Introduction

Appendix 3 describes the resources within the Deer Creek Hills Preserve and includes a seasonal checklist of birds found on the Preserve. The characterizations offer an overview of conditions on the Preserve for the purpose of providing a comprehensive understanding of the resource, as well as for identifying the sensitivities and opportunities created by implementing the management objectives being considered. Multiple surveys and studies were completed to obtain and develop the information described below. The rationale and levels of specificity included in the resource descriptions are expected to guide initial planning and management actions on the Preserve. These characterizations should be considered preliminary with future field investigation as research all contributing the body of knowledge about the Preserve. The information is intended to provide substantive information pertaining to management actions proposed in this Plan with subsequent evaluations to support adaptive management methodologies. A comprehensive understanding of the resource is consistent with the Conservancy's multiple objective approach and the emphasis on an adaptive management style involving the ability to assess actions, evaluate results versus performance standards, and to assess unanticipated consequences at any point in time. The range of specific site investigations included:

- geomorphology/ hydrology investigations,
- vegetation surveys with special attention paid to the presence of invasive exotic species,
- an evaluation of existing Blue Oak Woodlands for the purpose of establishing baseline conditions of health,
- a historic survey of the extent and distribution of Blue Oak Woodlands for which data will not be included in this report,
- two archeological surveys focusing on historic and pre-contact archeological resources, and
- six extensive bird surveys covering the breeding and winter seasons
- Small mammal and other vertebrate surveys

The following sections summarize the resources present within the Preserve, broken out by type, including geology/topography, soils, hydration, vegetation, wildlife, cultural/historic, and grazing.

Section 1 - Geology/Topography

1.1 Introduction

The Deer Creek Hills Preserve sits along the eastern boundary of Sacramento County adjacent to El Dorado County and just north of Amador County. Located approximately twenty (20) miles east of downtown Sacramento, the property straddles the drainages of Deer Creek and the Cosumnes River along the margin of the Great Valley Geomorphic Province, an asymmetrical trough between the Coast Ranges and the Sierra Nevada. The Great Valley includes the San Joaquin and Sacramento Valleys which extend approximately 450 miles from the Klamath Mountains in the north to the Transverse Range in the south. It is approximately ninety (90) miles wide spanning from the eastern border of the Sierra Nevada to the western border of the Coast Range. The Great Valley Province consists of vast deposits of sediments dating from as far back as 200 million years. The upper most deposits were formed by erosion from adjacent mountain systems over the last two million years. During this period, geological processes have included mountain building, volcanic eruption, erosion and deposition. The older alluvium of the region is sometimes exposed as inverted topography on the eastern edge of the valley, where older river channels filled with fluvial debris were covered with more resistant sediments or volcanics and adjacent materials were eroded away following uplift. Recent alluvium nearly covers the entire valley floor, so that the underlying geology has largely been deduced from exposures in the adjoining mountain ranges. The recent deposited alluviums have been so massive and pervasive that in many instances the surface topography has little expression. The alluvial materials tend to have small gradients and are sufficiently unconsolidated to enable river systems to erode this material and create extensive meandering systems, particularly in the Sacramento area.

1.2 - Topography

The topography on site consists of gently sloping terrain (0-15%) falling to the west and ranging from a 533 foot elevation at the highest ridgeline on the eastern side of the property to a 194 foot elevation at the lowest point in the drainage on the western side of the property (See **Figure 1: Topography**). The landform consists of small rolling hills and knolls with shallowly etched, mostly intermittent, drainage courses. Steeper slopes are found along the Deer Creek drainage (up to 50%) and along the ridgeline in the eastern portion of the property (up to 30%). The property has three main drainages:

- a drainage associated with Deer Creek along the northern property boundary;
- the Crevis Creek drainage system which serves the majority of the central and southern portions of the property, and;
- the Cosumnes River drainage which runs along the southeastern portion of the property.

The topography manifests localized erosion and generally reflects the underlying geological structures as described below. Seeps and stock ponds are scattered throughout the property.

Figure 1: Topography

1.3 - Site Geology

The property is situated along the Valley on the eastern border of the west-sloping Sierran bedrock surface, which continues westward beneath alluvium and older sediments. The property falls within the "west-central part of a northwest-trending belt of metamorphic rocks that underlie the western slope of the Sierra Nevada extending from Mariposa to Lake Almanor." Geology on the Deer Creek Hills Preserve is dominated by metamorphic rocks in the western belt of the Sierra Foothills (Wagner and others, 1987). The most widespread rock formations on site include the Gopher Ridge Volcanics (Jgo) and Salt Springs Slate (Jss), both Jurassic in age. These metavolcanic and metasedimentary rocks dominate the entire eastern half of the site and also occur on portions of the western half of the site. On the west and southwest portions of the site, younger sandstones and clays of the Tertiary (Eocene) Ione Formation (Ti) are exposed in broad areas, along with small patches of consolidated Tertiary (Pliocene) alluvium of the Laguna Formation (Tl). Significant Quaternary alluvium (Q) deposits are limited to the corridor along Crevis Creek in the vicinity of the corral. Small patches of young alluvium are present along the west branch of Crevis Creek and on the Michigan Bar tributaries downstream of South Pond.

The spatial distribution of the geologic units across the site reflects regional structures which are primarily northwest/southeast trending folds and contacts. The NNW/SSE axis of a prominent synclinal fold (concave bending) is near the middle of the site, along the east edge of the Blue Oak Woodlands. The geologic structures, including the direction (compass aspect) and angle (dip slope) of the folded rock layers exert visible control on stream alignments and profiles.

The following are brief descriptions of the most prevalent formations found within the Deer Creek Hills property:

- Gopher Ridge Volcanics: Mostly mafic to andesitic pyroclastic rocks, lava and pillow lava with subordinate felsic porphyritic and pyroclastic rocks;
- Salt Springs Slate: Mostly dark gray slate with subordinate tuff, greywacke, and rare conglomerate;
- Ione Formation: Inter-layered beds of kaolinitic clay, quartz sand, sandy clay and lignite, and;
- Laguna Formation: Alluvial sand, silt and conglomerate and Quartenary alluvial deposits.

1.4 - Minerals & Mining

Based on studies conducted by the California Department of Conservation, Division of Mines and Geology, assessments have been made regarding potential mineral resources present within eastern Sacramento County and the Deer Creek Hills property and vicinity. Land throughout this area has been classified according to Mineral Resource Zones (MRZs) with regards to the presence, absence or likely occurrence of mineral deposits. The entire property area falls into two principal MRZ categories as summarized below and shown in **Figure 2: Generalized Geology**:

- MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated based on available data. The MRZ-3 areas are hypothetical resources that are underlain with geological conditions within which undiscovered mineral resources similar to known deposits in the same producing district or region may be reasonably expected to exist. Land areas classified as MRZ-3a possess geological characteristics that are favorable for the occurrence of specific mineral deposits.
- MRZ-4: Areas where available information is inadequate for assignment to any other MRZ zone.

Figure 2: Generalized Geology

1.5 - Seismicity

Although no active or potentially active faults are known to cross the Deer Creek Hills Preserve, there are a number of active or potentially active faults within a 100 mile radius of the property. In general, the whole Sacramento area is considered a low intensity earthquake zone; a relatively low risk area for higher intensity seismic events. A low intensity zone is defined by the U. S. Geological Survey (USGS) as an area that could experience an event measuring a maximum of 5.0-5.9 in magnitude on the Richter scale or a maximum intensity of VI or VII on the Modified Mercantile scale. Most germane to the consideration of seismic risk is the level of use that is envisioned by the Conservancy for the property with minimal site facilities or constructed elements that could be subject to seismic events. Potential risk structures include water impound structures and major public serving facilities such as schools or hospitals. Existing off-site water impounds located to the south and southeast of the property have been constructed according to the Department of Water Resources Division of Dam Safety standards, which include seismic protective provisions and which are inspected on a regular basis.

Secondary hazards from seismic activity include ground rupture, settlement, liquefaction, ground lurching, and landsliding. Given the predominance of gentle slopes, landslide potential is generally negligible with exception to localized areas within the upper ridgeline and the slopes along the Deer Creek drainage at the northern end of the property. Minor risk of liquefaction may occur in the vicinity of the off-site reservoir where saturated or deeper soils may be present. Ground lurching is the failure of relatively level ground adjacent to stream channels or other open faced slopes due to horizontal seismic forces and usually occurs within unconsolidated materials. Seismic action can reactivate dormant landslides or accelerate the movement of active landslides. If an earthquake occurs during highly saturated winter runoff conditions, the risk of inducing new landslides or for enhanced activities with existing landslides is increased.

1.6 Soils

Soil patterns in the Preserve are strongly linked to geology, although other factors (e.g., climate, vegetation, topographic position, and surface age) also affect soil types and characteristics (**Figure 3: Soils Map**). The following descriptions (excerpts from the United States Department of Agriculture, Soils Conservation Service (USDA SCS) Soil Survey) highlight these variables for soils in the Preserve, with the most widespread soils listed first.

- Amador-Gillender complex, 2-15% slopes (101)
- Argonaut-Auburn complex, 3-8% slopes (107)
- Auburn Silty loam, 2-30% slopes (109)
- Argonaut-Auburn Rock outcrop complex,8-30% slopes (110)
- Crevis Creek sand loam, 0-3% slopes (132)
- Mokelumne gravelly loam, 2-15% slopes (178)
- Mokelumne – Pits mine complex, 15-50% slopes (179)
- Red Bluff loam, 0-2% slopes (191)
- Vleck gravelly loam, 2-15% slopes (235)
- White Rock Loam 3-30% slopes (237)

Auburn and Argonaut soils are in portions of the site underlain by Gopher Ridge Volcanics, including nearly all of the eastern half of the Preserve and the uplands in the western third of the site. Auburn Soils have a thin (6 inch) loam surface horizon and hard (fractured, tilted) bedrock at shallow depth (ranging from 10 to 28 inches). Erosion hazard is slight to moderate. Argonaut soils have a thin (8 inch) loam surface horizon, and a fifteen inch thick clay pan over weathered, tilted bedrock at moderate depth (ranging from 20 to 40 inches). Water may perch above the clay pan after rainfall in winter and early spring. Erosion hazard is slight.

Whiterock soils occur primarily in areas with vertically tilted Salt Springs Slate and are the dominant soils in the central corridor of the Preserve with Blue Oak Woodland. Whiterock soils have a thin (8 inch) loam surface horizon and weathered and tilted bedrock at very shallow to shallow depths (4 to 14 inches). Generally, erosion hazard is slight to moderate in this soil group.

Mokelumne soils occur in a corridor roughly parallel and west of the Whiterock and Auburn soils, located in areas underlain by sedimentary rocks of the Ione Formation. Mokelumne soils have a moderate (10 inch) gravelly loam surface horizon, and a nine inch thick clay pan above weakly consolidated clayey sediments at moderate depth (20 to 40 inches). Erosion hazard is moderate.

Overall, soils found within the Deer Creek Hills property generally demonstrate slow to moderate permeability, and slight to moderate water erosion potential. Rapid run-off

potential occurs on the Auburn Silty loam, Argonaut-Auburn Rock outcrop complex, White Rock Loam and Mokelumne Pits mine complex primarily due the extent of impervious surfaces. Soils with moderate to high shrink swell potential include the Argonaut-Auburn complex, Argonaut-Auburn Rock outcrop complex, the Mokelumne gravelly loam and the Vleck gravelly loam.

Figure 3: Soils Map

The Crevis Creek sand loam is the on-site soil group most subject to flooding based on intrinsic soil properties. Typically for the majority of soils found on the property, the high water table is at least six feet. However for the Crevis Creek sandy loam there maybe a perched high water table in the winter months from December through April.

Soils depths on upland ridge tops vary from less than twelve inches in rocky locations, to three to four feet in swales and other depositional areas, to tens of feet in alluvial bottomlands.

Runoff is medium to rapid, with moderate erosion hazard. The soil becomes thinner on steeper slopes due in part to water-induced erosion and due to gravity and seasonal moisture induced shrink-swell creep of plastic clay-type soils over geologic time. (See **Figure 4: Slopes Map)**

Figure 4: Slopes Map

Section 2: Hydrology

2.1 Watersheds and Sub-basins

The three major watersheds within the Deer Creek Hills Preserve are:

- areas directly draining to Deer Creek;
- headwaters of Crevis Creek, and;
- tributaries to the Michigan Bar reach of the Cosumnes River (**Figure 5: Watersheds and Sub-basins map**).
-

Surface runoff from these watersheds is discharged off the site to the north, southwest, and south, respectively, at a total of eight different locations (**Table 1: Watershed and Sub-basin Areas**). About 236 acres along the northern boundary of the Preserve are in three small tributaries to Deer Creek (referred to as the west, central and east Deer Creek tributaries, respectively). The east Deer Creek tributary is the largest of the three, but has more acreage off the Preserve than the other two. The three tributaries comprise a small portion of the overall watershed of Deer Creek, a perennial (flowing year-round) stream. Approximately 2,740 acres (4.28 square miles) of the Deer Creek Hills Preserve are headwater sub-basins of Crevis Creek. The largest Crevis Creek sub-basins on site include 1,349 acres of the north branch and the 778 acre east branch, which meet just upstream of the corral north of Latrobe Road. At its discharge point off-site, the main stem of Crevis Creek has a total drainage area of 2,595 acres (4.06 square miles), of which 2,242 acres (86.4%) are on site. Very little surrounding off-site area contributes to the headwater sub-basins. Another 178 acres of the west branch to Crevis Creek and 239 acres of the Scott Road tributary are within the Preserve, but join Crevis Creek downstream of the site. Only the west branch of Crevis Creek and the cemetery tributary have significant contributing areas outside/upstream of the property These off-site areas have reservoirs and other important land uses that may affect the on-site streams.

About 1,079 acres in the south and east area of the Preserve drain offsite to the south and join the Cosumnes River near Michigan Bar. The Michigan Bar tributary has a contributing watershed area of about 973 acres at the property boundary, most of which (809 acres) lies within the Preserve. However, the southeast Michigan Bar tributary has less than half (49.4%) of its contributing area within the property boundary. Land and water uses upstream of the Preserve may affect conditions on site.

Figure 5 Watersheds and Sub-basins

Table 1: Deer Creek Hills Watershed and Sub-basin Areas					
Watershed	**Off-site Discharge Points**	**Sub-basin**	**Drainage Area (acres)**	**Drainage Area in DCH (acres)**	**Percent of Drainage Area in DCH (%)**
Deer Creek					
	1	West Tributary	87.3	58.9	67.5
	2	Central Tributary	34.2	32.4	94.7
	3	East Tributary	194.4	144.8	74.5
Total all discharges to Deer Creek			316.0	236.1	74.7
Crevis Creek					
	4	West Branch	293.6	177.6	60.5
	5	Scott Road Tributary	250.1	239.0	95.6
		North Branch	1,545.7	1,348.6	87.2
		East Branch	778.8	776.0	99.6
	6	Main Stem (at Latrobe Road, includes North and East Branches)	2,595.4	2,242.1	86.4
Total all discharges to Crevis Creek			3,139.1	2,658.7	84.7
Cosumnes River					
		Michigan Bar West	208.8	203.4	97.4
		South Pond Tributaries	137.6	137.6	100.0
		Michigan Bar Canyon Tributary	626.3	605.4	96.7
	7	Michigan Bar (at South Fence, includes Michigan Bar West, South Pond and Canyon Tributaries)	972.6	808.8	83.2
	8	Southeast Michigan Bar	268.3	132.6	49.4
Total all discharges to Cosumnes River			1,241.0	1079.0	87.0

2.2 Stream flow Regimes

Deer Creek Hill Preserve stream flow regimes have been identified as either perennial or ephemeral (flowing only during and immediately after precipitation events). However, the flow regime descriptions should be considered tentative, since no on-site stream gage records are available, and field observations were limited to one season. The flow regimes identified from field observation are 'drier' than those suggested by the United States Geological Survey (USGS) topographic map blue lines (the maps show more/longer reaches as perennial). The differences may reflect the degraded channel conditions (discussed below), or the lack of hydrologic data. It is possible that with better hydrologic information,

some reaches could be considered intermittent (flowing throughout the winter season, including periods between storms) rather than ephemeral or perennial. These distinctions, while minor, may affect the suitability and feasibility of various sub-basins and stream reaches as aquatic and riparian habitat.

The Deer Creek tributaries on-site are ephemeral. The main stem and most of the north branch of Crevis Creek is perennial (per USGS maps) although shallow reaches probably dry out in summer and the whole stream may be dry in drought years. The west and east branches are also mapped as perennial in low gradient valley reaches, but would be discontinuous in summer or dry years. Reaches receiving seepage from stock ponds or reservoirs (i.e., North Pond tributary, cemetery tributary) may have perennial flow. All minor tributaries in the Crevis Creek sub-basins are ephemeral, but some isolated pools that persist through summer occur in locations with groundwater seeps or springs (primarily in the barn tributary and the headwaters tributary above the Barn Pond). The Michigan Bar canyon tributary and its northeast headwaters are mapped as perennial, but shallow reaches would dry out in most summers. The whole stream may be dry in drought years, with the possible exception of a couple of spring-fed perennial reaches (i.e., a section of the grasslands reach). All minor tributaries to Michigan Bar are ephemeral.

2.3 Reservoirs, Dams and Ditches

The hydrology within the Preserve has been affected by historic water diversion, storage and conveyance to support local mining, domestic water supply, grazing and other land use purposes. Earthen dams and ditches were constructed to impound runoff and move water between sub-basins. A few of the dams still impound water in active reservoirs, although many more of the dams and all of the ditches were abandoned decades ago. Four active reservoirs are used for grazing water supply. One is associated with a recently active mining claim and one impoundment is of uncertain use. The reservoirs are all small, but vary in surface area, drainage area, and dam size (See **Table 2: Active Impoundments and Reservoirs**). Reservoir depths and impoundment volumes have not been measured for this Master Plan, but are assumed to increase with surface area. Actual storage volume would vary with sediment accumulation and wetland/aquatic vegetation, spillway size and elevation, and the dam crest integrity/height. Additional information about the characteristics of the reservoirs, dams and spillways in relation to the stream channels is given in the reach descriptions, below.

s

Table 2: Active Impoundments and Reservoir					
Reservoir	**Surface Area* (acres)**	**Upstream Contributing Area* (acres)**	**Dam Length** (ft)**	**Dam Crest Width** (ft)**	**Maximum Dam Height*** (ft)**
South Pond	3.87	137.6	353	12 ±2	18 ±2
Barn Pond	1.53	565.5	355	6 ±1	15 ±2
North Pond	0.90	56.7	211	8 ±2	16 ±2
West Pond	0.31	220.7	332	5 ±2	13 ±2
Upper Pond	0.26	106.5	358	5 ±1	6 ±1
Mine Pond	0.10	18.2	86	15 ±2	18 ±2
Barn Tributary Pond	0.01	15.2	49	8 ±1	6 ±1

* Measured on base aerial in GIS; ** measured in field with GPS; *** estimated in field visually.

Numerous (17) earthen dam berm remnants remain in place across floodplains throughout the Preserve. Several dam remnants are concentrated in the headwaters of the North Branch of Crevis Creek, but abandoned dams are found in virtually all of the major sub-basins. The dams are in a variety of topographic positions, with different materials and cross-section shapes, and likely reflect multiple construction periods in the last 150 years. Some of the dams have rock foundations, but most appear to be composed entirely of earth materials. The lengths of these abandoned dams range from less than 50 feet to more than 400 feet. Maximum dam heights are less varied, generally ranging from five to eight feet. The abandoned dams typically have a three to six foot wide breach where the stream channel has cut through the earthen fill. Aside from the narrow breach, most of each dam crest is typically intact. The abandoned dams may continue to alter stream-flow hydrographs and local channel hydraulics during large storms, even if they are no longer used as water resource infrastructure. Some sub-basins and reaches have more than one abandoned dam that may have affected the channel and floodplain conditions (see reach descriptions, below). Several abandoned ditches are within the Preserve, some with relatively long intact sections and others that are indistinct and/or discontinuous (See **Figure 5: Watersheds and Sub-basins Map**). The ditches are important not only as indicators of past inter-basin transfers of water, but also because of their past and continuing effects on runoff and erosion. When the ditches were functioning, they affected peak flows, annual runoff volumes, and seasonal flow regimes in the diverted and receiving stream reaches. Once the ditches were no longer maintained, weak areas and/or portions of the ditches crossed by trails or roads became points of overflow that may initiate down-slope gullying. Discussion of ditches and ditch segments that affect stream geomorphology is included in the reach descriptions, below.

2.4 Upland Erosion

The surface horizon thickness, soil depth, depth and type of hardpan(s), bedrock or other consolidated parent material, and erosion hazard are important variables that affect geomorphology. In several locations within the Preserve, prior and on-going soil disturbance has exposed soils and subsoil materials that continue to be a source of sediment to stream channels (See **Figure 6: Stream Reaches Map**). Several of the areas are former

mining areas (exploration, tailings, or hydraulic mined) and related gullies (See **Table 3: Disturbed Uplands: Mining Spoils and Gullies**) and the other areas are unpaved roadways (**Table 4: Disturbed Uplands: Unpaved Roadways**).

Table 3: Disturbed Uplands: Mining Spoils and Gullies

Watershed	Sub-basin	Location (Reach)	Disturbed Area (acres)
Deer Creek	East Tributary	Mine pond (DE_east_mine pond)	9.8
Crevis Creek	West Crevis	Downstream of West Pond (WC1)	3.9
	West Crevis	Upstream of West Pond (WC2)	5.9
	North Branch	Upstream of Barn Pond (NC8)	10.0
	North Branch	Northwest of Barn Pond (NC7)	2.0
	North Branch	Bypassed Reach (NC7_ds)	0.4
	North Branch	Barn Tributary (BT_c)	0.2
	East Branch	Headwaters (EC4_1)	0.2
Cosumnes River	Michigan Bar	Southeast Headwaters (MB_6)	0.3

Table 4: Disturbed Uplands: Unpaved Roadways

Road	Length (ft)	Disturbed Area * (acres)	Average Slope (%)
Latrobe Road	18,142	8.6	1.7
Road A	10,082	2.4	1.2
Road B	3,271	0.07	2.8
Road C	1,184	0.03	1.5
Road D	5,117	0.1	2.7
Road E	6,537	1.5	0.0
Road F	10,071	2.4	2.2
Road H	5,933	0.1	2.2
Road K	4,167	0.1	1.6
Road L	1,348	0.03	0.4
Michigan Bar Road	7,966	0.2	1.1

* Area estimated by assuming an average disturbance width of 20 feet for the public roads and 10 feet for internal roads.

Figure 6 Stream Reaches

2.5 Stream Reaches

Stream reaches have been identified (**Figure 6: Stream Reaches Map**), but should be considered preliminary, based on initial interpretation of geology, soils, and land use controls. These reach breaks primarily reflect topography, sub basin sizes, tributary confluences and the location of roads and reservoirs. In the next phase of master planning, reach breakpoints could be modified as needed for management purposes. The following discussion of existing geomorphology conditions on the stream reaches is organized by major watershed and off-site discharge points (which may serve as future management and/or monitoring units).

2.5.1 Deer Creek Tributaries:

The Deer Creek tributaries have steep slopes, particularly in the portions closest to the Deer Creek canyon (See **Table 5: Stream Reach Characteristics: Deer Creek Watershed**). Of the three Deer Creek tributaries, the most pressing concerns related to stream geomorphology are in the east tributary, within the DC_east_mine pond reach. The reach is affected by a 9.81 acre area of disturbed uplands and the 0.1 acre mine pond reservoir, which continue to disrupt hydrology and sediment production and affect downstream channels (and potentially water quality). In addition, the mine pond tributary's floodplain was directly disturbed by historic mining and by channel down-cutting (incision), and historic ditch remnants cross the slopes.

The west and central tributaries to Deer Creek, and the fenceline branch of the east tributary have ongoing general grazing and trail disturbances, minor headcut gullies, some old (vegetated) gullies, and ditch remnant crossings. However, channel conditions in these tributaries are relatively stable and there are no actively disturbed uplands.

Table 5: Stream Reach Characteristics: Deer Creek Watershed

Sub-basin	Reach	Tributary Reach	Length (ft)	Slope (%)
West Tributary	DC_West_a		2,854	5.7
	DC_West_b		1,612	9.0
		DC_West_c	698	14.9
Central Tributary	DC_Central		1,918	9.2
East Tributary	DC_East_minepond		2,899	4.8
	DC_East_fenceline		2,911	4.3

2.5.2 West Crevis Creek:

The West Branch of Crevis Creek is a low gradient stream (See **Table 6 Stream Reach Characteristics: West Crevis Creek Watershed,** and **Figure 5: Watersheds and Sub-basins map**), but has several areas with ongoing and historic disturbances that affect hydrology, sedimentation, channel habitat, and, potentially, water quality. Two active reservoirs and some areas of disturbed uplands and historic mining and grazing impacts are located in the 40% of the sub-basin that is outside the property boundary. The WC1 reach has two patches of disturbed uplands with a total area of 3.93 acres along the northwest

drainage basin boundary. The WC2 reach receives sediment from 5.4 acres of disturbed uplands in gully a, 0.37 acres in gully b, and another 0.12 acres on the south side of the stream near the watershed boundary with the NW tributary to the North Branch of Crevis Creek. In addition to these actively eroding areas, the floodplain in the WC2 reach displays evidence of extensive direct disturbance from placer diggings and dams. The stream channel in both the WC1 and WC2 reaches is incised around two (2) feet, likely in response to historic disturbances. Channel widening and bank failures continue to contribute fine sediment to the stream in WC2. Channel banks are more stable, stream bedforms are more diverse, and the riparian habitat/floodplain is more functional in WC1. The discharge point of WC1 under Scott Road is mis-aligned with the main channel and may create eddies, increased bank erosion, and local backwater on the upstream, Preserve side of the road.

Table 6: Stream Reach Characteristics: West Crevis Creek Watershed

Sub-basin	Reach	Tributary Reach	Length (ft)	Slope (%)
West Branch	WC1		2,342	0.7
	WC2		3,662	0.9
Scott Road Tributary	CC1_west		4,219	0.9
	CC1_east		1,796	1.2

2.5.3 Scott Road to Crevis Creek:

The Scott Road tributary of Crevis Creek has several sites with ongoing and historic disturbances affecting hydrology, sedimentation, channel habitat, and, potentially, water quality. The streams are low gradient, but varied (See **Table 6: Stream Reach Characteristics: West Crevis Creek Watershed** and **Figure 5: Watershed and Sub-basins Map**), and the soils are fine textured. The primary issues in this sub-basin are historic ditches and active roads and trails. The ditches cross steep slopes at the northern edge of the watershed and have conveyed water between multiple natural sub-basins. Ditch failures at various times in the past have initiated downslope and upslope gullies. Roads and trails that run east/west and north/south in the basin cross gullies and continue to create ruts and concentrate runoff that increases channel erosion. The main channel experienced past incision, is actively widening, and has a small active floodplain that is not fully stabilized.

2.5.4 The North Branch of Crevis Creek:

The north branch of Crevis Creek is the largest single sub-basin in the Preserve, with diverse topography, geology and soils. Stream reaches can be grouped in three distinct sub-areas (See **Table 7: Stream Reach Characteristics: Crevis Creek Watershed** and **Figure 5: Watershed and Sub-basins Map**): the low gradient (<1%) headwaters upstream of the Barn Pond (NC8 and Upper Pond reaches); the steeper tributaries west of the pond and east of the Blue Oak Woodlands (NC5, NC6, BT); and, the low gradient (<1%) valley(s) through and downstream of the Blue Oak Woodlands (NC3, NC4). The largest area of disturbed uplands in the north branch of Crevis Creek is a 10.0 acre area off-site in the headwaters of NC8_a. Other disturbed uplands in the north branch within the Preserve are: a 2.04 acre

area in NC7, about 0.4 acres south of the Barn Pond in the bypassed reach (NC7_ds), 0.23 acres in the Barn Tributary (BT_c), and about 2,000 feet of unpaved Latrobe Road and its right-of-way.

All of the headwater tributaries above the Barn Pond exhibit evidence of historic disturbance from mining and grazing, including active and breached dam berms and degraded channels that have downcut (incised) into the former floodplains and swales between about .5 to 1.5 feet, reaching shallow bedrock in many areas that support shallow in-channel pools. The barn tributary of the north branch (BT), and the mainstem downstream of the Barn Pond (NC6) have similar topography and geology, but the barn tributary has a much smaller basin size and does not have the added effects of the larger reservoir and spillway. The barn pond tributary has smaller active and abandoned dams, and disturbance from mining exploration/extraction. Natural bedrock controls form knickpoints (waterfalls) in the channel profile. The channel is relatively stable, although it is incised about one to two feet in the former floodplain surface.

The stream channels around and downstream of the Barn Pond are highly disturbed. The reach that was bypassed by the dam (NC7_ds) is a relatively low gradient (1.5%) reach that only receives seepage, so its channel has been encroached by vegetation. The reservoir's only release is through the spillway channel on the west flank (NC7_spillway), which is a straighter, much steeper channel (4.6%) than the bypassed reach or downstream reach (2.6%). Based on evidence within the spillway itself and along the mainstem, multiple large spills have likely contributed to channel incision and widening downstream since the dam construction. The tributary north of the spillway (NC7) has a 2.0 acre area of disturbed uplands (shallow hydraulic mining effects) that continue to be a source of excess sediment to downstream channels.

The stream channel in reaches NC6 and NC5 is generally wide and shallow, incised about three feet below the original floodplain surface, with multiple relict channels on stabilized bars and low terrace surfaces that reflect direct and indirect floodplain disturbance in the past. The channel is not laterally stable, although several sections have bedrock or cobble providing relative vertical stability. Side tributaries (NC6_north and NC6_south) have not yet adjusted to the main channel elevation, and there is active head cutting.

Table 7: Stream Reach Characteristics: Crevis Creek Watershed				
Sub-basin	**Reach**	**Tributary Reach**	**Length (ft)**	**Slope (%)**
Crevis Creek Mainstem	CC2		4,582	0.6
		CC2_east	1,363	
North Branch	NC2		3,881	0.5
		NC1_NWTrib	3,594	1.1
		NP1	3,359	1.7
	NC3		3,695	0.5
		FL_Trib_west	2,350	1.9
	NC4		1,585	1.5
		NGT_a	2,517	3.1
		SGT_a	2,054	3.7
	NC5		1,740	2.3
		BT_a	3,471	4.2
	NC6		2,928	2.6
	NC7		756	
	NC7_spillway		676	4.6
	NC7_ds		1,755	1.5
	NC8		4,818	0.6
		NC8_d	3,748	
		NC8_b	1,614	
	Upper Pond	UP_east	1,801	0.7
East Branch	EC1		2,776	1.3
	EC2_Road Crossings		2,578	0.9
		EC_CT	7,835	2.1
	EC3		1,694	1.2
	EC_LRT	EC_LRT_a	7,642	1.0
		EC_LRT_c	3,140	2.0
	EC4		5,171	3.11

In reach NC4, the north and south grassland tributaries (NCT_north and NCT_south) are relatively steep tributaries (3% to 7%) in sensitive soils with extensive disturbance from trails, old mining activity, and grazing. Both have previously incised channels that have adjusted to meet the mainstem at grade, but still have eroding, moderately high (3 to 4 ft) stream banks, and active headwater gullies.

The fence-line tributary of the north branch Crevis Creek has two different areas, the west side is a north/south trending relatively narrow swale within Blue Oak Woodlands and the east branch is a southeast trending tributary draining from the grasslands. The channel is not adjusted to grade at the main stem; it is actively head cutting throughout. Little or no mining disturbance is evident, but grazing effects on soil compaction and runoff include concentrated flow effects along both sides of the fence-line up the stream corridor.

Reach NC3 extends from the fence-line tributary to the north pond tributary, in a narrow valley with steep side slopes and short tributaries on the north and south valley walls. The main channel is bedrock and cobble controlled vertically; with an over wide channel incised about one to two feet into alluvial fill. In some areas the channel has multiple threads between vegetated cobble and gravel bars.

The north pond tributary (NP) is a small sub-basin entirely within the Blue Oak Woodlands that has perennial flow and a relatively stable channel with a functional floodplain downstream of the active reservoir. Direct disturbance by mining, roads, trails, or grazing is limited. The salt lick and ranch access road on the west shore of the pond create local erosion, sedimentation, and water quality concerns, but the channels and floodplains are functional.

Reach NC2 of the north branch extends from the north pond tributary to the confluence with the east branch and just upstream of the corral. This reach has a broad valley with a relatively thick alluvial fill. The channel is degraded and incised three to four feet into alluvial terrace and side slope alluvial fan deposits. The channel is wide and shallow, with gravel and small cobble between bedrock control points that support pools. In the broad valley downstream of the large vernal pool, the height of the terrace increases somewhat and the channel bed lacks pools. In some sections, there are two inset floodplain levels within the larger incised channel.

The northwest tributary to Crevis Creek (NC1_NWtrib) is roughly parallel and west of the north pond tributary, and its west branch is a highly disturbed area where historic ditches and road disturbance created gullies and affected surface runoff patterns (i.e., sub-basin capture from the Scott Road tributary). The downstream reach of this tributary is parallel to the main stem of Crevis Creek (NC2 reach) and may have been straightened or directly modified as a ditch in the past. It meets Crevis Creek at grade, but is incised as much as 4 feet and has widened to 8 or 10 feet within the alluvial valley fill. Small floodplains are actively forming along the channel, but are not stable. Continuing disturbance is primarily from increased runoff and sediment out of the west headwaters and two road/trail crossings.

2.5.5 East Branch of Crevis Creek:

The east branch of Crevis Creek is a large sub-basin, similar in topography, geology and soil diversity to the north branch, but about one-half of the area. It does not have active dams and reservoirs that affect hydrology and sedimentation. However, it has about 11,150 feet (~2.1 miles) of unpaved Latrobe Road and its highly disturbed right-of-way, along with a

1.44 acre area of disturbed uplands near the headwaters (in EC4-a). About 2,600 feet of the east branch (EC2) is crossed (forded) by Latrobe Road multiple times. The channel has incised into the small alluvial valley fills and degraded to bedrock in this reach, which has an essentially flat (0%) stream gradient. The east branch tributaries south of Latrobe Road (EC_LRTrib and EC_3, EC_4) have experienced historic and continuing dispersed disturbance from mining activities, roads, and grazing. The main channels have incised 1 to 2 feet in the past, but have relatively functional active floodplains (e.g., EC3, EC_LRTrib_a). Active headcutting gullies (some of which are large and deep) occur in all the upper reaches (e.g., EC_LRTrib_b, EC_LRTrib_c). The central tributary (EC_CT) channel is incised on the order of 1 to 2 feet, but the mainstem is vertically stable. However, there is active channel erosion (head cutting gullies) in the small tributaries (Ec_CT_b, EC_CT_a) and the mainstem near Latrobe Road. The lower reach of the east branch (EC1) meets the main stem of Crevis Creek at grade, within a channel that previously incised about 2 feet through the former floodplain. There are well-pPreserved relict channel remnants on the low terrace, and the active channel has eroding cut banks ranging from 2 to 5 feet high.

2.5.6 Crevis Creek Mainstem:

The mainstem of Crevis Creek downstream of the north and east branch confluence is a wide, incised, but relatively well-vegetated reach. Upstream of Latrobe Road by the corral it has perennial water, but continuing disturbance from the ford crossing and drainage from about 2,600 feet of the unpaved Latrobe Road and right-of-way. The channel is incised 4 to 6 ft from the area of the corral to the valley narrows near the CC2_east tributary. The major incision and widening appears to have occurred many decades ago, based on the size of rooted trees, although multiple episodes of incision and widening are indicated by exposed and bark-covered roots and remnant channel sections in some sections. Recent and continued down-cutting is seen in the floodplain swale south of Latrobe Road and at the mouth of tributaries down valley. The reach through the Oak Woodlands has had extensive off-channel disturbance from historic placer mining. There are multiple inset terraces, and the channels of some placer debris fans are graded to the low terrace, not the modern channel, which suggests continuing and recent channel degradation. The streambed has reached resistant bedrock and cobble in much of the reach, and the channel has widened. The upper half of this reach has considerable length of vegetated banks that provide stability and shade, but the lower half is dominated by lower unprotected banks.

2.5.7 Michigan Bar West Side Tributaries:

The Michigan Bar west side tributaries are a small area of moderate slope streams (See **Table 8: Stream Reach Characteristics: Cosumnes River Watershed and Figure 5: Watershed and Sub-basins Map**) on erodible, fine-textured surface soils. Upstream of the spillway from South Pond, the main disturbance is from access roads along the drainage swales and channels. Downstream of South Pond, the tributaries have experienced erosion from spillway overflows, along with increased peak flows and flows concentrated along the roadway surface and ruts.

2.5.8 South Pond Tributaries:

The tributaries that drain directly to South Pond are in a dense portion of the Blue Oak Woodlands with narrow and relatively steep valleys. The northeast tributary (SP1_US_

northeast) is most accessible and forms the primary trail corridor between the South Pond and the grasslands to the east. This tributary has experienced 1-3 feet of incision in the past and has active and incipient gullies in the headwaters near the drainage divide with the MB4_north sub-basin. There are multiple compacted trails along the narrow valley, which increase runoff volumes and locally concentrate flows. Accelerated erosion in this reach does not cause off-site water quality impacts because flows are trapped in the South Pond, but the sedimentation may speed infill of the pond.

Table 8: Stream Reach Characteristics: Cosumnes River Watershed

Sub-basin	Reach	Tributary Reach	Length (ft)	Slope (%)
Michigan Bar West	MB_1		999	0.03
	MB_2		404	1.6
		MB2_west	1,583	2.6
		MB2_Road	1,263	2.9
South Pond Tributaries	SP1_US_northeast		3,021	2.7
	SP2_US_east		1,494	5.1
Michigan Bar Canyon Tributary	MB3_Canyon Reach		4,981	1.2
	MB4		1,950	1.2
		MB4_north	3,598	2.5
	MB5_NEheadwaters		7,382	2.8
	MB6_SEheadwaters			
		MB6_north	2,763	3.8
		MB6_south	2,169	3.8
Southeast Michigan Bar	SEMB		3,259	2.2

2.5.9 Michigan Bar Canyon Tributary:

The Michigan Bar canyon tributary has topography, geology, and soils patterns similar to both the north and east branches of Crevis Creek, and is comparable in area to the east branch. However, the Michigan Bar tributary has fewer areas with distinct mining impacts and no active reservoirs or evidence of past overflows like in the north branch. There are a few areas with abandoned dam berms and about 0.3 acres of disturbed upland (e.g. MB5_f and MB6_north), along with other isolated evidence of mine exploration/activity. About 6,250 ft of the unpaved Michigan Bar Road and its disturbed right-of-way extends along the east crest of the watershed, and may contribute sediment and increased runoff peak flows to the headwater tributaries. Other historic and continuing disturbances are effects of grazing and seasonally used access roads.

The downstream reach is the canyon reach (MB3) through the Blue Oak Woodlands, which is very narrow, lacking a floodplain or distinct valley floor, although the channel is not steep (1.2%). Bedrock controls the channel bed elevation and exerts a strong influence on the

planform (alignment, orientation). Upstream of the canyon is the grassland reach (MB4), which is also low gradient, and has significant bedrock control points that are associated with groundwater seeps or springs with deep pools. The north tributary to the grassland reach (MB4) is similar to the grassland tributaries to Crevis Creek. It is relatively steep, with steep actively eroding gullies in the uplands, and an incised (2 to 4 ft) main channel in a narrow valley. The channel has eroded through fine soil materials to bedrock, with laterally unstable banks.

The headwater reach of the Michigan Bar tributaries (MB5) is about 1.5 miles long with historic mining, grazing and small diversion impacts. The main channel has incised to a similar depth (2 to 4 ft) as north branch of Crevis Creek (NC5), and similarly shows more than one inset floodplain and relict channels within the incised channel corridor. The uplands have some old vegetated gullies (MB5_a) as well as active gullies (MB5_g).

2.5.10 Michigan Bar Southeast Tributary:

The southeast tributary to Michigan Bar is a low to moderate gradient stream with relatively broad floodplain wetlands that receive groundwater support in addition to streamflow and overbanking. There are sites with channel incision and unstable banks, but they are limited in extent. Historic disturbances include ditches and interbasin water movement, but there are few continuing disturbances. About half of the contributing drainage basin area is upstream of DCH.

Section 3: Vegetation

3.1 Surveys of Existing Deer Creek Hills Vegetation

Standard relevé techniques were used to collect quantitative data on the vegetation attributes in 146 sample plots. Each sample plot was selected to include a homogeneous stand of vegetation. For herbaceous vegetation, the plots were 100 square meters. For woody vegetation, the plots were 400 square meters in riparian areas, and 1000 square meters in woodlands. The plot locations were determined by walking random transects which resulted in the equivalent of a nested random sampling survey.

All plant species occurring within each plot were recorded and cover for each was estimated. Additional environmental attributes were also recorded for each plot including GPS point, slope, aspect, disturbance, rocks and cobbles, bedrock, thatch, and vegetation height. A total of 146 plots were sampled on the Deer Creek Hills site. Additionally, 10 grassland plots were re-sampled in late summer in an attempt to analyze the species dominance changes from early to late season. Some of this field work was done by staff and volunteers of the California Native Plant Society as a collaborative effort in conjunction with their Sierra Foothills vegetation mapping project.

These data will be analyzed using multi-variant techniques. The results of the analyses should provide further details on the alliance and association levels of the plant communities present on the Deer Creek Hills site. Unfortunately, because patch size tends to be small in the grassland habitat, it is doubtful that any additional refinement of the vegetation mapping will result.

3.1.1 Oak Woodland Assessments:

A group of volunteer arborists/ecologists/botanists assembled to perform tree surveys for the existing Blue Oaks on the Deer Creek Hills Preserve. Five survey teams were formed with four or five randomly based but pre-selected points to survey resulting in over 25 actual survey plots being field investigated. Geographic Information Systems (GIS) mapping, complimented with GPS hand-held ground units were utilized to ensure accuracy for the field teams. This information was intended to provide baseline evaluations of the existing Blue Oak trees on the property for the purpose of gaining insights pertaining to basic tree health, extent of regeneration occurrence, as well as other associated data such as presence of wildlife, cultural resources, or specific or unique site conditions. Subsequent tree studies will rely on these data developed through this process.

3.2 Vegetation Mapping

The vegetation map was produced by digitizing on a computer screen using a color aerial photograph taken in April 2004. Using a combination of plot locations and dominant species, hand drawn field maps of specific features and communities, and aerial photograph signatures, it was possible to roughly approximate the aerial extent of related groups of associated plant communities, such as dry grassland versus vernally mesic grassland, etc. (See **Figure 7: Vegetation**).

3.2.1 Weed Mapping:
Weeds were mapped using several techniques. When encountered, their location was either GPS'd or hand drawn onto field copies of the aerial photography. These were transferred into GIS system as coordinates or using heads up digitizing.

Medusahead *(Taeniatherum caput-medusae)* and Barbed Goatgrass *(Aegilops triuncialis)* were not mapped. They are ubiquitous throughout the site. When the plot data are analyzed, more information on their abundance and occurrence within specific plant associations will be available.

3.2.2 Riparian Mapping:
All suitable habitat land was surveyed on foot. The aerial extent of all riparian vegetation was hand drawn on field copies of the aerial photography. These were later transferred into the GIS system using heads up digitizing.

Figure 7 Vegetation Map

3.3 Herbarium Specimens

In cooperation with the University of California, Davis Herbaria, and volunteers from UCD, the California Native Plant Society, and the Deer Creek Hills Docents, several field collecting trips were made in an attempt to voucher (prepare well documented museum specimens) all of the plant species present on the site. A species list for the site, including both vouchered and un-vouchered observations is appended.

3.4 Vegetation Classifications and Descriptions

California Annual Grasslands – Open Grasslands: Central Valley grasslands, while typically dominated by non-native annual grasses, can be a refuge for native plants which were once more common. This is especially true on the Deer Creek Hills site where a colorful mosaic of native wildflowers blanket the grasslands in the early spring. As these annual forbs set seed and whither in the warming weather of late spring, the non-native grasses put on a burst of growth and become the dominant species.

3.4.1 Vernally Mesic Grasslands*:*

Vernally mesic grasslands occur throughout the site, generally along the margins of stream watersheds, in swales and in low lying flats, but also in areas where the upland terraces discharge their perched water table onto the surrounding slopes. In early spring, these areas are typically dominated by the perennial White-tipped Clover *(Trifolium variegatum),* with annual associates such as Toad Rush *(Juncus bufonius),* Annual Fescue *(Vulpia bromoides),* and Hawkbit *(Leontodon taraxacoides).* Later in the season, these areas are dominated by Italian Ryegrass *(Lolium multiflorum),* Low Barley *(Hordeum marinum* ssp. *gussoneanum),* and Soft Chess Brome *(Bromus hordeaceus).*

Within the vernally mesic grasslands are wetlands too small to map. These generally occur along the stream channels and contain typical obligate wetland species such as Pale Spikerush *(Eleocharis macrostachya)*, Seep-spring Monkeyflower *(Mimulus guttatus)*, and Water Plantain *(Alisma plantago-aquatica).*

3.4.2 Auburn-Argonaut Grasslands:

The drier grasslands that occur on the Auburn-Argonaut soil series contain a mosaic of plant associations, depending on soil depth, moisture availability, slope and exposure. Hawkbit *(Leontodon taraxacoides)* is ubiquitous and occasionally dominant. Purple Needlegrass *(Nassella pulchra)* is fairly common (found in 32% of the plots). Late in the spring, this grassland is generally dominated by Soft Chess Brome *(Bromus hordeaceus),* Annual Fescue *(Vulpia bromoides),* and in some areas by Medusahead *(Taeniatherum caput-medusae)* or Barbed Goatgrass *(Aegilops triuncialus).*

Early in the spring, before the grasses bolt and become dominant, many native plant associations are evidenced by the ribbons and patches of their colorful flowers. Some typical associations that occur in this grassland include:

- Butter-and-eggs *(Triphysaria eriantha)* – Tidy-tips *(Layia fremontii)* – Goldfields *(Lasthenia californica)*: Yellow patches which generally occur in moister areas with shallow soils.
- Popcorn-flowers *(Plagiobothrys northofulvus* and *Plagiobothrys fulvus)*: White patches that often occur on the sloping shoulders of the higher terraces.
- Clovers *(Trifolium microcephalum, Trifolium ciliolatum, Trifolium oliganthum,* and *Trifolium barbigerum)*: Pale pink patches with one or more clovers dominant.

Late in the spring, after the delicate annual native plants have set seed and the grasses dominate, the Preserve is dotted with the white, pink, purple, blue, and yellow flowers of native perennial bulbs such as White Hyacinth *(Triteleia hyacinthina)*, Clustered Brodiaea *(Dichelostemma multiflorum),* Appendaged Brodiaea *(Brodiaea appendiculata),* Harvest Brodiaea *(Brodiaea elegans),* Wally Baskets *(Triteleia laxa),* and Gold Nuggets *(Calochortus luteus).*

3.4.3 Vleck-Amador-Gillender Grasslands:
These grasslands are characterized by shallow soil and relatively low productivity. This area is also a mosaic of plant associations, many of which are dominated or co-dominated by native species. However, these associations are not as apparent from a distance because the dominant plants tend to have small flowers. Native dominants include Goldfields *(Lasthenia californica),* Blue Navarretia *(Navarretia tagetina),* and Sticky Calycadenia *(Calycadenia multiglandulosa).* The grasses present in this grassland also tend to be more delicate and diminutive, such as Silver Hairgrass *(Aira caryophyllea)*, Elliot's Hairgrass *(Agrostis elliottiana),* and Annual Fescue *(Vulpia bromoides).*

3.4.4 Crevis Creek Grasslands*:*
These grasslands are characterized by rather deep alluvial soils. The plant associations present within this grassland tend to have a low abundance of native species when compared with other open grasslands present on Deer Creek Hills. Vegetation is tall and weedy. Several invasive or noxious species occur in this grassland including Yellow Starthistle *(Centaurea solstitialis)*, Italian Thistle *(Carduus pycnocephalus)* and Klamath Weed *(Hypericum perforatum).*

3.4.5 California Annual Grasslands – Oak Woodland Associated Grasslands:
The grasslands that occur under and adjacent to the Oak Woodlands also contain a mosaic of plant associations. Those occurring directly under the tree canopy are generally different than those that occur in openings and along swales and stream corridors.

3.4.6 Whiterock-Auburn-Red Bluff Oak Woodland Associated Grasslands:
The grasslands associated with the central north-south belt of Blue Oak Woodland are typically dominated by the non-native Rose Clover *(Trifolium hirtum)* and various coarse, non-native grasses such as Ripgut Brome *(Bromus diandrus)* and Dogtail Grass *(Cynosurus echinatus).* Hedge Parsleys *(Torolis nodosa* and *Torolis arvensis)* are also common within the understory of the oaks.

Dry openings and slopes often contain plant associations that are dominated by Soft Chess Brome *(Bromus hordeaceus)* and various native forbs including Dwarf Lupine *(Lupinus nanus)*, Frying-pan Poppies *(Eschscholzia lobbii)*, and Popcorn Flower *(Plagiobothrys nothofulvus).*

Vernally mesic openings are similar to those described for the open grasslands and are typically dominated by White-tipped Clover *(Trifolium variegatum)*.

3.4.7 Mokelumne Oak Woodland Associated Grasslands*:*
The grasslands associated with the western belt of Blue Oak Woodland are typically dominated by False Brome *(Brachypodium distachyon)* and Dogtail Grass *(Cynosurus echinatus)*. Hedge Parsleys *(Torolis nodosa* and *Torolis arvensis)*, Doves-foot Geranium *(Geranium molle)*, and Tuberaria *(Tuberaria guttata)* are common within the understory.

Dry openings and slopes tend to be dominated by False Brome *(Brachypodium distachyon)* and Soft Chess Brome *(Bromus hordeaceus)* and contain an abundance of native bulbs including Appendaged Brodiaea *(Brodiaea appendiculata)* and Gold Nuggets *(Calochortus luteus)*. No significant areas of vernally mesic grassland are present in this grassland.

3.4.8 Oak *(Quercus douglasii)* Woodlands:
Two distinct belts of Blue Oak Woodland occur on the Deer Creek Hills site. The central, north-south belt occupies approximately 1,400 acres and occurs on soils from the Whiterock, Auburn and Red Bluff series. The western belt occupies approximately 200 acres and occurs on the Mokelumne soil series.

With the exception of some firewood cutting immediately adjacent to Latrobe Road, there is no evidence of recent tree harvesting on the site. The outer boundaries of the woodlands typically follow natural features such as geologic interfaces and slope changes.

3.4.9 Whiterock-Auburn-Red Bluff Blue Oak Woodland:
The central, north-south belt of Blue Oak Woodland is characterized by relatively high canopy cover and a grassland understory. There is an occasional Gray Pine *(Pinus sabiniana)* and Buckeye *(Aesculus californica)*, but generally few other trees occur within this woodland.

The Blue Oaks themselves fall into two general classes: large trees with broad canopies growing at well spaced intervals, and smaller trees with narrow canopies growing close together. There is very little evidence of regeneration within this woodland although seedlings were encountered in several sampling plots.

3.4.10 Mokelumne Blue Oak Woodland*:*
The western belt of Blue Oak Woodland is characterized by high canopy cover, an abundance of Interior Live Oak *(Quercus wislizenii)*, and a grassland understory. There are occasional shrubs and vines such as Poison Oak *(Toxicodendron diversilobum)* and Manroot *(Marah fabaceus)*.

Again, the Blue Oak trees fall into two general classes: large trees with broad canopies growing at well spaced intervals, and smaller trees with narrow canopies growing close together. However, in this woodland, there is ample evidence of regeneration with seedlings found in nearly all sampling plots and several areas of significant sampling recruitment.

3.4.11 Valley Oak *(Quercus lobata)* Savanna:
Valley Oak Savanna *was not specifically mapped.* There are scattered Valley Oaks in several low lying areas on the Deer Creek Hills site. Most occur in association with stream channels. The largest concentration along Crevis Creek was mapped as a riparian area.

3.4.12 Riparian Areas:
A total of 3 acres of riparian vegetation was mapped on the Deer Creek Hills site. These areas fall into three general categories: riparian vegetation associated with stock ponds, riparian vegetation associated with Crevis Creek, and an isolated patch of riparian vegetation associated with an outflow pipe coming in from an adjacent parcel.

3.4.13 Stock Pond Riparian Areas:
Two of the stock ponds on the site support riparian vegetation dominated by Willows *(Salix* spp.) and Cottonwoods *(Populus fremontii).* These areas are well watered from the ponds and recruitment is evident.

3.4.14 Crevis Creek Riparian Areas:
Two small patches of riparian vegetation occur along Crevis Creek south of Latrobe Road. One is dominated by large, old Valley Oaks *(Quercus lobata).* The other contains a decadent Cottonwood *(Populus fremontii)* and scattered Willows *(Salix* spp.). Due to the extreme downcutting of the creek in this area, these trees are well above the water. There is no evidence of recruitment in this area.

3.4.15 Artificially Supported Riparian Area:
This riparian area is diverse and contains shrubs as well as Cottonwoods *(Populus fremontii),* Willows *(Salix* spp.) and Valley Oaks *(Quercus lobata).* There is significant recruitment in this area. However, this patch of riparian vegetation is artificially watered from a pipe (perhaps an overflow pipe associated with Lake Calero).

3.4.16 Emergent Marsh:
Emergent marsh is associated with the shallow waters of four stock ponds found on the Deer Creek Hills site. The dominant species are Tules *(Scirpus acutus)* and Cattails *(Typha* spp.). The North Pond also contains the special-status Sanford's Arrowhead *(Sagittaria sanfordii).*

3.4.17 Vernal Pools:
A total of nine vernal pools were mapped on the site totaling approximately 3 wetted acres. These pools fall into two categories: natural vernal pools and vernal pool vegetation associated with artificially dyked areas (small shallow ponds that dry completely in the summer). All contain genera *(Downingia, Plagiobothrys, Eryngium)* typical of Northern Hardpan Vernal Pools with the ponds having a higher abundance of perennials such as Pale Spikerush *(Eleocharis macrostachya).*

3.4.18 Mining Disturbance:
Several large areas of mining disturbance – from both hydraulic and hardrock mining – occur on the site. While some of these have naturally revegetated, others are bare soil and pose a potential erosion problem.

Section 4: Wildlife

4.1 Special Status Species

Special status species that occur or are likely to occur within the Deer Creek Hills Preserve property include species that are listed as rare, threatened or endangered by the State listing through the California Department of Fish & Game (CDFG) or the Federal listing through the U. S. Department of Fish and Wildlife Service (USFWS). Candidate species for either Sate or Federal listing and species that are designated as "fully protected" or "species of special concern" by CDFG are also considered special status. Some species that are monitored by the California Natural Diversity Data Base or Native Plant Society that do not fall into to the categories listed above are also included because they are typically considered rare.

Several species of special status use grasslands during at least part of their life cycle and may occur within the Deer Creek Hills Preserve property. Although none have been specifically confirmed on the Preserve, Tiger salamanders and Western spadefoot frogs breed in similar vernal pool habitats and retreat to uplands near the pools during the other parts of the year.

Table 9: Potential Special Status Species of Plants that May Occur on the Deer Creek Hills Preserve.

Scientific Name **Common Name**	**Status**	**Bloom Period**	**Habitat**	**Status on DCH Preserve**
Eleocharis quadrangulata Four-angled Spikerush	4	May-Jun	Freshwater marshes and lake margins.	Observed on the site by DCH docents.
Gratiola heterosepala Bogg's Lake Hedge Hyssop	CE, 1B	Apr-Jun	Vernal pools, marshes and other wetlands (lake or pond margins).	Not likely, suitable vernal pool types not present.
Juncus leiospermus var. ahartii Ahart's Dwarf Rush	FC, 1B	Mar-May	Restricted to the edges of vernal pools.	Not likely, suitable soil types not present.
Legenere limosa Legenere	1B	May-Jun	Vernal pools and seasonal marshes.	Possible, may occur in seasonal marshes behind water retention berms.
Navarretia myersii ssp. myersii Pincushion Navarretia	1B	May-Jun	Vernal pools, generally on clay soils.	Not likely, suitable vernal pool types not present.
Sagittaria sanfordii Sanford's Arrowhead	1B	May-Aug	Vernal Pools marshes and other wetlands (lake or pond margins)	Observed on the site in two stock ponds.

Source: California Department of Fish and Game California Natural Diversity Database, California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, and consultants reports.

Status Key:

FC Federal Candidate status.
CE California Endangered.
1B CNPS List 1B – plants rare, threatened, or endangered in California and elsewhere.
4 CNPS List 4 – a watch list.

Table 10: Potential Special Status Species of Wildlife that May Occur on the Deer Creek Hills Preserve.

Scientific Name **Common Name**	**Status**	**Habitat**	**Status on DCH Preserve**
AMPHIBIANS			
Ambystoma californiense California Tiger Salamander	CSC	Grassland and open woodland; requires open water for breeding.	Possible, but none found during surveys conducted by USFWS and aquatic invertebrate consultant.
Rana aurora draytonii California Red-legged Frog	FT, CSC	Ponds, seeps, streams, riparian habitats.	Not likely. While this species has been reported to be present at DCH, the siting is unsubstantiated. Regional experts believe DCH to be outside its range, the nearest reliable historical record is in Placerville (Sean Barry, pers. comm.).
Rana boylii Foothill Yellow-legged Frog	CSC	Partly-shaded, shallow streams & riffles with a rocky substrate in a variety of habitats.	Possible, but according to regional experts, not likely to occur on the site (Sean Barry, pers. comm.). Requires highly oxygenated water in a rocky creek. Nearby records are questionable.
Spea hammondii Western Spadefoot	FT, CSC	Vernal pools are essential for breeding; grassland and foothill oak woodlands..	Possible, but none found during surveys conducted by USFWS and aquatic invertebrate consultant. Surveys focused on chorusing frogs should be conducted in February.
REPTILES			
Emys marmorata mamorata Pacific Pond Turtle	CSC	Pond, streams, riparian habitats. Uses upland areas for burrows.	Likely to occur in some of the stock ponds.
Phrynosoma coronatum frontale California Horned Lizard	CSC	Variety of habitats, primarily in lowland areas along sandy washes.	Not likely, suitable sandy substrates not present on the site. Generally prefers Gabbro soils in this region of the Sierra Foothills.
BIRDS			
Elanus leucurus White-tailed Kite	CA: Fully Protected	Open grasslands for foraging close to isolated, dense-topped trees for nesting and perching.	Observed foraging on the site. Breeding habitat is present on the site.
Circus cyaneus Northern Harrier	CSC	Grassland and marshland. Nest on ground in thick marsh or shrubby cover.	Observed foraging on the site. Not likely to nest on site.
Accipiter striatus Sharp-shinned Hawk	CSC	Nests in dense forest and woodland, often in areas with a shrubby understory.	Probable winter foraging on site.

Table 10: Potential Special Status Species of Wildlife that May Occur on the Deer Creek Hills Preserve.

Scientific Name **Common Name**	**Status**	**Habitat**	**Status on DCH Preserve**
Accipiter cooperii Cooper's Hawk	CSC	Nests in dense oak and riparian woodlands and forests, generally near water.	Observed on site as a spring migrant. Probable winter foraging on site. Possible breeding on site.
Buteo swainsoni Swainson's Hawk	CT	Open habitats such as savannah, grassland and agricultural areas. Nests in stands with few trees.	Possible foraging on site.
Buteo regalis Ferruginous Hawk	CSC	Migrant to region generally found in grassland and marshland habitats	Observed on site. Good winter foraging area.
Aquila chrysaetos Golden Eagle	CSC	Grasslands, open woodlands and forests. Typically selects nest sites with commanding views such as tall trees, tall cliffs, transmission line towers. Forages onsite & potential nesting	Possible winter foraging on site.
Falco columbarius Merlin	CSC	Migrant to region; can be found in almost any habitat type.	Possible in winter.
Falco mexicanus Prairie Falcon	CSC	Open semi-arid to arid habitats. Nests in cavities on cliffs and rock outcrops. No nesting habitat present.	Observed using the site for winter foraging.
Laterallus jamaicensis coturniculus California Black Rail	CT	Coastal marshland breeder; Also breeds in small cattail marshes in low foothill sites in nearby counties (Yuba, Nevada, Butte, Placer).	Possible. Not specifically surveyed for during Spring 2005.
Numenius americanus Long-billed Curlew	CSC	Migrant; forages in grassland, marshes, agricultural lands.	Possible. In mitigation.
Athene cunicularia Burrowing Owl	CSC	Grassland and marshland. Nest in underground burrows of other species.	Observed on the site. There are no ground squirrels on the site to provide dens. May however be using road culverts.
Asio flammeus Short-eared Owl	CSC	Grassland and marshland. Ground nesting in low (2' to 3' tall) thick cover.	Possible. In winter.
Asio otus Long-eared Owl	CSC	Open woodlands and forest edge habitats	Possible.
Melanerpes lewis Lewis's Woodpecker	*	Winters in oak woodlands during year of good acorn production	Common on site most winters.
Picoides nuttallii Nuttall's Woodpecker	*	Oak woodlands	Common breeder and year round resident.

Table 10: Potential Special Status Species of Wildlife that May Occur on the Deer Creek Hills Preserve.

Scientific Name **Common Name**	**Status**	**Habitat**	**Status on DCH Preserve**
Empidonax traillii Willow Flycatcher	CE	Require dense willow thickets for nesting/roosting. Low, exposed branches are used for singing posts/hunting perches.	Observed as a spring migrant.
Lanius ludovicianus Loggerhead Shrike	CSC	Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	Observed on the site from fall through early in the spring season. Suitable habitat for nesting is present.
Eremophilia alpestris Horned Lark	*	Open grasslands	Breeds on site. Year-round resident.
Baeolophus inortus Oak Titmouse	*	Oak woodlands	Common breeder and year round resident.
Dendroica petechia Yellow Warbler	CSC	Riparian habitats with dense low growth.	Observed as a spring migrant.
Ammodramus savannarum Grasshopper Sparrow	*	Favors native grasslands with a mix of grasses, forbs & scattered shrubs.	Possible, but not observed during spring 2005 surveys.
Chondestes grammacus Lark Sparrow	*	For nesting they prefer edges between grasslands & trees or bushes or open grassy oak woodlands.	Breeds on site. Year-round resident.
Agelaius tricolor Tricolored Blackbird	CSC	Colonial nester. Nests typically in tall, dense growth of cattail, tules, blackberry, etc.	Moderate flock observed foraging. Not likely to breed on the site.
MAMMALS			
Antrozous pallidus Pallid Bat	CSC	Prefers rocky cliffs and outcrops with access to open habitats. Roosts in mines, caves, rock crevices, hollow trees. Takes most prey on ground.	Possible. May roost in rocky outcrops adjacent to Deer Creek. May forage along Deer Creek even if it does not roost on site.
Eumops perotis californicus California Mastiff Bat	CSC	Open semi-arid to arid habitats, including deciduous woodlands and grasslands. Cliffs, high buildings and trees are used for roosting.	Possible. Both roosting and foraging habitat present.
Felis concolor Mountain Lion	Protected	Grassland and woodland.	Likely, though no direct evidence has been recorded on site.
Taxidea taxus American Badger	*	Grassland and other open semi-arid habitats.	Likely, though no direct evidence has been recorded on site.
INVERTEBRATES			
Andrena blennosepermatis Blennosperma Bee	*	Oligolectic on vernal pool flowers, especially *Blennosperma nanum;* bees nest in uplands.	Likely to occur; host plant is present in abundance.

Table 10: Potential Special Status Species of Wildlife that May Occur on the Deer Creek Hills Preserve.

Scientific Name **Common Name**	**Status**	**Habitat**	**Status on DCH Preserve**
Andrena subapasta Arenaria Bee	*	Oligolectic on *Arenaria, Othocarpus, Lasthenia;* bees nest in uplands.	Likely to occur; host plants are present in abundance.
Branchinecta lynchi Vernal Pool Fairy Shrimp	FT, CSC	Inhabits vernal pools, usually those with clear water.	Possible, not all pools surveyed in January 2004.
Branchinecta mesovallensis Midvalley Fairy Shrimp	CSC	Inhabits small vernal pools, often those with flashy hydrology.	Possible, not all pools surveyed in January 2004.
Desmocersus californicus dimorphus Elderberry Long-horn Beetle	FT, CSC	Occurs on Blue Elderberry plants.	Not likely, only a few scattered host plants on the site.
Hydrochara rickseckeri Ricksecker's Water Scavenger Beetle	CSC	Vernal pools and potentially other open water.	Possible, suitable habitat exists on the site.
Lepidurus packardi Vernal Pool Tadpole Shrimp	FE, CSC	Inhabits vernal pools and swales; either grassy bottomed or mud bottomed and turbid.	Possible, not all pools surveyed in January 2004.
Linderiella occidentalis California Linderiella	CSC	Inhabits vernal pools, usually those with low alkalinity, conductivity and TDS.	Possible, not all pools surveyed in January 2004.

Source: California Department of Fish and Game California Natural Diversity Database and consultants reports.

Status Key:

CSC	California Species of Special Concern
CT	California Threatened
FC	Candidate for listing under the Federal endangered Species Act.
FE	Federally Endangered
FT	Federally Threatened
*	Watch List or Species of Local Concern

The lists of potentially occurring special status plants and animals (**Tables 9: Potential Special Status Plants that May Occur on the Deer Creek Hills Preserve and Table 10: Potential Special Status Wildlife that May Occur on the Deer Creek Hills Preserve**) could be used by visitors to the site to confirm whether or not any special status species actually occur on the property. If a special status species is found and identification confirmed, the siting should be reported to the California Natural Diversity Database Office, and California Department of Fish and Game, in Sacramento, California.

4.2 Special Status Bird Species

Although no listed (Threatened or Endangered) bird species were observed during spring surveys, at least two such species have the potential to use the Deer Creek Hills Preserve. Listed below are the status or possible status of 17 Special Status species or species that merit concern on a regional basis. These are species defined by either the CDFG or USFWS as Endangered, Threatened, Special Concern, Conservation Concern or Fully-protected. Ten of the below listed species were found on site and are marked with an asterisk (*).

- Northern Harrier*: Both male and females were observed on site. It is unlikely that they breed on site, but they use the grasslands for foraging.
- White-tailed Kite*: We had only one detection of this species on site, which is somewhat surprising since the site looks good for breeding as well as foraging.
- Cooper's Hawk*/Sharp-shinned Hawk: We observed one Cooper's Hawk, likely a spring migrant, though on-site breeding is possible. More are likely to be found in winter as well as Sharp-shinned Hawks.
- Ferruginous Hawk*: One was found on site during an early visit. The site would seem to offer ideal winter foraging for this species.
- Swainson's Hawk: Though none were observed on site, a pair nested near the Cosumnes River just south of Deer Creek Hills and the site provides potential foraging habitat. At present, better foraging habitat occurs south and west of the area, but since much of that is threatened with development or conversion to vineyards, Deer Creek Hills could become more important to this species in the future.
- Golden Eagle: None were observed on site, but this species is more likely to be detected during proposed 2005-2006 winter surveys.
- Prairie Falcon*: This species is a winter visitor to the site (personal observation.). None were encountered during our breeding season surveys.
- Black Rail: This listed species was not detected (and we did not survey specifically for this species during the likely breeding period), but the patches of cattail marsh in this area are similar to sites in Yuba, Butte, Placer and Nevada Counties where Black Rails have been found to breed.
- Burrowing Owl*: Although this species has been observed on site, we did not find any evidence of nesting on site and found no evidence of burrows. We saw no evidence of California Ground Squirrels, the chief excavator of burrows used by these owls. Generally the soils are thin and may not be ideal for burrows over most of the site.
- Willow Flycatcher*: One was detected on site, a spring migrant.
- Loggerhead Shrike*: This species was found on an early visit, but not during breeding season. Good foraging habitat exists and suitable nesting habitat is also present. However, this species becomes increasingly rare as one moves from valley floor into the lower reaches of the Sierra foothills.
- Horned Lark*: Though only the California Race of this species (found in San Joaquin Valley) is a Special Status taxon, the species as a whole is of conservation concern regionally and nationally. It was one of the most abundant breeders we found in the grasslands of Deer Creek Hills.
- Yellow Warbler*: This species was found as a spring migrant on site. This species historically bred commonly in riparian areas of the valley and foothills.
- Lark Sparrow*: This species breeds on the site. Lark Sparrow is not a Special Status Species, but it has been shown to be particularly sensitive to even small degrees of Oak Woodland fragmentation. A large site like Deer Creek Hills may be very important for this species.
- Grasshopper Sparrow: Grasshopper Sparrow is on the CDFG candidate list for elevation to Special Concern. It has a narrow preference for grassland conditions and is now a rare breeder in the northern Central Valley. The species breeds in similar

areas in Southeast Sacramento County and the condition on site this year looked good for this species. However, we did not detect any Grasshopper Sparrows on site.

- Tricolored Blackbird*: Moderate-sized flocks (100-200 birds) were seen foraging on site this year. Though unlikely to breed on site, our observations suggest that an active colony was nearby this year.

4.3 Special Status Plant Species

The special status plants that may occur within the Preserve are listed in **Table 1: Potential Special Status Plants that May Occur on the Preserve**. A survey confirmed the presence of two listed species, Sanford's Arrowroot and Wooly Marbles, a vernal pool plant species. It is appropriate to assume that there could be other species that were not detected during that survey given the seasonal variation of certain plant species.

Section 5: Historic and Prehistoric Resources

5.1 Prior Survey Work

In 1996, a cultural resources investigation was conducted as part of the Deer Creek Hills General Plan Amendment and rezone project (Maniery et al. 1996). Approximately 1,500 acres of land was covered during the 1996 effort and resulted in recordation of thirty-nine (39) cultural resources or formal sites with succinct, articulated boundaries and features recorded and mapped, and non-formal or isolated sites with single artifacts or features not articulated or contiguous. Prehistoric resources included bedrock milling stations, surface lithic scatters, and habitation sites characterized by artifacts, midden and associated milling features. Historic resources related primarily to ranching and settlement and included home sites, ditches, check-dams, and reservoirs for irrigation. Mine tailings were also noted along Crevice Creek tributaries. Over 50 percent of the identified sites related to the prehistoric period, followed by the historic era sites (36%). Only two sites (12%) exhibited superimposed historic and prehistoric artifacts and features.

5.2 Additional Survey Area

In 2005, additional archeological surveys were undertaken of approximately 2, 200 acres of newly acquired Preserve land. An additional forty-eight (48) sites were located including, three (3) areas described and mapped as gulch mining and ten (10) isolated artifacts and/or feature sites. Of the forty-eight (48) resources, twenty-nine (29) were characterized as succinct sites that could easily be archaeologically deciphered in the field. Nineteen sites along with the gulch mining areas were located on the Preserve; however, it is not known how these mining and water conveyance systems relate both temporally and spatially. In other words, the mined out gulch and intermittent drainage may be one mining claim or two or more mining claims. Gulch mining areas could also represent subsequent mining episodes and different claims. The water conveyance sites (ditches) could represent one or more systems and therefore these site types may conceivably be folded into one or more sites.

Statistically, sixty-five (65) percent of the cultural resources on the 2,200 Preserve acres surveyed in 2005 are historic, six (6) percent have superimposed historic and prehistoric elements, and twenty-nine (29) percent are prehistoric sites. The three (3) gulch mining areas are not included in this basic breakdown.

5.3 Formal Archaeological Sites

5.3.1 Prehistoric:

Prehistoric use is characterized by bedrock milling sites that include single cups and very deep (several centimeters) multiple rock mortars. Bedrock mortar (BRM) sites varied because they also were associated with a few surface artifacts (flaked stone fragments), and another site may have a midden (cultural deposit consisting of organic material and artifacts).

In contrast to bedrock mortar occurrences, a lithic scatter and a quarry consisting of battered metavolcanic rock (e.g., rhyolite) were located.

5.3.2 Prehistoric/Historic:
Sites represented by superimposed prehistoric and historic features. All three sites probably represent a more permanent occupation (possibly homesteads) with foundations/dugout area, chimney and stone-lined well. Prehistoric material included flaked stone fragments and/or BRMs.

5.3.3 Historic:
A large majority of historic sites are related to mining (i.e., ditch systems, placer mining herein described as gulch mining of tributaries dissecting the property). These mined areas represent a variety of placer mining methods that likely date from the mid nineteenth century (hand placing, sluicing) into the first half of the twentieth century (doodle bug dredging). In addition, there are foundations and structure pads, trash scatters, ranch complexes/homestead, isolated stacked rock cairns (claim markers) and stone-lined wells, water tank foundations and fireplaces/hearths that represent 150 years of settlement, agriculture and ranching in the region. One site appears to represent a hard rock mining area, the only occurrence within the Preserve. Two distinctive and separate water conveyance systems appeared contiguous with structural support (e.g., rock lining) identified in places. The ditch systems transported water to claims, diverted water from drainages to allow placer mining in the creek beds, and/or later used for irrigation. Yet another site is characterized as a Ranch Complex containing a collapsed barn, several stone foundations, a cellar and well. According to a local rancher, this ranch was operated by a farmer of Basque descent.

Several ditch segments were identified on the Preserve, though many of these segments were vague and not well developed. In contrast, some stone-lined wells found on the Preserve were quite elaborate and distinctive. The latter description is also indicative of the collapsed water tanks, stacked rock and fireplace and/or hearths that occurred on the parcel and were likely associated with long-term occupation.

5.4 Non-Formal (Isolated) Cultural Resources

Ten (10) isolated cultural resources were located and identified on the Preserve. An isolated feature or artifact is defined as fewer than five (5) pieces of modified stone (prehistoric) and/or a single historic object such as shovel blade or historic feature such as stacked waste rock, prospect pit or fence. Just south of Latrobe Road there was evidence of extensive destruction of quartz outcrops, possibly by individuals searching for gold. It should be kept in mind that once aged; this destruction would be difficult to differentiate from historic prospects or prehistoric quarrying.

5.5 Summary

The cultural resource information in this section is intended to complement the other Preserve related investigations to serve collectively as a solid basis for long-term management. The combined surveys show that the Deer Creek Hills property has a cultural

resources base of eighty-nine (89) archaeological sites and/or areas. In 1996, eighteen (18) formal sites and twenty (20) non-formal resources were identified and recorded. The survey conducted in 2005 located forty-eight (48) sites and three different placer (or gulch) mining areas (cf. Maniery et al. 1996, Maniery et al. 2005).

Section 6: Grazing Management

6.1 Introduction

Typical of California grazing lands, forage production at Deer Creek Hills is highly variable from year to year primarily as a factor of the State and region's variable climate. Yield production is influenced by interactions between soils, depth to groundwater, canopy cover, slope, and aspect. Site characteristics determine a range of forage production values within which climatic characteristics will determine actual forage production for a particular year in response to annual weather differences (Hillyard, 1990).

Because of the annual variability in forage production there is no absolute quantification for an optimum yield of forage on the Preserve. Instead estimated yields must be based on a longer term understanding of the cyclical nature of the interplay between climate, geology, soils and hydrology, and then weighted by the conditions left from the previous year. Grazing capacity is a relative term based an ongoing monitoring of actual use and rangeland condition at the end of the grazing season. From both a business and an environmental standpoint adjusting stocking rates is an essential part of successful operations.

Grazing capacity is defined as the total number of Animal Unit Months (AUMs) of forage produced and available for grazing on a given site. One AUM is equal to the amount of forage that is needed to support one adult cow and her calf for one month (equal to about 1,000 lbs of forage). Available forage is the surplus produced in excess of the amount that is left at the end of the grazing season. Stocking rate is the number of animal units (AU) present on a given area over a designated time period (AUM/acre). Stocking rate refers to the maximum number of livestock that can graze on a given site without damage to range productivity or a decline in range condition.

One AU, defined as one cow-calf pair or equivalent, consumes one AUM of forage per month. Therefore, one cow-calf pair can graze a pasture that produces 12 AUMs of available forage for one year. Animal unit equivalents provide a way of standardizing the forage demand of various animals.

6.2 Current Operations

The current lessee on Deer Creek Hills Preserve lands is Lucky 7 Ranch. Lucky 7 Ranch uses the Preserve to raise beef cattle. The 4062-acre site is divided into five pastures by barbed wire fences. (See **Figure 8 Grazing Fields – Pasture Identification**). Approximate pasture sizes are as follows:

- Upper Field - 186 acres,
- Corral Field - 1,028 acres,
- Barn Field- 1,269 acres,
- South Field - 1,487 acres, and
- Holding Field 92 acres.

Preserve lands are bounded by fencing along all perimeters as well as along both sides of the public Right of Way along Latrobe Road. The entire property is under a single lease arrangement with Lucky 7 cattle management group. Lucky 7 leases additional land adjoining the Preserve for a total of ___ acres on which they run approximately ___ cow-calf pairs and a variable number of feeders. Lucky 7 allocates an average of eight acres per cow-calf pair and ____ per individual adult. Cow-calf pairs and heifers are raised on the Deer Creek Hills Preserve. Typically, the Lucky 7 runs 40 to 50 cow-calf pairs and approximately 100 heifers at Deer Creek Hills Preserve. Cows are typically on site from mid-November through to mid-May when calves are weaned and sold. In 2004, the property was lightly stocked on all the pastures with supplemental hay for approximately six weeks during the winter. The different pastures are utilized by moving cattle between pastures to get maximum use of the land while ensuring that forage resources remain ample.

6.2.1 Forage Resources:

Grassland vegetation is composed of primarily non-native grasses. Although the vegetation community is dominated by non-native annual grasses and forbs, native perennial grasses and native forbs are also present.

Non-native annual grass species found on site include farmer's foxtail, ripgut, wild oats, annual ryegrass, soft chess, Mediterranean barley, silver hairgrass (*Aira caryophyllea*), rat-tail fescue (*Vulpia bromoides*), quaking grass (*Briza minor*), and foxtail chess (*Bromus madritensis* ssp. *rubens*).

Purple needlegrass and California oatgrass occur on low and north facing slopes. Creeping wildrye and meadow barley are abundant on valley bottoms and in wet areas.

Forbs include yarrow, bindweed, filaree, sheep sorrel (*Rumex acetocella*), curly dock, clovers (*Trifolium* spp.), miner's lettuce (*Montia perfoliata*), and cranesbill.

6.2.2 Water Sources and Mineral Supplements:

Existing livestock watering sources include seven reservoirs/stock ponds and water troughs. The current grazing operation is built around water availability as a primary determinant in how long cattle are kept on the property and confined within specific pastures for grazing (See **Figure 9: Grazing Activity, 2004-2005 Season and Table 11 Deer Creek Hills Active Impoundments and Reservoirs**). This water supply based system conforms to a seasonal grazing management plan in which the cattle are removed from the property during the drier parts of the year and consequently greater capacities of water storage are not required. None of the reservoirs on the Preserve are designed or intended for year-round water supply for the cattle. The Preserve has approximately seven acres of water surface area at full capacity. Similarly, the salt and mineral supplements are a highly flexible component of distribution based on serving the pasture areas convenient to herd locations. The grazing operator has expressed interest in reconfiguring one or more of the stock ponds based on reducing maintenance time and costs and improving overall site conditions as related to cattle use.

Table 11: Deer Creek Hills Active Impoundments and Reservoirs					
Reservoir	Surface Area* (Acres)	Upstream Contributing Area* (acres)	Dam Length** (ft)	Dam Crest Width** (ft)	Maximum Dam Height*** (ft)
South Pond	3.87	137.6	353	12 ±2	18 ±2
Barn Pond	1.53	565.5	355	6 ±1	15 ±2
North Pond	0.90	56.7	211	8 ±2	16 ±2
West Pond	0.31	220.7	332	5 ±2	13 ±2
Upper Pond	0.26	106.5	358	5 ±1	6 ±1
Mine Pond	0.10	18.2	86	15 ±2	18 ±2
Barn Tributary Pond	0.01	15.2	49	8 ±1	6 ±1

Figure 8 Grazing Fields – Pasture Identification

Figure 9: Grazing Activity, 2004-2005 Season

Seasonal Checklist of the Birds of Deer Creek Hills Preserve

Western Meadowlark
(Photo by Tom Roach)

KEY TO THE ABUNDANCE CODES

C: Common: Almost certain to be seen or heard on nearly every visit

FC: Fairly Common: Likely to be seen or heard on most visits

U: Uncommon: May be missed on most visits

R: Rare: Has been observed but unlikely to be found on any given visit

M: Migrant: Passes through area on its way to wintering grounds or summer breeding area

ACC: Accidental: Completely unexpected occurrence

* Species which breeds on site
** Presence may vary from year to year

More about this Checklist

The information used to prepare this checklist was compiled from on-site surveys done in 2005 and 2006. The relative abundance is an approximation and is based on birds detected both by sight and by their songs or calls. Therefore, it is dependent on how detectable a particular bird might be in a particular season.

	Spring	Summer	Fall	Winter
WATERFOWL				
CANADA GOOSE	FC	FC	FC	FC
CACKLING GOOSE				R
WOOD DUCK*	U	U	U	U
MALLARD*	FC	FC	FC	FC
GADWALL				R
AMERICAN WIGEON				U
COMMON GOLDENEYE				R
COMMON MERGANSER	R, M			
GALLINACEOUS BIRDS				

CALIFORNIA QUAIL*	FC	FC	FC	FC
WILD TURKEY*	U	U	U	U
GREBES				
PIED-BILLED GREBE*	U	U	U	U
PELICANS & CORMORANTS				
AMERICAN WHITE PELICAN	R, M			
HERONS				
GREAT BLUE HERON	U		U	U
GREAT EGRET	U		U	U
VULTURES & RAPTORS				
TURKEY VULTURE	C	C	C	C
OSPREY	R, M			
WHITE-TAILED KITE	U	R	U	U
NORTHERN HARRIER	FC	FC	FC	FC
COOPER'S HAWK				R
SHARP-SHINNED HAWK				R
RED-SHOULDERED HAWK*	FC	FC	FC	FC
RED-TAILED HAWK*	C	C	C	C
SWAINSON'S HAWK	R			
FERRUGINOUS HAWK				R
AMERICAN KESTREL*	FC	FC	FC	FC
PRAIRIE FALCON				U
GOLDEN EAGLE				R
COOTS, RAILS and MOORHENS				
AMERICAN COOT*		R	R	
VIRGINIA RAIL*	U	U	U	U
SORA				R
SHOREBIRDS				
KILLDEER*	C	C	C	C
GREATER YELLOWLEGS				R
WILSON'S SNIPE				R
DOVES				
MOURNING DOVE*	C	C	C	C

ROCK PIGEON	U	U	U	U
OWLS				
BARN OWL	U	U	U	U
GREAT HORNED OWL*	FC	FC	FC	FC
WESTERN SCREECH OWL			U	U
BURROWING OWL			R	R
NIGHTJARS				
COMMON POORWILL			R, M	
HUMMINGBIRDS				
ANNA'S HUMMINGBIRD*	FC	FC	FC	FC
KINGFISHERS				
BELTED KINGFISHER			U	U
WOODPECKERS				
ACORN WOODPECKER*	C	C	C	C
LEWIS'S WOODPECKER			R-FC**	R-FC**
NUTTALL'S WOODPECKER*	C	C	C	C
DOWNY WOODPECKER				R
NORTHERN FLICKER	FC		FC	FC
RED-BREASTED SAPSUCKER				R
FLYCATCHERS				
WESTERN WOOD-PEWEE	FC, M		FC, M	
HAMMOND'S FLYCATCHER	R, M			
PACIFIC SLOPE FLYCATCHER	R, M			
WILLOW FLYCATCHER	R, M		R, M	
BLACK PHOEBE*	FC	FC	FC	FC
SAY'S PHOEBE			U	U
ASH-THROATED FLYCATCHER*	C	C		
WESTERN KINGBIRD*	C	C		
SHRIKES & VIREOS				
LOGGERHEAD SHRIKE*	U		U	U
CASSIN'S VIREO	R, M		R, M	
WARBLING VIREO	R, M		R, M	
HUTTON'S VIREO			R	R

CORVIDS				
WESTERN SCRUB-JAY*	U	U	U	U
YELLOW-BILLED MAGPIE	R			
AMERICAN CROW*	U	U	U	U
COMMON RAVEN	R		R	R
LARKS				
HORNED LARK*	C	C	C	C
SWALLOWS				
TREE SWALLOW*	C	C	C	U
VIOLET-GREEN SWALLOW*	U	U		
BARN SWALLOW	R	R		
CLIFF SWALLOW	R	R		
NORTHERN ROUGH-WINGED SWALLOW	U	U		
TITMICE & NUTHATCHES				
OAK TITMOUSE*	C	C	C	C
BUSHTIT*	FC	FC	FC	FC
WHITE-BREASTED NUTHATCH*	C	C	C	C
KINGLETS				
RUBY-CROWNED KINGLET			C	C
WRENS				
HOUSE WREN*	C	C	U	
BEWICK'S WREN*	U	U	U	U
MARSH WREN		R	R	
ROCK WREN			U	U
THRUSHES & MIMIC THRUSHES				
WESTERN BLUEBIRD*	FC	FC	FC	FC
SWAINSON'S THRUSH	R			
HERMIT THRUSH	R			R
AMERICAN ROBIN*	FC	FC	FC	FC
NORTHERN MOCKINGBIRD*	FC	FC	R	R
STARLINGS				
EUROPEAN STARLING*	C	C	C	C

PIPITS				
AMERICAN PIPIT	U			C
SILKY FLYCATCHERS				
PHAINOPEPLA	R			R
WARBLERS				
YELLOW WARBLER	U, M		U, M	
YELLOW-RUMPED WARBLER			FC	C
BLACK-THROATED GRAY WARBLER	U, M		U, M	
HERMIT WARBLER	R, M			
ORANGE-CROWNED WARBLER	FC, M		FC, M	R
WILSON'S WARBLER	U, M		U, M	
COMMON YELLOWTHROAT			R, M	
YELLOW-BREASTED CHAT	R, M			
TANAGERS				
WESTERN TANAGER	U, M		U, M	
SPARROWS & LONGSPURS				
SPOTTED TOWHEE	U		U	U
CALIFORNIA TOWHEE*	U	U	U	U
DARK-EYED JUNCO				FC
CASSIN'S SPARROW	ACC			
RUFOUS-CROWNED SPARROW*	U	U	U	U
BREWER'S SPARROW	R, M			
CHIPPING SPARROW	FC, M			
LARK SPARROW*	FC	FC	FC	FC
SAVANNAH SPARROW	C		C	C
GRASSHOPPER SPARROW				R
VESPER SPARROW				R
FOX SPARROW				R
SONG SPARROW			U	U
LINCOLN'S SPARROW			U	U
WHITE-THROATED SPARROW				R
GOLDEN-CROWNED SPARROW	FC		FC	FC
WHITE-CROWNED SPARROW	U		U	U

CHESTNUT-COLLARED LONGSPUR				R
GROSBEAKS & BUNTINGS				
BLACK-HEADED GROSBEAK*	FC	FC		
LAZULI BUNTING	U, M			
BLACKBIRDS & ORIOLES				
RED-WINGED BLACKBIRD*	C	C	C	C
TRICOLORED BLACKBIRD	R			
WESTERN MEADOWLARK*	C	C	C	C
BREWER'S BLACKBIRD*	C	C	C	C
BROWN-HEADED COWBIRD*	FC	FC	FC	FC
BULLOCK'S ORIOLE*	FC	FC		
FINCHES				
HOUSE FINCH*	FC	FC	FC	FC
LESSER GOLDFINCH*	FC	FC	FC	FC
LAWRENCE'S GOLDFINCH*	R**	R**		
AMERICAN GOLDFINCH*	FC	FC	FC	FC

Checklist prepared by Ed Pandolfino (updated April 22, 2006)