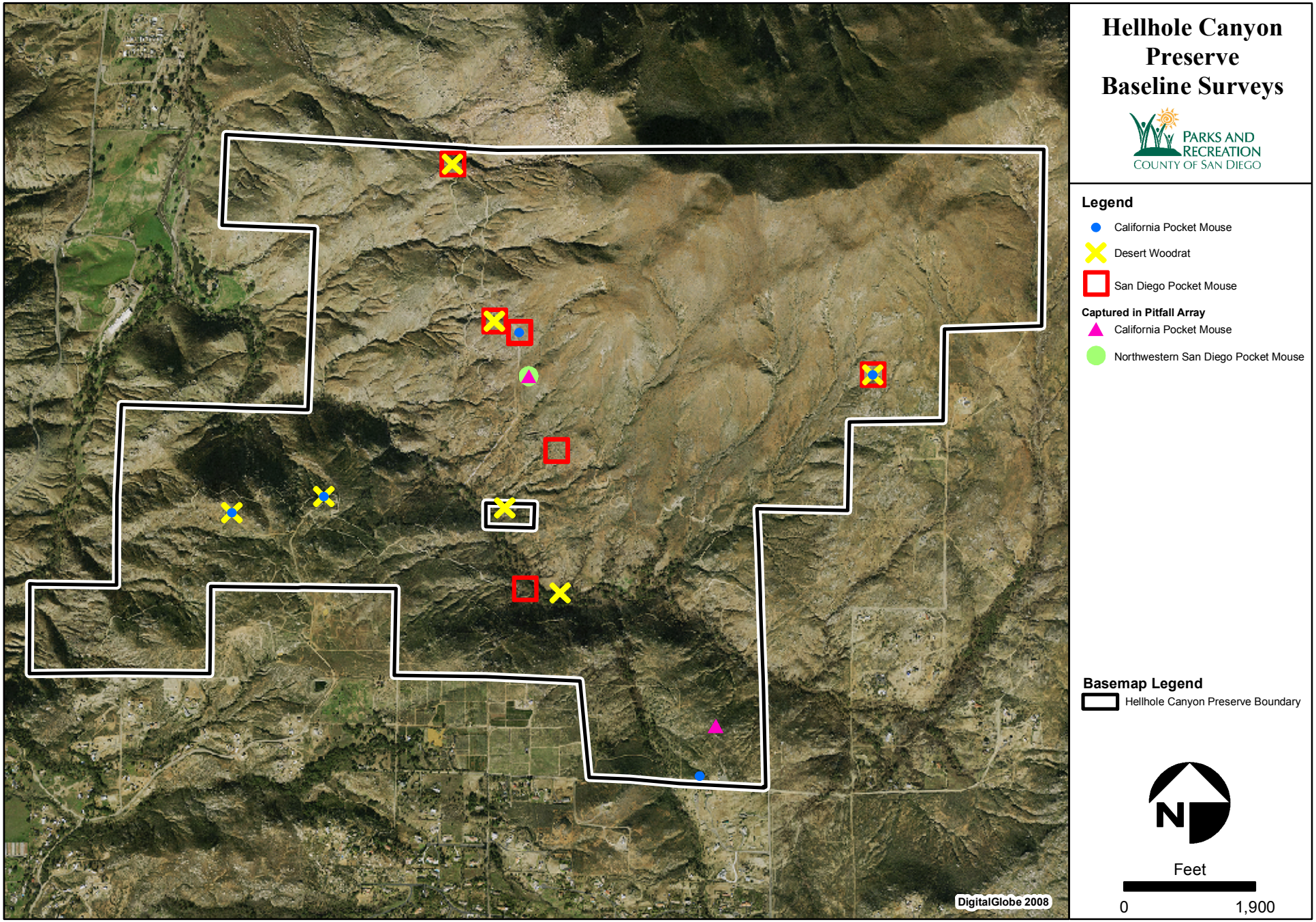

Technology Associates International Corporation

Sensitive Small Mammal Species Observed during 2008 Baseline Surveys

Figure 4-6

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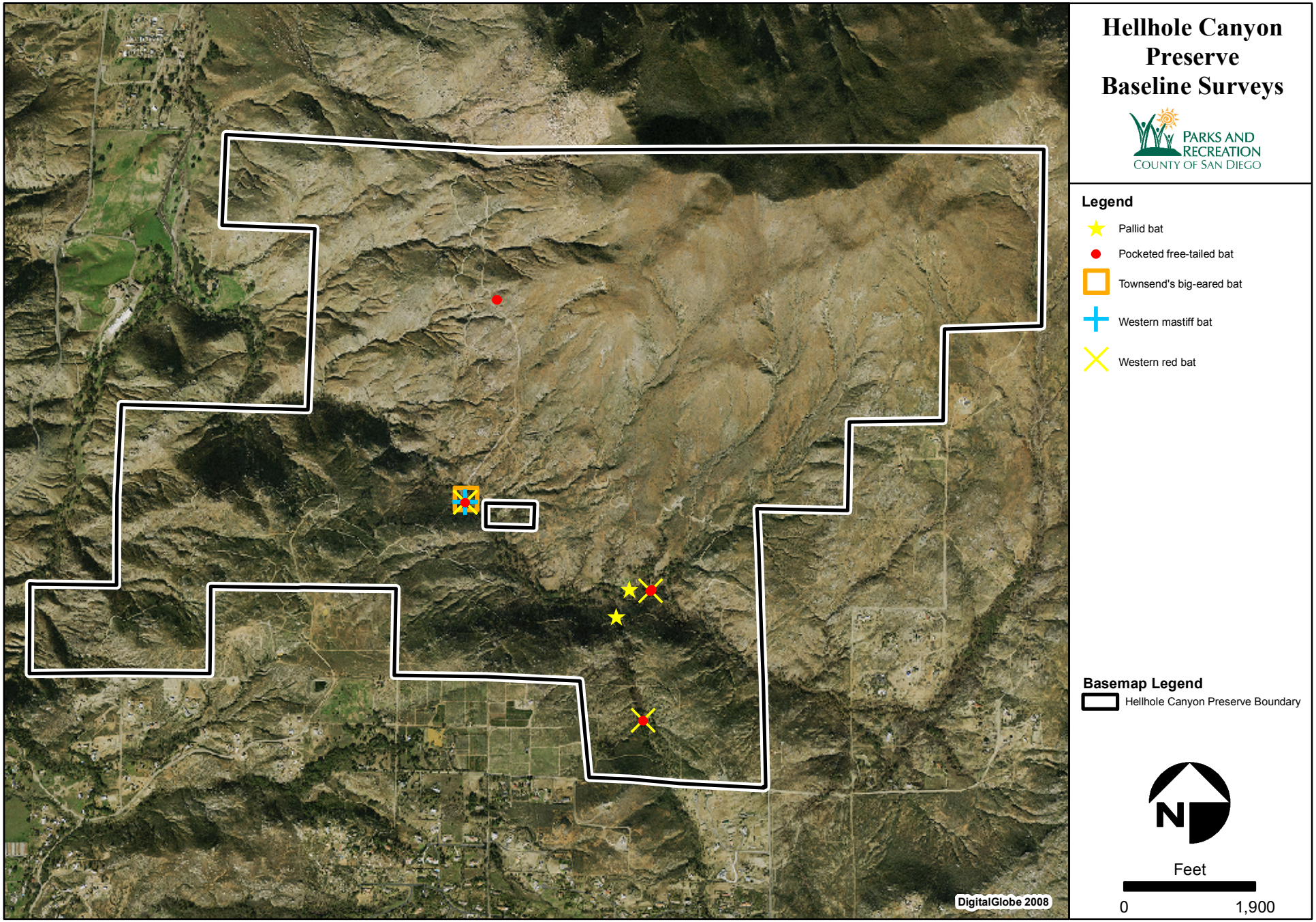

Technology Associates International Corporation

Sensitive Bat Species Documented during 2008 Baseline Surveys

Figure 4-7

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Coast horned lizard – *Phrynosoma coronatum*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: Covered

The coast horned lizard occurs from northern California to the tip of Baja California, Mexico (SDNHM 2008) from sea level to approximately 8,000 feet (2,438 m). This lizard occupies open habitats such as grasslands, coastal sage scrub, and chaparral, with loose soils. Horned lizards forage on the ground in open areas, often between shrubs and near ant nests (Morey 2000). They are also commonly found along dirt roads and trails. Current threats to the species include destruction of coastal habitat, introduction of non-native ant species, especially the Argentine ant (*Iridomyrmex humilis*), which displace its native ant food base, collection, and off-road activity. Within the Preserve, coast horned lizard observations were made frequently at pitfall arrays 1- 4, 6, and 7 (Figure 4-4).

Orange-throated whiptail – *Cnemidophorus hyperythrus*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: Covered

The orange-throated whiptail inhabits low-elevation coastal scrub, chamise-redshank chaparral, mixed chaparral, and valley-foothill hardwood habitats (Morey 2000). This species is restricted to the extreme southwest of California and northwest of Baja California Norte, Mexico (Stebbins 2003). In California, it is found on the west side of the Peninsular Ranges between sea level and 900 meters (3,000 ft), in Los Angeles, San Bernardino, Orange, Riverside and San Diego counties (Zeiner et al. 1988). It is still locally common in many areas where it remains. The principal threat to the orange-throated whiptail is degradation and loss of habitat, however it is also impacted by off-road vehicle activity, over-grazing by livestock, and predation by introduced predators (e.g., cats and dogs) (San Diego Herpetological Society 1980). A limiting factor to the species' range is the availability of its primary food item, the termite (*Reticulitermes Hesperus*). Within the Preserve, the orange-throated whiptail was captured at pitfall arrays 1- 4, 6, and 7 (Figure 4-4).

Two-striped garter snake – *Thamnophis hammondii*
Federal Status: None
State Status: Species of Special Concern
County: Group 1
Draft North County MSCP: Not Covered

The two-striped garter snake is distributed from central California to Baja California (SDNHM 2008). In southern California it occurs from the coast to the mountains and is usually found in riparian habitat in or near sources of freshwater, including streams, ponds, and lakes. Its preferred diet consists of small fish, tadpoles, frogs, toads, and insect larvae. However, small mammals and invertebrates such as leeches and earthworms are also taken (Fitch 1941, Nussbaum et al. 1983, Rathburn et al. 1993). The breeding season for this live-bearing species begins in April or May, and continues through the summer (SDNHM 2008). The species is now common only in eastern San Diego County and populations are threatened by elimination of habitat and predations by raptors and introduced species including bullfrogs, fishes, and feral pigs (Jennings and Hayes 1994). Within the Preserve, two striped garter snakes were captured at arrays 4 and 6 (Figure 4-4).

Western patch-nosed snake – *Salvadora hexalepis*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: Not Covered

The western patch-nosed snake occurs in California from the northern Carrizo Plains in San Luis Obispo County, south through the coastal zone, south and west of the deserts, into coastal northern Baja California up to 7,000 feet (2,120 m) in elevation (Marlow 2005). It occurs in semi-arid brushy areas within chaparral, desert scrub, washes, and sandy flats and rocky areas (Marlow 2005). This species seems to require at least a low shrub structure of minimum density; it is not found in habitats lacking this habitat characteristic (Jennings and Hayes 1994). An opportunistic predator, it will prey on lizards (*Cnemidophorus* ssp., *Coleonyx* ssp.), small mammals (*Dipodomys* ssp.), and the eggs of lizards and snakes (Stebbins 1985, Zeiner et al. 1988). It probably eats anything it can overpower (Stebbins 1954). This species is normally active in the spring and early summer, with the greatest activity occurring in May and June (Marlow 2005). Within the Preserve, the western patch-nosed snake was captured at arrays 1, 4, 6, and 7 (Figure 4-4).

Bell's sage sparrow – *Amphispiza belli*
Federal Status: None
State Status: Watch List
County: Group 1
Draft North County MSCP: Yes

The sage sparrow is distributed in arid areas of the western United States and Mexico. Bell's sage sparrow, a dark colored subspecies, occurs year round in the western two thirds of San Diego County. This subspecies tends to forage on the ground, and as such, prefers open coastal sage scrub or chaparral habitat. It is often found in areas that are recovering from fire. Breeding activity generally occurs from late March through June. Nest building occurs low down in the brush, and sometimes on the ground. The greatest threat to the Bell's sage sparrow is habitat fragmentation resulting from urban development. This subspecies may be the most sensitive shrubland bird to habitat fragmentation (Bolger et al. 1997, Lovio 1996). Within the Preserve, the Bell's sage sparrow was observed at point count locations 1, 14, 15, 19, 21-24, and 27 (Figure 4-5).

Burrowing owl – *Athene cunicularia*
Federal Status: None
State Status: Species of Special Concern
County: Group 1
Draft North County MSCP: Yes

The burrowing owl occurs as far north as southern Canada and as far east as the western edge of the Great Plains, with disjunct populations in Florida and the Caribbean (Haug et al. 1993). In San Diego, burrowing owls breed in five areas of the County (Unitt 2004). Burrowing owls are found in annual and perennial grasslands, deserts, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface (California Burrowing Owl Consortium 1993). Burrows are the essential component of burrowing owl habitat: both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement (California Burrowing Owl Consortium 1993). Burrowing owls have been adversely affected by loss of lowland habitats and by the widespread use of pesticides to control ground squirrel populations (Stephenson and Calcarone 1999). Improper use of pesticides affects chick survivorship and dispersal

(Winchell 1994). Within the Preserve, the burrowing owl was observed at point count location 27 (Figure 4-5).

Cooper's hawk – *Accipiter cooperii*
Federal Status: None
State Status: Watch List
County: Group 1
Draft North County MSCP: Yes

The Cooper's hawk is distributed throughout much of the United States from southern Canada to northern Mexico. It is a regular nesting species in San Diego County. This species has previously been closely associated with oak woodland, and the densely foliaged crowns of the coast live oak remain a favored site for Cooper's hawks to place their nests. Recently, however, Cooper's hawks have adapted to the urban environment and often nest in eucalyptus trees. Additionally, they can be observed foraging in many types of upland and riparian habitats. Habitat loss, pesticide contamination, and human disturbance at the nest site limit this species population sizes (Remsen 1978). Within the Preserve, the Cooper's hawk was observed at point count locations 15 and 22 (Figure 4-5).

Southern California rufous-crowned sparrow – *Aimophila ruficeps*
Federal Status: None
State Status: Watch List
County: Group 1
Draft North County MSCP: Yes

The southern California rufous-crowned sparrow is a common resident of scrub habitats of the coastal plain and foothills of southern California and Baja California, Mexico. It is locally common in open coastal sage scrub in San Diego County, and often occurs on slopes that are steep, sparsely vegetated, and rocky or recently burned. Urban development is the greatest threat to this species due to the loss, degradation, and fragmentation of coastal sage scrub habitat and associated edge effects. Within the Preserve, the southern California rufous-crowned sparrow was observed at point count locations 6-9, 13, 20, 21, and 24-27 (Figure 4-5).

Western bluebird – *Sialia mexicana*
Federal Status: None
State Status: None
County: Group 2
Draft North County MSCP: Yes

The western bluebird is a common cavity-nesting songbird of oak woodland and pine forests throughout the western United States. It breeds in open woodlands of oaks, riparian deciduous trees, or conifers with herbaceous understory, and winters in a wide variety of open habitats at elevations below 1,200 meters (4,000 ft). Bluebirds breed from the eastern reaches of lowland coastal valleys such as Lake Hodges, along the San Diego River east of Santee, and drainages east of Otay Reservoir, up through the foothills and montane areas where suitable habitat occurs. This species is vulnerable to competition with more aggressive introduced species (e.g., European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*)) for scarce nesting cavities (McLaren 1963, Zeleny 1969, Patterson 1979). However, in San Diego County, this species appears to be extending its range, successfully colonizing urban areas and adapting to novel nest sites such as nest boxes and certain species of palms (Unitt 2004). Within the Preserve, the western bluebird was observed at point count locations 2, 3, 6, 13, 21, and 25 (Figure 4-5).

Yellow warbler – *Dendroica petechia*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The yellow warbler breeds throughout most of San Diego County (Green 2005). In southern California, yellow warblers breed in riparian woodlands in the lowlands and foothill canyons (Garrett and Dunn 1981, Lehman 1994, Roberson and Tenney 1993, Unitt 2004). They typically occur in riparian forests that contain cottonwoods, sycamores, willows, or alders (Stephenson and Calcarone 1999). The breeding season of yellow warbler generally begins in May and can last to August. Available data show a strong tendency for breeding- and wintering-site fidelity over successive years (Lowther et al. 1999). Nest parasitism by brown-headed cowbirds has been strongly implicated as a cause of yellow warbler population declines in coastal lowland and foothill riparian areas of southern California (Garrett and Dunn 1981, Stephenson and Calcarone 1999, Unitt 2004). Within the Preserve, the yellow warbler was observed at point count locations 4, 10, 11, and 17-19 (Figure 4-5).

California pocket mouse – *Chaetodipus californicus*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The California pocket mouse is distributed from San Francisco Bay south to the border of Mexico, east to the edge of the Great Valley and from Auburn south along the foothills of the Sierra Nevada, and west across the Tehachapi Mountains to the coast (Brylski 2005). It is found in a variety of habitats year-round, including coastal scrub, chamise-redshank and montane chaparral, sagebrush, annual grassland, valley foothill hardwood, valley foothill hardwood-conifer, and montane hardwood habitats at elevations from sea level to 7,900 feet (2,400 m) (Brylski 2005). The species occurs in brushy areas but probably is attracted to grass-chaparral edge (Brylski 2005). Grazing of grassland by domestic stock eliminates cover necessary for predator avoidance (Brylski 2005). Within the Preserve, this species was captured at small mammal plots 1, 2, 13, 16, and 19 and pitfall arrays 1 and 6 (Figure 4-6).

Desert woodrat – *Neotoma lepida*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The desert woodrat occurs in coastal California from San Luis Obispo south through the Transverse and Peninsular Ranges into Baja California. This species commonly inhabits mixed chaparral, Joshua tree woodlands, pinyon-juniper woodlands, sagebrush, and desert habitats (Zeiner et al. 1990). Thompson (1982) observed desert woodrats actively avoiding open areas that did not provide adequate refuge sites. Nests are constructed with twigs, sticks, cactus parts, rocks and are usually built against a rock crevice, at the base of creosote or cactus, or in the lower branches of trees (Brylski 2005). Within the Preserve, this species was captured at small mammal plots 1, 2, 5, 8, 9, 14, and 19 (Figure 4-6).

Northwestern San Diego pocket mouse – *Chaetodipus fallax*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The northwestern San Diego pocket mouse occurs from the eastern San Gabriel Mountains in the interior to near San Onofre on the coast (Lackey 1996), and south into Baja California. It is found in coastal scrub, chamise-redshank chaparral, mixed chaparral, sagebrush, desert wash, desert scrub, desert succulent shrub, pinyon-juniper, and annual grassland habitats (Brylski 2005). The availability of shelter provided by rocky slopes or habitats may increase species abundance (Lackey 1996). The San Diego pocket mouse generally exhibits a strong microhabitat affinity for moderately gravelly and rocky substrates (Bleich 1973, Price and Waser 1984). San Diego pocket mouse appears to be sensitive to habitat fragmentation and degradation. Data collected by Bolger et al. (1997) suggests that isolated habitat patches must be at least 62 acres (25 ha) to 198 acres (80 ha) to sustain native rodent populations. Within the Preserve, this species was captured at small mammal plots 6, 8, 9, 15, 16, and 19 and pitfall array 6 (Figure 4-6).

Pallid bat – *Antrozous pallidus*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The pallid bat is a locally common species of low elevations in California (Harris 2005). It occurs throughout California except for the high Sierra Nevada from Shasta to Kern counties, and the northwestern corner of the state from Del Norte and western Siskiyou counties to northern Mendocino County (Harris 2005). The pallid bat is a yearlong resident in most of the range (Harris 2005). Pallid bats are found in a variety of habitats, including rocky canyons, open farmland, scattered desert scrub, grassland, shrubland, woodland, and mixed conifer forest (Barbour and Davis 1967, Hermanson and O'Shea 1983, Orr 1954, Philpott 1997). The species will roost in rock crevices, mines, caves, tree hollows, and a variety of anthropogenic structures (Hermanson and O'Shea 1983). This bat is intolerant of roosts with temperatures in excess of 104°F (40°C) (Philpott 1997). The pallid bat is very sensitive to disturbance of roosting sites (Harris 2005). Within the Preserve, the pallid bat was detected along Hell Creek, in the eastern portion of the Preserve (Figure 4-7).

Pocketed free-tailed bat – *Nyctinomops femorosaccus*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The pocketed free-tailed bat is rare in California and found in Riverside, San Diego, and Imperial counties (Harris 2005). Habitats frequently used by this species include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis (Harris 2005). The pocketed free-tailed bat prefers rock crevices in cliffs as roosting sites (Harris 2005). The status of this species in California is poorly known, but it appears to be rare (Harris 2005). Within the Preserve, the pocketed free-tailed bat was detected along Hell Creek and in the northwestern portion of the Preserve (Figure 4-7).

Townsend's big-eared bat – *Corynorhinus townsendii*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The Townsend's big-eared bat occurs throughout the western United States, including California, Nevada, Idaho, Oregon, and Washington, from near sea level to elevations well above 10,367 feet (3,160 m) (Nagorsen and Brigham 1993, Pearson et al. 1952). In California, the details of its distribution are not well known (Harris 2005). The species is most abundant in mesic habitats (Harris 2005). The Townsend's big eared bat roosts in caves, mines, tunnels, buildings, or other human-made structures (Harris 2005). The species may use separate sites for night, day, hibernation, or maternity roosts (Harris 2005). A high degree of site fidelity (more than 80 percent) has been noted for this species (Humphrey and Kunz 1976, Pierson et al. 1999). This species is extremely sensitive to disturbance of roosting sites and a single visit may result in abandonment of the roost (Harris 2005). Within the Preserve, the Townsend's big-eared bat was detected along Hell Creek, near the flume crossing (Figure 4-7).

Western mastiff bat – *Eumops perotis*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The western mastiff bat is primarily known from low to mid elevations in southern and central California southeast to Texas and south to central Mexico (Best et al. 1996). This species is a year-round resident in California (Philpott 1997). The species is found in desert scrub, chaparral, mixed conifer forest, giant sequoia forests, and montane meadows (Philpott 1997). It requires large bodies of flat water for drinking sites (USFS 2008). Day roosts are generally found in areas with rugged, rocky canyons and cliffs (Best et al. 1996). Western mastiff bat populations in California are believed to have undergone significant declines in recent years, due primarily to extensive loss of habitat by urbanization and widespread use of insecticides (Williams 1986). Other factors likely contributing to their decline include loss of large open water drinking sites, pest control operations in structures and activities that disturb or destroy cliff habitat (e.g. water impoundments, highway construction, quarry operations, recreational climbing) (Texas Parks and Wildlife 2003). Within the Preserve, the western mastiff bat was detected along Hell Creek, near the flume crossing (Figure 4-7).

Western red bat – *Lasiurus blossevillii*
Federal Status: None
State Status: Species of Special Concern
County: Group 2
Draft North County MSCP: No

The western red bat occurs in western Canada, western United States, western Mexico, and Central and South America (Harvey et al. 1999). There is little information on the distribution and relative abundance of this species in southern California (Stephenson and Calcarone 1999). This bat is associated with large deciduous trees in riparian habitat and often occurs in streamside habitats dominated by cottonwood, oaks, sycamore, and walnut (Bolster 1998, Harvey et al. 1999). This species is primarily a solitary species that roosts in the foliage of trees and shrubs in habitats bordering forests, rivers, cultivated fields, and urban areas (Harvey et al. 1999). The western red bat forages over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands (Harris 2005). The species does not form colonies and is difficult to find and census (USFS 2008). Within the Preserve, the western red bat was observed along Hell Creek and in the southeast portion of the Preserve (Figure 4-7).

4.3.9.2 Potentially Occurring Sensitive Wildlife Species: Previously Documented

Sensitive wildlife species previously documented from the Preserve include those species not documented during 2008 baseline surveys but with occurrence data within the Preserve (see Section 3.1 for list of databases). Five sensitive wildlife species have been previously documented from within the Preserve (Table 4-12; Figure 4-8), including the federally threatened California gnatcatcher (*Polioptila californica*).

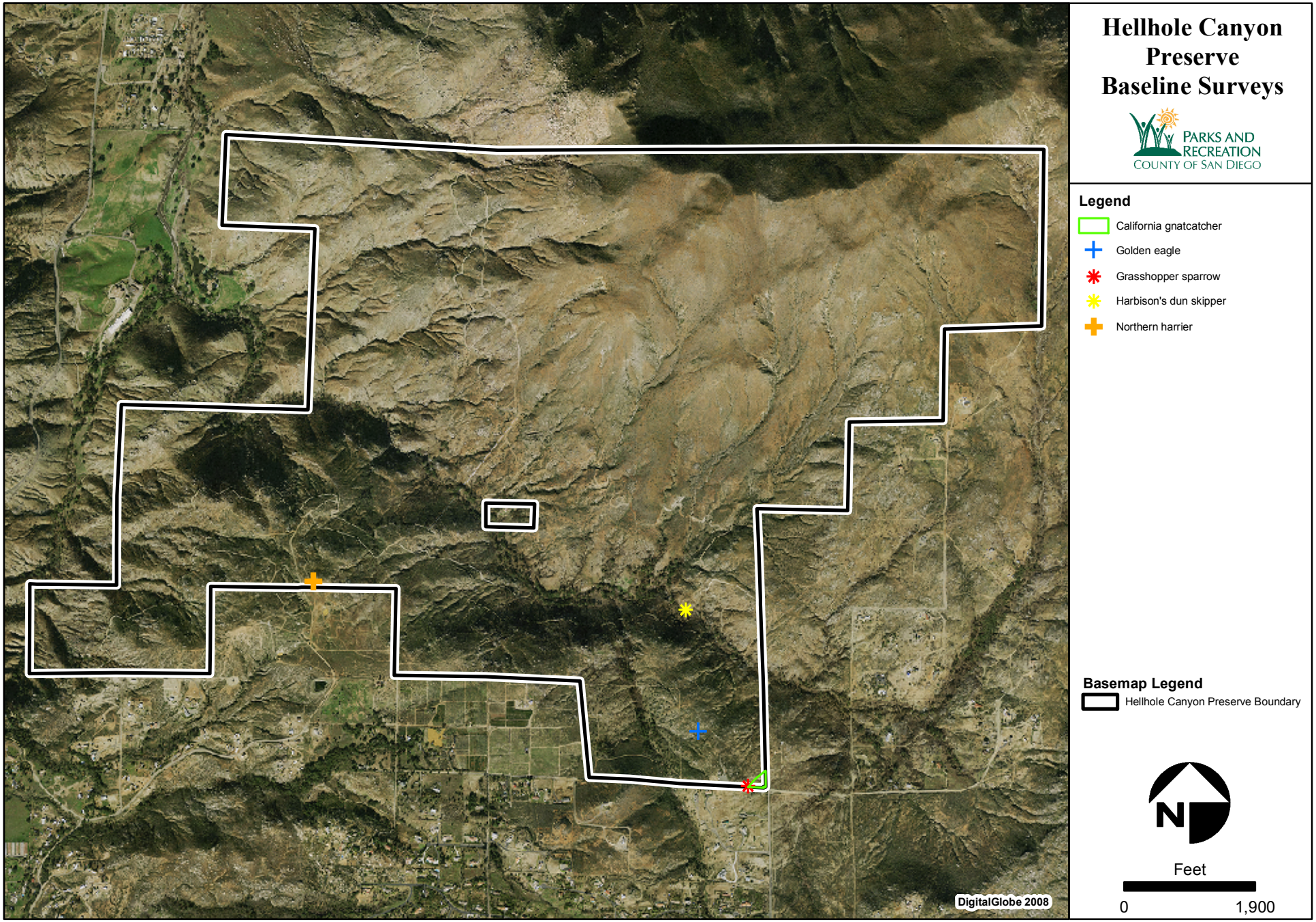
Table 4-12. Potentially Occurring Sensitive Wildlife Species Previously Documented from the Preserve.

Common Name	Scientific Name	Listing Status (Federal/State/ County)[1]	Potential to Occur
Invertebrates			
Harbison's dun skipper	*Euphyes vestris harbisoni*	--/--/1	High. Previously documented from the Preserve. Host plants and suitable habitat present along Hell Creek.
Birds			
Golden eagle	*Aquila chrysaetos*	--/WL/1	High. Previously documented from the Preserve. Nest site on Rodriguez Mountain.
Grasshopper sparrow	*Ammodramus savannarum*	--/SSC/1	High. Previously documented from the Preserve.
Northern harrier	*Circus cyaneus*	--/SSC/1	Not Expected. Occasional flyover. No suitable habitat present.
California gnatcatcher	***Polioptila californica***	**T/SSC/1**	Low. Previously documented from the Preserve. Not expected as a resident.

[1] Listing Status: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare, SSC – species of special concern, FP – fully protected, WL – watch list. County List: List 1 – Species with a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met; List 2 – Species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

4.3.9.3 Potentially Occurring Sensitive Wildlife Species: Based on Habitat and Distribution

Potentially occurring sensitive wildlife species based on habitat presence and distribution are presented in Table 4-13. These potentially occurring wildlife species are those; (1) with occurrence data outside of, but within 3 kilometers of the Preserve, and/or (2) whose habitat preferences are consistent with available habitat within the Preserve. Three sensitive wildlife species have been detected within the region and could potentially occupy the Preserve. Suitable habitat for two species was determined to be present during 2008 baseline surveys.



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Potentially Occurring Sensitive Species Previously Documented from the Preserve

Figure 4-8

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Date: Oct 13, 2008

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Table 4-13. Potentially Occurring Sensitive Wildlife Species at the Preserve Based on Habitat and Distribution.

Common Name	Scientific Name	Listing Status (Federal/State/ County)[1]	Potential to Occur
Invertebrates			
Quino checkerspot butterfly[2]	***Euphydryas editha quino***	**E/--/1**	Moderate. Suitable habitat present.
Fish			
Arroyo chub[3]	*Gila orcuttii*	--/SSC/1	Not expected. Hell Creek does not appear to support suitable habitat.
Birds			
Bald eagle[3]	***Haliaeetus leucocephalus***	**DL/E, FP/1**	Not expected. Very rare fly over.
Mammals			
Ringtail[2]	*Bassariscus astutus octavus*	--/FP/2	Expected. Suitable habitat present.
Stephens' kangaroo rat[3]	***Dipodomys stephensi***	**E/T/1**	Not Expected. No suitable habitat present.

[1] Listing Status: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare, SSC – species of special concern, FP – fully protected, WL – watch list. County List: List 1 – Species with a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met; List 2 – Species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

[2] Suitable habitat determined to be present during 2008 baseline surveys.

[3] Species occurrence data outside the Preserve by within 3 km of the Preserve

4.4 Habitat Connectivity and Wildlife Corridors

Hellhole Canyon is an important component of a large regional linkage, specifically of the Santa Ana-Palomar wildlife corridor (South Coast Wildlands 2008). Although it does not fall immediately within the mapped corridor, the Preserve is connected to that corridor via a group of connected public lands and largely undeveloped tribal lands.

The Preserve is crucial in providing linkage between Guejito Ranch and the San Luis Rey River Valley. It is important to note that the Preserve provides a funnel for animals moving between Guejito Ranch and the San Luis Rey River. The Preserve facilitates animal movement from Guejito Ranch north to Palomar Mountain, northwest toward Pala and Temecula (and ultimately the Santa Rosa Plateau), and east to Lake Henshaw. The Preserve borders Bureau of Land Management (BLM) lands that directly link to Guejito Ranch to the southeast. Guejito Ranch provides potential corridors south to San Pasqual Valley (and ultimately Lake Hodges), Ramona, Boden Canyon, Pamo Valley, and Black Mountain. To the east of the BLM lands lay vast tracts of the Cleveland National Forest that further provides connectivity to this regional mosaic of open space. Many of these lands are part of the Draft North Multiple Species Conservation Plan preserve area and constitute high quality core habitats (K. Preston, unpublished data).

Most animals seek cover when moving across the landscape and, therefore, often seek out riparian areas as their preferred movement corridors. Hell Creek runs through the Preserve and provides an easily-traversed linkage between lands to the south and east and the San Luis Rey River Valley to the northwest. The creek's headwaters begin on the BLM lands to the east, flow west briefly through private lands east of the Preserve (Upper Hellhole) and then flow through the Preserve and the Brown parcel in Lower Hellhole Canyon. Hell Creek joins Paradise Creek just west of the Preserve and then flows north to join the San Luis Rey River at the Rincon Indian Reservation.

5.0 CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

Biological baseline surveys identified nine land cover types and detected a total of 487 plant and wildlife species within the Preserve. Baseline surveys detected 337 plant taxa, 16 invertebrate species, three amphibian species, 16 reptile species, 78 bird species, and 37 mammal species (14 bats, 14 small mammals, and nine medium and large mammals) within the Preserve. Included on the list of species detected are seven sensitive plant and 19 sensitive wildlife species. The data collected during these baseline surveys will provide valuable information for development of Area Specific Management Directives included in the Resource Management Plan. This section provides management recommendations for each taxonomic group assessed during this survey effort including proposed North County MSCP-covered species. Generally, monitoring and management of the Preserve will follow the measures outlined in the monitoring and management sections of the North County MSCP, once this document is finalized. Additionally, management recommendations are provided for issues that are common across all open space areas in San Diego County.

5.1 Vegetation Communities

Nine vegetation communities were mapped within the Preserve during 2008 baseline surveys. The County should maintain at least the baseline acreages of native vegetation communities, as determined by baseline surveys. It is recommended that the County maintain an updated vegetation community map to be used as a tool for adaptive management within the Preserve. An ongoing mapping effort will aid in identifying changes in vegetation communities that may affect quality and usage by wildlife. Vegetation mapping and monitoring should address habitat value for target species, including those proposed for coverage under the Draft North County MSCP. Vegetation updates should be consistent with recommendations for regional vegetation monitoring and should include information about fire recovery of the vegetation communities.

Gabbro soils are a rare soil type in San Diego County and present on the Preserve, specifically within the northeast corner of the Preserve. These soils support unique mafic southern mixed chaparral communities which often include several species of limited distribution known almost exclusively from sites underlain by gabbro soils. Therefore, complete protection of areas that support this rare soil type is recommended. If at any time in the future new recreational trails become necessary, they should be located in less sensitive vegetation communities such as non-native grasslands and disturbed areas.

5.2 Flora

A total of 337 plant taxa were observed during floristic surveys conducted in 2008, including seven sensitive plant taxa. Periodic floristic surveys, as identified by the North County MSCP (once the plan and associated management and monitoring recommendations are finalized), are recommended to monitor the North County MSCP-covered plant species detected on the Preserve. Surveys should be scheduled during ideal climatic conditions (average or above-average rainfall) and appropriate time of year (blooming period) to maximize detection. Should future monitoring for North County MSCP-covered species uncover that additional covered species occur on the Preserve, these species will also be monitored following North County MSCP recommendations. In addition, prior to any ground disturbing activities, rare plant surveys are recommended in suitable habitats to ensure sensitive plant taxa will not be impacted by the activity.

The voucher-based species list of the Preserve is based on a few months of collections and additional collection trips are recommended to complete the list. Collecting efforts were temporally focused from March to June 2008 (San Diego County growing and flowering season) to maximize the total number of plant taxa collected in a one year period. Many of the summer and fall species were missed due to timing constraints of the baseline data collection effort. Collecting trips made in the summer and fall of a good rain year are recommended to be included in future monitoring methods.

5.3 Lepidoptera

Checklist surveys conducted in March, April, and May, 2008 resulted in the detection of 16 butterfly species. Some butterfly species have a tendency to congregate on ridges and hilltops, a phenomenon known as “hilltopping”. Hilltopping was observed in butterfly species occurring in the Preserve. Therefore, it is recommended that the highest points of hilltops on the Preserve should remain free of developments and that planned trails and public vistas should not be installed, or should be installed with minimal disturbance, in these locations.

Depending on funding, a focused effort should be made to determine the presence of the Quino checkerspot butterfly and Harbison's dun skipper to complement the 2008 baseline inventory. The Harbison's dun skipper had been documented from the Preserve prior to 2008 surveys (Dudek 1993). Although this species was not detected during 2008 surveys, potentially suitable habitat exists and the species' larval host plant, San Diego sedge, was observed in Hell Creek during 2008 floristic surveys. Future monitoring for this species will follow the recommendations identified by the finalized North County MSCP. Should future monitoring for this species uncover additional covered species, these species will also be monitored following North County MSCP recommendations.

The Quino checkerspot butterfly has not been documented from the Preserve. However, suitable habitat is present along with dot-seed plantain (*Plantago erecta*), Coulter's snapdragon (*Antirrhinum coulterianum*), and purple owl's-clover (*Castilleja exserta* ssp. *exserta*), all larval host plants used by the species (USFWS 2002). No nectar plants were observed on the Preserve. The Preserve is also within the known range of the species. While an effort should be made to determine presence of the species during surveys for MSCP-covered species, focused surveys following the USFWS survey protocol for this species are not warranted because the Preserve is outside the USFWS survey area for the species.

5.4 Herpetofauna

A combination of pitfall trapping and aquatic herpetofauna surveys resulted in the detection of three amphibian species, eight lizard species, and eight snake species. Of these species detected, two species, coast horned lizard and orange-throated whiptail, are proposed for coverage under the Draft North County MSCP (Table 4-11). Monitoring protocols, including survey methods and frequencies, for these two species will follow those recommended by the finalized North County MSCP. Should future monitoring for these species uncover additional covered species, these species will also be monitored following North County MSCP recommendations.

Many of the herpetofauna species captured may be encountered crossing, foraging, or basking on public roads and trails in the Preserve. This includes the sensitive coast horned lizard, which is commonly found on roads and trails and may burrow in loose sand along roads and trails. Appropriate signage should be posted to inform the public to stay on designated roads and trails and to avoid wildlife when encounters occur.

Downed wood provides refuge habitat for many herpetofauna species. This is often viewed as a fire hazard and removed. However, it is recommended that downed wood be

left in place to provide refuge habitat for species of salamanders, lizards, and snakes. Downed wood should be removed if blocking trails within the Preserve.

Rattlesnakes were detected on the Preserve during 2008 surveys. Signage and information kiosks are recommended to inform the public of their presence, that they shall not harm the species, and how to avoid encounters. Also, information should be provided to inform the public on what to do if bitten.

Unauthorized collection threatens many herpetofauna species. Appropriate signage should be in place to inform visitors to stay on designated trails, the impact of collection on species, and penalties for unauthorized collection. Gates at access points should remain locked during periods when the Preserve is closed.

5.5 Avifauna

Avian surveys resulted in the detection of 78 species within the Preserve. Five species proposed for coverage under the Draft North County MSCP were detected during the 2008 baseline surveys, including the Bell's sage sparrow, burrowing owl, Cooper's hawk, southern California rufous-crowned sparrow, and western bluebird. Monitoring protocols, including survey methods and frequencies, for these five species will follow those recommended by the finalized North County MSCP. Should future monitoring for these species uncover additional covered species, these species will also be monitored following North County MSCP recommendations.

Each of these five species depends on various habitats within the Preserve. The Bell's sage sparrow and southern California rufous-crowned sparrow rely on scrub habitats. The burrowing owl occurs in both grassland and open scrub habitats. Finally, the western bluebird and Cooper's hawk require woodland habitats for breeding.

Both quantitative and qualitative monitoring of bird populations by qualified personnel is recommended. Quantitative monitoring can consist, for example, of maintaining the baseline avian point counts. If necessary for budgetary reasons, they could be conducted at less frequent intervals (e.g., every other month), or only periodically (e.g., every other year). The accumulation of data over time will prove extremely valuable to identify trends in bird populations both at the Preserve and across the region. Qualitative monitoring can range from informal efforts, such as compiling a bird checklist for the Preserve.

The yellow warbler, a restrictedly riparian species that prefers mature woodland was most likely impacted by the 2007 wildfires that degraded the oak and riparian woodland along Hell Creek. A more exact census and monitoring of this species, designated a species of special concern by the California Department of Fish and Game, would be an index to the recovery of its habitat.

The yellow warbler is also a frequent victim of the brown-headed cowbird, so the warbler may serve also as an index to the effect of the cowbird on the bird community in general. The Preserve still supports small numbers of the blue-gray gnatcatcher, also a frequent cowbird victim. Monitoring of these two species with a history of population decline and recovery is appropriate to ensure recoveries are sustained.

5.6 Mammals

A total of 37 mammal species were detected across the Preserve during 2008 baseline surveys. Continued monitoring at the Preserve should occur for proposed North County MSCP-covered species using similar methods as those used for baseline surveys.

All mammals are sensitive to humans and domesticated animals (dogs, horses, etc.). Specifically, feral dogs can become efficient predators. Rabbits and ground squirrels are a preferred prey item but the dogs also harass mule deer, thus discouraging use of the area by the deer. In other cases, dog owners often allow dogs to run off leash while hiking in open space areas. These dogs will occasionally kill or harass native animals. It is recommended that leash requirements for pets should be posted frequently within the Preserve and that a public information campaign (e.g., through the distribution of informative flyers) be initiated to inform neighbors to keep their pets indoors or within the confines of their properties.

5.6.1 Bats

Fourteen bat species were detected during baseline surveys conducted in winter and summer of 2008. Oak and riparian woodlands at the Preserve provide important bat habitat. It is recommended that healthy oak and riparian woodland be maintained. Impacts to these habitats, including limiting removal of dead trees and snags which bats are known to utilize as roost sites, should be minimized.

In addition, disturbances of rocky habitats and boulder caves such as the grotto identified as a roost for bats should be prevented. It is recommend that measures be taken to prevent people from accessing the grotto in the southeastern portion of the Preserve (see

Figure 3-3, Active Roost Survey Location) and prohibit recreational rock climbing unless focused bat surveys are conducted in areas to be designated as climbing areas.

Hell Creek likely provides bats with water for at least of portion of the year. It is recommended that water quality in Hell Creek be maintained through monitoring native vegetation and removing invasive species associated with the creek. In addition, the introduction of exotic species such as mosquito fish, game fish, bullfrogs, crayfish, African clawed frogs, tamarisk, and giant reed that may affect (reduce) health of the aquatic ecosystem should be prevented and regularly monitored.

Most bat species are insectivorous and the use of insecticides on the Preserve may negatively impact these species. If insecticides or other chemicals are considered for use on the Preserve a qualified biologist should be consulted prior to application.

5.6.2 Small Mammals

No small mammal species proposed to be covered under the Draft North County MSCP were documented on the Preserve during the 2008 baseline surveys. However, monitoring for small mammals could be performed on the Preserve if funding is available or it is determined by DPR that monitoring of small mammals is necessary to determine the health and longevity of other species within the Preserve. If monitoring is proposed it should follow similar methods as those used for the baseline surveys. The small mammal population at the Preserve will generally benefit from habitat management measures, such as invasive species removal, provided that no herbicides are used in areas where animals sensitive to these chemicals occur. For example, the desert gray shrew (*Notiosorex crawfordi*) is insectivorous and the use of insecticides on the Preserve may negatively impact these species. If insecticides or other chemicals are considered for use on the Preserve a qualified biologist should be consulted prior to application.

5.6.3 Medium and Large Mammals

Two large mammal species proposed for coverage under the Draft North County MSCP were detected during 2008 surveys. Mule deer sign (scat and tracks) was observed throughout the Preserve. Additionally, reports from park rangers suggest that the mountain lion currently occupies the Preserve. Monitoring for these two species will follow the monitoring recommendations identified in the finalized North County MSCP. Should future monitoring for these species uncover additional covered species, these species will also be monitored following North County MSCP recommendations.

Domestic dogs were observed on the Preserve. It is recommended that the County amend signage on the Preserve to state that dog owners should remove all feces in order to minimize potential vector born disease transmission to the local coyote population. In addition, feces bags and disposal bins should be provided at trailheads to encourage the public to remove feces. Signage should reinforce that all dogs must be kept on a leash to avoid potential harm to wildlife.

5.7 Wildlife Corridors

The riparian habitat is an essential component of wildlife corridors in the Preserve. It allows movement for many of the bird and mammal species. It is important that all the riparian habitat within and adjacent to the Preserve be conserved and maintained. In some areas native and non-native vegetation should be removed periodically. The 2007 Witch Creek Fire appears to have removed some of this overgrowth. Overgrowth can discourage movement and access to water. Some areas within the riparian habitat also appear to have experienced moderate siltation. Removal of some of these soils will allow water to pool, thus attracting wildlife. This will also allow for better conditions for future monitoring of wildlife movement in the Preserve.

The Draft North County MSCP proposed covered species mountain lion was never verified by camera/track station or a qualified biologist. However, reports were made by park rangers suggesting the Preserve is currently occupied by the species (Figure 4-7). Periodic focused surveys using motion-sensing cameras to detect the species are recommended throughout the Preserve focusing on potential movement corridors.

5.8 Additional Management Recommendations

The Preserve faces similar threats as other open space preserves face across San Diego County. Some of these threats, which affect many of the sensitive plants and animals that are to be protected by these preserves, include fire management, erosion, invasion of non-native species, illegal off-road activity, unauthorized trail development, inadequate patrol by County staff, and unauthorized collection. This section discusses these threats and the some of the appropriate management actions that should be implemented to reduce the impact of each on the natural habitats supported by the Preserve.

5.8.1 Fire

Wildfire is an integral part of the southern California ecosystem and has shaped the landscape of the Preserve and its surroundings. Natural wildfires adequately spaced in time and occurring during the spring or summer seasons benefit certain vegetation communities, among them chaparral (the major vegetation community on the Preserve)

that includes plants that regenerate based on certain triggers provided by fire (e.g., heat, chemicals present in charcoal, etc.). If natural conditions prevailed, fire management would not be necessary. However, increased human presence has changed the natural fire cycles and more frequent fires exasperated by hot and strong Santa Ana winds have caused considerable damage to the human and natural landscape. Therefore, fire management has become necessary in the wildland-urban interface as a safety feature to protect homes and life. Fire management in conserved open space in areas away from the wildland-urban interface should be restricted to vegetation management geared toward public safety, as described below.

5.8.1.1 Public Safety

The County should maintain all management roads within the Preserve to be accessible to fire fighting personnel. Managed fire access is important to prevent that fire access routes would need to be cut in sensitive habitats in an emergency. The management of fire access roads includes the periodic removal of exotic species or non-native grasses within the confines of these roads to avoid increased flammability.

Continuing coordination among the state and local fire agencies (e.g. CDF, County of San Diego, etc.) with Federal [USFS] and other fire departments and with adjacent landowners and communities can increase the likelihood of sustaining long-term ecosystem health and processes in these fire-adapted lands.

5.8.1.2 Ecosystem and Vegetation Management

Vegetation management and fuel treatment have shown effectiveness in the wildland-urban interface, specifically within fuel breaks and 100-foot defensible space buffers. In areas of the Preserve directly adjacent to private residences, a 100-foot defensible space buffer should be maintained. Vegetation should be removed 30 feet from structures down to the ground, but not disturbing the root structures and thinned for the remaining 70 feet.

Prescribed burns are currently not recommended for the management of the Preserve because it recently burned in the 2007 wildfires. Future discussions with CalFire and other fire agencies should occur to discuss the potential for future prescribed burns within the Preserve as the fuel loads do rebuild. Planning for them now will allow for the establishment and maintenance of fuel modification zones that could be used as containment lines as needed.

Fire management in open space intended for the conservation of biological and ecological resources is currently being evaluated in parts of the County of San Diego's Draft Vegetation Management Report and the fire management section of the North County MSCP. Post-fire recovery monitoring is crucial in the context of fire management for conservation purposes. It is recommended that the County participate in regional post-fire recovery monitoring and include monitoring plots (for plant and wildlife monitoring) in areas burned frequently (e.g., overlap areas burned in 2003 and 2007) and less frequently.

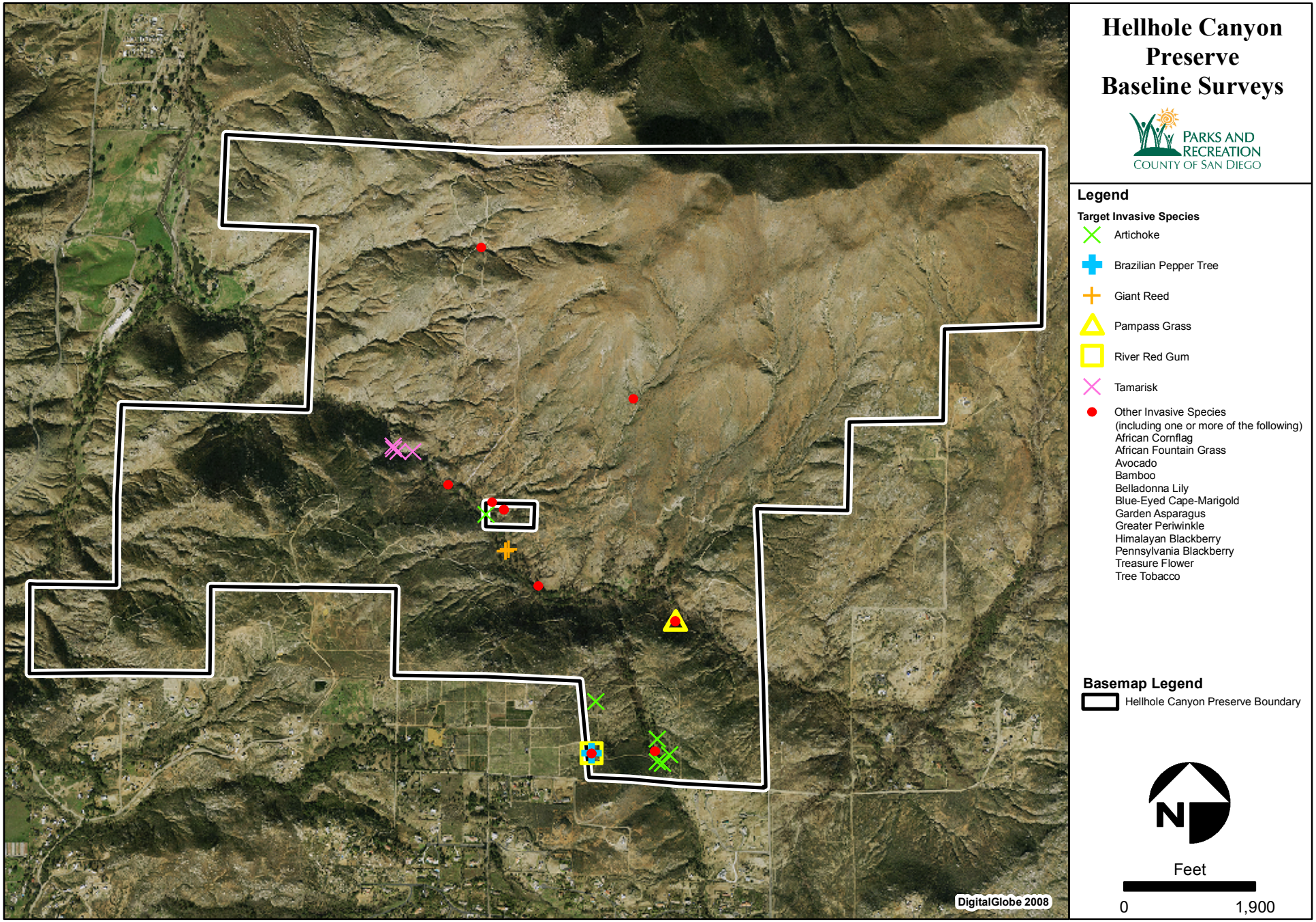
5.8.2 Restoration

Restoration opportunities exist on the Preserve specifically in disturbed areas (e.g., old trail alignments) and historic agricultural areas. Restoration may include passive restoration of these areas by allowing for natural revegetation. Erosion control and habitat enhancement involving the abatement of invasive species are additional methods of restoring degraded areas. Restoration needs to be carefully planned and implemented by experienced professionals and without disturbing the native landscape.

In addition, the Preserve has many access roads that would benefit from stabilization of eroded lands. Of special interest are those areas where eroded lands are adjacent to Hell Creek and tributaries and drainages and contribute to sediment built-up in the creek and its tributaries. As necessary, the County should install erosion control devices using bio-engineering methods and least invasive natural materials such as earthen water bars and/or deflectors on trails and access road to reduce the distance of flow acceleration and associated sheet flow velocities.

5.8.3 Invasive Species Removal

California Invasive Plant Council (Cal-IPC) listed plants were identified during the field surveys. These plants are shown in Figure 5-1 and are listed below in Table 5-1. Removal of invasive non-native species within the Preserve listed with a "High" status for control by Cal-IPC is recommended as a first priority. While other invasive species are present, these are judged to have the most potential to seriously degrade the biological value of the Preserve if not prevented from expanding on the site.



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Invasive Plant Species

Figure 5-1

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Date: Oct 13, 2008

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Table 5-1. Cal-IPC Listed Plants Identified during 2008 Surveys

Common Name	Scientific Name	Cal-IPC Status[1]
Giant Reed	*Arundo donax*	High
Selloa Pampas Grass	*Cortaderia selloana*	High
Artichoke Thistle	*Cynara cardunculus* ssp. *cardunculus*	Moderate
River Red Gum	*Eucalyptus camaldulensis*	Limited
Brazilian Pepper Tree	*Schinus terebinthifolius*	Limited
Tamarisk	*Tamarix ramosissima*	High

[1] **High** – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically. **Moderate** – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread. **Limited** – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Treatment methods for removal of invasive species should be determined on a case-by-case, site-specific basis by professionals specifically experienced with preserves and in the context of ecosystem conservation. Prior to program implementation, the treatment methods, schedule, site maintenance, and monitoring methods should be reviewed and approved by DPR.

5.8.4 Illegal Off-Road Activity

It is important that appropriate efforts are made to prevent illegal off-road activity from occurring on the Preserve. Off-road activities can have negative impacts on vegetation communities and plant and wildlife species, increase fire potential, the rate of weed invasion, and lead to direct mortality of wildlife.

Gates are currently in place at access points around the Preserve. Maintenance of these gates is recommended to ensure only authorized access is permitted. Appropriate signage, fencing, frequent ranger patrol, and public education should also be implemented to reduce illegal off-road activity on the Preserve.

5.8.5 Exotic Wildlife Species

Horseback riding is permitted in the Preserve and the manure left behind attracts brown-headed cowbirds. This bird was detected nine times during the avian point count surveys. Brown-headed cowbirds prey on native bird species and have been found to have a close association with livestock (Goguen and Mathews 1999). The manure and the insects associated with manure provide the brown-headed cowbird with foraging opportunities.

An education program should be implemented on the Preserve regarding the potential negative impacts to native ecosystems from the accumulation of non-point source pollutants in staging areas and on frequently used trails. In addition, a volunteer trail patrol could be instituted to keep trails and staging areas free of non-point source pollutants. Patrolling of the riparian corridors within the Preserve should be given first priority.

5.8.6 Patrol by County Staff

Patrol by park rangers is recommended to aid in the prevention of unauthorized activities and trespassing. Patrol may help prevent illegal off-road activity, trash dumping, pet leash enforcement, or unauthorized off-trail use by visitors. In addition, park rangers should be trained to identify and record non-native species and other species of interest. Patrol routes should be on designated trails and designed with minimal impact, avoiding areas supporting sensitive habitats or species.

5.8.7 Education

Natural history kiosks are currently in place at the main access point of the Preserve. These kiosks should be maintained and updated to provide the public with valuable information about plant and wildlife species that occur. Information regarding wildlife encounters and safety issues should be provided in these kiosks to ensure the protection of plant and wildlife species and visitors of the Preserve. Signage should be placed in locations along trails identifying conservation goals, advising to stay on trails and keep pets on leash, and including safety instructions (see specific species recommendations sections for signage).

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Appendix A

Floristic Collection Supplies and Guidelines

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How to Collect and Press Plant Specimens

Here is the basic methodology used by SDNHM on how to collect and press museum-quality plant specimens. This information is the basic standard that is used at the SD Herbarium and many other herbaria have very similar guidelines. For a more detailed account of collecting, pressing, and drying plant specimens, and for recording appropriate label information such as locality and plant data see the San Diego Plant Atlas web site (http://www.sdplantatlas.org). Also, refer to Simpson, Michael G. (1997) *Plant Collecting and Documentation Field Notebook*, SDSU Herbarium Press, for an excellent explanation of plant collection techniques.

Before You Collect: It is legal to collect plants only with the permission of the owner of the property on which they are found. Government agencies that manage lands generally grant permits only to researchers working for an approved institution, such as a university, or to botanists conducting specific research projects. Private landowners are often willing to allow judicious collecting if asked. Be aware that many "sensitive" species, i.e., those that are rare, threatened, or endangered may be protected by law and may require special permits. Make sure that you have all appropriate permits that are required for access and/or plant collecting before you conduct any collection activities. Do not collect illegally.

Basic Information Needed: The date the plant was collected and the location as exactly as possible including elevation. With today's online resources and with the availability of hand-held GPS devices, collection localities should have exact geographic coordinates such as latitude/longitude or UTM values. Record anything that the specimen won't show, for example, the size of the plant, flower color, whether the plant is woody or not, etc. Note what kind of a place the plant was found, e.g., in gravel at stream edge, in shade under live oaks, in sidewalk crack outside Wal-Mart. If you bring your plant to an herbarium, we will need all of this information in order to generate the specimen label. If you will be preparing your own labels, they must be printed on acid-free bond paper. For a more detailed account of how to record locality data please see the San Diego Plant Atlas web site (http://www.sdplantatlas.org). We recommend recording the field data for each specimen in your field notebook (including the collection number, and detailed information about the collecting location, surrounding vegetation, and characteristics of the plant itself). In this manner, the appropriate collection data is recorded in two different places (a private field book and on the newspaper where the specimen is pressed) and has a smaller chance of being lost before the specimen label is generated.

Field Collecting: Do not endanger the local population if there are only a few individuals present. In general, use the "1 to 20" rule of thumb: for every one specimen you collect, there should be at least 20 more present in the surrounding population. (For herbs, the rule applies to individual plants; for shrubs and trees, it applies to shoots removed.)

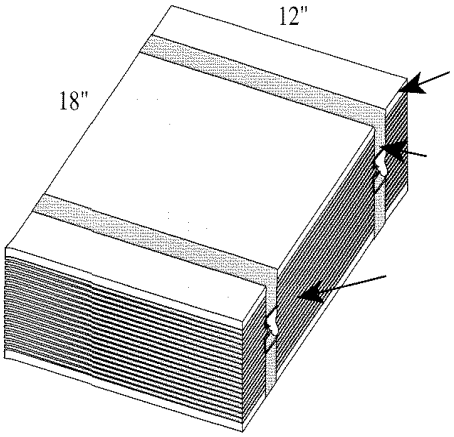
For herbs, dig up at least one whole plant to show roots that can help determine whether the plant is an annual, biennial, or perennial and identify the type of root (e.g., fibrous or tap) or underground stem (e.g., corm, bulb, rhizome, etc.). If the plant is small, take the whole thing, roots and all, or even several of them to make a decent voucher specimen. For shrubs, trees, or vines, clip one or more branches. If large, get a branch about 10 inches long, with leaves, flowers, and fruits, if possible.

The ideal plant specimen includes flowers (or other reproductive parts for ferns and non-vascular plants), fruit, leaves, and branches. Reproductive structures are often necessary to positively identify the plant, but it is not always possible to find flowers and fruit on the same plant at the same time. Do the best you can but do not mix together cuttings from different plants (i.e., don't take a branch from one plant and then take the fruits or flowers from another). Get enough of a sample to distribute over your 11x17 inch sheet in your plant press (e.g., a few branches of larger shrubs, or several small plants that can be distributed over the sheet).

For cacti and succulents, consult an herbarium on specific protocols regarding the preparation and processing of these plants. For the SD Herbarium, slice and press the flowers, but place the stems and fruits into a paper bag. Label the bag with the same collection number as the flowers and submit them to herbarium personnel for processing. Similarly, large cones cannot be pressed so they may be placed into a paper bag with the same collection number as the rest of the specimen.

How to Press a Plant: Place the specimen in a folded sheet of newspaper (like *The Reader*). Write the unique collection number, date, and collection locality on the upper outside edge of the newspaper, facing outwards. Arrange the plant so that all parts show; for example, don't get the flowers between layers of leaves. Clean up the specimen (e.g., shake off excess soil from the roots and pick off dead leaves, insects, etc.) and if necessary trim or bend into a "V", "N" or "M" shape to neatly fit inside the newspaper and press. Arrange the plants exactly as you want them to appear once they are mounted. Make sure leaves are spread out and not overlapping, that fruits and flowers are showing, and turn over a few leaves so that the underside of several can be seen. Remember, the voucher will need to be pressed and dried in such a way that all its parts can be studied after the specimen is mounted.

Place the specimens into a plant press. A basic plant press consists of two boards 12" by 18" (half-inch plywood or even thinner will do fine), plus two adjustable straps (or even ropes) and varying numbers of corrugated cardboard ventilators (see figure). Plants are pressed by placing each specimen inside one of the single sheets of folded newspapers, and separating each newspaper sheet with a cardboard ventilator (and blotters or paper towels can also be used to help absorb moisture) so you have an alternating stack of newspaper and cardboard. Place the stack between endboards and strap them tightly or place a heavy weight on top. Put the press where there is good air circulation--it is air, not heat that dries plants. Don't cook them.



Standard Plant Press

1/2" plywood endboards

Straps with buckles

Layers of cardboard ventilators

Figure from: Simpson, M.G. 1997 *Plant Collecting and Documentation Field Notebook*. SDSU Herbarium Press.

Examine the plants daily and change blotters as needed. It may take days to weeks for the plants to dry completely. Do not put the plants or plant press into a microwave or conventional oven. If required, change the paper every few days to prevent molding, especially for fleshy or succulent plants. Remove plants from the stack when they are dry (stiff and no longer cool to the touch). For the health of those who must handle the dried plants and the specimens, please do not use chemicals of any kind on the plants (e.g., use no mothballs, insecticides etc.). You can kill insects in dried plant specimens by freezing them for three or four days, and keep them pest-free in a tightly-sealed plastic bag.

Mounting and Storing Vouchers

Although we recommend submitting the dried, unmounted (in newspaper with basic collection data) specimens to a recognized and accredited herbarium so that they can be mounted and housed in a professional manner, here are some specifics in respect to the supplies needed for mounting and keeping museum-quality vouchers.

Paper for Mounting: Herbaria in the United States, and most other countries, use a standard size paper (11½ by 16½") for mounting plants. At the SD Herbarium, we use *University of California* type, a medium-weight acid-free buffered paper.

Glue: At the SD Herbarium, we use a neutral-pH formulation of PVA (polyvinyl acetate: a white glue like Elmer's) for mounting specimens. We dilute it with water for general mounting and use it full strength for specimens that need to be more firmly glued, such as a woody branch that only touches the sheet in a few spots.

Sources of Herbarium Supplies: Two sources of herbarium supplies are Herbarium Supply Co. (800-348-2388) and Pacific Papers (800-676-1151). Other archival quality supplies are available through University Products (800-628-1912 or www.universityproducts.com).

Gluing the Specimen: At the SD Herbarium, we usually use the "glass plate" method of mounting plants. A thin layer of glue is spread on an aluminum cookie sheet (traditionally a sheet of glass). If using white glue, some water can be stirred in to dilute it to the consistency you want.

The specimen is first arranged on the paper as it will be glued, and all necessary cleaning and trimming is done. Piece by piece the plant is placed into the glue, making sure all parts have touched down and picked up glue. It is then lifted and blotted on newspaper, and placed on the paper. A paper towel is gently pressed against all parts of the plant to squeeze out and blot up excess glue and to push the plant against the paper.

A thin layer of glue is spread on the back of the label with a palette knife, and the label smoothed into place and blotted.

Another method of gluing is useful for tricky specimens (like wispy grasses, which may gloop together in glue) or recalcitrant parts (such as roots or fuzzy leaves, which often seem glue-repellant). The specimen is arranged on the paper and held in place with weights. Then, working from the roots upward, the weights are removed and glue painted gently on the under side of the plant with a palette knife, and then blotted. The weight is then replaced before moving on to another part of the specimen. The weights are removed before placing the specimen for drying.

Allowing the Glue to Dry: The specimen is covered with a sheet of waxed paper so the glue won't stick to anything else. A square of cardboard is placed over the label to hold it

flat while it dries. Padding may be added to press down the flatter parts of the specimen if there are bulky parts like stems or fruits. A sheet of cardboard may be placed between specimens to distribute the weight. A board and a weight (we use a rock) top off the stack. The plants are left to dry overnight.

Storing Specimens: Although we suggest prompt deposition into a recognized and accredited herbarium, specimens that are well mounted using archival materials will last essentially forever, but *only* if protected from "agents of destruction" such as molds, light, and insects. They should be stored in a tightly-sealed box or cabinet. No pesticides need be used if no insects can get into this space.

Insects can be killed by freezing the specimens (after the plants are dried, but either before or after mounting) at a temperature of -10° F. for three days or longer, preferably in a freezer that is not self-defrosting (since these have cycles of warm temperatures). Specimens should be placed in a plastic bag first, and left in the bag until they reach room temperature after coming out of the freezer. Everything should be frozen before being placed in your storage space, and if an infestation is found, everything should be removed and frozen, and the space thoroughly cleaned before replacing the specimens.

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Appendix B

Pitfall Array Diagrams/Photographs

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Photographs/Diagrams of survey methods for herpetofauna pitfall sampling.

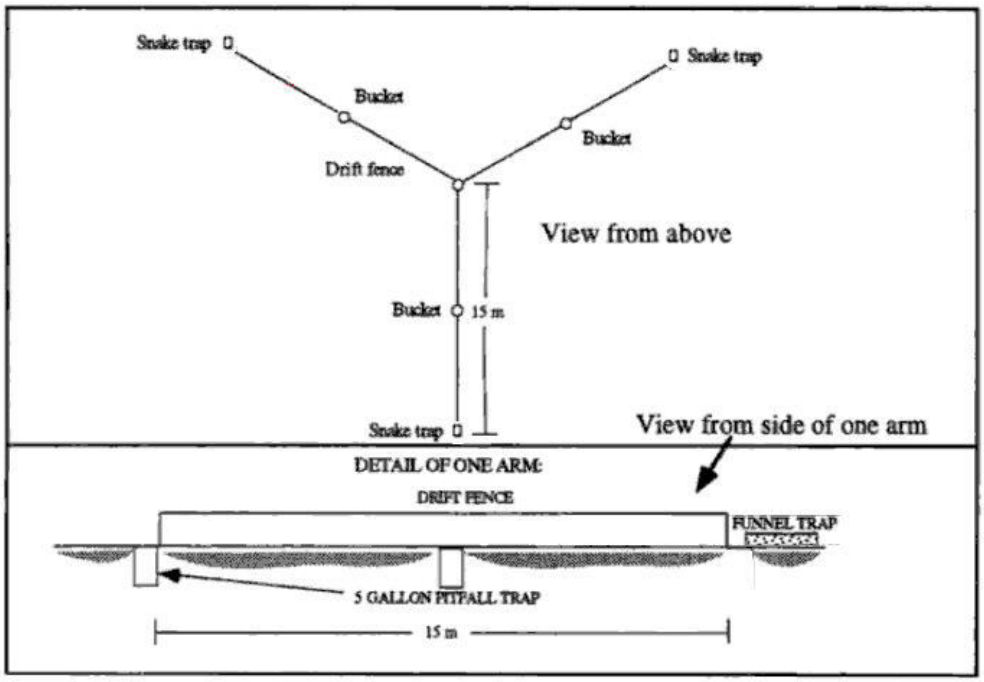

Diagram 1: Modified pitfall array design. Note snake trap (funnel trap) at terminus of each arm (See Photo 1).

Photo 1: Snake trap at terminus of array arm (picture taken at Del Dios Highlands Preserve)

Photo 2: Pitfall array near Hell Creek.

Photographs/Diagrams of survey methods for herpetofauna pitfall sampling *continued*.

Photo 3: Pitfall array near Hell Creek (Panorama).

Appendix C

Arroyo Toad/Aquatic Herpetofauna Survey Forms

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Aquatic/Arroyo Toad Surveys (Hellhole Canyon)

Site ID (Reach): _____ Date: _____ Start Time: _____
Observer(s): _____ End Time: _____

GPS (Start): _____ (WGS84)
GPS (End): _____ (WGS84)

Habitat Conditions

Air Temperature: _____ Water Depth: _____ Wetted Width: _____
Water Channel
Water Temperature: _____ Velocity: _____ Width: _____
Humidity: _____

Exotic species: _____

Comments: _____

Species Counts

Species Code: _____ Adults: _____ Tadpoles: _____
Metamorphs: _____ Eggmass: _____

Species Code: _____ Adults: _____ Tadpoles: _____
Metamorphs: _____ Eggmass: _____

Species Code: _____ Adults: _____ Tadpoles: _____
Metamorphs: _____ Eggmass: _____

Arroyo Toad

Habitat Comments: _____

Incidental Observations: _____

Photo Records

Photo Number: _____ Photo Notes: _____

Photo Number: _____ Photo Notes: _____

Photo Number: _____ Photo Notes: _____

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Appendix D

Bat Survey Photographs (Anabats/Mist-nets)

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Photographs of survey methods for bat surveys.

Photo 1: Drew Stokes setting up Anabat.

Photo 2: Anabat along drainage.

Photo 3: Anabat in upland habitat.

Photo 4: Anabat along Hell Creek, near flume.

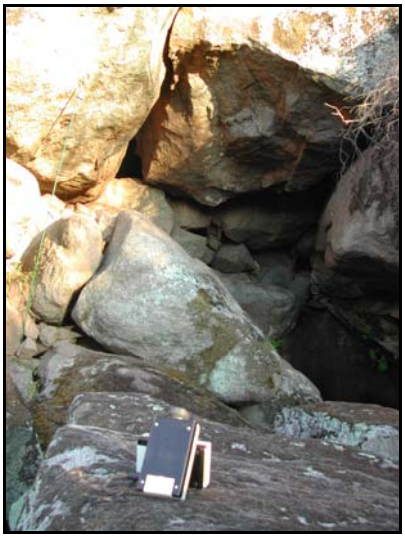

Photo 5: Anabat and mist-net at grotto.

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Appendix E

Species Compendium

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Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
PLANTS			
FERNS AND FERN ALLIES			
BLECHNACEAE – Deer Fern Family			
Woodwardia fimbriata	Giant Chain Fern	--/--/--/--	No
DRYOPTERIDACEAE – Wood Fern Family			
Dryopteris arguta	Coastal Wood Fern	--/--/--/--	No
EQUISETACEAE – Horsetail Family			
Equisetum laevigatum	Smooth Scouring-Rush	--/--/--/--	No
POLYPODIACEAE – Polypody Family			
Polypodium californicum	California Polypody	--/--/--/--	No
PTERIDACEAE - Brake Family			
Adiantum jordanii	California Maidenhair	--/--/--/--	No
Aspidotis californica	California Lace Fern	--/--/--/--	No
Cheilanthes clevelandii var. *clevelandii*	Cleveland's Lip Fern	--/--/--/--	No
Cheilanthes newberryi	California Cotton Fern	--/--/--/--	No
Pellaea andromedifolia	Coffee Fern	--/--/--/--	No
Pellaea mucronata var. *mucronata*	Bird's Foot Cliff-Brake	--/--/--/--	No
Pentagramma triangularis ssp. *triangularis*	California Goldback Fern	--/--/--/--	No
SELAGINELLACEAE - Spike-Moss Family			
Selaginella bigelovii	Bigelow's Spike-Moss	--/--/--/--	No
DICOTS			
ADOXACEAE – Adoxa Family			
Sambucus mexicana	Blue Elderberry	--/--/--/--	No
AMARANTHACEAE – Amaranth Family			
**Amaranthus albus*	White Tumbleweed	--/--/--/--	No
Chenopodium berlandieri	Berlandier's Pit-Seed Goosefoot	--/--/--/--	No
**Chenopodium murale*	Nettle-Leaf Goosefoot	--/--/--/--	No
**Dysphania ambrosioides*	Mexican Tea	--/--/--/--	No
**Salsola tragus*	Prickly Russian-Thistle	--/--/--/--	No
ANACARDIACEAE - Sumac Family			
Malosma laurina	Laurel Sumac	--/--/--/--	No
Rhus ovata	Sugar Bush	--/--/--/--	No
Rhus trilobata	Skunkbrush	--/--/--/--	No
**Schinus terebinthifolius*	Brazilian Pepper Tree	--/--/--/--	No
Toxicodendron diversilobum	Western Poison-Oak	--/--/--/--	No
APIACEAE - Carrot Family			
**Anthriscus caucalis*	Bur Chervil	--/--/--/--	No
Apiastrum angustifolium	Mock-Parsley	--/--/--/--	No
Daucus pusillus	Rattlesnake Weed	--/--/--/--	No
Lomatium dasycarpum ssp. *dasycarpum*	Woolly-Fruit Lomatium	--/--/--/--	No
Sanicula crassicaulis	Pacific Sanicle	--/--/--/--	No

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Sanicula tuberosa	Turkey Pea Sanicle	--/--/--/--	No
Tauschia arguta	Southern Tauschia	--/--/--/--	No
APOCYNACEAE – Dogbane Family			
Apocynum cannabinum	Indian-Hemp	--/--/--/--	No
**Vinca major*	Greater Periwinkle	--/--/--/--	No
ASTERACEAE - Sunflower Family			
Achillea millefolium	Yarrow, Milfoil	--/--/--/--	No
Acourtia microcephala	Sacapellote	--/--/--/--	No
Artemisia californica	Coastal Sagebrush	--/--/--/--	No
Artemisia douglasiana	Douglas Mugwort	--/--/--/--	No
Baccharis salicifolia	Mule-Fat, Seep-Willow	--/--/--/--	No
Brickellia californica	California Brickellbush	--/--/--/--	No
**Carduus pycnocephalus*	Italian Thistle	--/--/--/--	No
**Centaurea melitensis*	Tocalote	--/--/--/--	No
Chaenactis artemisiifolia	White Pincushion	--/--/--/--	No
Chaenactis glabriuscula var. *glabriuscula*	Yellow Pincushion	--/--/--/--	No
Cirsium occidentale var. *californicum*	California Thistle	--/--/--/--	No
**Conyza floribunda*	Asthmaweed	--/--/--/--	No
**Cotula australis*	Australian Brass-Buttons	--/--/--/--	No
**Cynara cardunculus* ssp. *cardunculus*	Artichoke	--/--/--/--	No
Deinandra fasciculata	Fascicled Tarweed	--/--/--/--	No
**Dimorphotheca sinuata*	Blue-Eye Cape-Marigold	--/--/--/--	No
Erigeron foliosus var. foliosus	Leafy Daisy	--/--/--/--	No
Eriophyllum confertiflorum var. *confertiflorum*	Long-Stem Golden-Yarrow	--/--/--/--	No
**Gazania linearis*	Treasure Flower	--/--/--/--	No
Gutierrezia californica	California Matchweed	--/--/--/--	No
**Hedypnois cretica*	Crete Hedypnois	--/--/--/--	No
Helianthus gracilentus	Slender Sunflower	--/--/--/--	No
Heterotheca grandiflora	Telegraph Weed	--/--/--/--	No
**Hypochaeris glabra*	Smooth Cat's Ear	--/--/--/--	No
**Lactuca serriola*	Prickly Lettuce	--/--/--/--	No
Logfia filaginoides	California Filago	--/--/--/--	No
**Logfia gallica*	Narrow-Leaf Filago	--/--/--/--	No
Porophyllum gracile	Odora	--/--/--/--	No
Pseudognaphalium biolettii	Bicolor Cudweed	--/--/--/--	No
Pseudognaphalium californicum	California Everlasting	--/--/--/--	No
**Pseudognaphalium luteo-album*	Fragrant Cudweed	--/--/--/--	No
Pseudognaphalium microcephalum	White Everlasting	--/--/--/--	No
Pseudognaphalium stramineum	Cotton-Batting Plant	--/--/--/--	No
Rafinesquia californica	California Chicory	--/--/--/--	No
**Senecio vulgaris*	Common Groundsel	--/--/--/--	No
**Sonchus asper* ssp. *asper*	Prickly Sow-Thistle	--/--/--/--	No
**Sonchus oleraceus*	Common Sow-Thistle	--/--/--/--	No
Stylocline gnaphaloides	Everlasting Nest-Straw	--/--/--/--	No
**Tragopogon dubius*	Goat's Beard	--/--/--/--	No
Uropappus lindleyi	Silver Puffs	--/--/--/--	No
Xanthium strumarium	Cocklebur	--/--/--/--	No

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BORAGINACEAE - Borage Family			
Amsinckia menziesii var. *intermedia*	Rancher's Fiddleneck	--/--/--/--	No
Cryptantha intermedia	Nievitas Cryptantha	--/--/--/--	No
Cryptantha micromeres	Minute-Flower Cryptantha	--/--/--/--	No
Cryptantha muricata	Prickly Cryptantha	--/--/--/--	No
Pectocarya linearis ssp. *ferocula*	Slender Pectocarya	--/--/--/--	No
Plagiobothrys collinus var. *fulvescens*	Rough Popcornflower	--/--/--/--	No
Plagiobothrys collinus var. *gracilis*	San Diego Popcornflower	--/--/--/--	No
BRASSICACEAE - Mustard Family			
Athysanus pusillus	Dwarf Athysanus	--/--/--/--	No
**Capsella bursa-pastoris*	Shepherd's Purse	--/--/--/--	No
**Coronopus didymus*	Lesser Wart-Cress	--/--/--/--	No
Guillenia lasiophylla	California Mustard	--/--/--/--	No
**Hirschfeldia incana*	Short-Pod Mustard	--/--/--/--	No
Lepidium virginicum* var. *robinsonii	**Robinson's Peppergrass**	**--/--/1B.2/A**	**No**
**Raphanus sativus*	Wild Radish	--/--/--/--	No
Rorippa nasturtium-aquaticum	Water-Cress	--/--/--/--	No
**Sisymbrium irio*	London Rocket	--/--/--/--	No
**Sisymbrium officinale*	Hedge Mustard	--/--/--/--	No
**Sisymbrium orientale*	Hare's-Ear Cabbage	--/--/--/--	No
CAMPANULACEAE – Bellflower Family			
Triodanis biflora	Small Venus Looking-Glass	--/--/--/--	No
CAPRIFOLIACEAE – Honeysuckle Family			
Lonicera subspicata var. *denudata*	Johnston's Honeysuckle	--/--/--/--	No
CARYOPHYLLACEAE - Pink Family			
**Cerastium glomeratum*	Mouse-Ear Chickweed	--/--/--/--	No
Loeflingia squarrosa	California Loeflingia	--/--/--/--	No
Polycarpon depressum	California Polycarp	--/--/--/--	No
**Polycarpon tetraphyllum* ssp. *tetraphyllum*	Four-Leaf Allseed	--/--/--/--	No
Sagina apetala	Dwarf/Sticky Pearlwort	--/--/--/--	No
**Silene gallica*	Common Catchfly	--/--/--/--	No
Silene laciniata ssp. *laciniata*	Southern Pink	--/--/--/--	No
Silene multinervia	Many-Nerve Catchfly	--/--/--/--	No
**Stellaria media*	Common Chickweed	--/--/--/--	No
**Stellaria pallida*	Pale Starwort	--/--/--/--	No
CISTACEAE - Rock-Rose Family			
Helianthemum scoparium	Peak Rush-Rose	--/--/--/--	No
CONVOLVULACEAE - Morning-Glory Family			
Calystegia macrostegia ssp. *tenuifolia*	San Diego Morning-Glory	--/--/--/--	No
Cuscuta californica var. *breviflora*	Short-Flower Chaparral Dodder	--/--/--/--	No
Cuscuta subinclusa	Canyon Dodder	--/--/--/--	No
CRASSULACEAE - Stonecrop Family			
Crassula connata	Pygmyweed	--/--/--/--	No
Dudleya edulis	Ladies' Fingers	--/--/--/--	No

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CUCURBITACEAE - Gourd Family			
Marah macrocarpus var. *macrocarpus*	Manroot, Wild-Cucumber	--/--/--/--	No
DATISCACEAE - Datisca Family			
Datisca glomerata	Durango Root	--/--/--/--	No
ERICACEAE - Heath Family			
Arctostaphylos glandulosa ssp. *glandulosa*	Eastwood's Manzanita	--/--/--/--	No
Arctostaphylos glauca	Big-Berry Manzanita	--/--/--/--	No
Xylococcus bicolor	Mission Manzanita	--/--/--/--	No
EUPHORBIACEAE - Spurge Family			
Chamaesyce polycarpa	Small-Seed Sandmat	--/--/--/--	No
**Euphorbia peplus*	Petty Spurge	--/--/--/--	No
FABACEAE - Pea Family			
Amorpha fruticosa	False Indigo	--/--/--/--	No
Lathyrus vestitus var. *alefeldii*	San Diego Sweet Pea	--/--/--/--	No
Lotus hamatus	Grab Lotus	--/--/--/--	No
Lotus heermannii var. *heermannii*	Heermann's Lotus	--/--/--/--	No
Lotus purshianus var. *purshianus*	Spanish-Clover	--/--/--/--	No
Lotus scoparius var. *brevialatus*	Short-Wing Deerweed	--/--/--/--	No
Lotus scoparius var. *scoparius*	Coastal Deerweed	--/--/--/--	No
Lotus strigosus	Bishop's/Strigose Lotus	--/--/--/--	No
Lupinus bicolor	Miniature Lupine	--/--/--/--	No
Lupinus hirsutissimus	Stinging Lupine	--/--/--/--	No
Lupinus latifolius var. *parishii*	Parish's Stream Lupine	--/--/--/--	No
Lupinus sparsiflorus	Coulter's Lupine	--/--/--/--	No
Lupinus truncatus	Collar Lupine	--/--/--/--	No
**Medicago polymorpha*	California Burclover	--/--/--/--	No
**Melilotus indicus*	Indian Sweetclover	--/--/--/--	No
Trifolium ciliolatum	Tree Clover	--/--/--/--	No
**Trifolium hirtum*	Rose Clover	--/--/--/--	No
Trifolium microcephalum	Maiden Clover	--/--/--/--	No
Trifolium obtusiflorum	Creek Clover	--/--/--/--	No
Trifolium willdenovii	Valley Clover	--/--/--/--	No
Vicia ludoviciana var. *ludoviciana*	Deer Pea Vetch	--/--/--/--	No
**Vicia sativa* ssp. *nigra*	Narrow-Leaf Vetch, Common Vetch	--/--/--/--	No
**Vicia villosa* var. *villosa*	Winter Vetch	--/--/--/--	No
FAGACEAE - Oak Family			
Quercus agrifolia var. *agrifolia*	Coast Live Oak, Encina	--/--/--/--	No
Quercus berberidifolia	Scrub Oak	--/--/--/--	No
Quercus engelmannii	**Engelmann/Mesa Blue Oak**	**--/--/4.2/D**	**Yes**
Quercus xacutidens	Torrey's Scrub Oak	--/--/--/--	No
GARRYACEAE – Silk Tassel Family			
Garrya veatchii	Canyon Silk Tassel	--/--/--/--	No

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GERANIACEAE - Geranium Family			
*Erodium botrys	Long-Beak Filaree/Storksbill	--/--/--/--	No
*Erodium brachycarpum	Short-Beak Filaree/Storksbill	--/--/--/--	No
*Erodium cicutarium	Red-Stem Filaree/Storksbill	--/--/--/--	No
*Erodium moschatum	White-Stem Filaree/Storksbill	--/--/--/--	No
*Geranium dissectum	Cut-Leaf Geranium	--/--/--/--	No
GROSSULARIACEAE – Gooseberry Family			
Ribes indecorum	White-Flower Currant	--/--/--/--	No
HYDROPHYLLACEAE - Waterleaf Family			
Emmenanthe penduliflora var. *penduliflora*	Whispering Bells	--/--/--/--	No
Eriodictyon crassifolium var. *crassifolium*	Felt-Leaf Yerba Santa	--/--/--/--	No
Eucrypta chrysanthemifolia var. *chrysanthemifolia*	Common Eucrypta	--/--/--/--	No
Phacelia brachyloba	Short-Lobe Phacelia	--/--/--/--	No
Phacelia cicutaria var. *hispida*	Caterpillar Phacelia	--/--/--/--	No
Phacelia grandiflora	Giant-Flower Phacelia	--/--/--/--	No
Phacelia parryi	Parry's Phacelia	--/--/--/--	No
Phacelia ramosissima var. *latifolia*	Branching Phacelia	--/--/--/--	No
LAMIACEAE - Mint Family			
**Lamium amplexicaule*	Henbit	--/--/--/--	No
Monardella hypoleuca* ssp. *lanata	**Felt-leaved monardella**	**--/--/1B.2/A**	**No**
Salvia apiana	White Sage	--/--/--/--	No
Salvia clevelandii	Fragrant Sage	--/--/--/--	No
Salvia columbariae	Chia	--/--/--/--	No
Salvia mellifera	Black Sage	--/--/--/--	No
Stachys ajugoides var. *rigida*	Rigid Hedge-Nettle	--/--/--/--	No
Trichostema parishii	Mountain Bluecurls	--/--/--/--	No
LAURACEAE – Laurel Family			
**Persea americana*	Avacado	--/--/--/--	No
LYTHRACEAE – Loosestrife Family			
*Lythrum hyssopifolia	Grass Poly	--/--/--/--	No
MALVACEAE - Mallow Family			
Malacothamnus densiflorus	Many-Flower Bushmallow	--/--/--/--	No
**Malva parviflora*	Cheeseweed	--/--/--/--	No
MYRTACEAE – Myrtle Family			
**Eucalyptus camaldulensis*	River Red Gum	--/--/--/--	No
NYCTAGINACEAE - Four-O'Clock Family			
Mirabilis laevis var. *crassifolia*	Coastal Wishbone Plant	--/--/--/--	No
ONAGRACEAE - Evening Primrose Family			
Camissonia bistorta	California Sun Cup	--/--/--/--	No
Camissonia californica	False-Mustard	--/--/--/--	No
Camissonia hirtella	Field Sun Cup	--/--/--/--	No

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Camissonia strigulosa	Sandysoil Sun Cup	--/--/--/--	No
Clarkia epilobioides	Canyon Godetia	--/--/--/--	No
Clarkia purpurea var. *quadrivulnera*	Four-Spot Clarkia	--/--/--/--	No
Clarkia similis	Canyon Clarkia	--/--/--/--	No
Epilobium canum ssp. *canum*	California Fuchsia	--/--/--/--	No
Epilobium ciliatum ssp. *ciliatum*	Willow Herb	--/--/--/--	No
OROBANCHACEAE – Broom-rape Family			
Castilleja exserta ssp. *exserta*	Purple Owl's-Clover	--/--/--/--	No
Orobanche bulbosa	Chaparral Broom-Rape	--/--/--/--	No
OXALIDACEAE - Oxalis Family			
Oxalis albicans ssp. *pilosa*	Hairy Wood-Sorrel	--/--/--/--	No
**Oxalis pes-caprae*	Bermuda-Buttercup	--/--/--/--	No
PAEONIACEAE – Peony Family			
Paeonia californica	California Peony	--/--/--/--	No
PAPAVERACEAE - Poppy Family			
Dicentra chrysantha	Golden Ear-Drops	--/--/--/--	No
Eschscholzia californica	California Poppy	--/--/--/--	No
Meconella denticulata	Small-Flower Meconella	--/--/--/--	No
Papaver californicum	Fire Poppy	--/--/--/--	No
PHRYMACEAE – Hopseed Family			
Mimulus aurantiacus var. *pubescens* x var. *puniceus*	San Diego Monkey Flower	--/--/--/--	No
Mimulus brevipes	Slope Semiphore	--/--/--/--	No
Mimulus cardinalis	Scarlet Monkey Flower	--/--/--/--	No
Mimulus clevelandii	**Cleveland's Bush Monkey Flower**	**--/--/4.2/D**	**No**
Mimulus floribundus	Showy Monkey Flower	--/--/--/--	No
Mimulus fremontii var. *fremontii*	Fremont's Monkey Flower	--/--/--/--	No
Mimulus guttatus	Seep Monkey Flower	--/--/--/--	No
Mimulus palmeri	Palomar Monkey Flower	--/--/--/--	No
Mimulus pilosus	Downy Monkey Flower	--/--/--/--	No
PLANTAGINACEAE - Plantain Family			
Antirrhinum coulterianum	Coulter's Snapdragon	--/--/--/--	No
Antirrhinum nuttallianum ssp. *nuttallianum*	Nuttall's Snapdragon	--/--/--/--	No
Collinsia heterophylla	Chinese Houses	--/--/--/--	No
Keckiella antirrhinoides var. *antirrhinoides*	Yellow Bush Penstemon	--/--/--/--	No
Keckiella cordifolia	Climbing Bush Penstemon	--/--/--/--	No
Linaria canadensis	Large Blue Toadflax	--/--/--/--	No
Penstemon spectabilis var. *spectabilis*	Showy Penstemon	--/--/--/--	No
Plantago erecta	Dot-Seed Plantain	--/--/--/--	No
**Plantago lanceolata*	English Plantain, Rib-Grass	--/--/--/--	No
**Veronica anagallis-aquatica*	Water Speedwell	--/--/--/--	No
PLATANACEAE - Sycamore Family			
Platanus racemosa	Western Sycamore	--/--/--/--	No

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POLEMONIACEAE - Phlox Family			
Allophyllum glutinosum	Blue False-Gilia	--/--/--/--	No
Eriastrum sapphirinum ssp. *dasyanthum*	Many-Flower Woolly-Star	--/--/--/--	No
Gilia angelensis	Grassland Gilia	--/--/--/--	No
Navarretia hamata ssp. *hamata*	Hooked Skunkweed	--/--/--/--	No
Saltugilia caruifolia	Caraway-Leaf Gilia	--/--/--/--	No
POLYGALACEAE - Milkwort Family			
Polygala cornuta* var. *fishiae	**Fish's Milkwort**	**--/--/4.3/D**	**No**
POLYGONACEAE - Buckwheat Family			
Chorizanthe fimbriata var. *fimbriata*	Fringed Spineflower	--/--/--/--	No
Chorizanthe leptotheca	Ramona Spineflower	--/--/--/--	No
Chorizanthe procumbens	Prostrate Spineflower	--/--/--/--	No
Chorizanthe staticoides	Turkish Rugging	--/--/--/--	No
Eriogonum fasciculatum var. *foliolosum*	Inland California Buckwheat	--/--/--/--	No
Polygonum lapathifolium	Willow Smartweed, Willow Weed	--/--/--/--	No
Pterostegia drymarioides	Granny's Hairnet	--/--/--/--	No
**Rumex conglomeratus*	Whorled Dock	--/--/--/--	No
**Rumex crispus*	Curly Dock	--/--/--/--	No
Rumex maritimus	Golden Dock	--/--/--/--	No
Rumex salicifolius var. *salicifolius*	Willow Dock	--/--/--/--	No
Rumex salicifolius var. *denticulatus*	Toothed Willow Dock	--/--/--/--	No
PORTULACACEAE – Purslane Family			
Calandrinia breweri	**Brewer's Calandrinia**	**--/--/4.2/D**	**No**
Calandrinia ciliata	Red Maids	--/--/--/--	No
Claytonia parviflora ssp. *parviflora*	Utah Miner's-Lettuce	--/--/--/--	No
Claytonia parviflora ssp. *viridis*	Green Miner's-Lettuce	--/--/--/--	No
Claytonia perfoliata ssp. *mexicana*	Mexican Miner's-Lettuce	--/--/--/--	No
Claytonia perfoliata ssp. *perfoliata*	Miner's-Lettuce	--/--/--/--	No
PRIMULACEAE - Primrose Family			
**Anagallis arvensis*	Scarlet Pimpernel	--/--/--/--	No
RANUNCULACEAE - Crowfoot Family			
Clematis pauciflora	Ropevine Clematis	--/--/--/--	No
Delphinium parryi ssp. *parryi*	Parry's Larkspur	--/--/--/--	No
Thalictrum fendleri var. *polycarpum*	Smooth-Leaf Meadow-Rue	--/--/--/--	No
RHAMNACEAE - Buckthorn Family			
Ceanothus crassifolius	Thick-Leaf-Lilac	--/--/--/--	No
Ceanothus leucodermis	Chaparral Whitethorn	--/--/--/--	No
Ceanothus leucodermis X *C. tomentosus*	Ceanothus hybrid	--/--/--/--	No
Ceanothus oliganthus var. *oliganthus*	Hairy Ceanothus	--/--/--/--	No
Ceanothus tomentosus	Ramona-Lilac	--/--/--/--	No
Rhamnus ilicifolia	Holly-Leaf Redberry	--/--/--/--	No
Rhamnus pilosa	Hairy-Leaf Redberry	--/--/--/--	No
ROSACEAE - Rose Family			
Adenostoma fasciculatum	Chamise	--/--/--/--	No

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Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
Cercocarpus minutiflorus	San Diego Mountain-Mahogany	--/--/--/--	No
Heteromeles arbutifolia	Toyon, Christmas Berry	--/--/--/--	No
Potentilla glandulosa ssp. *glandulosa*	Sticky Cinquefoil	--/--/--/--	No
Prunus ilicifolia ssp. *ilicifolia*	Islay, Holly-Leaf Cherry	--/--/--/--	No
Rosa californica	California Rose	--/--/--/--	No
**Rubus armeniacus*	Himalayan Blackberry	--/--/--/--	No
**Rubus pensilvanicus*	Pennsylvania Blackberry	--/--/--/--	No
RUBIACEAE - Madder Family			
Galium angustifolium ssp. *angustifolium*	Narrow-Leaf Bedstraw	--/--/--/--	No
Galium aparine	Common Bedstraw, Goose Grass	--/--/--/--	No
Galium nuttallii ssp. *nuttallii*	San Diego Bedstraw	--/--/--/--	No
**Galium parisiense*	Wall Bedstraw	--/--/--/--	No
Galium porrigens var. *porrigens*	Climbing/Oval-Leaf Bedstraw	--/--/--/--	No
SALICACEAE - Willow Family			
Populus fremontii ssp. *fremontii*	Western Cottonwood	--/--/--/--	No
Salix gooddingii	Goodding's Black Willow	--/--/--/--	No
Salix laevigata	Red Willow	--/--/--/--	No
Salix lasiolepis	Arroyo Willow	--/--/--/--	No
SAXIFRAGACEAE - Saxifrage Family			
Jepsonia parryi	Coast Jepsonia	--/--/--/--	No
Lithophragma affine	Woodland Star	--/--/--/--	No
SCROPHULARIACEAE - Figwort Family			
Scrophularia californica ssp. *floribunda*	California Bee Plant/Figwort	--/--/--/--	No
SOLANACEAE - Nightshade Family			
**Nicotiana glauca*	Tree Tobacco	--/--/--/--	No
Solanum americanum	White Nightshade	--/--/--/--	No
Solanum parishii	Parish's Nightshade	--/--/--/--	No
Solanum xanti	Chaparral Nightshade	--/--/--/--	No
STYRACACEAE – Storax Family			
Styrax redivivus	Snowdrop Bush	--/--/--/--	No
TAMARICACEAE - Tamarisk Family			
**Tamarix ramosissima*	Tamarisk, Salt-Cedar	--/--/--/--	No
URTICACEAE - Nettle Family			
Parietaria hespera var. *hespera*	Western Pellitory	--/--/--/--	No
VITACEAE – Grape Family			
Vitis girdiana	Southern California Wild Grape	--/--/--/--	No
MONOCOTS			
AGAVACEAE - Agave Family			
Hesperoyucca whipplei	Chaparral Candle	--/--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
ALLIACEAE – Onion Family			
Allium haematochiton	Red-Skin Onion	--/--/--/--	No
AMARYLLIDACEAE – Amaryllis Family			
**Amaryllis belladonna*	Belladonna-Lily	--/--/--/--	No
ASPARAGACEAE – Asparagus Family			
**Asparagus officinalis*	Garden Asparagus	--/--/--/--	No
CYPERACEAE - Sedge Family			
Carex barbarae	Barbara's Sedge	--/--/--/--	No
Carex spissa	San Diego Sedge	--/--/--/--	No
Carex triquetra	Triangular-Fruit Sedge	--/--/--/--	No
Cyperus eragrostis	Tall Flatsedge	--/--/--/--	No
Eleocharis montevidensis	Dombey's Spike-Rush	--/--/--/--	No
Eleocharis parishii	Parish's Spike-Rush	--/--/--/--	No
Schoenoplectus acutus var. *occidentalis*	Viscid Bulrush	--/--/--/--	No
Scirpus microcarpus	Small-Fruit Bulrush	--/--/--/--	No
IRIDACEAE – Iris Family			
*Chasmanthe floribunda	African Cornflag	--/--/--/--	No
JUNCACEAE - Rush Family			
Juncus arcticus var. *balticus*	Wire Rush	--/--/--/--	No
Juncus bufonius var. *bufonius*	Toad Rush	--/--/--/--	No
Juncus bufonius var. *congestus*	Clustered Toad Rush	--/--/--/--	No
Juncus dubius	Mariposa Rush	--/--/--/--	No
Juncus xiphioides	Iris-Leaf Rush	--/--/--/--	No
LILIACEAE - Lily Family			
Calochortus albus	White Globe Lily, Fairy Lantern	--/--/--/--	No
Calochortus splendens	Splendid Mariposa Lily	--/--/--/--	No
Calochortus weedii var. *weedii*	Weed's Mariposa Lily	--/--/--/--	No
Hesperolinon micranthum	Thread-Stem Dwarf-Flax	--/--/--/--	No
Lilium humboldtii* ssp. *ocellatum	**Humboldt's lily**	**--/--/4.2/D**	**No**
MELANTHIACEAE – Camas Family			
Zigadenus fremontii	Fremont's Camas	--/--/--/--	No
POACEAE - Grass Family			
Achnatherum coronatum	Giant Stipa	--/--/--/--	No
**Agrostis viridis*	Water Beardgrass	--/--/--/--	No
Aristida purpurea var. *parishii*	Parish's Three-Awn	--/--/--/--	No
Aristida purpurea var. *purpurea*	Purple Three-Awn	--/--/--/--	No
**Arundo donax*	Giant Reed	--/--/--/--	No
**Avena barbata*	Slender Wild Oat	--/--/--/--	No
**Avena fatua*	Wild Oat	--/--/--/--	No
**Brachypodium distachyon*	Purple Falsebrome	--/--/--/--	No
**Bromus diandrus*	Ripgut Grass	--/--/--/--	No
**Bromus hordeaceus*	Soft Chess	--/--/--/--	No
**Bromus madritensis*	Compact Brome	--/--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
**Bromus rubens*	Foxtail Chess, Red Brome	--/--/--/--	No
Calamagrostis koelerioides	San Diego Reedgrass	--/--/--/--	No
**Cortaderia selloana*	Selloa Pampas Grass	--/--/--/--	No
**Cynodon dactylon*	Bermuda Grass	--/--/--/--	No
Elymus glaucus ssp. *glaucus*	Blue Wildrye	--/--/--/--	No
Elymus glaucus ssp. *jepsonii*	Jepson's Blue Wildrye	--/--/--/--	No
**Gastridium ventricosum*	Nit Grass	--/--/--/--	No
**Hordeum murinum* ssp. *glaucum*	Glaucous Barley	--/--/--/--	No
**Lamarckia aurea*	Golden-Top	--/--/--/--	No
**Lasiacis divaricata*	Wild Bamboo	--/--/--/--	No
Leymus condensatus	Giant Wild-Rye	--/--/--/--	No
Leymus triticoides	Beardless Wild-Rye	--/--/--/--	No
**Lolium multiflorum*	Italian Ryegrass	--/--/--/--	No
**Lolium perenne*	Perennial Ryegrass	--/--/--/--	No
Melica imperfecta	Coast Range Melic	--/--/--/--	No
Muhlenbergia microsperma	Little-Seed Muhly	--/--/--/--	No
Nassella lepida	Foothill Needlegrass	--/--/--/--	No
**Paspalum dilatatum*	Dallis Grass	--/--/--/--	No
**Pennisetum setaceum*	African Fountain Grass	--/--/--/--	No
**Poa annua*	Annual Bluegrass	--/--/--/--	No
**Polypogon interruptus*	Ditch Beard Grass	--/--/--/--	No
**Schismus barbatus*	Mediterranean Schismus	--/--/--/--	No
Vulpia microstachys var. *confusa*	Hairy-Leaf Fescue	--/--/--/--	No
**Vulpia myuros* var. *myuros*	Rat-Tail Fescue	--/--/--/--	No
**Vulpia myuros* var. *hirsuta*	Hairy Rat-Tail Fescue	--/--/--/--	No
Vulpia octoflora var. *hirtella*	Tufted Fescue	--/--/--/--	No
THEMIDACEAE - Brodiaea Family			
Dichelostemma capitatum ssp. *capitatum*	Blue Dicks	--/--/--/--	No
Muilla maritima	Common Muilla	--/--/--/--	No
TYPHACEAE – Cattail Family			
Typha domingensis	Southern Cattail	--/--/--/--	No
ANIMALS			
INSECTA			
LEPIDOPTERA (Butterflies and Moths)			
Family Hesperidae (Skippers)			
Erynnis funeralis	Funereal Duskywing	--/--/--	No
Heliopetes ericetorum	Large White Skipper	--/--/--	No
Family Lycaenidae (Blues, Hairstreaks, Coppers)			
Callophrys dumetorum dumetorum	Bramble Hairsteak	--/--/--	No
Glaucopsyche lygdamus australis	Silvery (Southern) Blue	--/--/--	No
Incisalia augustinus iroides	Western Elfin	--/--/--	No
Plebejus acmon acmon	Acmon Blue	--/--/--	No
Family Nymphalidae (Brushfoots)			
Cynthia annabella	West Coast Lady	--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
Cynthia cardui	Painted Lady	--/--/--	No
Junonia coenia	Common Buckeye	--/--/--	No
Family Papilionidae (Swallowtails)			
Papilio rutulus	Western Tiger Swallowtail	--/--/--	No
Papilio zelicaon	Anise Swallowtail	--/--/--	No
Family Pieridae (Whites and Sulphurs)			
Anthocharis sara sara	Sara Orangetip	--/--/--	No
Colias eurydice	California Dogface	--/--/--	No
Pieris protodice	Common (Checkered) White	--/--/--	No
Pieris sisymbrii sisymbrii	California White	--/--/--	No
Family Riodinidae (Metalmarks)			
Apodemia mormo virgulti	Behr's Metalmark	--/--/--	No
AMPHIBIA (Amphibians)			
ANURA (Frogs and Toads)			
Bufonidae (True Toads)			
Bufo boreas	Western Toad	--/--/--	No
Hylidae (Tree frogs and relatives)			
Pseudacris cadaverina	California Tree Frog	--/--/--	No
Pseudacris regilla	Pacific Tree Frog	--/--/--	No
REPTILIA (Reptiles)			
SQUAMATA (Lizards and Snakes)			
Phrynosomatidae (Spiny lizards and relatives)			
Phrynosoma coronatum	**Coast Horned Lizard**	**--/SSC/2**	**Yes**
Sceloporus occidentalis	Western Fence Lizard	--/--/--	No
Sceloporus orcutti	Granite Spiny Lizard	--/--/--	No
Uta stansburiana	Side-blotched Lizard	--/--/--	No
Scincidae (Skinks)			
Eumeces skiltonianus	Western Skink	--/--/2	No
Teiidae (Whiptails and relatives)			
Cnemidophorus hyperythrus	**Orange-Throated Whiptail**	**--/SSC/2**	**Yes**
Cnemidophorus tigris	Western Whiptail	--/--/2	No
Anguidae (Alligator Lizards and relatives)			
Elgaria multicarinata	Southern Alligator Lizard	--/--/--	No
Colubridae (Colubrids)			
Diadophis punctatus	Ringneck Snake	--/--/2	No
Lampropeltis getula	Common Kingsnake	--/--/--	No
Masticophis lateralis	California Whipsnake	--/--/--	No
Pituophis catenifer	Gopher Snake	--/--/--	No
Rhinocheilus lecontei	Long-Nosed Snake	--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
Salvadora hexalepis	**Western Patched-Nosed Snake**	**--/SSC/2**	**No**
Natricidae (Live-bearing Snakes)			
Thamnophis hammondii	**Two-Striped Garter Snake**	**--/SSC/1**	**No**
Viperidae (Vipers)			
Crotalus viridis	Western Rattlesnake	--/--/--	No
AVES (Birds)			
CICONIIFORMES (Herons, Storks, Ibises, and relatives)			
Cathartidae (New World Vultures)			
Cathartes aura	Turkey Vulture	--/--/1	No
FALCONIFORMES (Vultures, Hawks, and Falcons)			
Accipitridae (Hawks, Old World Vultures, and Harriers)			
Accipiter cooperii	**Cooper's Hawk**	**--/WL/1**	**Yes**
Buteo jamaicensis	Red-tailed Hawk	--/--/--	No
Buteo lineatus	Red-shouldered Hawk	--/--/1	No
Falconidae (Caracaras and Falcons)			
Falco sparverius	American Kestrel	--/--/--	No
Odontophoridae (New World Quail)			
Callipepla californica	California Quail	--/--/--	No
COLUMBIFORMES (Pigeons and Doves)			
Columbidae (Pigeons and Doves)			
Zenaida macroura	Mourning Dove	--/--/--	No
CUCULIFORMES (Cuckoos and relatives)			
Cuculidae (Typical Cuckoos)			
Geococcyx californianus	Greater Roadrunner	--/--/--	No
Strigidae (Typical Owls)			
Megascops kennicottii	Western Screech Owl	--/--/--	No
Bubo virginianus	Great Horned Owl	--/--/--	No
Athene cunicularia	**Burrowing Owl**	**--/SSC/1**	**Yes**
APODIFORMES (Swifts and Hummingbirds)			
Trochillidae (Hummingbirds)			
Archilochus alexandri	Black-chinned Hummingbird	--/--/--	No
Calypte anna	Anna's Hummingbird	--/--/--	No
Calypte costae	Costa's Hummingbird	--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
PICIFORMES (Woodpeckers and relatives)			
Picidae (Woodpeckers and Wrynecks)			
Colaptes auratus	Northern Flicker	--/--/--	No
Melanerpes formicivorus	Acorn Woodpecker	--/--/--	No
Picoides pubescens	Downy Woodpecker	--/--/--	No
Picoides nuttallii	Nuttall's Woodpecker	--/--/--	No
PASSERIFORMES (Perching Birds)			
Tyrannidae (Tyrant Flycatchers)			
Empidonax difficilis	Western Flycatcher	--/--/--	No
Contopus cooperi	Olive-sided Flycatcher	--/--/2	No
Contopus sordidulus	Western Wood Pewee	--/--/--	No
Myiarchus cinerascens	Ash-throated Flycatcher	--/--/--	No
Sayornis nigricans	Black Phoebe	--/--/--	No
Sayornis saya	Say's Phoebe	--/--/--	No
Tyrannus vociferans	Cassin's Kingbird	--/--/--	No
Vireonidae (Typical Vireos)			
Vireo cassinii	Cassin's Vireo	--/--/--	No
Vireo gilvus	Warbling Vireo	--/--/--	No
Vireo huttoni	Hutton's Vireo	--/--/--	No
Corvidae (Jays, Magpies, and Crows)			
Aphelocoma californica	Western Scrub Jay	--/--/--	No
Corvus brachyrhynchos	American Crow	--/--/--	No
Corvus corax	Common Raven	--/--/--	No
Bombycillidae (Waxwings and Silky Flycatchers)			
Phainopepla nitens	Phainopepla	--/--/--	No
Turdidae (Thrushes)			
Catharus guttatus	Hermit Thrush	--/--/--	No
Catharus ustulatus	Swainson's Thrush	--/--/--	No
Sialia mexicana	**Western Bluebird**	**--/--/2**	**Yes**
Turdus migratorius	American Robin	--/--/--	No
Mimidae (Mockingbirds and Thrashers)			
Mimus polyglottos	Northern Mockingbird	--/--/--	No
Toxostoma redivivum	California Thrasher	--/--/--	No
Sittidae (Nuthatches)			
Sitta carolinensis	White-breasted Nuthatch	--/---/--	No
Troglodytidae (Wrens)			
Salpinctes obsoletus	Rock Wren	--/---/--	No
Thryomanes bewickii	Bewick's Wren	--/---/--	No
Troglodytes aedon	House Wren	--/---/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
Polioptilidae (Verdin and Gnatcatcher)			
Polioptila caerulea	Blue-gray Gnatcatcher	--/--/--	No
Paridae (Titmice and relatives)			
Baeolophus inornatus	Oak Titmouse	--/--/--	No
Aegithalidae (Bushtit)			
Psaltriparus minimus	Bushtit	--/--/--	No
Hirundinidae (Swallows)			
Petrochelidon pyrrhonota	Cliff Swallow	--/--/--	No
Stelgidopteryx serripennis	Northern Rough-winged Swallow	--/--/--	No
Tachycineta thalassina	Violet-green Swallow	--/--/--	No
Timaliidae (Babblers)			
Chamaea fasciata	Wrentit	--/--/--	No
Fringillidae (Finches)			
Carduelis psaltria	Lesser Goldfinch	--/--/--	No
Carpodacus mexicanus	House Finch	--/--/--	No
Emberizidae (Emberizines)			
Aimophila ruficeps	**So. CA. Rufous-crowned Sparrow**	**--/WL/1**	**Yes**
Amphispiza belli	**Bell's Sage Sparrow**	**--/WL/1**	**Yes**
Chondestes grammacus	Lark Sparrow	--/--/--	No
Junco hyemalis	Dark-eyed Junco	--/--/--	No
Melospiza lincolnii	Lincoln's Sparrow	--/--/--	No
Melospiza melodia	Song Sparrow	--/--/--	No
Passerella iliaca	Fox Sparrow	--/--/--	No
Pipilo crissalis	California Towhee	--/--/--	No
Pipilo maculatus	Spotted Towhee	--/--/--	No
Spizella atrogularis	Black-chinned Sparrow	--/--/--	No
Zonotrichia leucophrys	White-crowned Sparrow	--/--/--	No
Zonotrichia atricapilla	Golden-crowned Sparrow	--/--/--	No
Parulidae (Wood Warblers and relatives)			
Dendroica coronata	Yellow-rumped Warbler	--/--/--	No
Dendroica occidentalis	Hermit Warbler	--/--/--	No
Dendroica petechia	**Yellow Warbler**	**--/SSC/2**	**No**
Geothlypis trichas	Common Yellowthroat	--/--/--	No
Vermivora celata	Orange-crowned Warbler	--/--/--	No
Wilsonia pusilla	Wilson's Warbler	--/--/--	No
Thraupidae (Tanagers)			
Piranga ludoviciana	Western Tanager	--/--/--	No
Cardinalidae (Cardinals, Grosbeaks & Allies)			
Passerina amoena	Lazuli Bunting	--/--/--	No
Passerina caerulea	Blue Grosbeak	--/--/--	No
Pheucticus melanocephalus	Black-headed Grosbeak	--/--/--	No

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

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Icteridae (Blackbirds, Orioles & Allies)			
Euphagus cyanocephalus	Brewer's Blackbird	--/--/--	No
Icterus bullockii	Bullock's Oriole	--/--/--	No
Icterus cucullatus	Hooded Oriole	--/--/--	No
**Molothrus ater*	Brown-headed Cowbird	--/--/--	No
Sturnella neglecta	Western Meadowlark	--/--/--	No
MAMMALIA (Mammals)			
INSECTIVORA (Insectivores)			
Soricidae (Shrews)			
Notiosorex crawfordi	Grey Shrew	--/--/--	No
Talpidae (Moles)			
Scapanus latimanus occultus	Broad-footed Mole	--/--/--	No
CHIROPTERA (Bats)			
Vespertilionidae (Evening Bats)			
Antrozous pallidus	**Pallid Bat**	**--/SSC/2**	**Yes**
Corynorhinus townsendii	**Townsend's Big-eared Bat**	**--/SSC/2**	**Yes**
Eptesicus fuscus	Big Brown Bat	--/--/--	No
Lasiurus blossevillii	**Western Red Bat**	**--/SSC/2**	**No**
Lasiurus cinereus	Hoary Bat	--/--/--	No
Lasiurus xanthinus	Western Yellow Bat	--/--/--	No
Myotis californicus	California Myotis	--/--/--	No
Myotis ciliolabrum	Small-footed Myotis	--/--/2	No
Myotis evotis	Long-eared myotis	--/--/2	No
Myotis yumanensis	Yuma Myotis	--/--/2	No
Parastrellus hesperus	Western Pipistrelle	--/--/--	No
Molossidae (Free-tailed Bats)			
Eumops perotis	**Western Mastiff Bat**	**--/SSC/2**	**No**
Nyctinomops femorosaccus	**Pocketed Free-tailed Bat**	**--/SSC/2**	**No**
Tadarida brasiliensis	Mexican Free-tailed Bat	--/--/--	No
LAGOMORPHA (Rabbits, Hares, and Pikas)			
Leporidae (Rabbits and Hares)			
Sylvilagus audubonii	Desert Cottontail	--/--/--	No
RODENTIA (Squirrels, Rats, Mice, and relatives)			
Sciuridae (Squirrels, Chipmunks, and Marmots)			
Spermophilus beecheyi	California Ground Squirrel	--/--/--	No
Geomyidae (Pocket Gophers)			
Thomomys bottae	Botta's Pocket Gopher	--/--/--	No
Heteromyidae (Pocket Mice and Kangaroo Rats)			
Chaetodipus californicus	**California Pocket Mouse**	**--/SSC/2**	**No**

Inventory of Plants and Animals Documented at Hellhole Canyon Preserve during 2008 Baseline Surveys

Scientific Name	Common Name	Status[1]	Covered by Draft North County MSCP
Chaetodipus fallax	**San Diego Pocket Mouse**	**--/SSC/2**	**No**
Dipodomys simulans	Dulzura Kangaroo Rat	--/--/--	No
Muridae (Mice, Muskrats, Rats, and Voles)			
Neotoma macrotis	Large-eared Woodrat	--/--/--	No
Neotoma lepida	**Desert Woodrat**	**--/SSC/2**	**No**
Peromyscus boylii	Brush Mouse	--/--/--	No
Peromyscus californicus	California Mouse	--/--/--	No
Peromyscus eremicus	Cactus Mouse	--/--/--	No
Peromyscus maniculatus	Deer Mouse	--/--/--	No
Reithrodontomys megalotis	Western Harvest Mouse	--/--/--	No
CARNIVORA (Carnivores)			
Canidae (Foxes, Wolves, and relatives)			
**Canis familiaris*	Domestic Dog	--/--/--	No
Canis latrans	Coyote	--/--/--	No
Procyonidae (Raccoons and relatives)			
Procyon lotor	Raccoon	--/--/--	No
Mustelidae (Skunks, and weasles)			
Mephitis mephitis	Striped Skunk	--/--/--	No
Spilogale putorius phenax	Spotted Skunk	--/--/--	No
Felidae (Cats)			
Lynx rufus	Bobcat	--/--/--	No
ARTIODACTYLA (Even-toed Ungulates)			
Cervidae (Deer, Elk, and relatives)			
Odocoileus hemionus	Southern Mule Deer	--/--/2	No
PERISSODACTYLA (Odd-toed Ungulates			
Equidae (Horses)			
**Equus caballus*	Domestic Horse	--/--/--	No

[1] Listing Status – **Plants (Federal/State/CNPS/County)**: Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare. California Native Plant Society (CNPS): List 1B – Plants rare, threatened, or endangered in California and elsewhere, List 2: Plants rare, threatened, or endangered in California, but more common elsewhere, List 3 – Plants about which we need more information, List 4 – Plants of limited distribution (a watch list). County List: List A – plants rare, threatened, or endangered in California and elsewhere; List B – plants rare, threatened, or endangered in California but more common elsewhere; List C – plants which may be quite rare, but need more information to determine their true rarity status; List D – plants of limited distribution and are uncommon, but not presently rare or endangered.

Animals (Federal/State/County): Federal: E – endangered, T – threatened, DL – federally delisted. State: E – endangered, T – threatened, R – rare, SSC – species of special concern, FP – fully protected, WL – watch list. County List: List 1 – Species with a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met; List 2 – Species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

***** Introduced Species.

Appendix F

Photograph Vouchers

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Photographs of herpetofauna captured during pitfall sampling.

Photo 1: Western whiptail (*Cnemidophorus tigris*).

Photo 2: Western rattlesnake (*Crotalus viridis*) captured in snake trap.

Photo 3: California whipsnake (*Masticophis lateralis*).

Photo 4: Western patch-nosed snake (*Salvadora hexalepis*).

Photo 5: Coast horned lizard (*Phrynosoma coronatum*).

Photo 6: Side-blotched lizard (*Uta stansburiana*).

Photographs of herpetofauna captured during pitfall sampling *continued*.

Photo 7: Gopher snake (*Pituophis catenifer*) entering snake trap. Note two California whipsnakes already in trap.

Photo 8: Common kingsnake (*Lampropeltis getula*).

Photo 9: Long-nosed snake (*Rhinocheilus lecontei*).

Photo 10: Ringneck snake (*Diadophis punctatus*).

Photographs of small mammals captured during small mammal trapping surveys.

Photo 1: California pocket mouse (*Chaetodipus californicus*).

Photo 2: Desert cottontail (*Sylvilagus audubonii*).

Photo 3: Dulzura kangaroo rat (*Dipodomys simulans*).

Photo 4: Dead broad-footed mole (*Scapanus latimanus occultus*).

Photo 5: Brush mouse (*Peromyscus boylii*)

Photo 6: California mouse (*Peromyscus californicus*)

Photographs of small mammals captured during small mammal trapping surveys *continued*.

Photo 7: Deer mouse (*Peromyscus maniculatus*)

Photo 8: Marked California mouse (*Peromyscus californicus*)

Photographs of medium and large mammals detected.

Photo 1: Bobcat (*Lynx rufus*).

Photo 2: Bobcat track.

Photo 3: Coyote (*Canis latrans*).

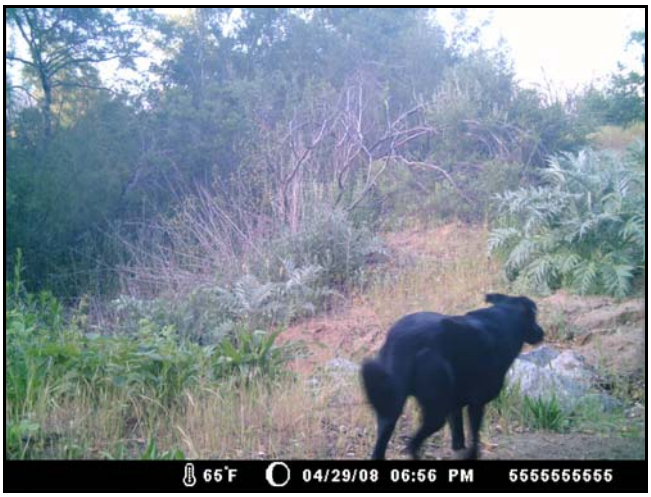

Photo 4: Domestic dog (*Canis lupus familiaris*).

Photo 5: Raccoon (*Procyon lotor*).

Photo 6: Raccoon track.

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