

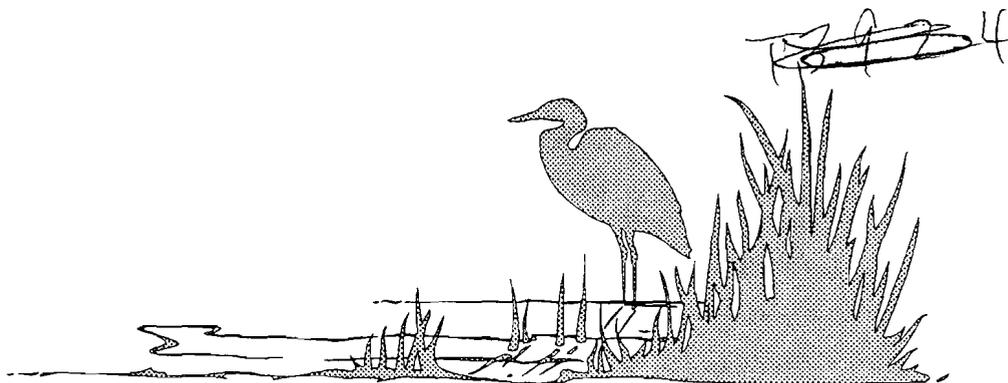
RECORD COPY
PROJECT: 17823
CAT: ~~17823~~

TB.2.4

LEHR
RECEIVED

3-25-97

ECOLOGICAL ASSESSMENT OF THE
LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH
(LEHR) FACILITY AND VICINITY,
DAVIS, SOLANO COUNTY, CALIFORNIA



March 23, 1997

Prepared for:

WEISS Associates
5500 Shellmound
Emeryville, CA 94508
tel: (510) 450-6000

Prepared by:

Michael Wood and Associates
Botanical Consulting Services
1912 Vicente Street
San Francisco, CA 94116
(415) 759-5021

TABLE OF CONTENTS

SUMMARY	iii
1.0 INTRODUCTION	1
1.1 Methods and Limitations	1
2.0 EXISTING CONDITIONS	3
2.1 Setting	3
2.2 Plant Communities	7
2.2.1 Onsite Plant Communities	11
2.2.2 Offsite Plant Communities	12
2.3 Wildlife Habitats	13
2.3.1 Terrestrial Wildlife Habitats	13
2.3.1.1 Onsite Wildlife Habitats	13
2.3.1.2 Offsite Wildlife Habitats	14
2.3.2 Aquatic Wildlife Habitats	15
2.4 Special-Status Species	17
2.4.1 Special-Status Plant Species	18
2.4.1.1 Onsite Special-Status Plant Species	18
2.4.1.2 Offsite Special-Status Plant Species	18
2.4.2 Special-Status Animal Species	23
2.4.2.1 Onsite Special-Status Animal Species	23
2.4.2.2 Offsite Special-Status Animal Species	36
2.4.3 Special-Status Natural Communities	39
2.4.3.1 Onsite Special-Status Natural Communities	39
2.4.3.2 Offsite Special-Status Natural Communities	40
3.0 CONCLUSIONS	40
4.0 LITERATURE CITED	43
5.0 PERSONS CONTACTED	46

LIST OF TABLES

1 Potentially-Occurring Special-Status Plant Species	19
2 Potentially-Occurring Special-Status Animal Species	24

LIST OF FIGURES

1	Site Location Map, LEHR Facility	4
2	LEHR Site and U.C. Davis Location Map	5
3	LEHR Site Map Showing Operable Units	6
4	Habitats at LEHR	(map pocket)
5	Habitats surrounding LEHR	(map pocket)

LIST OF APPENDICES

A	Preliminary Inventory of Plant and Animal Species Detected or Expected to Occur at LEHR	A-1
B	Preliminary Inventory of Plant and Animal Species Detected, Expected to Occur or Recorded in the Vicinity of LEHR	B-1
C	Fish Species Recorded within the U.C. Davis Campus Area	C-1
D	Explanation of Sensitivity Status Codes	D-1
E	Raptors Historically and Currently Housed at the U. C. Davis Raptor Center	E-1
F	Site Habitat Summary and Potential Ecological Receptors	F-1
G	Summary of Adjacent Habitats and Potential Ecological Receptors	G-1
H	Summary of Potential Exposure Pathways	H-1

SUMMARY

To assist in the preparation of a baseline Risk Assessment, an evaluation of the terrestrial and aquatic ecology at and in the vicinity of LEHR was conducted. The objective of this study is to characterize the biological resources of the site and vicinity and to identify potential ecological receptors, including special-status animal and plant species. The study area includes the 12-acre LEHR site and adjacent lands within a one-mile radius of LEHR.

LEHR is situated within the Yolo Basin in the southern Sacramento Valley. A majority of the land in the region has been converted to agricultural uses and altered by the construction of levees. Habitat types occurring within the study area include cultivated fields, ruderal/non-native grassland, ruderal/landscaped, eucalyptus groves, Great Valley mixed riparian woodland, Great Valley willow scrub, Valley freshwater marsh and open water.

The LEHR site consists of highly modified lands supporting buildings, parking areas, former landfill sites and former dog kennels. Areas not currently occupied by structures or covered with paving support ruderal vegetation, non-native grassland, landscaping (primarily horticultural trees) and bare ground. No naturally occurring special-status natural communities occur at LEHR. Three special-status natural communities occur within the study area, adjacent to LEHR. These include Great Valley mixed riparian forest, Great Valley willow scrub and Valley freshwater marsh. These plant communities are considered sensitive by the CNDDDB and are expected to meet the federal definition of wetlands.

No focussed surveys for special-status plant species of the remediation sites within LEHR appear warranted at this time. In the event that remediation actions would result in impacts to the banks of the South Fork of Putah Creek, focused surveys for Sanford's arrowhead and rose mallow should be conducted in the summer.

Wildlife habitats at LEHR have been significantly altered by historic and current land-uses. Habitat for wildlife currently consists of ruderal/annual grassland and ornamental (non-native) trees and shrubs. Wildlife species utilizing the site are generally adapted to disturbed conditions. However, the close proximity of Putah Creek influences the suite of species which are found on the project site.

Lands immediately surrounding LEHR consist of cultivated fields, livestock enclosures and research facilities. The predominant vegetation consists of ornamental trees and other landscaping, and small patches of ruderal/non-native grassland. No extensive, uncultivated plant communities occur within a one mile radius to the west, north or east. To the south, LEHR is bordered by ruderal/non-native grassland and a narrow band of Great Valley mixed riparian forest associated with both banks of the South Fork of Putah Creek.

The section of the South Fork of Putah Creek located in the vicinity of LEHR is a warm water, intermittent stream which frequently becomes reduced to scattered pools during dry years. Common fish species occurring in the South Fork of Putah Creek include largemouth bass, green sunfish, common carp and channel catfish. Anadromous fish such as rainbow trout and chinook salmon may migrate through the study area during high flow years, but are not expected to spawn in the lower reaches of Putah Creek. Benthic invertebrates expected to occur in the area include common species adapted to slow flows and muddy substrates. Such species are typically tolerant of environmental disturbance but may introduce pollutants into the aquatic food web. Neither special-status fish nor special-status benthic invertebrates have been observed in the area.

A total of 32 special-status plant species has been recorded in the region of the study area. Of these, none were detected or have been recorded at LEHR. Due to the highly disturbed condition of the site and the lack of suitable habitat, no special-status plant species are expected to occur onsite. Offsite, none of the target plant species were detected or have been recorded in the vicinity of LEHR and none are considered to have a high potential for occurrence. Two species, Sanford's arrowhead and rose-mallow are considered to have a moderate potential for occurrence offsite. Marginally suitable habitat is present for these marsh species along the banks of the South Fork of Putah Creek.

A total of 72 special-status wildlife species have been recorded in the region or may inhabit the study area. Of these, a total of 14 special-status wildlife species are considered to have a moderate to high potential to inhabit or forage at LEHR. These include Valley elderberry longhorn beetle, Swainson's hawk, white-tailed kite, northern harrier, burrowing owl, California horned lark, California yellow warbler, Cooper's hawk, short-eared owl, loggerhead shrike, Townsend's big-eared bat, California mastiff bat, pallid bat and American badger. Burrowing owl is actively nesting at Landfill Unit No. 3. Swainson's hawk regularly nests along both the North Fork and South Fork of Putah Creek.

An additional 18 special-status animal species are recorded from or are considered to have a potential to occur within the study area. These include California red-legged frog, northwestern pond turtle, giant garter snake, Sacramento anthicid beetle, Antioch mutilid wasp, Delta june beetle, Sacramento Valley tiger beetle, Pacific lamprey, great blue heron, great egret, snowy egret, black-crowned night heron, sharp-shinned hawk, ferruginous hawk, golden eagle, mountain plover, tricolored blackbird and Canada goose. The remaining 40 target species are not considered to have any potential for occurrence within the study area.

Preconstruction surveys for burrowing owl should be conducted prior to the initiation of remediation work. Resident burrowing owls at Landfill Unit No. 3 may need to be relocated after chicks have fledged. Pre-construction surveys should also be conducted to determine the proximity of the closest breeding Swainson's hawks, breeding white-tailed kites and Valley elderberry longhorn beetles.

1.0 INTRODUCTION

The Laboratory for Energy-Related Health Research (LEHR) facility, operated originally by the Atomic Energy Commission (AEC) and later by the Department of Energy (DOE), began conducting radiological studies on laboratory animals at its present location in 1958. Between 1940 and the mid-1960s, portions of LEHR were used as a campus landfill by the University of California at Davis (UCD). Portions of the landfill were used for the disposal of low-level radioactive and mixed wastes from UCD and LEHR. In 1994, the federal Environmental Protection Agency (EPA) placed LEHR on the National Priorities List (Superfund) due to the detection of contaminants in the groundwater and potential threats from contaminants to public health and the environment.

Work is ongoing to assess the environmental impacts that might have resulted from research activities at LEHR as well as the disposal of hazardous wastes. Weiss Associates is in the process of preparing a baseline Risk Assessment (RA). EPA guidelines require that risks to non-human receptors including non-domesticated plants and animals also be evaluated in a RA. To assist in the preparation of the RA and to fulfill requirements of the National Environmental Policy Act of 1969 (NEPA) and the California Environmental Quality Act of 1970 (CEQA), Botanical Consulting Services was contracted to prepare a biological characterization of the site and vicinity and to identify potential ecological receptors, including special-status animal and plant species. Terrestrial and aquatic biologists with Biosearch Wildlife Surveys and the Institute of Chemical Biology at the University of San Francisco were contracted to assist in the collection of field data.

The purpose of this report is to identify potential biological receptors and to provide the technical information needed for the preparation of a RA and ultimately an Ecological Risk Assessment in conformance with NEPA guidelines (DOE, 1993) and California Environmental Protection Agency guidelines (Cal-EPA, 1996a, b). Potential biological receptors, both common and rare, are identified within one mile of the study site. In addition, likely routes of exposure to biota are identified and analyzed.

1.1 Methods and Limitations

Terrestrial surveys of the site and vicinity were conducted on January 14 and January 29-30, 1997 by biologist Michael Wood of Botanical Consulting Services. Daytime and nighttime wildlife surveys were conducted on January 29 and February 11, 1997 by David Laabs of Biosearch Wildlife Surveys. Aquatic habitat surveys were conducted on January 17 by Mike Podlech at UCSF's Institute of Chemical Biology.

Surveys were conducted by walking parallel transects over the entire LEHR site. Both day-time and night-time surveys of LEHR were conducted. Day and night surveys were conducted to identify wildlife species active during different times of the day. The assessment of habitats within a one-mile radius of LEHR was performed by conducting a combination of windshield and foot surveys. Because much of the offsite study area

consists of actively cultivated fields, the walking of detailed parallel transects was not warranted. Distinctive habitats such as water bodies, marshes, woodlands and uncultivated lands were surveyed in more detail on foot. A visual survey of offsite aquatic habitats associated with the South Fork of Putah Creek was conducted by walking both banks upstream and downstream from LEHR.

All distinct habitat types were visited within a one-mile radius of LEHR. All identifiable plant species and animal observations were recorded and habitats mapped. Habitats and species locations were mapped in the field on a 1"=100' scale plan map of LEHR (Figure 4) and a 1"=300' scale topographic map of the site vicinity (Figure 5). A 1"=1,000' scale black and white aerial photograph (flown August 1995) was used to aid in mapping.

The intent of this study was to provide a reconnaissance-level evaluation of onsite and offsite habitat types. The surveys were conducted during a single season (winter) and they might not have been optimal for the detection of all commonly occurring plant and wildlife species. No focussed plant or wildlife surveys nor animal trapping studies were performed as part of this. No fish or benthic macroinvertebrate sampling was conducted. The surveys were not intended to conform with survey protocols for potentially occurring special-status animal species.

Due to the timing of the reconnaissance surveys, this study does not conform with California Department of Fish and Game's (CDFG) *Guidelines for assessing the effects of proposed developments on rare and endangered plants and plant communities* (CDFG, 1984). In addition, due to exceedingly heavy rainfall and record-breaking floods during January 1997, water levels in the South Fork of Putah Creek were too high to effectively conduct fish and benthic macroinvertebrate surveys. However, for the purposes of characterizing the biological resources of LEHR and surrounding areas, the conduct of a reconnaissance-level survey is considered adequate, especially since abundant fisheries data for Putah Creek already exist. However, there is a lack of data on benthic macroinvertebrates in Putah Creek. Further studies are needed to adequately characterize the aquatic fauna of the creek adjacent to LEHR.

A preliminary inventory of plant and animal species detected or expected to occur at LEHR is included in Appendix A. An inventory of plant and animal species detected within the vicinity of the project site during the present survey or previous studies is included in Appendices B.

A previous biological study was conducted for lands adjacent to LEHR. The *Draft Environmental Impact Report, Wastewater Treatment Plant Replacement Project* (UCD, 1996) describes biological resources for the immediate vicinity of LEHR and overlaps with the study area included in this report. Information cited in the document was based on properly timed surveys for plant and animals conducted in 1996. Additional background information on biological resources is presented in *University of California, Davis, Long Range Development Plan* (UCD, 1994). Background information on LEHR is presented

in *Draft Site Characterization Summary Report for the U.S. Department of Energy Areas at the Laboratory for Environmental Health Research, University of California, Davis* (DOE, 1996).

Information on sensitive biological resources used in the preparation of this report is based on field surveys of LEHR and vicinity, review of relevant environmental documents, review of the CDFG's California Natural Diversity Data Base (CNDDDB) (CDFG, 1996a) and the California Native Plant Society's (CNPS) *Electronic Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik, 1995) and lists of potentially occurring listed and proposed endangered and threatened species and candidate species (USFWS, 1997a, b). Rarity and distribution information on special-status plant and animal species was compiled from these documents as well as the CDFG's *Special Plants List* (CDFG, 1996b) and *Special Animals List* (CDFG, 1994), *Endangered, Threatened and Rare Plants of California* (CDFG, 1997a), *Endangered and Threatened Animals of California* (CDFG, 1997b), the U.S. Fish and Wildlife Service's *Endangered and Threatened Wildlife and Plants* (USFWS, 1994), and *Endangered and Threatened Species Plant and Animal Taxa; Proposed Rule* (USFWS, 1996). Additional sources of information include *Bird Species of Special Concern in California: an Annotated List of Declining or Vulnerable Bird Species* (Remsen, 1978), *Mammalian Species of Special Concern in California* (Williams, 1986), *Amphibian and Reptile Species of Special Concern in California* (Jennings and Hayes, 1994) and *Fish Species of Special Concern in California* (Moyle *et al.*, 1995).

Nomenclature used in this report conforms to Hickman (1993) for plants, AOU (1983) for birds, Jennings (1983) for reptiles and amphibians, and Jones *et al.* (1982) for mammals. Plant community names conform to Holland (1986) and Sawyer and Keeler-Wolf (1995); wetland community names conforming to Cowardin *et al.* (1979) are also provided. Nomenclature for special-status plant and wildlife species conforms to CDFG (1994, 1996b) and Skinner and Pavlik (1995).

2.0 EXISTING CONDITIONS

2.1 Setting

LEHR is located in northeastern Solano County, approximately 1.5 miles south of the Town of Davis (Figures 1 and 2). The site covers approximately 12 acres in the southeast portion of the UCD campus. The location of specific Operable Units (OUs) at LEHR addressed in this document are shown in Figure 3. LEHR is situated within the Sacramento Valley at approximately 50 feet above mean sea level. It is located on the north side of the South Fork of Putah Creek.

Approximately 75 percent of adjacent lands are used for agriculture including cattle grazing and the production of row crops, animal fodder, grains, fruit and nut crops.

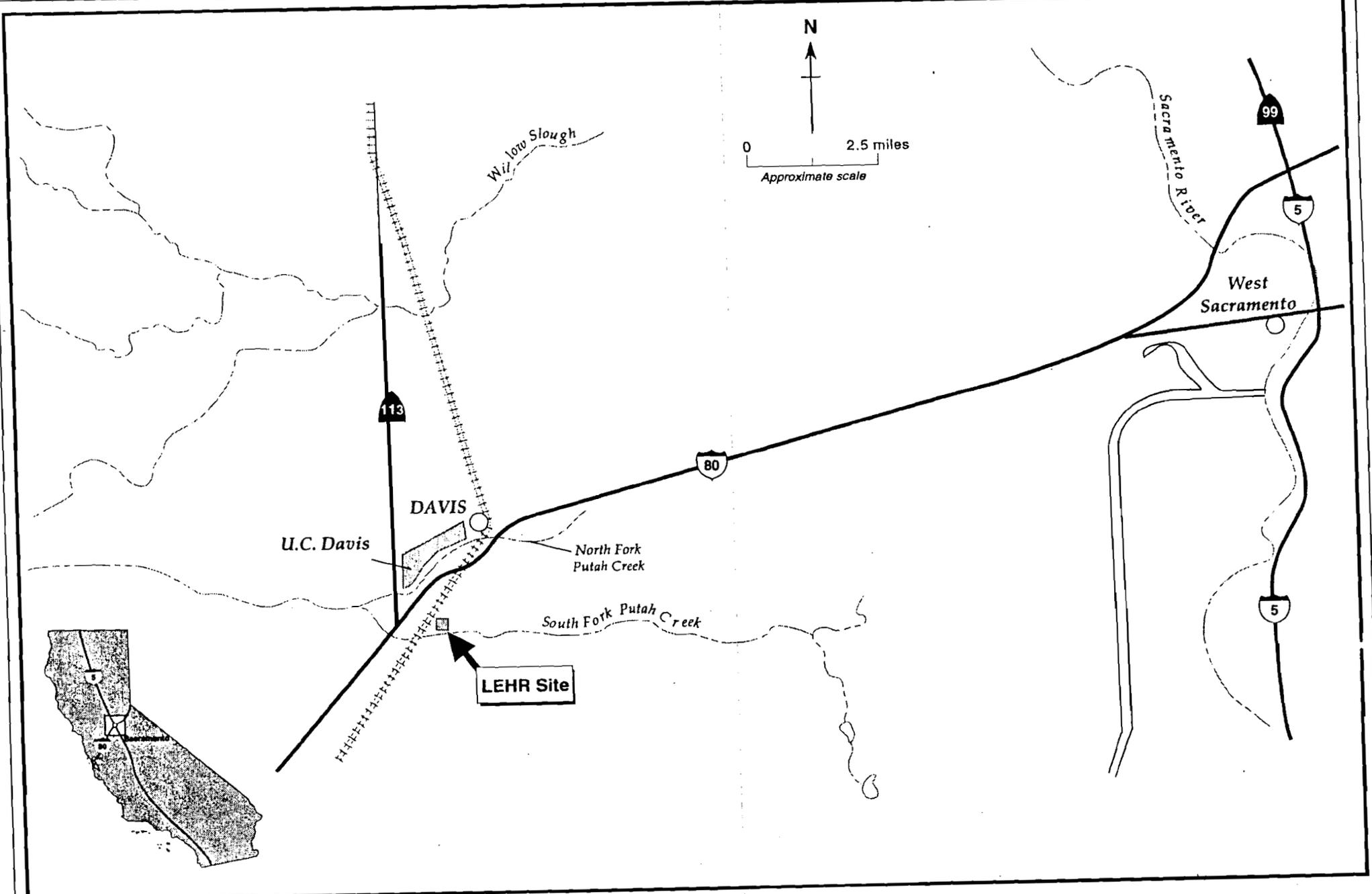


Figure 1. Site Location Map - LEHR Facility, Davis, California

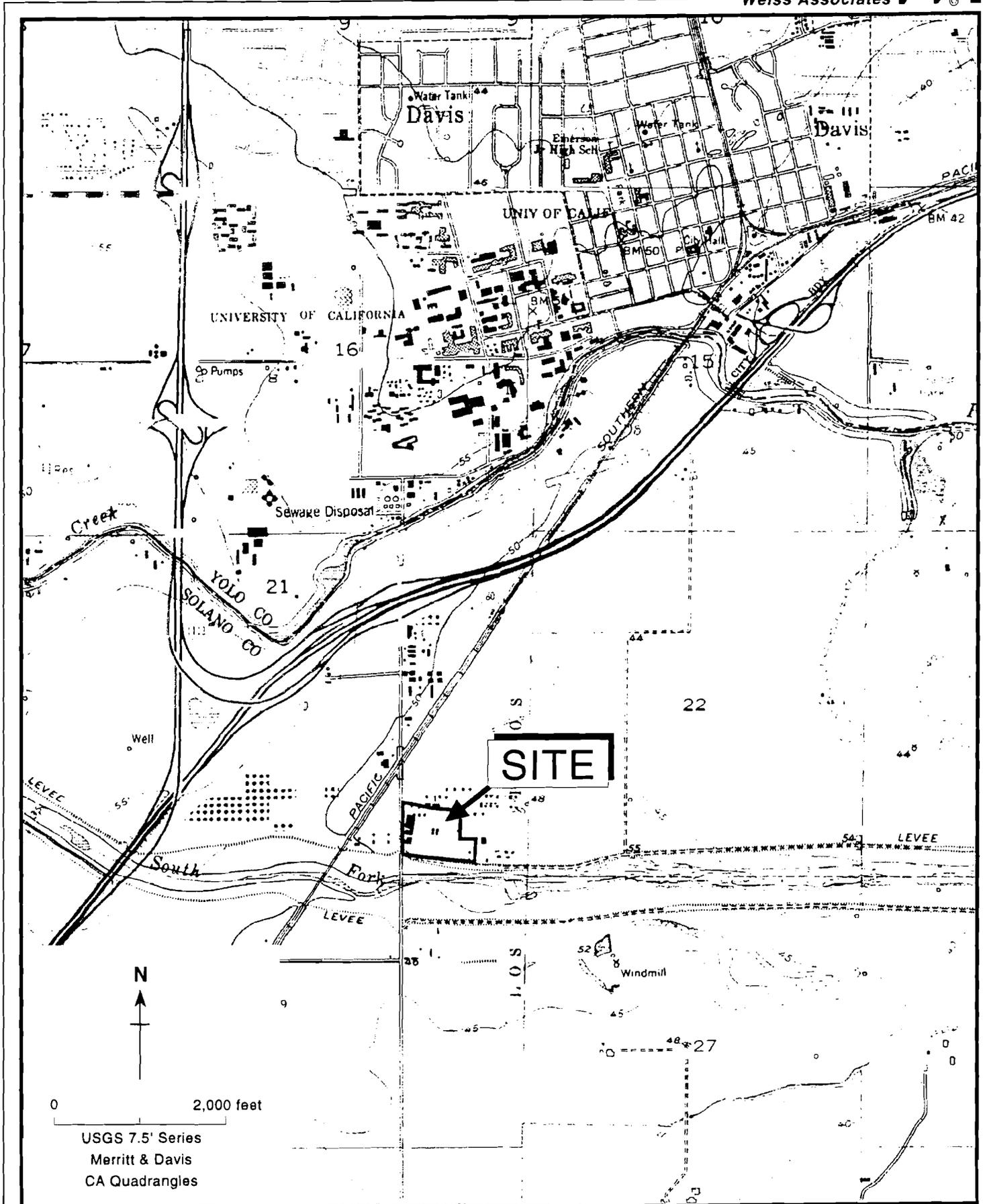


Figure 2. LEHR Site and UC Davis Location Map



EXPLANATION

- OU-1 DOE disposal trenches SW area, UC Davis disposal trenches
- OU-2 Strontium-90 leach system
Radium-226 leach system
- OU-3 Dog pens and north chemical dispensing area
- OU-4 Septic tanks
- OU-5 UC Davis landfill disposal units

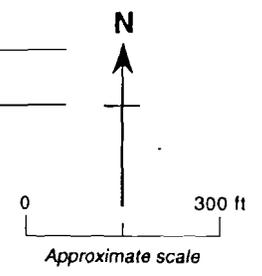
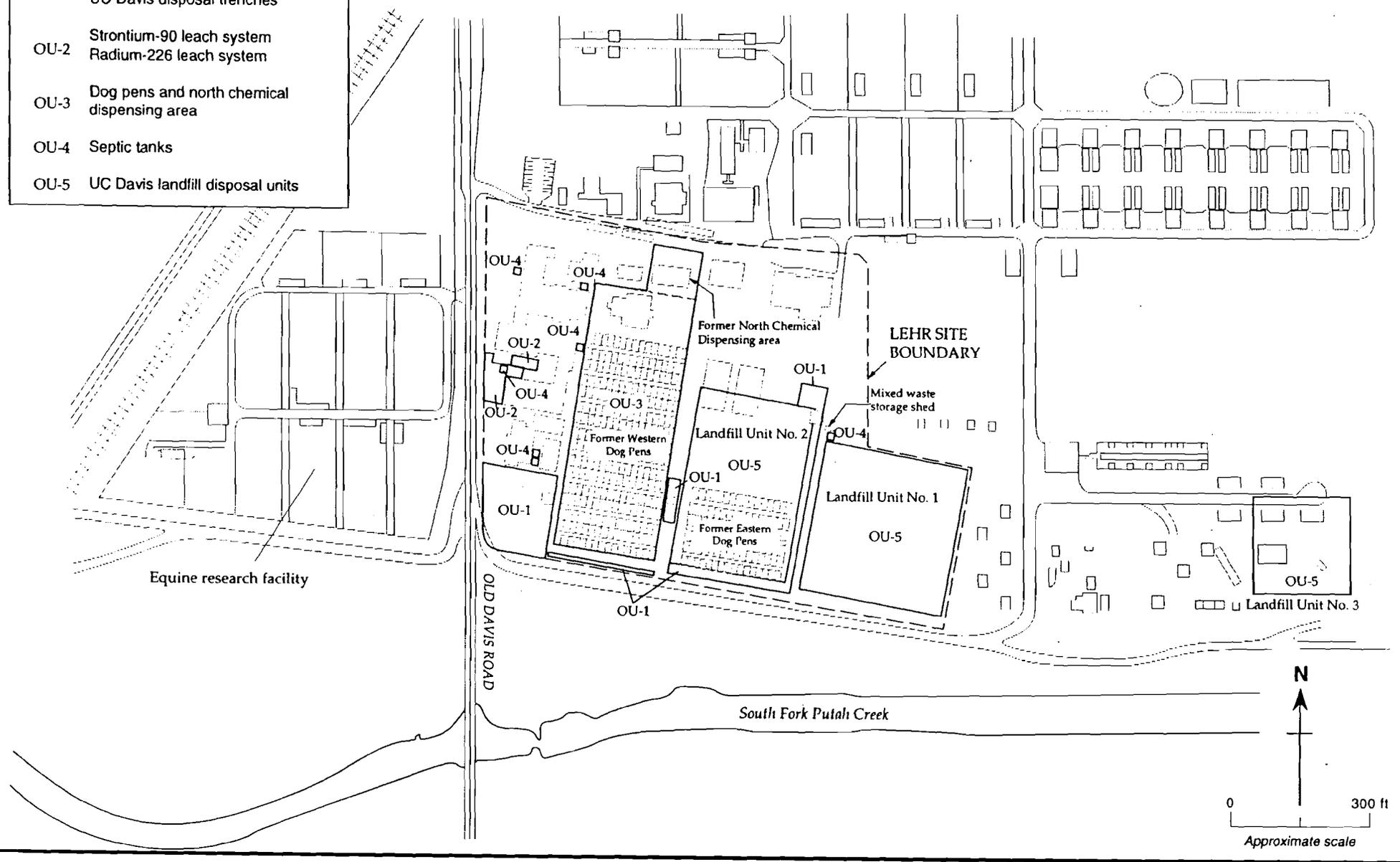


Figure 3. LEHR Site Map Showing Operable Units, LEHR Facility, Davis, California

Approximately 40 percent of agricultural lands in the vicinity are irrigated (DOE, 1996). Other nearby land uses include UCD equine and plant pathology research facilities and other research facilities. Approximately 40 percent of the site itself is developed, supporting laboratory buildings and other structures, paved areas and former kennels used by DOE. The former outdoor dog

kennels occupy 20 percent of the site, 30 percent consists of unpaved and weedy land and five percent is covered with mature non-native horticultural trees and landscaping (DOE, 1996).

Topography of the site is primarily level. Storm water is discharged into unlined drainage ditches that flow into the South Fork of Putah Creek. Soils at LEHR are mapped as Reiff fine sandy loam and are classified as Typic Xerofluvents (USDA, 1977). This unit consists of well-drained soils on alluvial fans approximately 180 feet thick. Soils are comprised of clays and silts and are well suited for agriculture. Permeability is moderately rapid, run-off is slow to very slow and the hazard of erosion is slight. The average annual temperature is

60° to 62° F, the average annual rainfall is 18 to 20 inches and the average frost-free season is 240 to 260 days. The Reiff series is not considered hydric (USDA, 1990).

Immediately south of LEHR is the South Fork of Putah Creek. It is an artificial channel built to divert flood waters from the City of Davis (Jones & Stokes, 1992). Flows are intermittent and the channel contains only scattered pools during dry years.

2.2 Plant Communities

LEHR is situated within the Yolo Basin in the southern Sacramento Valley. Although a majority of land in the region has been converted to agricultural uses and altered by the construction of levees, it once supported extensive areas of riparian woodland, prairie and tule marsh. These native plant communities are now restricted primarily to narrow bands along modified stream courses or in isolated upland patches.

LEHR is situated within the Yolo Basin in the southern Sacramento Valley. Although a majority of the land in the region has been converted to agricultural uses and altered by the construction of levees, it once supported extensive areas of riparian woodland, prairie and tule marsh. These plant communities are now restricted primarily to narrow bands along modified stream courses or in isolated patches.

Habitat types occurring within the study area include cultivated fields, ruderal/non-native grassland, ruderal/landscaped, a eucalyptus grove, Great Valley mixed riparian woodland, Great Valley willow scrub, Valley freshwater marsh and open water.

Cultivated Fields

Actively cultivated agricultural fields and orchards comprise approximately 75 percent of the study area. Cultivated lands to the north and west of LEHR belong to UCD and are used for the production of livestock fodder, pasturage and agricultural research. Test fields are cultivated for various row crops and fruit and nut crops. Lands to the east, south and southwest are privately owned and used primarily for the production of row crops. Most cultivated fields were fallow at the time of the present surveys.

Ruderal/Non-native Grassland

Ruderal/non-native grassland habitat occurs throughout the study area on vacant lots, long-fallow agricultural fields and areas that have been graded and abandoned. Non-native grassland is generally found in open areas in valleys and foothills throughout coastal and interior California (Holland, 1986). It typically occurs on soils consisting of fine-textured loams or clays that are somewhat poorly drained. Ruderal/non-native grassland consists of weedy vegetation that has recolonized disturbed sites from which most of the native annual and perennial plants have been removed. It is dominated by non-native annual grasses, weedy annual and perennial forbs and scattered native herbaceous species.

Within the study area, the most prevalent species occurring within this community include wild oats (*Avena* spp.), black mustard (*Brassica nigra*), brome grasses (*Bromus* spp.), yellow star thistle (*Centaurea solstitialis*), miner's lettuce (*Claytonia perfoliata*), willow herb (*Epilobium brachycarpum*), doveweed (*Eremocarpus setigerus*), filaree (*Erodium* spp.), jimson-weed (*Datura* sp.), hare barley (*Hordeum murinum* ssp. *leporinum*), annual bluegrass (*Poa annua*), Russian thistle (*Salsola* sp.), common groundsel (*Senecio vulgaris*), milk thistle (*Silybum marianum*), Johnson grass (*Sorghum halapense*), and common chickweed (*Stellaria media*), among others.

Ruderal/Landscaped

Ruderal/landscaped habitats consist of infrequently maintained or unmaintained areas that have been planted in part with horticultural trees and shrubs. Within the study area, this habitat type is common around buildings, along roadsides, and adjacent to cultivated fields. In addition to the herbaceous species occurring in the ruderal/non-native grassland habitat, described above, common shrub and tree species found in ruderal landscaped areas include oleander (*Nerium oleander*), aleppo pine (*Pinus halepensis*), Monterey pine (*Pinus radiata*), white mulberry (*Morus alba*), walnut (*Juglans* spp.), Tasmanian blue gum, black locust (*Robinia pseudo-acacia*), valley oak (*Quercus lobata*), cork oak (*Quercus suber*), common firethorn (*Pyracantha angustifolia*) and coast redwood (*Sequoia sempervirens*), among others. Intensively maintained landscaped areas associated with the UCD campus, such as the arboretum, support a wide variety of horticultural trees, shrubs, bedding plants and lawn areas. These areas were not surveyed in detail and are not included in the species lists.

Eucalyptus Grove

This non-native plant community has become naturalized throughout coastal and inland California since eucalyptus trees were first brought to the state in the late 1850s. Numerous species of the genus were imported for their horticultural interest and their potential utility as a fast-growing hardwood. Groves of eucalypts were first planted in the vicinity of Berkeley and later planted in groves throughout the Central Coast and into southern California. Because climatic conditions in the western half of the state are very similar to the range of many of the imported species of eucalypts, the planted groves managed to persist and spread without cultivation. It is estimated that there are between 600 and 800 species of *Eucalyptus*, about 18 of which have become fairly widespread in California. The most common and widely grown species is Tasmanian blue gum (*Eucalyptus globulus*). Tasmanian blue gum and another commonly found species, river red gum (*Eucalyptus camaldulensis*) form a single grove surrounded by cultivated fields south of the South Fork of Putah Creek. In addition, numerous river red gum trees have become established along the banks of the South Fork of Putah Creek.

Great Valley Mixed Riparian Forest

Great Valley mixed riparian forest is a tall, dense winter-deciduous forest, typically with a fairly well closed canopy. It consists of any of several species of tall riparian trees with an understory of shade-tolerant shrubs and lianas. It occurs on low gradient floodplains with fine-textured alluvial soil, usually away from active river channels but subject to periodic flooding. It is distributed on depositional streams throughout the Great Central Valley below 500 feet in elevation. It was once extensive in the Sacramento and San Joaquin valleys, where it has since been cleared for agriculture, flood control and urban expansion.

Within the study area, Great Valley mixed riparian forest consists of a narrow, poorly developed bands along the banks of the South Fork and North Fork of Putah Creek. It is comprised of such tree species as walnut (*Juglans* spp.), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), California box elder (*Acer negundo* ssp. *californicum*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), shining or Pacific willow (*Salix lucida* ssp. *lasiandra*), sandbar willow (*Salix exigua*), black willow (*Salix gooddingii*) and Mexican elderberry (*Sambucus mexicana*).

Great Valley mixed riparian forest within the study area most closely conforms to the Mixed Willow Series as described in Sawyer and Keeler-Wolf (1995) and palustrine forested or shrub-scrub wetland as described in Cowardin *et al.* (1979).

Great Valley Willow Scrub

Great Valley willow scrub typically consists of a dense, shrubby, streamside thicket dominated by any of several species of willows. An herbaceous understory may be present or not. This native plant community occurs close to river channels on fine-grained sand and gravel bars with a high water table. It is distributed along all the major rivers and most smaller streams throughout the Great Central Valley watershed below 1,000 feet in elevation (Holland, 1986).

Within the study area, Great Valley willow scrub consists of dense stands on the shore of a detention pond at the intersection of Interstate 80 and State Route 113. Patches of willows also occur along the South Fork of Putah Creek, intermixed with Great Valley mixed riparian forest, described above. Dominant species occurring within the study area include red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), shining or Pacific willow (*Salix lucida* ssp. *lasiandra*), sandbar willow (*Salix exigua*) and black willow (*Salix gooddingii*).

Great Valley willow scrub conforms to the Narrowleaf Willow, Black Willow, Arroyo Willow, Pacific Willow, and Red Willow series as described in Sawyer and Keeler-Wolf (1995) and palustrine shrub-scrub wetland as described in Cowardin *et al.* (1979).

Valley Freshwater Marsh

Valley freshwater marsh typically occurs in low-lying sites that are permanently flooded with fresh water and lacking significant current. It is found on nutrient-rich mineral soils that are saturated for all or most of the year. This vegetation community is best developed where surface flow is slow or stagnant or where the water table is so close to the surface as to saturate the soil surface from below. Valley freshwater marsh is distributed along coastal and inland valleys near river mouths and around the margins of lakes, springs and streams (Holland, 1986). This vegetation community characteristically forms a dense vegetative cover dominated by native, perennial, emergent monocots 1-15 feet high that reproduce by underground rhizomes.

Within the study area, valley freshwater marsh was detected in an isolated detention pond at the intersection of Interstate 80 and State Route 113, approximately 3,300 feet to the northwest of LEHR. This habitat is dominated by narrow-leaf cattail (*Typha angustifolia*) and broad-leaf cattail (*Typha latifolia*). While scattered stands of this plant community are expected along the South Fork of Putah Creek, none was evident at the time of the present surveys due to high water levels. No stands of Valley freshwater marsh are expected within the North Fork of Putah Creek within the study area because the channel has been highly modified and its banks lined with concrete and rip-rap. This native plant community conforms to the Cattail Series as classified by Sawyer and Keeler-Wolf (1995) and palustrine emergent freshwater wetland as described in Cowardin *et al.* (1979).

2.2.1 Onsite Plant Communities

LEHR consists of highly modified lands supporting buildings, parking areas, former landfill sites and former dog kennels. Areas not currently occupied by structures or covered with paving support ruderal vegetation, non-native grassland, landscaping (primarily horticultural trees) and bare ground (Figure 4). No naturally-occurring native plant communities occur at LEHR, although a small patch of native bunchgrass grassland has been created at the UCD Raptor Center, near OU-5 Landfill Unit No. 3 (see below).

Former Dog Pens

The former western and eastern dog pens consist of broad concrete walkways between rows of abandoned dog kennels. Each kennel is rimmed by a small concrete foundation and the ground is covered by a layer of gravel.

Vegetation within the former dog pens consists of entirely ruderal herbaceous species covering less than 20 percent of the land area, with gravel and paved areas covering the remaining 80 percent of the site. Common plant species include milk thistle, yellow star thistle and filaree. The western dog kennel supports a single young aleppo pine and six young Mexican elderberry shrubs. The eastern dog kennel supports a young aleppo pine, several young almond trees and a single large hackberry (*Celtis* sp.). Also present are four mature Mexican elderberry shrubs. A row of tall aleppo pines runs adjacent to the southern edge of the dog pens and to the east of the eastern dog pens. Three mature hackberry trees occur between the two sites.

Landfill Units

Three former landfill disposal units (OU-5) are included in this study. Landfill Unit No. 1, the cobalt field, is located just east of the former eastern dog pens. Approximately one-quarter of the site is paved with concrete. The remaining area supports 100 percent cover of ruderal herbaceous species. Common plant species detected during the present survey include filaree, annual bluegrass, miner's lettuce, willow herb, chickweed, milk thistle, yellow star thistle, wild oats, jimson-weed and common unicorn plant (*Proboscidea louisianica* ssp. *louisianica*), among others. The site is bounded by mature aleppo pines to the west and north and hackberry trees to the south.

Landfill Unit No. 2 consists of open ground immediately to the north of the eastern dog pens. It supports ruderal herbaceous species and a stand of aleppo pines. Vegetative cover is approximately 65 percent and consists of ruderal herbaceous species. Common plant species detected include filaree, yellow star thistle, milk thistle, black mustard, chickweed and annual bluegrass.

Landfill Unit No. 3 consists of open and developed land in the southeastern corner of LEHR. The site encompasses four buildings and a paved road. Undeveloped sites are vegetated by ruderal herbaceous species including filaree, milk thistle, annual bluegrass, common unicorn plant, brome grasses, willow herb, yellow star thistle and hare barley, among others. Vegetative cover is approximately 65 percent. An unlined drainage ditch crosses the southern portion of the site, draining from west to east and emptying into the adjacent agricultural drainage canal. Storm water drains directly into the South Fork of Putah Creek. The site overlaps a portion of the UCD Raptor Center's burrowing owl breeding habitat and artificial bunchgrass habitat.

Miscellaneous Remediation Sites

There are seven septic tank sites (OU-4) located in the western portion of LEHR. These sites are located beneath pavement or highly disturbed land and do not support any vegetation. Adjacent vegetation includes ornamental trees or shrubs such as aleppo pine, white mulberry, oleander, common firethorn, walnut, Tasmanian blue gum and shiny xylosma (*Xylosma congestum*), among others.

Strontium-90 and radium-226 treatment systems (OU-2) are also located in the western portion of LEHR on paved or highly disturbed sites. They do not currently support any vegetation but occur adjacent to mature aleppo pine trees, Tasmanian blue gum and oleander.

DOE and UCD disposal trenches (OU-1) are located in the southwest corner of LEHR and immediately to the north of Landfill Unit No. 2. The site in the southwest corner of LEHR consists of mostly bare ground with about 35 percent cover of ruderal herbaceous species. Common species include milk thistle, willow herb, filaree, common groundsel, annual bluegrass and chickweed, among others. A hackberry tree and walnut also occur onsite. The site is bounded to the south and west by mature aleppo pine trees and oleander. The second disposal trench site consists of a field supporting a dense cover of ruderal herbaceous weeds. Common species include filaree, milk thistle, chickweed, miner's lettuce, wild oats and brome grasses, among others. The native species rigid fiddleneck (*Amsinckia menziesii* var. *intermedia*) is also common.

2.2.2 Offsite Plant Communities

Lands immediately surrounding LEHR to the west, north and east consist of cultivated fields, animal (horse and goat) enclosures and research facilities. The predominant vegetation consists of ornamental trees and other landscaping, and small patches of ruderal/non-native grassland. No extensive, uncultivated plant communities occur within a one mile radius to the west, north or east.

To the south, however, LEHR is bordered by ruderal/non-native grassland and a narrow band of Great Valley mixed riparian forest associated with both banks of the South Fork of Putah Creek. Both plant communities are described in section 2.2, above. South of the creek, the privately owned lands support active agriculture, a few residences with ornamental tree and shrub plantings and a small eucalyptus grove. No extensive stands of uncultivated plant communities occur south of the creek levee within a one mile radius of LEHR. Plant communities within the study area are shown in Figure 5.

2.3 Wildlife Habitats

LEHR is situated in the southern Sacramento Valley. Topography in the region is virtually flat, sloping slightly to the east towards the Sacramento River. Native habitats in the area have been largely modified by agricultural and urban development.

2.3.1 Terrestrial Wildlife Habitats

2.3.1.1 Onsite Wildlife Habitats

Wildlife habitats at LEHR have been significantly altered by historic and current land-uses. Habitat for wildlife currently consists of ruderal/annual grassland and ornamental (non-native) trees and shrubs. Wildlife species utilizing the site are generally adapted to disturbed conditions. However, the close proximity of Putah Creek influences the suite of species which are found on the project site.

Ruderal/Non-native Grassland

Ruderal/annual grassland habitat on-site is occupied by resident mammals including California ground squirrel, Botta's pocket gopher and black-tailed jackrabbit. Mammalian predators that forage on the site include striped skunk, red fox, gray fox and raccoon. Several avian species forage in the ruderal habitat including white-crowned sparrow, house finch, California towhee and dark-eyed junco. Several nesting and wintering raptor species could use this habitat for foraging.

Ruderal/Landscaped

The ornamental non-native trees and shrubs on the project site provide roosting and foraging habitat for a number of native avian species including yellow-rumped warbler, red-breasted nuthatch, ruby-crowned kinglet, great horned owl and northern flicker. Mammalian species including striped skunk, opossum and raccoon are likely to use the trees and shrubs for cover.

Buildings and Structures

Several native species have adapted to use buildings and structures. Numerous birds perch and forage on structures including American crow, Say's phoebe and California towhee. Other birds often nest in eaves or rafters including house finch, house sparrow and barn owl. Bat species including big brown bat and California myotis utilize buildings as diurnal or nocturnal roosts.

2.3.1.2 Offsite Wildlife Habitats

Agricultural

Much of the area surrounding LEHR has been converted to agricultural use and ornamental (non-native trees and shrubs) habitat. Agricultural lands near LEHR include row crops and orchards. Cropland and pasture can be used by burrowing mammals including pocket gopher and deer mouse. Several raptor species forage in these fields, as do ground-feeding birds such as Brewer's blackbird and horned lark. Use by other fauna is limited. Orchards provide perches for raptor species such as red-tailed hawk and American kestrel, as well as American crow, house finch, scrub jay and yellow-billed magpie.

Mixed Riparian Woodland

The most significant resource in the area is the South Fork of Putah Creek, adjacent to the south of the site. The valley-foothill riparian woodland associated with the creek has been altered by the construction of levees and controlled water releases from upstream. Nevertheless, the South Fork of Putah Creek provides quality habitat for a number of native wildlife species. Riparian habitats are the most productive ecosystems in the region, and wide-spread conversion of surrounding lands has served to increase the importance of this resource. Numerous native birds, mammals, reptiles and amphibians utilize the creek for foraging, cover and breeding, while others use the creek as a movement corridor or as a migration stop.

Buildings and Structures

Several native species have adapted to use buildings and structures. Numerous birds perch and hunt on structures including American crow, Say's phoebe and California towhee. Other birds often nest in eaves or rafters including house finch, house sparrow and barn owl. Bat species including big brown bat and California myotis utilize buildings as diurnal or nocturnal roosts. Other structures in the vicinity of LEHR include wooden railroad bridges and concrete highway overpasses. Both of these structures can provide roosting sites for native bat species.

Eucalyptus Grove

Although non-native, eucalyptus groves are utilized by a number of native wildlife species in the region, in part because native woodlands are rare. Several avian species including yellow-rumped warbler, house finch and Nuttall's woodpecker forage and find cover in these groves. Raptors, particularly red-tailed hawks, are known to nest in eucalyptus groves.

Great Valley Willow Scrub

This habitat type is typically associated with streamsides and pond edges. The dense structure along with the proximity to water attracts a variety of species seeking water and cover. Because they are often associated with riparian systems, these habitats can provide cover to species moving along the riparian corridor during daily movements or migrations. Avian species that inhabit willow scrub include Bewick's wren and song sparrow. Mammalian species that find cover in this habitat include raccoon and Aubudon's cottontail.

Valley Freshwater Marsh

This habitat provides dense vegetative cover as well as a valuable water source for many native wildlife species in the region. These features provide cover from predation, thermal protection, and a food source. The pond between I-80 and SR-113 is relatively large and provides open water for diving and dabbling ducks. Pied-billed grebe, mallard, American coot, snowy egret and great blue heron are some of the avian species that forage in freshwater marshes. Many amphibians and reptiles use marshes for part or all of their life-cycles including Pacific tree frog, western toad, and western pond turtle. The California red-legged frog was historically

distributed in these habitats, although the species has been virtually extirpated from the Central Valley.

2.3.2 Aquatic Wildlife Habitats

Putah Creek is one of the largest streams within the Sacramento River drainage (UCD, 1996). The South Fork of the creek, running adjacent to the southern border of LEHR, is an artificial channel built to divert flood waters from the City of Davis (Jones & Stokes Associates, 1992). It is an intermittent stream containing only scattered pools during dry years. In the past, drought conditions have completely dried out the lower portions of the creek, resulting in significant fish and invertebrate kills (Marchetti and Moyle, 1995). The relatively narrow and straight stream channel is characterized by slow flows and shallow water levels during much of the year. The stream substrate is composed of sand and other fine sediments, making it an inadequate spawning site for anadromous fish. The riparian vegetation associated with the South Fork of Putah Creek is dominated by several species

of willow, cottonwood, valley oak and eucalyptus (see Section 2.2, above), providing some vegetative cover to the active stream channel in spring. The dominant instream vegetation in aquatic habitats like lower Putah Creek is an attached filamentous alga in the genus *Periphyton* sp.). During summer months when surface waters are limited to the low flow channel, only portions of the stream are shaded by riparian vegetation. Water temperatures during summer may rise considerably, providing reduced habitat values for warm water fish and invertebrates.

Fish

Although the South Fork of Putah Creek still contains a large number of fish species (Appendix C), the majority of these are introduced warm-water species such as bass, sunfish and catfish. During years of high flow, anadromous fish such as rainbow trout and chinook salmon have been observed migrating through the lower reaches of Putah Creek (UCD, 1996) to spawning sites below Solano Dam (Jones & Stokes Associates, 1992).

Due to high water levels of the South Fork of Putah Creek at the time of the survey, thorough sampling of fish and benthic macroinvertebrates was not practical. Even if sampling had been possible, species abundance and diversity would have been low due to the volume and velocity of water flowing in the creek (Molles, 1985; Erman *et al.*, 1988). During high flows when volume and velocity of water are high fish tend to disperse to find shelter, making meaningful sampling extremely difficult. Instead, an extensive search for historic data on fish and invertebrates for Putah Creek was conducted. Sources include published literature and personal communications with regional experts and agency officials. Over a period of 15 years, from 1980 to 1995, researchers and students at UCD have established an extensive list of fish species occurring along the lower reaches of Putah Creek (UCD, 1996). Because these data have been compiled over a period of many years, they provide a more complete assessment of the fish populations of Putah Creek than could have been achieved during a single season survey.

No special-status fish species have been recorded in the South Fork of Putah Creek (CDFG, 1996a) and none are expected to occur.

Benthic Invertebrates

No benthic invertebrate data currently exist for the lower reaches of Putah Creek (Carney, pers. comm.; Erman, pers. comm.; Williams, pers. comm.). Although unpublished invertebrate data have been collected from the upper reaches of Putah Creek, extrapolation of these results to the study area is not possible due to the vastly different physical characteristics of the two reaches of the creek.

The benthic macroinvertebrate community of the South Fork of Putah Creek is expected to consist of species adapted to warm water, slow currents and a muddy substrate. Characteristic taxa likely to be present include members of Diptera (family Chironomidae),

Trichoptera (family Lepidostomatidae), Oligocheata, Tubellaria, Gastropoda, Amphipoda, Mollusca and Crustacea (Merritt and Cummins, 1996; McCafferty, 1981). Most species within these groups are generally classified as being tolerant of environmental disturbances and are typically common and abundant. Even with specific sampling of benthic macroinvertebrates, identification to the specific level is very rarely performed due to a lack of useful keys and the great level of expertise necessary. The family Chironimidae, for example, is usually not even identified to the generic level because of its complexity. As far as environmental requirements and tolerances are concerned, all chironomids are considered to be very similar. The family Lepidostomatidae has only one genus in the western U.S. (*Lepidostoma* sp.). No special-status benthic or pelagic invertebrate species are expected to occur within the South Fork of Putah Creek (Erman, pers. comm.).

2.4 Special-Status Species

Special-status plant species include those listed as endangered, threatened, rare or candidates for listing by the USFWS (1994, 1996) and CDFG (1997a), those listed as "Special Plants" by the CDFG (1996b) and those listed as rare and endangered by the CNPS (Skinner and Pavlik, 1995). The CNPS listing is sanctioned by the CDFG, and serves essentially as their list of "candidate" plant species. The CDFG recommends that all taxa listed by the CNPS be addressed in California Environmental Quality Act (CEQA) documents.

Special-status animal species include those listed as endangered, threatened, rare or candidates for listing by the USFWS (1994, 1996) or CDFG (1997b), those listed as "Special Animals" by the CDFG (1994). Additional species receive federal protection under the Bald Eagle Protection Act (*i.e.*, bald eagle, golden eagle) and the Migratory Bird Treaty Act CEQA Section 15380(d). The CDFG further classifies some species under the following categories: "fully protected", "protected fur-bearer", "protected amphibian", and "protected reptile". The designation as "protected" indicates that a species may not be taken or possessed except under special permit from the CDFG; "fully protected" indicates that a species can be taken for scientific purposes by permit only. The Audubon Society's Blue List (Tate, 1986) is a list of bird species considered to be declining in the United States. The list does not include species already listed by the federal government as endangered or threatened. Local populations may, and often do, differ in status from the Blue List status for the entire U.S. and the actual degree of sensitivity of species on the Blue List depends on their local status.

The USFWS recently changed its policy on candidate species. The term "candidate" now strictly refers to species for which the USFWS has on file enough information to propose listing. Former Category 2 candidate species are now regarded as "Species of Concern" but are no longer monitored by the USFWS. However, the USFWS encourages the consideration of these taxa during project planning and environmental review as they may become candidate species in the future.

2.4.1 Special-Status Plant Species

A total of 32 special-status plant species have been recorded in the region of the study area. A complete list of potentially occurring special-status plant species, their legal status, habitat affinities, flowering times and life forms is included in Table 1. An explanation of sensitivity codes is provided in Appendix D.

2.4.1.1 Onsite Special-Status Plant Species

Of the 32 potentially-occurring special-status plant species recorded from the project region, none were detected or have been recorded at LEHR. Due to the highly disturbed condition of the site and the lack of suitable habitat, no special-status plant species are expected to occur onsite. Although northern California black walnut (*Juglans californica* var. *hindsii*) does occur at and near LEHR, these trees are not naturally occurring and would not be regarded as a significant biological resource (see below).

Northern California Black Walnut

Northern California black walnut is a federal Species of Concern and is on the CNPS list 1B as a species that is rare or endangered in California. Only 2 out of 3 natural stands of this native variety are still extant in Napa and Contra Costa counties (Skinner and Pavlik, 1995). Northern California black walnut is a large, single-trunked deciduous tree reaching 80 feet in height. It once was found mostly around old Indian campsites and occurred from Lake and Napa counties to Contra Costa and Stanislaus counties. It is frequently found growing as a street tree in central California and was widely used as root stock for budding English walnuts (*Juglans regia*), with which it freely hybridizes.

Northern California black walnut occurs onsite and in the project vicinity. The presence of these trees is not regarded as significant; it is believed that they were either planted for ornament or have sprouted from former orchard plantings. English walnut, the common eating walnut, also occurs in the project vicinity.

2.4.1.2 Offsite Special-Status Plant Species

Of the 32 target special-status plant species recorded from the project region, none were detected or have been recorded in the vicinity of LEHR and none are considered to have a high potential for occurrence. Two species, Sanford's arrowhead (*Sagittaria sanfordii*) and rose-mallow (*Hibiscus lasiocarpus*) are considered to have a moderate potential for occurrence within the study area. Marginally suitable habitat is present for these marsh species along the banks of the South Fork of Putah Creek. Although northern California black walnut does occur within the study area, these trees are not naturally occurring and would not be regarded as a significant biological resource (see above).

TABLE 1

POTENTIALLY OCCURRING SPECIAL-STATUS PLANT SPECIES AT THE
LEHR PROJECT SITE AND VICINITY

Family Scientific Name Common Name	Status ¹	Habitat Affinities and Reported Localities in the Project Area	Blooming Period/ Life Form	Potential for Occurrence Onsite or in Project Area
Alismataceae				
<i>Sagittaria sanfordii</i> Sanford's arrowhead	Federal SC State CEQA CNPS 1B:2-2-3	Assorted shallow freshwater marshes and swamps. Known from Shasta to Fresno counties and Marin County.	May-Aug Perennial herb (rhizomatous)	None onsite: no suitable habitat present. Moderate offsite: suitable habitat present.
Apiaceae				
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	Federal SC State CR CNPS 1B:2-2-3	Intertidal brackish and freshwater marshes along streambanks. Recorded in the San Joaquin and Sacramento River Delta and lower Napa River channel.	April-Oct Perennial herb	None: no suitable habitat present onsite or in project vicinity.
<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i> Gairdner's yampah	Federal SC State CEQA? CNPS 4:1-2-3	Mesic sites in broadleaved upland forest, chaparral, coastal prairie, Valley/foothill grassland, vernal pools. Found from the Bay Area and San Joaquin Valley to the Oregon border. Endangered in the southern portion of its range.	June-Oct Perennial herb	None: no suitable habitat present onsite or in project vicinity.
Brassicaceae				
<i>Lepidium latipes</i> var. <i>heckardii</i> Heckard's pepper-grass	Federal none State CEQA CNPS 1B:3-2-3	Valley/foothill grassland on alkaline flats. Restricted to Yolo County.	April-May Annual herb	None onsite: no suitable habitat. Low offsite: marginally suitable habitat present.
Campanulaceae				
<i>Downingia pusilla</i> dwarf downingia	Federal none State CEQA CNPS 2:1-2-1	Mesic sites in Valley/foothill grassland and vernal pools. Occurs from Sonoma and Napa counties through the Sacramento Valley and Sierra foothills.	Mar-May Annual herb	None onsite: no suitable habitat. Low offsite: marginally suitable habitat present.
<i>Legenere limosa</i> legenere	Federal SC State CEQA CNPS 1B:2-3-3	Vernal pools. Recorded from Lake and Napa counties throughout the Sacramento Valley. Believed extinct in Sonoma and Stanislaus counties.	May-June Annual herb	None: no suitable habitat present onsite or in project vicinity.
Chenopodiaceae				
<i>Atriplex cordulata</i> heartscale	Federal SC State CEQA CNPS 1B:2-2-3	Chenopod scrub, Valley/foothill grassland, on somewhat alkaline or saline hard packed soils. Recorded from Alameda County throughout the Central Valley from Glenn to Kern counties. Presumed extinct in Contra Costa and San Joaquin counties.	May-Oct Annual herb	None: no suitable habitat present onsite or in project vicinity.

TABLE 1 (continued)

<i>Atriplex coronata</i> var. <i>coronata</i> crownscale	Federal State CNPS	none CEQA? 4:1-2-3	Chenopod scrub, Valley/foothill grassland on alkaline soils. Known from the northern San Joaquin Valley, Central Coast, and eastern San Francisco Bay.	Apr-Oct Annual herb	None: no suitable habitat present onsite or in project vicinity.
<i>Atriplex depressa</i> brittlescale	Federal State CNPS	none CEQA 1B:2-2-3	Chenopod scrub, playas and Valley/foothill grassland on alkaline and clay soils. Occurs from Solano County throughout the Sacramento and San Joaquin Valleys. Presumed extinct in Stanislaus County.	May-Oct Annual herb	None: no suitable habitat present onsite or in project vicinity.
<i>Atriplex joaquiniana</i> San Joaquin spearscale	Federal State CNPS	SC CEQA 1B:2-2-3	Chenopod scrub, Valley/foothill grassland and alkali meadows. Occurs from Solano County throughout the Sacramento and San Joaquin valleys. Presumed extinct in Santa Clara, San Joaquin and Tulare counties.	April-Sept Annual herb	None: no suitable habitat present onsite or in project vicinity.
Fabaceae					
<i>Astragalus breweri</i> Brewer's milk-vetch	Federal State CNPS	none CEQA? 4:1-2-3	Meadows and grassy hillsides, oak woodland, chaparral, often on serpentinite or volcanic soils. Known from Marin, Mendocino, Lake, Sonoma, Colusa, Napa and Yolo counties.	April-June Annual herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
<i>Astragalus rattanii</i> var. <i>jepsonianus</i> Jepson's milk vetch	Federal State CNPS	none CEQA 1B:2-2-3	Cismontane woodland and Valley/foothill grasslands, often on serpentinite. Recorded from Colusa, Glenn, Lake, Napa, Tehama and Yolo counties.	April-June Annual herb	None: no suitable habitat present onsite or in project vicinity.
<i>Astragalus tener</i> var. <i>ferrisiae</i> alkali milk vetch	Federal State CNPS	SC CEQA 1B:3-3-3	Vernally mesic meadows, Valley/foothill grasslands on sub-alkaline flats. Extant in Butte County; presumed extirpated in Solano, Colusa and Yolo counties.	April-May Annual herb	None: no suitable habitat present onsite or in project vicinity.
<i>Astragalus tener</i> var. <i>tener</i> alkali milk vetch	Federal State CNPS	none CEQA 1B:3-2-3	Playas, Valley/foothill grasslands, on adobe clay and alkaline vernal pools. Extant in Merced, Solano and Yolo counties. Extinct throughout the Bay Area and San Joaquin Valley.	March-June Annual herb	None: no suitable habitat present onsite or in project vicinity.
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	Federal State CNPS	SC CEQA 1B:2-2-3	Freshwater and brackish marshes. Occurs throughout the Sacramento -San Joaquin River delta, San Francisco Bay, and Central Valley.	May-Sept. Perennial herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
<i>Trifolium amoenum</i> showy Indian clover	Federal State CNPS	FPE CEQA 1B:3-3-3	Valley/foothill grasslands, in sunny open sites, sometimes on serpentinite. Rediscovered in Sonoma County in 1993, believed extinct in Alameda, Mendocino, Marin, Napa, Santa Clara and Solano counties.	April-June Annual herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.

TABLE 1 (continued)

Grossulariaceae					
<i>Ribes victoris</i> Victor's gooseberry	Federal State CNPS	none CEQA? 4:1-1-3	Mixed evergreen forest, redwood forest, and chaparral in canyons. Known from Mendocino, Marin, Napa, Solano and Sonoma counties.	Mar-April Deciduous shrub	None: no suitable habitat present onsite or in project vicinity.
Juglandaceae					
<i>Juglans californica</i> var. <i>hindsii</i> Northern California black walnut	Federal State CNPS	SC CEQA 1B:3-3-3	Riparian forests and riparian woodlands. Known from only two extant populations in Napa and Contra Costa counties. Presumed extinct in Sacramento, Solano and Yolo counties. Widely naturalized in cismontane Calif., used as a root stock for <i>J. regia</i> .	April-May Deciduous tree	None: no natural stands present (see text).
Liliaceae					
<i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	Federal State CNPS	none CEQA 1B:2-2-3	Chaparral, cismontane woodland, Valley/foothill grassland. Known from Contra Costa and possibly Solano counties.	April-June Perennial herb (bulbiferous)	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
<i>Fritillaria liliacea</i> fragrant fritillary	Federal State CNPS	SC CEQA 1B:1-2-3	Coastal prairie, coastal scrub, Valley/foothill grassland near the coast, on clay or serpentinite. Known from throughout the Central Coast from Sonoma to Monterey counties and the San Francisco Bay Area.	Feb-April Perennial herb (bulbiferous)	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
<i>Fritillaria pluriflora</i> adobe lily	Federal State CNPS	SC CEQA 1B:1-2-3	Chaparral, cismontane woodland, Valley/foothill grassland, often on adobe soils. Recorded from throughout the northern Sacramento Valley to Napa.	Feb-April (bulbiferous)	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
Malvaceae					
<i>Hibiscus lasiocarpus</i> rose-mallow	Federal State CNPS	none CEQA 2:2-2-1	Freshwater marshes. Restricted to the Sacramento-San Joaquin River Delta.	June-Sept Perennial herb (rhizomatous)	None onsite: no suitable habitat present. Moderate offsite: suitable habitat present.
Poaceae					
<i>Neostafa colusana</i> Colusa grass	Federal State CNPS	FPT CE 1B:1-3-3	Restricted to large, northern claypan vernal pools with alkaline soils that remain flooded until early summer. Known from Merced, Solano, Stanislaus and Yolo counties; presumed extinct in Colusa County.	May-July Annual herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
<i>Tuctoria mucronata</i> Crampton's tuctoria	Federal State CNPS	FE CE 1B:3-3-3	Restricted to vernal pools. Known from only three occurrences near Jepson Prairie and Davis. Reported in Solano and Yolo counties.	April-July Annual herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.
Polemoniaceae					
<i>Navarretia leucocephala</i> ssp. <i>bakeri</i> Baker's navarretia	Federal State CNPS	none CEQA 1B:2-2-3	Cismontane woodland, lower montane coniferous forest, mesic meadows, Valley/foothill grassland, vernal pools. Known from Tehama, Colusa, Lake, Mendocino, Solano, Sonoma, Santa Clara, Marin, and Napa counties.	May-July Annual herb	None onsite: no suitable habitat present. Low offsite: marginally suitable habitat present.

TABLE 1 (continued)

Ranunculaceae					
<i>Delphinium recurvatum</i> recurved larkspur	Federal State CNPS	SC CEQA 1B:1-2-3	Chenopod scrub, cismontane woodland and Valley/ foothill grassland, in alkaline places. Restricted to the Central Valley from Colusa to Kern counties, San Luis Obispo.	Mar-May Perennial herb	Noneonsite: nosuitablehabitat present. Low offsite: marginally suitable habitat present.
<i>Myosorus minimus</i> ssp. <i>apus</i> little mousetail	Federal State CNPS	SC CEQA? 3:2-3-2	Alkaline vernal pools. Recorded throughout the Central Valley.	March-June Annual herb	Noneonsite: nosuitablehabitat present. Low offsite: marginally suitable habitat present.
<i>Ranunculus lobbii</i> Lobb's aquatic buttercup	Federal State CNPS	none CEQA? 4:1-2-3	Mesic sites in cismontane woodland, Valley/foothill grassland, North Coast coniferous forest and vernal pools. Known from the San Francisco Bay Area to Mendocino and Napa counties.	March-May Annual herb (aquatic)	Noneonsite: nosuitablehabitat present. Low offsite: marginally suitable habitat present.
Scrophulariaceae					
<i>Cordylanthus mollis</i> ssp. <i>hispidus</i> hispid bird's-beak	Federal State CNPS	SC CEQA 1B:2-3-3	Meadows, playas, Valley/foothill grassland on alkaline sites. Recorded from Alameda, Kern, Merced, Placer and Solano counties.	June-Sept Annual herb (hemiparasite)	None: no suitable habitat present onsite or in project vicinity.
<i>Cordylanthus palmatus</i> palmate-bracted bird's-beak	Federal State CNPS	FE CE 1B:3-3-3	Chenopod scrub, foothill/Valley grassland (alkaline sites). Known from Springtown and three small populations in the Central Valley.	May-Oct Annual herb (hemiparasite)	None: no suitable habitat present onsite or in project vicinity.
<i>Gratiola heterosepala</i> Boggs Lake hedge-hyssop	Federal State CNPS	none CE 1B:1-2-2	Marshes along lake margins, vernal pools on clay. Occurs from the Sacramento Valley to the Modoc Plateau, central Sierra foothills and interior of the North Coast Ranges.	April-Aug Annual herb	Noneonsite: nosuitablehabitat present. Low offsite: marginally suitable habitat present.
<i>Limosella subulata</i> Delta mudwort	Federal State CNPS	none CEQA 2:2-3-1	Marshes and swamps, muddy or sandy intertidal flats in the Sacramento and San Joaquin river deltas.	May-Aug Perennial herb (stoloniferous)	None: no suitable habitat present onsite or in project vicinity.

¹ Explanation of sensitivity status codes provided in Appendix D.

2.4.2 Special-Status Animal Species

A total of 72 special-status animal species have been recorded in the region or may inhabit the study area. A complete list of potentially occurring special-status animal species, their legal status and habitat affinities is included in Table 2. An explanation of sensitivity codes is provided in Appendix D.

2.4.2.1 Onsite Special-Status Animal Species

A total of 14 special-status wildlife species are considered to have a moderate to high potential to inhabit or forage at LEHR. These are described in detail below. The remaining 58 target species are not considered to have any potential for occurrence onsite.

Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle (*Desmocerus californicus demorphus*) is dependent on elderberry trees (*Sambucus* sp.) for every stage of its life cycle. Adults deposit eggs in the bark of elderberries. Following hatching, the larvae burrow into the pith of plant stems to feed and develop into pupae. As the plants blossom in the spring, the beetles metamorphose into their adult form and emerge to feed on the leaves and flowers. Wide-spread clearing of riparian habitats and water diversions have resulted in a severe decline of this species. They are most abundant where elderberry trees grow in well-developed riparian forests. Although scattered elderberries are present within the LEHR boundaries, those plants along Putah Creek are more likely to harbor the species. Potentially suitable habitat for Valley elderberry longhorn beetle is present in the former eastern dog pens, former western dog pens, immediately south of Landfill Unit No. 3, near the southeastern corner of the UCD Raptor Center parking lot and along the north bank of the South Fork of Putah Creek (Figure 2). Prior to the initiation of remediation actions, elderberry bushes onsite should be surveyed for the presence of the species.

Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) was once considered one of the most common raptor species in California. The species winters in Argentina and migrates to nesting areas beginning in March. Nests are situated in tall trees, usually near streams, and adjacent to foraging habitat. Foraging areas are relatively large, sometimes encompassing more than two thousand acres. Prey includes voles and insects. Conversion of grassland and riparian habitats in the Central Valley has contributed to a dramatic population decrease. The statewide population estimate is only 550 birds (CDFG, 1992). Swainson's hawk is listed by the state as threatened.

Nesting Swainson's hawks have been recorded on both the South and North Forks of Putah Creek. At least seven recorded nesting sites are within a mile of LEHR. One

TABLE 2

**POTENTIALLY OCCURRING SPECIAL-STATUS ANIMAL SPECIES AT THE
LEHR PROJECT SITE AND VICINITY**

Scientific Name	Status¹		Habitat Affinities and Reported Localities in the Project Area	Potential for Occurrence Onsite or in Project Area
Common Name				
Invertebrates				
<i>Anthiscus antiochensis</i> Antioch Dunes Anthicid Beetle	Federal State	SC none	Extinct. Formerly inhabited sandy substrate at the Antioch Dunes.	None: no suitable habitat onsite or offsite.
<i>Anthiscus sacramento</i> Sacramento Anthicid Beetle	Federal State	SC none	Inhabits sandy substrate among willows in riparian habitats. Known from Sacramento, Solano and Butte counties and upper Putah Creek in Yolo County.	None onsite. Low to Moderate: suitable habitat present along South Fork of Putah Creek.
<i>Branchinecta conseratio</i> Conservancy Fairy Shrimp	Federal State	FE none	Inhabits astatic pools located in swales formed by old, braided alluvium and filled by winter and spring rains, lasting until June. Endemic to grasslands in the northern 2/3 of the Central Valley. Recorded from Jepson Prairie.	Low: aquatic habitats in vicinity are not suitable.
<i>Branchinecta lynchi</i> Vernal Pool Fairy Shrimp	Federal State	FT none	Inhabits vernal pools in grasslands in the Central Valley, Coast Ranges and South Coast Mountains. Active between December and May.	None: No vernal pools in vicinity of project site.
<i>Cicindela hirticollis abrupta</i> Sacramento Valley Tiger Beetle	Federal State	SC none	Open sandy areas among willows in riparian habitats. Occurs in the lower Sacramento Valley. Recorded in the Sacramento and American rivers and Cache Creek. Not recorded in project vicinity.	None onsite. Low to Moderate: suitable habitat present along South Fork of Putah Creek.
<i>Desmocerus californicus demorphus</i> Valley Elderberry Longhorn Beetle	Federal State	FT none	Riparian and oak savanna habitats. Requires elderberry (<i>Sambucus</i> spp.) as host plants. Inhabits streamsidings in the Central Valley below 3,000 feet.	Low onsite: marginally suitable habitat present. High offsite: abundant suitable habitat present.
<i>Lepidurus packardi</i> Vernal Pool Tadpole Shrimp	Federal State	FE none	Inhabits vernal pools in grassland habitats in the Central Valley between Shasta County and Merced County. Eggs hatch within a month of inundation, adults present until pools dry in the spring.	None: No vernal pools in vicinity of project site.
<i>Mimosula pacifica</i> Antioch Multilid Wasp	Federal State	SC none	Sand deposits along rivers. Distributed throughout the Sacramento/San Joaquin River Delta. Not recorded in project vicinity.	None onsite. Low to Moderate offsite: suitable habitat present along South Fork of Putah Creek.

TABLE 2 (continued)

<i>Plyphylla stellata</i> Delta June Beetle	Federal State	SC none	Inhabits sandy areas in riverine habitats. Occurs in the Sacramento/San Joaquin River Delta. Not recorded in project vicinity.	None onsite. Moderate offsite: moderately suitable habitat present in Putah Creek.
<i>Proceratium californicum</i> Valley Oak Ant	Federal State	SC none	Riparian valley oak woodland. Recorded from isolated locations throughout California. Recorded from Yolo County, but not from project vicinity.	None: no suitable habitat present within study area.
<i>Smithistruma reliquia</i> Ancient Ant	Federal State	SC none	Inhabits riparian valley oak woodland. Known from Yolo County. Not recorded from project vicinity.	None: no suitable habitat present within study area.
Birds				
<i>Accipiter cooperi</i> Cooper's Hawk (nesting site only)	Federal State Audubon	MB SSC Blue List	Nests primarily in deciduous riparian forests. May also occupy dense canopied forests from gray pine-oak woodland to ponderosa pine. Forages in open woodlands. Not known to nest in Yolo County.	Moderate onsite: limited foraging habitat present. Detected offsite: species is a regular winter resident in region.
<i>Accipiter striatus</i> Sharp-shinned Hawk	Federal State Audubon	MB SSC blue list	Dense canopy pine or mixed conifer forest and riparian habitats. Permanent resident in the Sierra Nevada, Cascade, Klamath, and North Coast Ranges as well as along the coast from Marin to Monterey counties.	Low onsite: limited foraging habitat present. Moderate offsite: may occur as an occasional winter visitor.
<i>Agelaius tricolor</i> Tricolored Blackbird	Federal State Audubon	SC, MB SSC none	Nests in dense freshwater marshes with cattail or tules. Forages in grasslands. Largely endemic to California. Permanent resident in the Central Valley and along the coast from Marin to San Diego counties. Also known from Lake, Sonoma and Solano counties.	None onsite. Moderate offsite: may occur as an occasional visitor. No suitable nesting habitat present.
<i>Aquila chrysaetos</i> Golden Eagle (nesting/wintering sites only)	Federal State Audubon	MB SSC none	Forages in a variety of habitats including grasslands, chaparral and oak woodland supporting abundant mammals. Nests on cliffs and escarpments and tall trees.	Low onsite: marginal foraging habitat present. Moderate offsite: may occur as a winter visitor.
<i>Ardea herodias</i> Great Blue Heron (rookery site only)	Federal State Audubon	MB * none	Nests in large trees including <i>Eucalyptus</i> and fir. Often colonial. Known from San Francisco Bay.	Low onsite: marginal habitat present. Detected offsite: individuals only. No rookeries present nor expected.
<i>Asio flammeus</i> Short-eared Owl (nesting only)	Federal State Audubon	MB SSC Blue List	Found in salt and freshwater swamps, lowland meadows, irrigated alfalfa fields. Nests in tules and tall grasslands. Needs daytime seclusion. Nests on dry ground in depressions concealed by vegetation. Regularly observed north of Davis.	Moderate onsite and offsite: may forage in region; no appropriate nesting habitat present.

TABLE 2 (continued)

<i>Athene cunicularia hypugea</i> Western Burrowing Owl	Federal State Audubon	SC, MB SSC SC	Open, dry grasslands, deserts, prairies, farmland and scrublands with abundant active and abandoned mammal burrows. Occurs in lowlands throughout California. Nested on UC Davis campus until recently.	Detected onsite: Nesting at Raptor Center. May forage onsite. Suitable habitat offsite.
<i>Branta canadensis leucopareia</i> Aleutian Canada Goose	Federal State Audubon	FT, MB none none	One of eleven recognized subspecies. Winters in wetlands, grasslands and cultivated fields.	None onsite. Moderate offsite: Potential foraging habitat in vicinity.
<i>Buteo regalis</i> Ferruginous Hawk	Federal State Audubon	SC, MB SSC SC	Forages over open terrain in plains and foothills where there are abundant ground squirrels or other small mammals. Does not nest in California.	Low onsite: limited foraging habitat present. Moderate offsite: may occur as an occasional winter visitor.
<i>Buteo swainsoni</i> Swainson's Hawk	Federal State Audubon	MB CT SC	Nests in oaks or cottonwoods in or near riparian habitat. Forages in grasslands and agricultural fields. Highest nesting densities are in Yolo County. Common throughout the lower Sacramento and San Joaquin valleys.	High onsite. Detected offsite: over 30 recorded nest sites within ½ mile of UCD. Nests along Putah Creek.
<i>Casmerodius albus</i> Great Egret (rookery site only)	Federal State Audubon	MB * none	Nests in large trees near water. Forages in marshes and mudflats.	Low onsite. Moderate offsite: Detected in Putah Creek.
<i>Charadrius montanus</i> Mountain Plover	Federal State Audubon	C SSC none	Nests on arid plains and short-grass prairies in Western Great Plains and Great Basin; Winters in open, arid habitats, as well as fallow fields.	Low onsite. Moderate offsite: may occur as winter resident.
<i>Circus cyaneus</i> Northern Harrier (nesting)	Federal State Audubon	MB SSC blue list	Inhabits open habitats including grasslands and agricultural fields; is known to roost communally. Known as winter and breeding resident from the vicinity of Davis;	Moderate onsite. Detected offsite: forages over study area. No nesting habitat onsite.
<i>Coccyzus americanus occidentalis</i> Western Yellow Billed Cuckoo	Federal State Audubon	MB CE blue list	Nests in dense riparian forests with a dense understory of willows. Preferred foraging habitat consists of cottonwoods as the dominant overstory species. Nearby populations are recorded along the upper Sacramento and lower Feather rivers.	None: no suitable nesting habitat present within study area.
<i>Dendroica petechia brewsteri</i> California Yellow Warbler	Federal State Audubon	MB SSC SC	Nests in riparian areas dominated by willows, cottonwoods, sycamores or alders and in mature chaparral. May also inhabit oak and coniferous woodlands and urban areas near stream courses.	Moderate onsite and offsite: occurs as a regular migrant. Not expected to nest in study area.

TABLE 2 (continued)

<i>Egretta thula</i> Snowy Egret (rookery site only)	Federal State Audubon	MB * none	Nests in dense marshes or low trees. Forages in marshes, ponds, mudflats and fields.	Low onsite. Moderate offsite: Detected in Putah Creek.
<i>Elanus leucurus</i> White-tailed Kite (nesting sites only)	Federal State Audubon	none * none	Inhabits foothills and valleys of central and southern California. Nests in oak woodlands and riparian habitats. Forages in marshlands and grasslands.	Moderate onsite: potential nesting habitat on site. Detected offsite.
<i>Empidonax traillii brewsteri</i> Little Willow Flycatcher	Federal State Audubon	SC, MB CE SC	Inhabits riparian areas and wet meadows with abundant willows for breeding. Occurs in isolated areas in the foothills of the Sierra Nevada.	None: no suitable nesting habitat present. Not recorded in site vicinity.
<i>Eremophila alpestris actia</i> California Horned Lark	Federal State Audubon	MB SSC none	Nests on ground in open grassland. Known from vicinity of San Francisco Bay.	High onsite. Detected offsite: suitable foraging habitat onsite and adjacent.
<i>Falco columbarius</i> Merlin	Federal State Audubon	MB SSC SC	Winters in open country often along coast near concentrations of shorebirds. Known from vicinity of San Francisco Bay.	Low: possible foraging migrant. No suitable nesting habitat onsite or offsite.
<i>Falco mexicanus</i> (nesting) Prairie Falcon	Federal State Audubon	MB SSC none	Nests in cliffs and forages in open, arid and semi-arid habitats and marshes. Occurs as a permanent resident throughout California.	Low onsite and offsite: may occur as an occasional migrant.
<i>Falco peregrinus anatum</i> American Peregrine Falcon	Federal State Audubon	FE, MB CE none	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers or marshes. Permanent resident in the North and South Coast Ranges. Winters in the Central Valley southward through the Transverse and Peninsular Ranges. Not known to nest in Yolo County.	Low onsite and offsite: may occur as an occasional migrant or winter visitor.
<i>Grus canadensis tabida</i> Greater Sandhill Crane	Federal State Audubon	MB CT none	Summers in open terrain near shallow freshwater lakes or marshes. Winters in plains and valleys near bodies of fresh water. Breeds from Sierra County northward to east side of the Cascade Range. Winters in the Central Valley and southern Imperial County.	None onsite. Low offsite: a rare visitor to the area. No suitable foraging habitat present.
<i>Haliaeetus leucocephalus</i> Bald Eagle	Federal State Audubon	FT CE none	Nests in tall trees, often near water in Pacific Northwest and Canada. Winters in a variety of habitats. Occurs in project vicinity as a transient.	Low onsite and offsite: may occur as an occasional migrant.

TABLE 2 (continued)

<i>Icteria virens</i> Yellow-breasted Chat	Federal State Audubon	MB SSC none	Nests in dense riparian habitats dominated by willows, alders, ash, blackberry and grape vines. Uncommon migrant in California. Known to nest in Sonoma, Mendocino, El Dorado, Shasta and Yolo counties.	Low onsite and offsite: may occur as an occasional migrant. No suitable nesting habitat present.
<i>Lanius ludovicianus</i> Loggerhead Shrike	Federal State Audubon	SC, MB SSC Blue List	Open grasslands at margins of woodland and scrub habitats. Requires abundant lookout perches such as fence posts. Resident and winter visitor in lowlands and foothills throughout California.	Moderate onsite and offsite: suitable nesting habitat present. Observed in study area.
<i>Numenius americanus</i> Long-billed Curlew	Federal State Audubon	MB SSC SC	Nests at high elevations in grasslands adjacent to lakes or marshes. Winters along the coast on mudflats or in interior valleys in grasslands and agricultural fields.	Low onsite and offsite: uncommon visitor in agricultural fields.
<i>Nycticorax nycticorax</i> Black-crowned Night Heron (rookery site only)	Federal State Audubon	MB * none	Forages in marshes, streams and ponds. Active at night. Roosts communally during the day.	Low onsite. Moderate offsite: potential nesting/roosting sites present. Detected in Putah Creek.
<i>Pandion haliaetus</i> Osprey	Federal State Audubon	none SSC none	Nests in snags or cliffs, usually near water. Forages on fish. Nests along north coast, Cascades, and Sierra Nevada, winters along coast of central and southern California.	Low onsite and offsite: occasional visitor along Putah Creek.
<i>Phalacrocorax auritus</i> Double Crested Cormorant (Rookery Site)	Federal State Audubon	MB SSC none	Nests in colonies on coastal cliffs and offshore islands and on lake margins in the interior of the state. Nesting colonies recorded on the San Mateo-Hayward bridge, south San Francisco Bay.	None onsite. Low offsite: detected in Putah Creek. No suitable nesting sites.
<i>Plegadis chihi</i> White-faced Ibis (rookeries only)	Federal State Audubon	SC, MB SSC none	Breeds in freshwater marsh habitats in Great Plains and Great Basin. Winters in marsh habitats in Central Valley of California	None onsite. Low offsite: does not breed in vicinity; may occur as occasional winter migrant.
<i>Riparia riparia</i> Bank Swallow (nesting colonies only)	Federal State Audubon	MB CT none	Nests in colonies on sandy cliffs near water, marshes, lakes, streams, the ocean. Forages in fields. Largest remaining populations occur along the Sacramento River from Tehama to Sacramento counties. Also found along the Feather and lower American rivers and in the Owens Valley. Breeding populations also present along the coast from San Francisco to Monterey counties.	None: no suitable nesting habitat present. Not recorded in project vicinity.

TABLE 2 (continued)

Reptiles				
<i>Clemmys marmorata marmorata</i> Northwestern Pond Turtle	Federal State	SC SSC	Permanent, slow-moving creeks with mud or rocky bottom and densely vegetated shoreline. Inhabits woodlands, grasslands and open forests. Occurs from the Oregon border to the San Francisco Bay and inland throughout the Sacramento Valley.	None onsite. High offsite: suitable habitat present in South Fork of Putah Creek. Recorded in project vicinity.
<i>Phrynosoma coronatum frontale</i> California Horned Lizard	Federal State	SC SSC	Occurs in scrub and grassland on sandy soils; Active above ground between April and October; Prey primarily on native ant species. Known historically from vicinity of Davis.	Low onsite and offsite: No suitable habitat in vicinity of project site.
<i>Thamnophis gigas</i> Giant Garter Snake	Federal State	FT CT	Inhabits sloughs, canals and small water courses with grassy banks and emergent vegetation. Requires high ground for basking and escape during winter flooding. Known from the Central Valley from Fresno north to the Sutter Buttes.	None onsite. Moderate offsite: recorded in the South Fork of Putah Creek within study area in 1976. Habitat is marginally suitable.
Amphibians				
<i>Ambystoma californiense</i> California Tiger Salamander	Federal State	C SSC	Breeds in temporary ponds and vernal pools; aestivates in small mammal burrows. Recorded from vicinity of Davis.	None onsite. Low offsite: No appropriate breeding habitat in project vicinity.
<i>Rana aurora draytonii</i> California Red-legged Frog	Federal State	FT SSC	Permanent stream pools, ponds and creeks with emergent and/or riparian vegetation. May aestivate in rodent burrows during dry periods. Restricted to Coastal areas and coastal mountains from Marin to San Diego counties.	None onsite. Low offsite: believed extirpated from the Sacramento Valley.
<i>Scaphiopus hammondii</i> Western Spadefoot Toad	Federal State	SC SSC	Breeds in temporary pools following winter and spring rains; larvae transform within 3 - 11 weeks; aestivates in burrows in loose soil; Historically recorded from vicinity of Winters.	None onsite. Low offsite: No suitable breeding habitat present.
Mammals				
<i>Antrozous pallidus</i> Pallid Bat	Federal State	none SSC	Roosts in hollow trees, rock outcrops, buildings and bridges. Forages primarily on ground-dwelling arthropods.	Low onsite. Moderate offsite: suitable foraging and roosting habitat along Putah Creek.
<i>Corynorhinus (Plecotus) townsendii</i> <i>townsendii</i> Townsend's Big-eared Bat	Federal State	SC SSC	Roosts in caves and buildings; Maternal colonies very sensitive to disturbance by humans; forages in woodlands and grasslands, primarily on moths.	Low onsite. Moderate offsite: suitable foraging and roosting habitat along Putah Creek.

TABLE 2 (continued)

<i>Eumops perotis californicus</i> California Mastiff Bat	Federal State	SC SSC	Roosts in rock outcrops, occasionally buildings. Forages on moths, beetles and crickets. May travel up to 25 miles from roost to foraging area.	Low onsite. Moderate offsite: suitable foraging and roosting habitat along Putah Creek.
<i>Myotis ciliolabrum</i> Small-footed Myotis Bat	Federal State	SC none	Roosts in caves, mine tunnels, crevices in rocks and buildings, generally near forested areas. Feeds low among trees or over shrubs. Distributed from interior California through the Great Plains states to the east coast.	Low: potentially suitable foraging and roosting habitat present onsite and offsite.
<i>Myotis evotis</i> longe-eared bat	Federal State	SC none	Inhabits forested areas, roosts in building or trees. Occassionally found in caves. Does not occur in large colonies. Distributed throughout the western U.S.	Low: potentially suitable foraging and roosting habitat
<i>Myotis thysanoides</i> Fringed Myotis Bat	Federal State	SC none	Roosts in colonies in caves, attics of old buildings, snags and cliffs. Distributed throughout the western U.S. and into Mexico.	Low: potentially suitable foraging and roosting habitat present onsite and offsite.
<i>Myotis volans</i> Long-legged Myotis	Federal State	SC none	Roosts colonially in snags, buildings and small pockets and crevices in rock ledges. Distributed throughout the western U.S., Mexico and Canada.	Low: potentially suitable foraging and roosting habitat present onsite and offsite.
<i>Myotis yumanensis</i> Yuma Myotis Bat	Federal State	SC none	Roosts colonially in caves, tunnels and buildings. Inhabits arid regions. Distributed throughout the western U.S., Mexico and Canada.	Low: potentially suitable foraging and roosting habitat present onsite and offsite.
<i>Neotoma fuscipes riparia</i> San Joaquin Valley Woodrat	Federal State	SC SSC	Inhabits brushy and forested areas in riparian habitats. Builds nests in trees, snags and logs. Occurs along the San Joaquin, Stanislaus and Tuolumne rivers; not known from	Low: no suitable habitat along Putah Creek; requires undisturbed creek terrace vegetation project area.
<i>Perognathus inornatus</i> San Joaquin Pocket Mouse	Federal State	SC SSC	Inhabits grassland and scrub habitats in Central and San Joaquin Valleys.	None onsite and offsite: no suitable habitat instudy area.
<i>Taxidea taxus</i> American Badger	Federal State	none *	Inhabits open grasslands, savannas and mountain meadows near timberline. Require abundant burrowing mammals, their principal food source, and loose, friable soils. Believed restricted in California to the Central Valley and adjacent lowlands to the west.	Moderate onsite and offsite: an individual was seen at LEHR by UCD personnel in 1996.

TABLE 2 (continued)

Fish				
<i>Acipenser medirostris</i> Green Sturgeon	Federal State	SC CT	Anadromous. Inhabits estuaries of large rivers. Migrates far inland to spawn. Spawns during spring in rivers in deep, cold, fast-moving water. Only known to spawn in the Sacramento and Klamath rivers. Estuaries serve as nurseries. Adults are mostly marine, spending limited time in estuaries and rivers. Occurs from Alaska to Baja California.	None: no suitable habitat present onsite or in Putah Creek.
<i>Archoplites interruptus</i> Sacramento Perch	Federal State	none watch	This warm water, lacustrine species formerly inhabited sloughs, slow-moving rivers and lakes of the Central Valley. It is now mostly restricted to reservoirs and farm ponds. It is associated with submerged or emergent vegetation, which is essential for young. The species is native to the Sacramento, San Joaquin, Salinas and Pajaro rivers.	None currently: existing habitat is not considered suitable. Species might have historically occurred in lower Putah Creek.
<i>Hypomesus transpacificus</i> Delta Smelt	Federal State	FT CT	Inhabits open brackish and fresh water of large channels. Spawns during spring in sloughs and channels in the upper Delta. Spawning has also been recorded in Montezuma Slough and Suisun Bay. Occurs from Isleton on the Sacramento River and Mossman on the San Joaquin River to Suisun Bay.	None: no suitable habitat present in Putah Creek.
<i>Lampetra ayresi</i> River Lamprey	Federal State	SC watch	Anadromous. Spawns during spring in clear gravel riffle pools in coastal streams. Young metamorphose upriver from salt water and enter the ocean in the following late spring. Restricted to coastal streams from Alaska to the San Francisco Bay. In Calif., the species is only recorded the Sacramento-San Joaquin rivers and the Russian River.	Low: marginally suitable habitat present in Putah Creek.
<i>Lampreta tridentata</i> Pacific Lamprey	Federal State	SC none	Anadromous. Spawns during spring in clear, gravel riffle pools in clear, coastal streams. Adults feed in the ocean. Distributed from Alaska to the Santa Ana River.	High: suitable habitat present in Putah Creek.
<i>Oncorhynchus mykiss irideus</i> Steelhead (Rainbow) Trout (Summer-run)	Federal State	FPE CT	Anadromous. Inhabits cold headwaters, creeks, and small to large rivers and lakes with swift, shallow water and clean, loose gravel for spawning. Requires large pools during summer months. Spawns in spring. Occurs throughout the Pacific coast of the U.S. Migrates throughout the SF Bay.	Very low: while steelhead are likely to migrate through Putah Creek, the presence of summer-run fish is highly unlikely
<i>Oncorhynchus tshawtscha</i> winter-run Chinook (King) Salmon	Federal State	FE CT	Anadromous. Inhabits open ocean and coastal streams. Adults move upstream Jan.-June and begin spawning in April. Downstream migrant smolts move past Red Bluff Aug.-Oct. Limited entirely to the Sacramento River system.	None: no suitable habitat present in Putah Creek.
<i>Oncorhynchus tshawtscha</i> spring-run Chinook (King) Salmon	Federal State	none CE	Anadromous. Inhabits open ocean and coastal streams. Adults move upstream Mar.-July and begin spawning in August. Limited entirely to the Sacramento River system.	Low: marginally suitable habitat present in Putah Creek. The presence of spring-run fish is unlikely.

TABLE 2 (continued)

<i>Pogonichthys macrolepidotus</i> Sacramento Splittail	Federal State	FPT CT	Inhabits both fresh and brackish water. Adults spawn on flooded vegetation after storms from Jan.-May. Larvae remain in inshore vegetation until late summer. Recorded in Sacramento, Sutter, Yolo and Stanislaus counties.	Low: marginally suitable habitat present in Putah Creek. Presence is unlikely.
<i>Spirinchus thaleichthys</i> Longfin Smelt	Federal State	SC CE	This native species inhabits estuaries and bays near to shore. It occurs along the Pacific coast from Alaska to the Monterey Bay. In the San Francisco Bay, its main populations are in San Pablo Bay. It ascends coastal streams from Oct. to Dec. to spawn. It is an important forage species.	None: no suitable habitat present in Putah Creek.

¹ Explanation of sensitivity status codes provided in Appendix D.

recorded nesting site is within 1/4 mile of LEHR on the bank of the South Fork of Putah Creek between the Railroad tracks and Old Davis Road. Potential nesting trees, roosting trees and foraging habitat occurs at LEHR. Pre-construction surveys should be conducted to determine the proximity of the closest breeding Swainson's hawks.

White-Tailed Kite

White-tailed kite (*Elanus leucurus*), formerly black-shouldered kite, underwent a dramatic reduction in numbers as a result of hunting. It has since recovered and expanded its range, which extends throughout the Central Valley and Coastal Zone in California. The species nests in trees near open foraging areas. It is able to persist around agricultural areas if appropriate prey such as voles, other small mammals, small birds and insects is available. It is regularly seen from roadsides. White-tailed kite is listed as a state "fully protected species" in California.

White-tailed kites are known to nest along the South Fork of Putah Creek. The nearest recorded nesting site is within 1.5 miles of LEHR. Pairs of white-tailed kites were observed during the present surveys at two locations within a mile of the project site. Potential nesting trees, roosting trees and foraging habitat occurs on the LEHR facilities. Numerous foraging individuals were observed in the vicinity of LEHR during the present surveys. Pre-construction surveys should be conducted to determine the proximity of the closest breeding white-tailed kites.

Northern Harrier

Northern harrier (*Circus cyaneus*), formerly known as marsh hawk, occupies a variety of open habitats including grassland, wetlands and agricultural fields. The species has a broad range that includes most of North America. Northern Harriers nest on the ground in tall vegetation and forage low over the ground for small mammals and amphibians. A decline in northern harrier breeding populations was noted as early as the 1940's, and is likely associated with destruction of marsh habitat. Foraging individuals were observed in the vicinity of LEHR during the present surveys.

Burrowing owl

Burrowing owl (*Athene cunicularia hypugea*) is primarily a resident of grassland and desert scrub communities that ranges from central and coastal California throughout the southwest and much of the United States. It feeds on small mammals, birds and insects. It typically occupies burrows excavated by other species such as California ground squirrel, American badger and San Joaquin kit fox. It is also able to utilize manmade cover-sites such as culverts, artificial dens and rubble piles (California Burrowing Owl Consortium, 1993). In open habitats, burrowing owls prefer areas where the grasses are relatively short, including non-native grasslands grazed by livestock. The species shows a strong site-fidelity from year to year (Plumton and Lutz, 1993). It is also capable of becoming

tolerant of human activity and is regularly observed along roadsides and adjacent to cultivated fields. Habitat conversion and secondary poisoning resulting from ground squirrel control efforts have caused declines throughout much of its range, especially in the Bay Area and surrounding regions (DeSante and Ruhlen, 1995). The burrowing owl is listed as a Species of Special Concern (CDFG, 1994) and has received increased attention due to the endorsement of the California Burrowing Owl Consortium (CBOC) survey protocol by the CDFG (CBOC, 1993; CDFG, 1995).

Resident burrowing owls historically occurred on the UCD campus, but populations have decreased drastically in recent years. Twenty-two pairs were observed on campus on 1981 (CDFG, 1996a), while none were observed in 1991 (UCD, 1996). The UCD Raptor Center, located adjacent to LEHR, has a captive breeding program for the burrowing owl. Currently, there are six owls living in artificial burrows at the Center. These individuals are not enclosed and could potentially forage on the project site.

Potential nesting habitat is present at LEHR, particularly at Landfill Unit No. 1, where numerous California ground squirrel burrows are present. Pre-construction surveys should be conducted to determine if burrowing owls are nesting on the project site. Depending on the time of year, passive relocation of individual owls might be appropriate. The Raptor Center should be consulted during this process.

California Horned Lark

California horned lark (*Eremophila alpestris actia*) breeds in open grasslands throughout the Central Valley and adjacent foothills and along the central and southern California coast region. It is a ground nesting species that prefers shorter, less dense grasses. It forms flocks in the summer and winter months which are often observed foraging and roosting in cultivated fields and along dirt roads. The California horned lark is listed as a Species of Special Concern. Wintering individuals were observed in the vicinity of LEHR during the present surveys. Appropriate foraging habitat is present in the non-native grasslands on the LEHR site, and the species was observed within 1/2 mile of the site.

Cooper's Hawk

Cooper's hawk (*Accipiter cooperi*) breeds primarily in deciduous and riparian forests. It preys upon small birds and mammals and is usually found near water. Cooper's hawks were observed at two locations in the vicinity of LEHR during the present surveys. One individual was observed along the south levee of the South Fork of Putah Creek adjacent to LEHR. Another individual was observed in the redwood grove near the Arboretum along the North Fork of Putah Creek. These individuals are likely winter residents. The species has not been recorded as a breeding bird in the project vicinity.

Short-eared Owl

Short-eared owl (*Asio flammeus*) has a winter range that extends from southern California south and a breeding range extending from central California north through Alaska. It is usually found in open habitats including grasslands, irrigated lands and marshes. It preys primarily on voles and other small mammals although it will also take birds and reptiles. The species requires dense vegetation for use as cover and nesting. Short-eared owl is listed by the state as a Species of Special Concern.

Individuals of short-eared owl are residents at a raptor preserve located approximately five miles northeast of LEHR (Wilkenson & Debben, 1980; Laabs, pers. obs.). Potential foraging habitat for the species exists in the irrigated fields adjacent to LEHR and within the study area.

Loggerhead Shrike

Loggerhead shrike (*Lanius ludovicianus*) ranges throughout California. It utilizes open grassland and scrub communities for foraging and nests above the ground in trees and shrubs. It is usually observed perched on telephone wire or fence posts. It regularly impales prey, including lizards and small mammals, on thorns or barbed wire. Availability of suitable nesting sites is believed to limit the abundance and distribution of this species within its range. Loggerhead shrike is listed by the state as a Species of Special Concern. The species was observed on the UCD campus during the present survey. Within the study area, potential nesting habitat is present along both the North Fork and South Fork of Putah Creek.

California Yellow Warbler

California yellow warbler (*Dendroica petechia brewsteri*) was once a common to locally abundant summer resident in riparian areas throughout California. The subspecies nests in riparian areas dominated by willows, cottonwoods, sycamores or alders and in mature chaparral. It may also inhabit oak and coniferous woodlands and urban areas near stream courses. Populations in the Central Valley have virtually disappeared due to the reduction of as much as 95% of its habitat. The subspecies is still fairly common along the coast. This migratory bird is listed by the state as a Species of Special Concern.

Townsend's Big-eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii*, formerly *Plecotus townsendii*), inhabits a wide variety of habitats in California including oak and conifer woodlands, grasslands and deserts. Primary roosting sites are caves and mines, but the species will use buildings as well. Different sites are utilized for temporary roosts, hibernation roosts, and maternity roosts. Communal roosts are especially sensitive to disturbance; roosts may be abandoned following a single visit by humans. Potential roosting sites are present in the

buildings at LEHR. Appropriate foraging habitat is present in the non-native grasslands onsite.

California Mastiff Bat

California mastiff bat (*Eumops perotis californicus*) was historically widely distributed in the Central and San Joaquin valleys as well as coastal areas from San Francisco Bay to San Diego. Populations have undergone dramatic reductions, possibly related to urban and agricultural development. Day roosts are generally situated in rocky areas, but can also be found in buildings. Foraging is often high above the ground, and often at considerable distances from roosting sites. Appropriate foraging habitat is available at LEHR.

Pallid Bat

Pallid bat (*Antrozous pallidus*) is found in a variety of habitats including deserts, forests and grasslands. Roost sites can be situated in rock outcrops, hollow trees, bridges and buildings. The species hibernates, but is active periodically throughout the winter. The pallid bat feeds primarily on ground dwelling arthropods and large moths. Appropriate roosting and foraging habitat is present at LEHR.

American Badger

American badger (*Taxidea taxus*) was once a widespread, though uncommon resident throughout much of California, with the exception of the north coastal region. However, within the last century, badger populations and range have declined severely. Badgers feed primarily on fossorial rodents, such as gophers and ground squirrels, though they will eat a variety of foods depending on availability. Burrows excavated by badgers are utilized by a variety of other wildlife species. A badger was observed on the LEHR site in 1996, and appropriate foraging habitat exists in the non-native grasslands.

2.4.2.2 Offsite Special-Status Animal Species

The UCD Raptor Center, located 300 feet east of Landfill Unit No. 1, houses numerous common and special-status bird species. The number of bird species housed at the Center at any one time varies. Currently, there are eighteen special-status bird species housed at the Center. Although special-status birds housed at the Center are captive and do not forage onsite, remediation activities at LEHR could pose a risk to them. A complete list of bird species that are currently and have been historically housed at the Center is provided in Appendix E.

In addition to the 14 special-status species described above, 18 special-status animal species have been recorded in the vicinity or are considered to have a moderate to high potential for occurrence within the study area. These are described below. The remaining

40 target species are not considered to have any potential for occurrence within the offsite study area. All target special-status wildlife species are summarized in Table 2.

California Red-legged Frog

California red-legged frog (*Rana aurora draytonii*) is a large (75-138 mm), nocturnal frog that historically occupied many of the Pacific drainage basins in California throughout the Central Valley and Coast Range from Marin County south through San Diego County (Jennings and Hayes, 1994). Although California red-legged frog is known historically from the Central Valley, extensive habitat conversion, commercial exploitation and introduction of non-native predators (bullfrogs, fish and crayfish) have virtually extirpated the species from the Valley floor (Jennings & Hayes, 1994). California red-legged frog is not expected to occur at LEHR or in the South Fork of Putah Creek. Although the isolated pond located between Interstate 80 and State Route 113 represents potential habitat for the subspecies, its potential for occurrence is considered to be very low.

California red-legged frog prefers still or slow-moving water in which large egg masses are deposited between late November and April, depending on locality (Stebbins, 1985; Jennings and Hayes, 1994). Eggs require 6 to 12 days before hatching and metamorphosis occurs 3.5 to 7 months after hatching (Miller, 1994). Following metamorphosis between July and September, juveniles generally do not travel far from aquatic habitats, although their movements are not well understood. Individuals are capable of traveling away from aquatic environments, mostly during the wet, winter months and may spend several weeks in upland habitat (Westphal, unpublished data; Scott and Rathbun, pers. comm.). Juveniles and adults typically require riparian vegetation, overhanging banks or plunge pools for cover. They generally take refuge in small mammal burrows or leaf litter in or near the riparian zone during periods of inactivity (Rathbun *et al.*, 1993; Jennings and Hayes, 1994) or when water levels are down. The occurrence of this frog is negatively correlated with the presence of introduced bullfrogs (Moyle, 1973; Hayes and Jennings, 1986, 1988), although both species are able to persist at certain locations in the Coastal Zone (Laabs, pers. obs.; Jennings, pers. comm.). On May 23, 1996, California red-legged frog was listed as threatened by the federal government (Miller *et al.*, 1996).

Giant Garter Snake

Giant garter snake (*Thamnophis gigas*) occupies a restricted range on the Central Valley floor from Colusa County south to Los Banos Creek (Stebbins, 1985). Currently the highest densities are found in the Sacramento Valley within the American Basin, where the species persists primarily in seasonally-flooded rice fields and irrigation ditches (Thelander and Crabtree, 1994; Wylie, pers. comm.). It is the largest member of the genus: females reach over one meter in length (Wylie, pers. comm.). Giant garter snake is highly aquatic and is typically found in association with marshes and stream channels, or in altered habitats such as irrigation ditches and rice fields (CDFG, 1992; Wylie, pers. comm.). It preys on fish, tadpoles and frogs. Although cryptic, it can be found by conducting

pedestrian surveys in the spring along suitable ecotones, when individuals are still concentrated near over-wintering sites (Wylie, pers. comm.). The species has been extirpated from approximately 50% of its historic range (Thelander and Crabtree, 1994). Habitat conversion continues to be the primary threat to this species. Giant garter snake is listed as threatened by the state and federal government.

Giant garter snake has been recorded adjacent to the project site at the intersection of Old Davis Road with the South Fork of Putah Creek (CDFG, 1996a). The species was observed in an irrigation canal northeast of Davis in 1987. Two irrigation canals in agricultural lands to the south of the LEHR are within a mile of the project site, and could provide potential habitat for the species.

Northwestern Pond Turtle

Northwestern pond turtle (*Clemmys marmorata marmorata*) originally inhabited most Pacific drainage basins in California from the Oregon to Mexican borders. This aquatic species requires permanent water sources, including ponds, streams and rivers. It often utilizes structures that provide basking opportunities, such as logs and matted vegetation. Females travel from aquatic sites into upland areas to lay eggs in a shallow nest. Nests have been reported from 2-800 meters away from water bodies, presumably related to the availability of suitable upland habitat (Jennings, pers. comm.). Pond turtles live for 20 years or more and can sometimes persist in poor aquatic habitat unsuitable for successful breeding such as irrigation canals. Western pond turtle has been separated into two subspecies (*C. m. marmorata* is the northwestern subspecies and *C. m. pallida* is the southwestern subspecies), both of which are listed as by the state as Species of Special Concern. Current research suggests, however, that the species complex may be represented by three distinct populations throughout its range in California (Jennings and Hayes, 1994) and may therefore require a taxonomic revision.

Northwestern pond turtles have been observed in on the UCD campus and along the South Fork of Putah Creek. The pond between Interstate 80 and State Route 113 provides potential habitat for the species.

Other Special-Status Wildlife Species

The adjacent riparian habitat along the banks of the South Fork of Putah Creek has the potential to support Sacramento anthicid beetle, Antioch mutilid wasp, Delta june beetle and Sacramento Valley tiger beetle. The creek itself has a high potential to support Pacific lamprey.

Numerous birds listed as Species of Special Concern were observed or have been recorded along Putah Creek. Great blue heron, great egret, snowy egret and black-crowned night heron were observed during the present surveys along Putah Creek. It is, however, unlikely that any of these species have breeding rookeries within the study area. Other

raptors with the potential to occur along the creek include sharp-shinned hawk, ferruginous hawk and golden eagle.

Special-status wildlife species that have the potential to utilize agricultural lands in the vicinity of the project site include mountain plover, tricolored blackbird and Canada goose.

2.4.3 Special-Status Natural Communities

Special-status natural communities are those which are considered rare in the region, support sensitive plant or animal populations, or receive regulatory protection (*i.e.*, §404 of the Clean Water Act and/or the CDFG §§1600 *et seq.* of the California Fish and Game Code). In addition, the CNDDDB has designated a number of communities as rare; these communities are given the highest inventory priority (Holland, 1986; CDFG, 1990).

Wetlands and riparian habitats are considered to be sensitive and declining resources by several regulatory agencies including the USFWS, CDFG and the California Regional Water Quality Control Board (CRWQCB). Wetlands are specifically addressed by the CDFG Code §§1600 *et seq.* and § 404 of the Clean Water Act. Permit provisions of the Clean Water Act regulating dredge and fill operation are enforced by the U.S. Army Corps of Engineers (ACOE) and U.S. Environmental Protection Agency (EPA), with technical input from the USFWS, the Natural Resource Conservation Service (NRCS), and the National Marine Fisheries Service (NMFS). The ACOE exerts jurisdiction over "waters of the U.S." which include territorial seas, tidal, and non-tidal waters in addition to wetlands and drainages that support wetland vegetation, exhibit ponding or scouring, show obvious signs or channeling, or have discernible banks and high water marks.

The ACOE considers wetlands to be important to the public interest by performing vital functions (Corps of Engineers Regulatory Program Regulations, §33 CFR 320.4).

Wetlands serve significant biological functions by providing nesting, breeding, foraging, and spawning habitat for a wide variety of resident and migratory animal species.

Wetlands also provide for the movement of water and sediments, ground-water recharge, water purification, storage of storm runoff, and recreation and transport.

2.4.3.1 Onsite Special-Status Natural Communities

No naturally occurring special-status natural communities occur at LEHR. A small patch of Valley needlegrass grassland occurs at the southern edge of the Landfill Unit No. 3 (see Figure 4). This habitat was created by personnel at the UCD Raptor Center in 1994 to enhance the environment around the burrowing owl enclosure (B. Stedman, pers. comm.). Although this plant community type is considered a special-status natural community by the CNDDDB, the stand onsite would not be regarded as a significant biological resource because it was planted on a site that did not previously support similar habitat.

2.4.3.2 Offsite Special-Status Natural Communities

Three special-status natural communities occur within the study area. These include Great Valley mixed riparian forest, Great Valley willow scrub and Valley freshwater marsh. Great Valley mixed riparian forest within the study area is considered a sensitive plant community by the CNDDDB. In addition, portions of this plant community might meet the federal definition of wetlands. Great Valley willow scrub and Valley freshwater marsh are also considered sensitive plant communities by the CNDDDB and would be classified as wetlands. Impacts to wetlands are regulated under state and federal laws. In addition, both the North Fork and South Fork of Putah Creek qualify as waters of the U.S.; impacts are similarly regulated.

3.0 CONCLUSIONS

No naturally occurring native plant communities are present at LEHR. Existing botanical resources are limited to ruderal herbaceous species and ornamental trees and shrubs. No special-status plant species were detected onsite and none are expected due to the highly disturbed condition of the site. Future remediation activities of the site are not expected to result in any significant impacts to special-status plant species or natural communities, either onsite or within a one mile radius, assuming that all surface disturbances occur within the boundaries of LEHR. No focussed surveys for special-status plant species of the remediation sites appear warranted at this time. In the event remediation actions would require impacting the ground along the bank of the creek, focused surveys for Sanford's arrowhead and rose mallow should be conducted in the summer.

Terrestrial wildlife habitats at LEHR include bare ground, ruderal herbaceous vegetation and ornamental trees and shrubs. Resident burrowing mammals detected onsite include California ground squirrel, California vole, Botta's pocket gopher and house mouse. These prey species burrow in contaminated soils and represent an existing pathway for the movement of contaminants up the food web. Common predatory mammals and reptiles likely to forage onsite include coyote, gray fox, red fox, house cat gopher snake and western terrestrial garter snake. Common predatory birds likely to forage onsite include red-tailed hawk, red-shouldered hawk, American kestrel, great-horned owl and barn owl. Because a biological pathway for the transferral of contaminants already exists, remediation efforts are not expected to increase the risk to terrestrial animals. However, remediation actions resulting in the transport of dust or contaminated surface or ground water offsite could lead to the contamination of animal populations not currently exposed. A summary of onsite habitats and potential ecological receptors is presented in Appendix F. A summary of adjacent habitats and potential ecological receptors is presented in Appendix G. A summary of potential exposure pathways is presented in Appendix H.

Special-status animals detected at LEHR include burrowing owl, northern harrier and white-tailed kite. Burrowing owl is a resident at Landfill Unit No. 3, occupying three artificially constructed burrow mounds. Special-status animals known to occur in the vicinity and likely to forage onsite include Swainson's hawk, American badger, northern harrier, white-tailed kite, Cooper's hawk, loggerhead shrike, short-eared owl, California horned lark, Townsend's big-eared bat, California mastiff bat and pallid bat. In addition, suitable larval habitat for Valley elderberry longhorn beetle is present at the former eastern and western dog pens site, adjacent to the parking area of the UCD Raptor Center, along the south fence line near Landfill Unit No. 3 and along the north bank of the South Fork of Putah Creek.

Preconstruction surveys for burrowing owl and Valley elderberry longhorn beetle should be conducted prior to the initiation of remediation work. Resident burrowing owls may need to be relocated after chicks have fledged, in conformance with CDFG protocol.

While no aquatic wildlife habitats exist at LEHR, open water of the South Fork of Putah Creek occurs as little as 350 feet from remediation sites. However, because Putah Creek is considered a "losing" creek, indicating that the creek "leaks" into the shallow water table, there is no net flow into the creek (DOE, 1996). This indicates that there is a low probability that contaminants found in the ground water leach into Putah Creek (DOE, 1996). Nonetheless, storm water flows from LEHR into the creek provide a potential pathway for the movement of contaminants into the aquatic ecosystem. Remediation efforts could increase the risk of contamination of the aquatic ecosystem in the short term. Accumulation of contaminants by benthic and pelagic invertebrates could result in increased contaminant levels in predatory fish, amphibian, reptiles, mammals and birds.

The South Fork of Putah Creek is an artificial channel characterized by slow flows of warm water and periodic drying, leaving only scattered pools in late summer and fall. The fish community of the creek is a mixture of native and introduced species. Non-native fish species are generally better adapted to warm water conditions than native species which tend to move upstream during the summer where waters are cooler and flows greater. Anadromous fish such as rainbow trout and chinook salmon may migrate through the study area during high flow years (such as 1997), but are not expected to spawn in the lower reaches of Putah Creek.

No benthic macroinvertebrate data are currently available for the South Fork of Putah Creek. In general, aquatic invertebrates occupy a relatively stable position in the benthos and may act as receptors of environmental contamination introduced into the water column and substrate. Invertebrates are the main food source of many fish species and may bioaccumulate toxic compounds in the food web. Pollutants frequently remain detectable in benthic macroinvertebrates long after the source of contamination has been mitigated. Thus, the prevention of chemical or radioactive contamination of the creek invertebrate population is essential to the protection of the aquatic ecosystem.

If detailed sampling of fish and benthic macroinvertebrates should be necessary for the preparation of an Ecological Risk Assessment, sampling should be conducted in April or May after the rainy season has ended, water levels have subsided, and aquatic organisms have had time to recolonize the creek.

No special-status fish or aquatic invertebrate species are known to occur in the South Fork of Putah Creek and only one, Pacific lamprey, is considered to have a moderate potential to occur within the study area. Common fish expected in the creek include largemouth bass, green sunfish, carp and catfish. Fish-feeding animals likely to occur in the South Fork of Putah Creek include river otter, beaver and muskrat.

4.0 REFERENCES

- American Ornithologist's Union (AOU). 1983. *Checklist of North American Birds*. 6th Edition. American Ornithologist's Union, Washington, D.C. 877 pp.
- California Burrowing Owl Consortium (CBOC). 1993. *Burrowing Owl Survey Protocol and Mitigation Guidelines*. Alviso, CA.
- California Department of Fish and Game (CDFG). 1984. *Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities*. The Resources Agency, Sacramento.
- California Department of Fish and Game (CDFG). 1992. *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants*. Sacramento, CA.
- California Department of Fish and Game (CDFG). 1994. *Special Animals List*. Natural Heritage Division, Natural Diversity Data Base. August.
- California Department of Fish and Game (CDFG). 1995. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.
- California Department of Fish and Game (CDFG). 1996a. Print-out for the Davis and Merritt USGS quads. Natural Heritage Division, Natural Diversity Data Base. December 27.
- California Department of Fish and Game (CDFG). 1996b. *Special Plants List*. Natural Heritage Division, Natural Diversity Data Base. January.
- California Department of Fish and Game (CDFG). 1997a. *Endangered, Threatened, and Rare Plants of California*. Natural Heritage Division, Endangered Plant Program. January.
- California Department of Fish and Game (CDFG). 1997b. *Endangered and Threatened Animals of California*. Natural Heritage Division, Natural Diversity Data Base. January.
- California Environmental Protection Agency (Cal-EPA). 1996a. *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities. Part A: Overview*. Department of Toxic Substances Control, Human and Ecological Risk Division. July 4.
- California Environmental Protection Agency (Cal-EPA). 1996b. *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities. Part B: Scoping Assessment*. and Department of Toxic Substances Control, Human and Ecological Risk Division. July 4.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131 pp.
- DeSante, D. F. and E. D. Ruhlen. 1995. *Draft Census of Burrowing Owls in California, 1991-1993*. The Institute for Bird Populations, Point Reyes Station, California.
- Erman, D. C. , E. D. Andrews and M. Yoder-Williams. 1988. *Effects of Winter Floods on Fishes in the Sierra Nevada*. Can. J. Fish. Aquat. Sci. 45(12):2195-2200.

- Hayes, M. P. and M. R. Jennings. 1986. *Decline of Ranid Frog Species in Western North America: are Bullfrogs (Rana catesbeiana) Responsible?* Journal of Herpetology 20:490-509.
- Hayes, M. P. and M. R. Jennings. 1988. *Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylei): Implications for management.* In R.C Szaro, K.E. Severson, and D.R. Patton tech. corr., *Management of Amphibians, Reptiles and Small Mammals in North America.* USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. Gen. Tech. Rpt. RM-166.
- Hickman, J.C. 1993. *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley, California. 1400 pp.
- Holland, R. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* California Department of Fish and Game, The Resources Agency. 156 pp.
- Jennings, M.R. 1983. *An Annotated Checklist of the Amphibians and Reptiles of California.* California Department of Fish and Game 69(3): 151-171.
- Jennings, M. R. and M. P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California.* Final report submitted to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. Contract Number 8023.
- Jones, J.K., D.C. Carter, H.H. Genoways, R.S. Hoffmann, and D.W. Rice. 1982. *Revised Checklist of North American Mammals North of Mexico.* Occasional Papers of the Museum, Texas Tech University 80: 1-22.
- Jones & Stokes Associates. 1992. *Final Hydrologic, Vegetation, and Fisheries Analysis for the U.S. Fish and Wildlife Service Putah Creek Resource Management Plan.* July. (JSA 91-196) Sacramento, CA. Prepared for U.S. Fish and Wildlife Service, Sacramento, CA.
- Marchetti, M. P. and P. B. Moyle. 1995. *The case of Putah Creek ...conflicting values complicate stream protection.* Cal. Agri. Nov.-Dec. 1995:73-78.
- McCafferty, W.P. 1981. *Aquatic Entomology.* Jones and Bartlett Publ. Boston, Mass.
- Merritt, R.W. and K.W. Cummings (eds.). 1996. *An Introduction to the Aquatic Insects of North America.* 3rd. ed. Kendall/Hunt Publ. Co. Dubuque, Iowa.
- Miller, K. J. 1994. *Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for the California Red-legged Frog.* Federal Register, 59: 22.
- Miller, K. J., A. Willy, S. Larsen, and S. Morey. 1996. *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Red-legged Frog.* Federal Register: Vol. 61, No. 101.
- Molles, M. C., Jr. 1985. *Recovery of a Stream Invertebrate Community from a Flash Flood in Tesuque Creek, New Mexico.* Southwest. Nat. 30(2):279-287.
- Moyle, P. B. 1973. *Effects of Introduced Bullfrogs, Rana catesbeiana, on the Native Frogs of the San Joaquin Valley, California.* Copeia, 1973:18-22.
- Plumpton, D. L. and R. S. Lutz. 1993. *Nesting Habitat Use by Burrowing Owls in Colorado.* The Journal of Raptor Research 27 (4):175-179.

- Rathbun, G. B., M. R. Jennings, T. G. Murphey, and N. R. Siepel. 1993. *Status and Ecology of Sensitive Aquatic Vertebrates in Lower San Simeon and Pico Creeks, San Luis Obispo County, California*. Unpublished report, National Ecology Research Center, Piedras Blancas Research Station, San Simeon, California, 93452-0070. Cooperative Agreement 14-16-009-91-1909. 103 pp.
- Remsen, H.V. 1978. *Bird Species of Special Concern in California: an Annotated List of Declining or Vulnerable Bird Species*. California Department of Fish and Game, The Resources Agency.
- Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento. 471 pp.
- Skinner, M.W. and B.M. Pavlik. 1995. *Electronic Inventory of Rare and Endangered Vascular Plants of California*. Fifth ed. update. California Native Plant Society, Sacramento, California.
- Stebbins, R.C. 1985. *A Field Guide to Western Reptiles and Amphibians*. 2nd ed. Houghton Mifflin Company, Boston MA.
- Tate, J. 1986. *The Blue List for 1986*. American Birds 40:227-236.
- Thelander, C. G. and M. Crabtree, editors. 1994. *Life on the Edge: a Guide to California's Endangered Natural Resources: Wildlife*. Biosystems Analysis, Santa Cruz, California.
- United States Department of Agriculture (USDA). 1977. *Soil Survey of Solano County, California*. Natural Resource Conservation Service. May.
- United States Department of Agriculture (USDA). 1990. *List of Hydric Soils, Solano County, California*. Natural Resource Conservation Service. November.
- United States Department of Energy (DOE). 1993. *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*. Office of NEPA Oversight. May.
- United States Department of Energy (DOE). 1996. *Draft Site Characterization Summary Report for the U.S. Department of Energy Areas at the Laboratory for Environmental Health Research, University of California, Davis*.
- United States Fish and Wildlife Service (USFWS). 1994. *Endangered and Threatened Wildlife and Plants*. 50 CFR 17.11 & 17.12. August 20.
- United States Fish and Wildlife Service (USFWS). 1996. *Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species; Proposed Rule*. 50 CFR part 17. February 26.
- United States Fish and Wildlife Service (USFWS). 1997a. *Endangered and Threatened Species that May Occur in or be Affected by Projects in the Davis and Merrit Quads*. Letter from W. White to M. Wood. January 23.
- United States Fish and Wildlife Service (USFWS). 1997b. *Listed and Proposed Endangered and Threatened Species and Candidate Species that May Occur in or be Affected by Projects in the area of the Saxon, Dixon, Taylor Monument, Grays Bend, Sacramento West, Woodland, Madison and Winters Quads*. Letter from W. White to M. Wood. January 23.

- University of California, Davis (UCD). 1994. *University of California, Davis Long Range Development Plan, 1994-2005, Environmental Impact Report*. State Clearinghouse no. 94022005. Planning and Budget Office. Davis, CA.
- University of California, Davis (UCD). 1996. *Draft Environmental Impact Report, Wastewater Treatment Plant Replacement Project*. State Clearinghouse nos. 95123027 and 96072024. Planning and Budget Office. Davis, CA. October.
- Wilkinson, G.S. and K.R. Debben. 1980. *Habitat Preferences of Wintering Diurnal Raptors in the Sacramento Valley*. *Western Birds* 11:25-34.
- Williams, D.F. 1986. *Mammalian Species of Special Concern in California*. California Department of Fish and Game. Wildlife Management Division Administrative Report 86-1. 112 pp.

5.0 PERSONS CONTACTED

- Carney, Heath J. Division of Environmental Studies. University of California, Davis, CA. E-mail communication with M. Podlech, January 28, 1997.
- Erman, Nancy. Aquatic Ecologist. University of California, Davis, CA. Telephone conversation with M. Podlech, January 24, 1997.
- Jennings, M. R. Research Associate. Department of Herpetology, California Academy of Sciences, San Francisco. 12 June 1994 - Speaker at seminar entitled "Biology and Management of Sensitive Amphibians and Reptiles of Central and Southern California." Central California Chapter of The Wildlife Society, Goleta, CA.
- McGriff, Darleen. Natural Heritage Division. California Dept. of Fish and Game, Rancho Cordova, CA. Telephone conversation with M. Podlech, January 23, 1997.
- Scott, Norman and G. Rathbun. U. S. Geological Survey, Peidras Blancas Field Station, San Simeon, California. 6 February 1997- Delivered paper entitled "What do we need to know to manage red-legged frogs." Annual Meeting of the Western Section of The Wildlife Society, San Diego, California.
- Stedman, B. University of California, Davis Raptor Center. Telephone conversation with M. Wood. February 4, 1997.
- Taylor, Steve. Fisheries Biologist. California Dept. of Fish and Game, Sacramento, CA. Telephone conversation with M. Podlech, January 22, 1997.
- Westphal, Mike. Research Associate. Coyote Creek Riparian Station. Alviso, CA. 3 July 1995 - meeting.
- Williams, Kevin Z. Manager, Putah Creek Reserve. Telephone conversation with M. Podlech, January 31, 1997.
- Wylie, G. D. U. S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California. 7 February 1997- Delivered paper entitled "In search of the giant garter snake." Annual Meeting of the Western Section of The Wildlife Society, San Diego, California.

APPENDIX A

Plant and Animal Species Detected or Expected to Occur at the LEHR Facility

PLANTS

Family

Scientific Name	Common Name
Amaranthaceae - Amaranth Family	
<i>Amaranthus albus</i> *	tumbleweed
Apiaceae - Parsley Family	
<i>Conium maculatum</i> *	poison hemlock
<i>Foeniculum vulgare</i> *	sweet fennel
Apocynaceae - Dogbane Family	
<i>Nerium oleander</i> *	common oleander
Asteraceae - Sunflower Family	
<i>Anthemis cotula</i> *	dog mayweed
<i>Carduus pycnocephalus</i> *	Italian thistle
<i>Centaurea solstitialis</i> *	yellow star thistle
<i>Conyza canadensis</i> *	horseweed
<i>Gnaphalium</i> sp.	pearly everlasting
<i>Lactuca serriola</i> *	wild lettuce
<i>Senecio vulgaris</i> *	common groundsel
<i>Silybum marianum</i> *	milk thistle
<i>Sonchus asper</i> *	prickly sow-thistle
<i>Taraxacum officinale</i> *	common dandelion
Boraginaceae - Borage Family	
<i>Amsinckia menziesii</i> var. <i>intermedia</i>	rigid fiddleneck
Brassicaceae - Mustard Family	
<i>Brassica nigra</i> *	black mustard
<i>Capsella bursa-pastoris</i> *	shepards purse
Caryophyllaceae - Pink Family	
<i>Stellaria media</i> *	common chickweed
Caprifoliaceae - Honeysuckle Family	
<i>Sambucus mexicana</i>	blue elderberry
Chenopodiaceae - Goosefoot Family	
<i>Salsola</i> sp.*	Russian thistle
Cupressaceae - Cypress Family	
<i>Juniperus</i> sp.*	juniper
Euphorbiaceae - Spurge Family	
<i>Chamaesyce prostrata</i> *	prostrate spurge
<i>Eremocarpus setigerus</i>	doveweed

Plants**Family**

Scientific Name	Common Name
Fabaceae - Pea Family	
<i>Lupinus bicolor</i>	lupine
<i>Medicago polymorpha</i> *	bur-clover
<i>Trifolium</i> sp.	clover
Fagaceae - Oak Family	
<i>Quercus agrifolia</i>	coast live oak
Flacourtiaceae - Flacourtiaceae Family	
<i>Xylosma congestum</i> *	shiny xylosma
Geraniaceae - Geranium Family	
<i>Erodium botrys</i> *	long-beaked storkbill
<i>Erodium cicutarium</i> *	red-stemmed filaree
<i>Erodium moschatum</i> *	white-stemmed filaree
<i>Geranium dissectum</i> *	cranesbill
Juglandaceae - Walnut Family	
<i>Juglans californica</i> var. <i>hindsii</i>	California black walnut
<i>Juglans nigra</i> *	black walnut
Lamiaceae - Mint Family	
<i>Lamium amplexicaule</i> *	common henbit
<i>Marrubium vulgare</i> *	horehound
Malvaceae - Mallow Family	
<i>Malva parviflora</i> *	cheeseweed
<i>Malvella leprosa</i>	alkali-mallow
Martyniaceae - Unicorn-plant Family	
<i>Proboscidea louisianica</i> *	common unicorn plant
Moraceae - Mulberry Family	
<i>Morus alba</i> *	white mulberry
Myrtaceae - Myrtle Family	
<i>Eucalyptus globulus</i> *	Tasmanian blue gum
Oleaceae - Olive Family	
<i>Olea europea</i> *	olive
Onagraceae - Evening Primrose Family	
<i>Epilobium brachycarpum</i>	fireweed
Papaveraceae - Poppy Family	
<i>Eschscholzia californica</i>	California poppy
Pinaceae - Pine Family	
<i>Pinus halepensis</i> *	aleppo pine
<i>Pinus radiata</i> *	Monterey pine
Portulacaceae - Purslane Family	
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miner's lettuce
Poaceae - Grass Family	
<i>Avena fatua</i> *	wild oat
<i>Bromus diandrus</i> *	ripgut brome

Plants**Family**

Scientific Name	Common Name
<i>Bromus hordeaceus</i> *	soft chess
<i>Cynodon dactylon</i> *	Bermuda grass
<i>Hordeum murinum</i> ssp. <i>leporinum</i> *	hare barley
<i>Lolium multiflorum</i> *	Italian ryegrass
<i>Nassella pulchra</i> *	purple needlegrass
<i>Paspalum dilatatum</i> *	dallis grass
<i>Poa annua</i> *	annual bluegrass
<i>Polypogon monspeliensis</i> *	rabbitfoot grass
<i>Sorghum halepense</i> *	Johnsongrass
<i>Vulpia myuros</i> *	foxtail fescue
Rosaceae - Rose Family	
<i>Cotoneaster pannosa</i> *	cotoneaster
<i>Prunus dulcis</i> *	almond
Salicaceae - Willow Family	
<i>Salix lasiolepis</i>	arroyo willow
Scrophulariaceae - Figwort Family	
<i>Kickxia spuria</i> *	fluellin
Solanaceae - Nightshade Family	
<i>Chamaesaracha nana</i>	dwarf chamaesaracha
<i>Datura</i> sp.	jimson weed
<i>Solanum nigrum</i> *	black nightshade
Ulmaceae - Elm Family	
<i>Celtis occidentalis</i> *	hackberry
Viscaceae - Mistletoe Family	
<i>Phoradendron</i> sp.	mistletoe

ANIMALS

Scientific Name	Common Name	Occurrence ¹
Birds		
<i>Accipiter cooperi</i>	Coopers Hawk	w**2
<i>Accipiter striatus</i>	Sharp-shinned Hawk	w ²
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	f
<i>Agelaius tricolor</i>	Tricolored Blackbird	f ²
<i>Anthus rubescens</i>	American Pipit	w
<i>Aphelocoma coerulescens</i>	Scrub Jay	b,w**
<i>Aquila chrysaetos</i>	Golden Eagle	t ²
<i>Ardea herodias</i>	Great Blue Heron	f ²
<i>Asio flammeus</i>	Short-eared Owl	f ²
<i>Athene cunicularia hypugea</i>	Western Burrowing Owl	b,w**2
<i>Bombycilla cedrorum</i>	Cedar Waxwing	w
<i>Bubo virginianus</i>	Great Horned Owl	b,w**
<i>Buteo jamaicensis</i>	Red-tailed Hawk	b,w**
<i>Buteo lagopus</i>	Rough-legged Hawk	t
<i>Buteo lineatus</i>	Red-shouldered Hawk	b,w
<i>Buteo regalis</i>	Ferruginous Hawk	t ²
<i>Buteo swainsoni</i>	Swainson's Hawk	b**2
<i>Butorides striatus</i>	Green-backed Heron	b,w
<i>Calypte anna</i>	Anna's Hummingbird	b,w**
<i>Callipepla californica</i>	California Quail	b,w
<i>Carduelis psaltria</i>	Lesser Goldfinch	b,w**
<i>Carduelis tristis</i>	American Goldfinch	b,w**
<i>Carpodacus mexicanus</i>	House Finch	b,w**
<i>Casmerodius albus</i>	Great Egret	f ²
<i>Cathartes aura</i>	Turkey Vulture	w
<i>Catharus guttatus</i>	Hermit Thrush	b,w**
<i>Charadrius vociferus</i>	Killdeer	f
<i>Chondestes grammacus</i>	Lark Sparrow	b,w
<i>Circus cyaneus</i>	Northern Harrier	f ²
<i>Colaptes auratus</i>	Northern Flicker	b,w**
<i>Columba livia</i>	Rock Dove	b,w**
<i>Corvus brachyrhynchos</i>	American Crow	b,w**
<i>Dendroica coronata</i>	Yellow-rumped Warbler	w**
<i>Dendroica nigrescens</i>	Black-throated Gray Warbler	w
<i>Egretta thula</i>	Snowy Egret	f ²
<i>Elanus leucurus</i>	White-tailed Kite	b,w**2
<i>Eremophila alpestris</i>	California Horned Lark	w ²
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	f
<i>Falco columbarius</i>	Merlin	t ²
<i>Falco mexicanus</i>	Prairie Falcon	t ²
<i>Falco sparverius</i>	American Kestrel	b,w**

ANIMALS

Scientific Name	Common Name	Occurrence ¹
<i>Hirundo pyrrhonota</i>	Cliff Swallow	b
<i>Hirundo rustica</i>	Barn Swallow	b**
<i>Icterus galbula</i>	Northern Oriole	b
<i>Ixoreus naevius</i>	Varied Thrush	w
<i>Junco hyemalis</i>	Dark-eyed Junco	b,w**
<i>Lanius ludovicianus</i>	Loggerhead Shrike	b,w ²
<i>Loxia curvirostra</i>	Red Crossbill	t**
<i>Melanerpes formicivorus</i>	Acorn Woodpecker	b,w
<i>Melospiza lincolni</i>	Lincoln's Sparrow	w
<i>Melospiza melodia</i>	Song Sparrow	b,w**
<i>Mimus polyglottos</i>	Northern Mockingbird	b,w
<i>Molothrus ater</i>	Brown-headed Cowbird	b,w
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	b
<i>Parus inornatus</i>	Plain Titmouse	b,w
<i>Passer domesticus</i>	House Sparrow	b,w
<i>Passerculus sandwichensis</i>	Savannah Sparrow	w
<i>Pica nuttalli</i>	Yellow-billed Magpie	b,w**
<i>Picoides nuttalli</i>	Nuttall's Woodpecker	b,w**
<i>Picoides pubescens</i>	Downy Woodpecker	b,w
<i>Pipilo crissalis</i>	California Towhee	b,w**
<i>Pipilo erythrophthalmus</i>	Rufous-sided Towhee	b,w**
<i>Psaltriparus minimus</i>	Bushtit	b,w**
<i>Regulus calendula</i>	Ruby-crowned Kinglet	w**
<i>Sayornis nigricans</i>	Black Phoebe	b,w**
<i>Sayornis saya</i>	Says Phoebe	w**
<i>Sitta canadensis</i>	Red-breasted Nuthatch	b,w**
<i>Stelgidopteryx serripennis</i>	No. Rough-winged Swallow	f
<i>Sturnella neglecta</i>	Western Meadowlark	b,w**
<i>Sturnus vulgaris</i>	European Starling	b,w**
<i>Troglodytes aedon</i>	House Wren	b,w**
<i>Turdus migratorius</i>	American Robin	b,w**
<i>Tyrannus verticalis</i>	Western Kingbird	b
<i>Tyto alba</i>	Barn Owl	b,w**
<i>Zenaidura macroura</i>	Mourning Dove	b,w**
<i>Zonotrichia atricapilla</i>	Golden-crowned Sparrow	w**
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	w**

ANIMALS

Scientific Name	Common Name	Occurrence ¹
Mammals		
<i>Canis latrans</i>	Coyote	y**
<i>Didelphis virginiana</i>	Opposum	y
<i>Eptesicus fuscus</i>	Big Brown Bat	y
<i>Felis domesticus</i>	House Cat	y**
<i>Lasiurus blossevillii (borealis)</i>	Western Red Bat	y
<i>Lepus californicus</i>	Black-tailed Jackrabbit	y**
<i>Lynx rufus</i>	Bobcat	y
<i>Mephitis mephitis</i>	Striped Skunk	y**
<i>Microtus californicus</i>	California Vole	y
<i>Mus musculus</i>	House Mouse	y
<i>Mustela frenata</i>	Long-tailed Weasel	y
<i>Myotis californicus</i>	California Myotis	y
<i>Myotis yumanensis</i>	Yuma Myotis	y
<i>Peromyscus maniculatus</i>	Deer Mouse	y
<i>Procyon lotor</i>	Raccoon	y**
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	y
<i>Spermophilus beecheyi</i>	California Ground Squirrel	y**
<i>Spilogale putorius</i>	Spotted Skunk	y
<i>Sylvilagus audubonii</i>	Audubon's Cottontail	y**
<i>Taxidea taxus</i>	American Badger	y ²
<i>Thomomys bottae</i>	Botta's Pocket Gopher	y**
<i>Urocyon cinereoargenteus</i>	Gray Fox	y
<i>Vulpes vulpes</i>	Red Fox	y**
Reptiles		
<i>Gerrhonotus multicarinatus</i>	Southern Alligator Lizard	y
<i>Lampropeltis getulus</i>	Common Kingsnake	y
<i>Pituophis melanoleucus</i>	Gopher Snake	y
<i>Sceloporus occidentalis</i>	Western Fence Lizard	y
<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	y
Amphibians		
<i>Bufo boreas</i>	Western Toad	y
<i>Hyla regilla</i>	Pacific Treefrog	y

* denotes nonnative species or species not naturally occurring onsite

? indicates uncertain identification due to condition of plant material

¹Occurrence: b = breeding; f = foraging habitat; t = transient; w = wintering;
y = rear-round residents;

** = observed during 1997 surveys

² indicates sensitive taxon (see text)

APPENDIX B

Plant and Animal Species Detected, Expected to Occur or Recorded in the Vicinity of the LEHR Facility

PLANTS

Family

Scientific Name	Common Name
Aceraceae - Maple Family	
<i>Acer negundo</i> ssp. <i>californicum</i>	box elder
Amaranthaceae - Amaranth Family	
<i>Amaranthus albus</i> *	tumbleweed
<i>Amaranthus blitoides</i>	pigweed
Anacardiaceae - Sumac Family	
<i>Toxicodendron diversilobum</i>	poison oak
Apiaceae - Parsley Family	
<i>Conium maculatum</i> *	poison hemlock
<i>Foeniculum vulgare</i> *	sweet fennel
Apocynaceae - Dogbane Family	
<i>Nerium oleander</i> *	common oleander
Asteraceae - Sunflower Family	
<i>Achyrachaena mollis</i>	blow-wives
<i>Anthemis cotula</i> *	dog mayweed
<i>Chamomilla suaveolens</i> *	pineapple weed
<i>Carduus pycnocephalus</i> *	Italian thistle
<i>Centaurea solstitialis</i> *	yellow star thistle
<i>Cirsium vulgare</i> *	bull thistle
<i>Conyza canadensis</i> *	horseweed
<i>Gnaphalium</i> sp.	pearly everlasting
<i>Grindelia camporum</i>	Great Valley grindelia
<i>Hemizonia fitchii</i>	Fitch's spikeweed
<i>Hemizonia pungens</i>	common spikeweed
<i>Lactuca serriola</i> *	wild lettuce
<i>Picris echioides</i> *	bristly ox-tongue
<i>Senecio vulgaris</i> *	common groundsel
<i>Silybum marianum</i> *	milk thistle
<i>Sonchus asper</i> *	prickly sow-thistle
<i>Sonchus oleraceus</i> *	common sow-thistle
<i>Taraxacum officinale</i> *	common dandelion
<i>Tragopogon porrifolius</i> *	salsify
<i>Xanthium strumarium</i> *	eastern cocklebur

PLANTS

Family

Scientific Name	Common Name
Boraginaceae - Borage Family	
<i>Amsinckia menziesii</i> var. <i>intermedia</i>	rigid fiddleneck
<i>Heliotropium curvassavicum</i>	salt heliotrope
Brassicaceae - Mustard Family	
<i>Brassica nigra</i> *	black mustard
<i>Capsella bursa-pastoris</i> *	shepards purse
<i>Hirschfeldia incana</i> *	Mediterranean mustard
<i>Lepidium nitidum</i>	peppergrass
<i>Lepidium perfoliatum</i> *	common peppergrass
<i>Raphanus sativus</i> *	wild radish
Caryophyllaceae - Pink Family	
<i>Cerastium fontanum</i> ssp. <i>vulgare</i> *	mouse-eared chickweed
<i>Stellaria media</i> *	common chickweed
Caprifoliaceae - Honeysuckle Family	
<i>Sambucus mexicana</i>	blue elderberry
Chenopodiaceae - Goosefoot Family	
<i>Atriplex lentiformis</i> ssp. <i>lentiformis</i>	big saltbush
<i>Chenopodium album</i> *	lamb's quarters
<i>Chenopodium ambrosioides</i> *	Mexican tea
<i>Salsola</i> sp.*	Russian thistle
Convolvulaceae - Morning-glory Family	
<i>Convolvulus arvensis</i> *	field bindweed
Cucurbitaceae - Gourd Family	
<i>Citrullus colocynthis</i> var. <i>lanatus</i> *	watermelon
Cupressaceae - Cypress Family	
<i>Juniperus</i> sp.*	juniper
Cyperaceae - Sedge Family	
<i>Cyperus</i> sp.	sedge
<i>Cyperus involucratus</i> *	umbrella sedge
<i>Scirpus acutus</i> var. <i>occidentalis</i>	common tule
Euphorbiaceae - Spurge Family	
<i>Chamaesyce prostrata</i> *	prostrate spurge
<i>Eremocarpus setigerus</i>	doveweed
Fabaceae - Pea Family	
<i>Lotus corniculatus</i> *	bird's foot trefoil
<i>Lupinus bicolor</i>	lupine
<i>Lupinus succulentus</i>	succulent annual lupine
<i>Medicago polymorpha</i> *	bur-clover
<i>Medicago sativa</i> *	alfalfa
<i>Melilotus indica</i> *	yellow sweet-clover
<i>Trifolium hirtum</i> *	rose clover
<i>Trifolium</i> sp.	clover

PLANTS

Family

Scientific Name	Common Name
<i>Vicia sativa</i> ssp. <i>sativa</i> *	common vetch
Fagaceae - Oak Family	
<i>Quercus agrifolia</i>	coast live oak
<i>Quercus lobata</i>	Valley oak
<i>Quercus suber</i> *	cork oak
Flacourtiaceae - Flacourtia Family	
<i>Xylosma congestum</i> *	shiny xylosma
Geraniaceae - Geranium Family	
<i>Erodium botrys</i> *	long-beaked storkbill
<i>Erodium cicutarium</i> *	red-stemmed filaree
<i>Erodium moschatum</i> *	white-stemmed filaree
<i>Geranium dissectum</i> *	cranesbill
Hippocastanaceae - Buckeye Family	
<i>Aesculus californica</i>	California buckeye
Juglandaceae - Walnut Family	
<i>Juglans californica</i> var. <i>hindsii</i>	California black walnut
<i>Juglans nigra</i> *	black walnut
Lamiaceae - Mint Family	
<i>Lamium amplexicaule</i> *	common henbit
<i>Marrubium vulgare</i> *	horehound
Malvaceae - Mallow Family	
<i>Malva parviflora</i> *	cheeseweed
<i>Malvella leprosa</i>	alkali-mallow
Martyniaceae - Unicorn-plant Family	
<i>Proboscidea louisianica</i> *	common unicorn plant
Moraceae - Mulberry Family	
<i>Morus alba</i> *	white mulberry
Myrtaceae - Myrtle Family	
<i>Eucalyptus globulus</i> *	Tasmanian blue gum
Oleaceae - Olive Family	
<i>Olea europea</i> *	olive
Onagraceae - Evening Primrose Family	
<i>Epilobium brachycarpum</i>	fireweed
Papaveraceae - Poppy Family	
<i>Eschscholzia californica</i>	California poppy
Pinaceae - Pine Family	
<i>Pinus halepensis</i> *	aleppo pine
<i>Pinus radiata</i> *	Monterey pine
Platanaceae - Sycamore Family	
<i>Platanus racemosa</i>	California sycamore

PLANTS

Family

Scientific Name	Common Name
Polygonaceae - Buckwheat Family	
<i>Polygonum arenastrum</i> *	common knotweed
<i>Rumex crispus</i> *	curly dock
Portulacaceae - Purslane Family	
<i>Calandrinia ciliata</i>	red maids
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miner's lettuce
<i>Portulaca oleraceus</i> *	common purslane
Poaceae - Grass Family	
<i>Avena fatua</i> *	wild oat
<i>Briza minor</i> *	quaking grass
<i>Bromus carinatus</i>	California brome
<i>Bromus diandrus</i> *	ripgut brome
<i>Bromus hordeaceus</i> *	soft chess
<i>Cynodon dactylon</i> *	Bermuda grass
<i>Distichlis spicata</i>	salt grass
<i>Echinochloa crus-galli</i> *	barnyard grass
<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>	meadow barley
<i>Hordeum murinum</i> ssp. <i>leporinum</i> *	hare barley
<i>Leymus triticoides</i>	creeping ryegrass
<i>Lolium multiflorum</i> *	Italian ryegrass
<i>Nassella pulchra</i> *	purple needlegrass
<i>Paspalum dilatatum</i> *	dallis grass
<i>Phalaris minor</i> *	littleseed canary grass
<i>Phalaris paradoxa</i> *	paradox canary grass
<i>Poa annua</i> *	annual bluegrass
<i>Polypogon monspeliensis</i> *	rabbitfoot grass
<i>Sorghum halepense</i> *	Johnsongrass
<i>Sporobolus airoides</i>	alkali sacaton
<i>Triticum aestivum</i> *	cultivated wheat
<i>Vulpia myuros</i> *	foxtail fescue
Rosaceae - Rose Family	
<i>Cotoneaster pannosa</i> *	cotoneaster
<i>Heteromeles arbutifolia</i>	toyon
<i>Prunus domestica</i> *	plum
<i>Prunus dulcis</i> *	almond
<i>Raphiolepis indica</i> *	India hawthorne
Rubiaceae - Madder Family	
<i>Galium aparine</i>	goose grass
<i>Cephalanthus occidentalis</i> var. <i>californicus</i>	California button willow

PLANTS

Family

Scientific Name	Common Name
Salicaceae - Willow Family	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood
<i>Salix exigua</i>	narrow-leaved willow
<i>Salix gooddingii</i>	black willow
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
<i>Salix lucida</i> var. <i>lasiandra</i>	lance-leaf willow
Scrophulariaceae - Figwort Family	
<i>Kickxia elatine</i> *	sharp-leaved fluellin
<i>Kickxia spuria</i> *	fluellin
Simarubaceae - Quassia Family	
<i>Ailanthus altissima</i> *	tree of heaven
Solanaceae - Nightshade Family	
<i>Chamaesaracha nana</i>	dwarf chamaesaracha
<i>Datura</i> sp.	jimson weed
<i>Nicotiana glauca</i> *	tree tobacco
<i>Solanum nigrum</i> *	black nightshade
Typhaceae - Cattail Family	
<i>Typha angustifolia</i>	narrowleaf cattail
<i>Typha latifolia</i>	broadleaf cattail
Ulmaceae - Elm Family	
<i>Celtis occidentalis</i> *	hackberry
Verbenaceae - Vervain Family	
<i>Verbena lasiostachys</i>	western vervain
Viscaceae - Mistletoe Family	
<i>Phoradendron</i> sp.	mistletoe
Vitaceae - Grape Family	
<i>Vitis californica</i>	California wild grape
<i>Vitis vinifera</i> *	wine grape
Zygophyllaceae - Caltrop Family	
<i>Tribulus terrestris</i> *	puncture vine

ANIMALS

Scientific Name	Common Name	Occurrence¹
Birds		
<i>Accipiter cooperi</i>	Coopers Hawk	w**2
<i>Accipiter striatus</i>	Sharp-shinned Hawk	w ²
<i>Actitis macularia</i>	Spotted Sandpiper	w
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	b,w
<i>Agelaius tricolor</i>	Tricolored Blackbird	b,w ²
<i>Aix sponsa</i>	Wood Duck	b,w
<i>Anas acuta</i>	Northern Pintail	w
<i>Anas americana</i>	American Widgeon	w
<i>Anas carolinensis</i>	Green-winged Teal	w
<i>Anas clypeata</i>	Northern Shoveler	w
<i>Anas crecca</i>	Green Winged Teal	w
<i>Anas cyanoptera</i>	Cinnamon Teal	w
<i>Anas platyrhynchos</i>	Mallard	b,w**
<i>Anas strepera</i>	Gadwall	w
<i>Anser albifrons</i>	Greater White-fronted Goose	w
<i>Anthus rubescens</i>	American Pipit	w
<i>Aphelocoma coerulescens</i>	Scrub Jay	b,w**
<i>Aquila chrysaetos</i>	Golden Eagle	t ²
<i>Ardea herodias</i>	Great Blue Heron	f ²
<i>Asio flammeus</i>	Short-eared Owl	e ²
<i>Athene cucularia hypugea</i>	Western Burrowing Owl	b,w**2
<i>Aythya affinis</i>	Lesser Scaup	w
<i>Aythya collaris</i>	Ring-necked Duck	w
<i>Bombycilla cedrorum</i>	Cedar Waxwing	w
<i>Branta canadensis</i>	Canada Goose	w**
<i>Bubo virginianus</i>	Great Horned Owl	b,w**
<i>Bucephala albeola</i>	Bufflehead	w
<i>Bucephala clangula</i>	Common Goldeneye	w
<i>Buteo jamaicensis</i>	Red-tailed Hawk	b,w**
<i>Buteo lagopus</i>	Rough-legged Hawk	t
<i>Buteo lineatus</i>	Red-shouldered Hawk	b,w
<i>Buteo regalis</i>	Ferruginous Hawk	t ²
<i>Buteo swainsoni</i>	Swainson's Hawk	b**2
<i>Butorides striatus</i>	Green-backed Heron	b,w
<i>Calidris mauri</i>	Western Sandpiper	t
<i>Calidris minutilla</i>	Least Sandpiper	t
<i>Calypte anna</i>	Anna's Hummingbird	b,w**
<i>Callipepla californica</i>	California Quail	b,w
<i>Carduelis tristis</i>	American Goldfinch	b,w
<i>Carduelis psaltria</i>	Lesser Goldfinch	b,w**
<i>Carpodacus mexicanus</i>	House Finch	b,w**

ANIMALS

Scientific Name	Common Name	Occurrence ¹
<i>Casmerodius albus</i>	Great Egret	f**2
<i>Cathartes aura</i>	Turkey Vulture	w
<i>Catharus guttatus</i>	Hermit Thrush	b,w**
<i>Ceryle alcyon</i>	Belted Kingfisher	b,w**
<i>Charadrius vociferus</i>	Killdeer	b,w**
<i>Chondestes grammacus</i>	Lark Sparrow	b,w
<i>Circus cyaneus</i>	Northern Harrier	b,w**2
<i>Cistothorus palustris</i>	Marsh Wren	b,w
<i>Colaptes auratus</i>	Northern Flicker	b,w**
<i>Columba livia</i>	Rock Dove	b,w**
<i>Corvus brachyrhynchos</i>	American Crow	b,w**
<i>Dendroica coronata</i>	Yellow-rumped Warbler	w**
<i>Dendroica nigrescens</i>	Black-throated Gray Warbler	w
<i>Egretta thula</i>	Snowy Egret	f**2
<i>Elanus leucurus</i>	White-tailed Kite	b,w**2
<i>Eremophila alpestris</i>	California Horned Lark	w**2
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	b,w**
<i>Falco columbarius</i>	Merlin	t ²
<i>Falco mexicanus</i>	Prairie Falcon	t ²
<i>Falco sparverius</i>	American Kestrel	b,w**
<i>Fulica americana</i>	American Coot	b,w**
<i>Gallinago gallinago</i>	Common Snipe	b,w
<i>Gallinula chloropus</i>	Common Moorhen	b,w
<i>Geothlypis trichas</i>	Common Yellowthroat	b,w
<i>Himantopus mexicanus</i>	Black-necked Stilt	b,w
<i>Hirundo pyrrhonota</i>	Cliff Swallow	b
<i>Icterus galbula</i>	Northern Oriole	b
<i>Ixoreus naevius</i>	Varied Thrush	w**
<i>Junco hyemalis</i>	Dark-eyed Junco	b,w**
<i>Lanius ludovicianus</i>	Loggerhead Shrike	b,w**2
<i>Larus californicus</i>	California Gull	t
<i>Larus delawarensis</i>	Ring-billed Gull	t
<i>Loxia curvirostra</i>	Red Crossbill	t
<i>Melanerpes formicivorus</i>	Acorn Woodpecker	b,w
<i>Melospiza lincolnii</i>	Lincoln's Sparrow	w
<i>Melospiza melodia</i>	Song Sparrow	b,w**
<i>Mergus merganser</i>	Common Merganser	w
<i>Mimus polyglottos</i>	Northern Mockingbird	b,w
<i>Molothrus ater</i>	Brown-headed Cowbird	b,w
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	b,w
<i>Numenius americanus</i>	Long-billed Curlew	w
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	b,w**2
<i>Otus kennicotti</i>	Western Screech-owl	b,w

ANIMALS

Scientific Name	Common Name	Occurrence¹
<i>Passer domesticus</i>	House Sparrow	b,w
<i>Passerculus sandwichensis</i>	Savannah Sparrow	w
<i>Passerina amoena</i>	Lazuli Bunting	b,w
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	w ²
<i>Phasianus colchicus</i>	Ring-necked Pheasant	b,w
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak	b,w
<i>Pica nuttalli</i>	Yellow-billed Magpie	b,w**
<i>Picoides nuttalli</i>	Nuttall's Woodpecker	b,w**
<i>Picoides pubescens</i>	Downy Woodpecker	b,w
<i>Pipilo crissalis</i>	California Towhee	b,w**
<i>Pipilo erythrophthalmus</i>	Rufous-sided Towhee	b,w**
<i>Pluvialis squatarola</i>	Black-bellied Plover	w
<i>Podilymbus podiceps</i>	Pied-billed Grebe	w
<i>Porzana carolina</i>	Sora	b,w
<i>Psaltriparus minimus</i>	Bushtit	b,w**
<i>Rallus limicola</i>	Virginia Rail	b,w
<i>Recurvirostra americana</i>	American Avocet	b,w
<i>Regulus calendula</i>	Ruby-crowned Kinglet	w**
<i>Riparia rustica</i>	Barn Swallow	b**
<i>Sayornis nigricans</i>	Black Phoebe	b,w**
<i>Sayornis saya</i>	Says Phoebe	w**
<i>Sialia currucoides</i>	Mountain Bluebird	w**
<i>Sialia mexicana</i>	Western Bluebird	b,w
<i>Sitta canadensis</i>	Red-breasted Nuthatch	b,w**
<i>Spizella passerina</i>	Chipping Sparrow	b,w
<i>Stelgidopteryx serripennis</i>	No. Rough-winged Swallow	b
<i>Sterna forsteri</i>	Forster's Tern	w
<i>Sturnella neglecta</i>	Western Meadowlark	b,w**
<i>Sturnus vulgaris</i>	European Starling	b,w**
<i>Tachycineta bicolor</i>	Tree Swallow	b
<i>Tachycineta thalassina</i>	Violet-green Swallow	b
<i>Thryomanes bewickii</i>	Bewick's Wren	b,w
<i>Tringa melanoleuca</i>	Greater Yellowlegs	w
<i>Troglodytes aedon</i>	House Wren	b,w**
<i>Turdus migratorius</i>	American Robin	b,w**
<i>Tyrannus verticalis</i>	Western Kingbird	b
<i>Tyto alba</i>	Barn Owl	b,w**
<i>Vermivora celata</i>	Orange-crowned Warbler	w
<i>Wilsonia pusilla</i>	Wilson's Warbler	b,w
<i>Zenaidura macroura</i>	Mourning Dove	b,w
<i>Zonotrichia atricapilla</i>	Golden-crowned Sparrow	w**
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	w**

ANIMALS

Scientific Name	Common Name	Occurrence ¹
Mammals		
<i>Antrozous pallidus</i>	Pallid Bat	y, f ²
<i>Canis latrans</i>	Coyote	y**
<i>Castor canadensis</i>	Beaver	y**
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	y, f ²
<i>Didelphis virginiana</i>	Opposum	y
<i>Eptesicus fuscus</i>	Big Brown Bat	y
<i>Eumops perotis californicus</i>	California Mastiff Bat	y, f ²
<i>Felis domesticus</i>	House Cat	y**
<i>Lasiurus blossevillii (borealis)</i>	Western red Bat	y
<i>Lepus californicus</i>	Black-tailed Jackrabbit	y**
<i>Lutra canadensis</i>	River Otter	y
<i>Lynx rufus</i>	Bobcat	y
<i>Mephitis mephitis</i>	Striped Skunk	y**
<i>Microtus californicus</i>	California Vole	y
<i>Mus musculus</i>	House Mouse	y
<i>Mustela frenata</i>	Long-tailed Weasel	y
<i>Myotis californicus</i>	California Myotis	y
<i>Myotis yumanensis</i>	Yuma Myotis	y
<i>Odocoileus hemionus</i>	Mule Deer	y
<i>Peromyscus maniculatus</i>	Deer Mouse	y
<i>Procyon lotor</i>	Raccoon	y**
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	y
<i>Sorex ornatus</i>	Ornate Shrew	y
<i>Spermophilus beecheyi</i>	California Ground Squirrel	y**
<i>Spilogale putorius</i>	Spotted Skunk	y
<i>Sylvilagus audubonii</i>	Audubon's Cottontail	y**
<i>Taxidea taxus</i>	American Badger	y ²
<i>Thomomys bottae</i>	Botta Pocket Gopher	y**
<i>Urocyon cinereoargenteus</i>	Gray Fox	y
<i>Vulpes vulpes</i>	Red Fox	y**
Reptiles		
<i>Clemmys marmorata marmorata</i>	Northwestern Pond Turtle	y ²
<i>Coluber constrictor</i>	Racer	y
<i>Crotalus viridis</i>	Western Rattlesnake	y
<i>Eumeces gilberti</i>	Gilbert's Skink	y
<i>Gerrhonotus multicarinatus</i>	Southern Alligator Lizard	y
<i>Lampropeltis getulus</i>	Common Kingsnake	y
<i>Phrynosoma coronatum</i>	Coast Horned Lizard	y

ANIMALS

Scientific Name	Common Name	Occurrence¹
<i>Thamnophis elegans</i>	W. Terrestrial Garter Snake	y
<i>Thamnophis gigas</i>	Giant Garter Snake	y ²
<i>Uta stansburiana</i>	Side-blotched Lizard	y

Amphibians

<i>Ambystoma californiense</i>	California Tiger Salamander	y ²
<i>Bufo boreas</i>	Western Toad	y
<i>Hyla regilla</i>	Pacific Treefrog	y
<i>Rana catesbeiana</i>	Bullfrog	y
<i>Scaphiopus hammondi</i>	Western Spadefoot Toad	y

Terrestrial Invertebrates

<i>Desmocerus californicus demorphus</i>	Valley Elderberry Longhorn Beetle	y ²
--	-----------------------------------	----------------

* denotes nonnative species or species not naturally occurring onsite

? indicates uncertain identification due to condition of plant material

¹Occurrence: b = breeding; f = foraging habitat; t = transient; w = wintering;
y = rear-round residents;

** = observed during 1997 surveys

² indicates sensitive taxon (see text)

APPENDIX C

FISH SPECIES RECORDED WITHIN THE U. C. DAVIS CAMPUS AREA¹

Scientific Name	Common Name
<u>Native Fish Species</u>	
<i>Catostomus occidentalis</i>	Sacramento Sucker
<i>Gasterosteus aculeatus</i> ssp.	Three-spined Stickleback ²
<i>Hysterocarpus traski</i>	Tule Perch
<i>Lampetra tridentata</i>	Pacific Lamprey
<i>Lavinia exilicauda</i>	Hitch
<i>Oncorhynchus mykiss</i>	Rainbow Trout
<i>Oncorhynchus tshawytscha</i>	Chinook Salmon ³
<i>Orthodon microlepidotus</i>	Sacramento Blackfish
<i>Ptychocheilus grandis</i>	Sacramento Squawfish
<u>Non-native Fish Species</u>	
<i>Alosa sapidissima</i>	American Shad
<i>Ameiurus catus</i>	White Catfish
<i>Carassius auratus</i>	Goldfish
<i>Cyprinus carpio</i>	Common Carp
<i>Dorosoma petenense</i>	Threadfin Shad
<i>Gambusia affinis</i>	Mosquitofish
<i>Ictalurus melas</i>	Black Bullhead
<i>Ictalurus nebulosus</i>	Brown Bullhead
<i>Ictalurus punctatus</i>	Channel Catfish
<i>Lepomis cyanellus</i>	Green Sunfish
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis microlophus</i>	Redear Sunfish
<i>Menidia audens</i>	Mississippi Silverside
<i>Menidia beryllina</i>	Inland Silverside
<i>Micropterus dolomieu</i>	Smallmouth Bass
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Morone saxatilis</i>	Striped Bass
<i>Notemigonus crysoleucas</i>	Golden Shiner
<i>Percina macrolepada</i>	Bigscale Logperch
<i>Pimephales promelas</i>	Fathead Minnow
<i>Pomoxis annularis</i>	White Crappie
<i>Pomoxis nigromaculatus</i>	Black Crappie

¹Adapted from University of California, Davis (1996)

²The subspecies was not identified. *Gasterosteus aculeatus williamsoni* is listed as Endangered by the state and federal governments. However, there are no records for this subspecies in Putah Creek (McGriff, pers. comm., 1997).

³The winter-run chinook salmon, listed as Endangered by the state and federal governments, does not occur in Putah Creek (Taylor, pers. comm., 1997).

APPENDIX D

EXPLANATION OF SENSITIVITY STATUS CODES

AGENCIES

- USFWS = U.S. Fish and Wildlife Service
CDFG = California Department of Fish and Game
CNPS = California Native Plant Society
BLM = Bureau of Land Management
USFS = U.S. Forest Service

CALIFORNIA NATIVE PLANT SOCIETY DESIGNATIONS

- List 1: Plants of highest priority
List 1A: Plants presumed extinct in California
List 1B: Plants rare and endangered in California and elsewhere
List 2: Plants rare and endangered in California but more common elsewhere
List 3: Plants about which additional data are needed
List 4: Plants of limited distribution

CNPS R-E-D Codes

R (Rarity)

- 1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
2 = Occurrence confined to several populations or to one extended population.
3 = Occurrence limited to one or a few highly restricted populations, or present in such low numbers that it is seldom reported.
? = More data are needed

E (Endangerment)

- 1 = Not endangered
2 = Endangered in a portion of its range
3 = Endangered throughout its range
? = More data are needed

D (Distribution)

- 1 = More or less widespread outside California
2 = Rare outside California
3 = Endemic to California
? = More data are needed

FEDERAL DESIGNATIONS

- FE = listed as Endangered by the Federal Government
FT = listed as Threatened by the Federal Government
FPE = proposed as Endangered by the Federal Government
FTE = proposed as Threatened by the Federal Government
FSS = federal sensitive species, as listed by BLM and USFS
C¹ = Candidate; taxa for which USFWS has sufficient biological information to support a proposal to list as Endangered or Threatened).
SC¹ = Species of Concern
MB = migratory non-game birds of management concern to the USFWS; protected under the Migratory Bird Treaty Act.

¹As of Feb. 28, 1996, all Category 1 candidate taxa are now regarded merely as Candidates. The USFWS ceased to maintain lists of Category 2 and Category 3 candidate taxa; Category 2 taxa are now regarded as Species of Concern.

CALIFORNIA DEPT. OF FISH AND GAME DESIGNATIONS

- CE = Listed as Endangered by the State of California
CR = Listed as Rare by the State of California
CT = Listed as Threatened by the State of California
CPE = Proposed for listing as Endangered
SSC = California Species of Special Concern
* = taxa that are restricted in distribution, declining throughout their range, or associated with habitats that are declining in California.
CEQA = taxa which are considered to meet the criteria for listing as Endangered, Threatened or Rare by the CDFG; impacts to such taxa must be addressed in CEQA documents.
CEQA? = Taxa that might be locally significant; should be evaluated for consideration during preparation of CEQA documents, as recommended by the CDFG.

note: currently, all CNPS list 1B and 2 taxa are considered "Special Plants" by the CDFG.

APPENDIX E

Raptors Historically and Currently Housed at the
U. C. Davis Raptor Center

Scientific Name	Common Name	Fed/CA Status ¹	Currently Present
<i>Accipiter cooperii</i>	Cooper's Hawk	MB/SSC	X
<i>Accipiter gentilis</i>	Northern Goshawk	SC,MB/SSC	-
<i>Accipiter striatus</i>	Sharp-shinned Hawk	MB/SSC	-
<i>Aegolius acadicus</i>	Northern Saw-whet Owl	MB/-	-
<i>Aquila chrysaetos</i>	Golden Eagle	MB/SSC	X
<i>Asio otus</i>	Long-eared Owl	MB/SSC	-
<i>Asio flammeus</i>	Short-eared Owl	MB/SSC	-
<i>Bubo virginianus</i>	Great Horned Owl	MB/-	X
<i>Buteo jamaicensis</i>	Red-tailed Hawk	MB/-	X
<i>Buteo lagopus</i>	Rough-legged Hawk	MB/-	-
<i>Buteo lineatus</i>	Red-shouldered Hawk	MB/-	X
<i>Buteo regalis</i>	Ferruginous Hawk	SC,MB/SSC	X
<i>Buteo swainsoni</i>	Swainson's Hawk	MB/CT	X
<i>Cathartes aura</i>	Turkey Vulture	MB/-	X
<i>Circus cyaneus</i>	Northern Harrier	MB/SSC	X
<i>Elanus caeruleus</i>	Black-shouldered kite	MB/*	-
<i>Falco columbarius</i>	Merlin	MB/SSC	X
<i>Falco mexicanus</i>	Prairie Falcon	MB/SSC	-
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	FE,MB/SSC	X
<i>Falco sparverius</i>	American Kestrel	MB/-	X
<i>Glaucidium gnoma</i>	Northern Pygmy Owl	MB/-	-
<i>Haliaeetus leucocephalus</i>	Bald Eagle	FE/CE	X
<i>Otus flammeolus</i>	Flammulated Owl	MB/-	-
<i>Otus kennecottii</i>	Western Screech Owl	MB/-	X
<i>Pandion haliaetus</i>	Osprey	MB/SSC	-
<i>Speotyto (=Athene) cunicularia</i>	Burrowing Owl	MB/SSC	X
<i>Strix nebulosa</i>	Great Gray Owl	MB/CE	-
<i>Strix occidentalis</i>	Spotted Owl	SC,MB/SSC	X
<i>Strix varia</i>	Barred Owl	MB/-	X
<i>Tyto alba</i>	Common Barn-Owl	MB/-	X

¹See Appendix D for an explanation of status codes.

APPENDIX F
Summary of Onsite Habitats and Potential Ecological Receptors

Habitat Type	Area (% of Site)	Expected Species	Observed Species	Relative Occurrence	Fed/CA Status ¹
Ruderal/Non-native Grassland	222,400 sf 5.1 acres (27%)	Western Toad	-	uncommon	-/-
		Pacific Tree Frog	-	common	-/-
		Gopher Snake	-	uncommon	-/-
		Western Fence Lizard	-	common	-/-
		CA Ground Squirrel	x	common	-/-
		CA Vole	-	common	-/-
		House Mouse	-	common	-/-
		W. Harvest Mouse	-	uncommon	-/-
		Bottas Pocket Gopher	x	common	-/-
		Black-tailed Jackrabbit	x	common	-/-
		Audubon's Cottontail	x	common	-/-
		Coyote	x	uncommon	-/-
		Opossum	-	uncommon	-/-
		Big Brown Bat	-	uncommon	-/-
		Striped Skunk	x	common	-/-
		California Myotis	-	uncommon	-/-
		Raccoon	x	common	-/-
		Red Fox	-	uncommon	-/-
		Gray Fox	-	uncommon	-/-
		Red-winged Blackbird	-	common	MB/-
		Mourning Dove	x	common	MB/-
		Short-eared Owl	-	uncommon	MB/SSC
		Burrowing Owl	-	uncommon	SC,MB/SSC
		Great Horned Owl	x	uncommon	MB/-
		Barn Owl	x	uncommon	MB/-
		Red-tailed Hawk	x	common	MB/-
		House Finch	x	common	MB/-
		Hermit Thrush	x	uncommon	MB/-
		Killdeer	x	common	MB/-
		Northern Harrier	x	common	MB/SSC
		Black Phoebe	x	common	MB/-
		Rock Dove	x	common	-/-
		American Crow	x	common	MB/-
White-tailed Kite	x	common	MB/*		
CA Horned Lark	x	uncommon	SC,MB/SSC		
Brewer's Blackbird	x	common	MB/-		
American Kestrel	x	common	MB/-		
Dark-eyed Junco	x	common	MB/-		
California Towhee	x	common	-/-		
Western Meadowlark	x	common	MB/-		
European Starling	x	common	-/-		
American Robin	x	common	MB/-		
Golden-crowned Sparrow	x	common	MB/-		
White-crowned Sparrow	x	common	MB/-		

APPENDIX F (continued)

Habitat Type	Area (% of Site)	Expected Species	Observed Species	Relative Occurrence	Fed/CA Status¹
Ornamental Trees	61,300 sf 1.4 acres (26%)	Coopers Hawk	x	uncommon	MB/SSC
		Scrub Jay	x	common	MB/-
		Great Horned Owl	x	uncommon	MB/-
		Barn Owl	x	uncommon	MB/-
		Red-tailed Hawk	x	common	MB/-
		House Finch	x	common	MB/-
		Hermit Thrush	x	uncommon	MB/-
		Rock Dove	x	common	-/-
		American Crow	x	common	MB/-
		California Towhee	x	common	-/-
		Western Meadowlark	x	common	MB/-
		European Starling	x	common	-/-
		American Robin	x	common	MB/-
		Golden-crowned Sparrow	x	common	MB/-
		White-crowned Sparrow	x	common	MB/-
		Anna's Hummingbird	x	common	MB/-
		Northern Flicker	x	uncommon	MB/-
		Yellow-rumped Warbler	x	common	MB/-
		American Kestrel	x	uncommon	MB/-
		Dark-eyed Junco	x	common	MB/-
		Red Crossbill	x	uncommon	MB/-
		Yellow-billed Magpie	x	common	MB/-
		Rufous-sided Towhee	x	uncommon	MB/-
Ruby-crowned Kinglet	x	common	MB/-		
Black Phoebe	x	common	MB/-		
Red-breasted Nuthatch	x	uncommon	MB/-		
House Wren	x	uncommon	MB/-		
Mourning Dove	x	common	MB/-		
Buildings and Structures	100,900sf 2.3 acres (12%)	House Finch	x	common	MB/-
		House Sparrow	-	common	-/-
		Rock Dove	x	common	-/-
		Barn Owl	x	common	MB/-
		Big Brown Bat	-	common	-/-
		California Myotis	-	common	-/-

¹See Appendix D for an explanation of status codes.

APPENDIX G
Summary of Adjacent Habitats and Potential Ecological Receptors

Habitat Type	Expected Species	Observed Species	Relative Occurrence	Status ¹
Ruderal/Non-native Grassland	same as Appendix F			
Ornamental Trees	same as Appendix F			
Building and Structures	same as Appendix F			
Cultivated Fields and Orchards	Bottas Pocket Gopher	x	common	-/-
	Black-tailed Jackrabbit	x	common	-/-
	Audubon's Cottontail	x	common	-/-
	Red-winged Blackbird	-	common	MB/-
	Tricolored Blackbird	-	uncommon	MB/SSC
	Red-tailed Hawk	x	common	MB/-
	Killdeer	x	common	MB/-
	Northern Harrier	x	common	MB/SSC
	American Crow	x	common	MB/-
	White-tailed Kite	x	common	MB/SSC
	CA Horned Lark	x	uncommon	MB/SSC
	Brewer's Blackbird	x	common	MB/-
	American Kestrel	x	common	MB/-
	Yellow-billed Magpie	x	common	MB/-
	Western Meadowlark	x	common	MB/-
	American Robin	x	common	MB/-
	Golden-crowned Sparrow	x	common	MB/-
	White-crowned Sparrow	x	common	MB/-
	Gopher Snake	-	uncommon	-/-
	Western Fence Lizard	-	common	-/-
Striped Skunk	x	common	-/-	
Coyote	x	uncommon	-/-	
Great Valley Mixed Riparian Forest	Coopers Hawk	x	uncommon	MB/SSC
	Sharp-shinned Hawk	-	uncommon	MB/SSC
	Spotted Sandpiper	-	uncommon	MB/-
	Wood Duck	-	uncommon	MB/-
	Northern Pintail	-	uncommon	MB/-
	American Widgeon	-	uncommon	MB/-
	Green-winged Teal	-	uncommon	MB/-
	Northern Shoveler	-	uncommon	MB/-
	Cinnamon Teal	-	uncommon	MB/-
	Mallard	x	common	MB/-
	Gadwall	-	uncommon	MB/-
	Greater White-fronted Goose	-	uncommon	MB/-
	Scrub Jay	x	common	MB/-
	Golden Eagle	-	uncommon	MB/SSC
	Great Blue Heron	x	uncommon	MB/*

APPENDIX G (continued)

Habitat Type	Expected Species	Observed Species	Relative Occurrence	Status ¹
Great Valley Mixed Riparian Forest (continued)	Lesser Scaup	-	uncommon	MB/-
	Ring-necked Duck	-	uncommon	MB/-
	Canada Goose	x	uncommon	MB/-
	Great Horned Owl	x	uncommon	MB/-
	Bufflehead	-	uncommon	MB/-
	Common Goldeneye	-	uncommon	MB/-
	Red-tailed Hawk	x	common	MB/-
	Red-shouldered Hawk	-	uncommon	MB/-
	Green-backed Heron	-	uncommon	MB/-
	Western Sandpiper	-	common	MB/-
	Least Sandpiper	-	common	MB/-
	Anna's Hummingbird	x	common	MB/-
	California Quail	x	common	-/-
	American Goldfinch	-	common	MB/-
	Lesser Goldfinch	x	common	MB/-
	Great Egret	x	uncommon	MB/-
	Hermit Thrush	x	uncommon	MB/-
	Belted Kingfisher	x	uncommon	MB/-
	Killdeer	x	common	MB/-
	Lark Sparrow	-	common	MB/-
	Northern Harrier	x	common	MB/SSC
	Marsh Wren	-	uncommon	MB/-
	Northern Flicker	x	common	MB/-
	American Crow	x	common	MB/-
	Yellow-rumped Warbler	x	common	MB/-
	Black-throated Gray Warbler	-	uncommon	MB/-
	Snowy Egret	x	common	MB/-
	White-tailed Kite	x	common	MB/-
	Brewer's Blackbird	x	common	MB/-
	Merlin	-	uncommon	MB/SSC
	American Kestrel	x	common	MB/-
	American Coot	x	common	MB/-
	Common Snipe	-	uncommon	MB/-
	Common Moorhen	-	uncommon	MB/-
	Common Yellowthroat	-	uncommon	MB/-
	Black-necked Stilt	-	uncommon	MB/-
	Cliff Swallow	-	common	MB/-
	Northern Oriole	-	common	MB/-
	Varied Thrush	-	uncommon	MB/-
	Dark-eyed Junco	x	common	MB/-
Loggerhead Shrike	-	uncommon	MB/SSC	
California Gull	x	common	MB/-	
Ring-billed Gull	-	uncommon	MB/-	
Acorn Woodpecker	-	uncommon	MB/-	
Lincoln's Sparrow	-	uncommon	MB/-	
Song Sparrow	x	common	MB/-	
Common Merganser	-	uncommon	MB/-	

APPENDIX G (continued)

Habitat Type	Expected Species	Observed Species	Relative Occurrence	Status ¹
Great Valley Mixed Riparian Forest (continued)	Northern Mockingbird	-	common	MB/-
	Brown-headed Cowbird	-	common	MB/-
	Ash-throated Flycatcher	-	uncommon	MB/-
	Long-billed Curlew	-	uncommon	MB/SSC
	Black-crowned Night Heron	x	common	MB/-
	Western Screech-owl	-	uncommon	MB/-
	Plain Titmouse	-	common	MB/-
	Lazuli Bunting	-	common	MB/-
	Double-crested Cormorant	-	uncommon	MB/-
	Ring-necked Pheasant	-	uncommon	-/-
	Black-headed Grosbeak	-	uncommon	MB/-
	Yellow-billed Magpie	x	common	MB/-
	Nuttall's Woodpecker	x	common	MB/-
	Downy Woodpecker	-	uncommon	MB/-
	California Towhee	x	common	-/-
	Rufous-sided Towhee	x	uncommon	MB/-
	Black-bellied Plover	-	uncommon	MB/-
	Pied-billed Grebe	x	uncommon	MB/-
	Sora	-	uncommon	MB/-
	Bushtit	-	common	MB/-
	Virginia Rail	-	uncommon	MB/-
	American Avocet	-	uncommon	MB/-
	Ruby-crowned Kinglet	x	common	MB/-
	Barn Swallow	x	common	MB/-
	Black Phoebe	x	common	MB/-
	Pays Phoebe	x	common	MB/-
	Mountain Bluebird	-	common	MB/-
	Western Bluebird	-	uncommon	MB/-
	Red-breasted Nuthatch	x	common	MB/-
	Chipping Sparrow	-	uncommon	MB/-
	No. Rough-winged Swallow	-	common	MB/-
	Forster's Tern	-	common	MB/-
	European Starling	x	common	-/-
	Tree Swallow	-	uncommon	MB/-
	Violet-green Swallow	-	common	MB/-
	Bewick's Wren	-	common	MB/-
	Greater Yellowlegs	-	uncommon	MB/-
	House Wren	x	common	MB/-
	American Robin	x	common	MB/-
	Western Kingbird	-	uncommon	MB/-
	Barn Owl	x	common	MB/-
	Orange-crowned Warbler	-	common	MB/-
	Wilson's Warbler	-	common	MB/-
	Mourning Dove	-	common	MB/-
	Golden-crowned Sparrow	-	common	MB/-
	White-crowned Sparrow	-	common	MB/-
	Western Pond Turtle	-	uncommon	SC/SSC

APPENDIX G (continued)

Habitat Type	Expected Species	Observed Species	Relative Occurrence	Status ¹
Great Valley Mixed Riparian Forest (continued)	Racer	-	uncommon	-/-
	Gilbert's Skink	-	uncommon	-/-
	Southern Alligator Lizard	-	uncommon	-/-
	Common Kingsnake	-	uncommon	-/-
	Gopher Snake	-	uncommon	-/-
	Western Fence Lizard	-	common	-/-
	Western Terrestrial Garter Snake	-	common	-/-
	Giant Garter Snake	-	uncommon	FT/CT
	Side-blotched Lizard	-	common	-/-
	Western Toad	-	uncommon	-/-
	Pacific Treefrog	-	common	-/-
	Coyote	x	common	-/-
	Beaver	x	common	-/-
	Opposum	-	common	-/-
	Big Brown Bat	-	common	-/-
	Western Red Bat	-	uncommon	-/-
	River Otter	-	uncommon	-/-
	Bobcat	-	uncommon	-/-
	Striped Skunk	x	common	-/-
	California Vole	-	common	-/-
	House Mouse	-	common	-/-
	Long-tailed Weasel	-	uncommon	-/-
	California Myotis	-	uncommon	-/-
	Yuma Myotis	-	uncommon	-/-
	Mule Deer	-	uncommon	-/-
	Deer Mouse	-	common	-/-
	Raccoon	x	common	-/-
	Western Harvest Mouse	-	common	-/-
	Ornate Shrew	-	uncommon	-/-
	Spotted Skunk	-	uncommon	-/-
	Audubon's Cottontail	x	common	-/-
	American Badger	-	uncommon	-/*
	Gray Fox	-	uncommon	-/-
Red Fox	-	uncommon	-/-	
Creek	Pacific Lamprey	-	uncommon	none
	Hitch	-	common	none
	Rainbow Trout	-	uncommon	none
	Chinook Salmon	-	uncommon	FE/CE
	Sacramento Blackfish	-	common	none
	American Shad	-	uncommon	none
	White Catfish	-	common	none
	Common Carp	-	common	none
	Black Bullhead	-	common	none
	Channel Catfish	-	common	none
	Green Sunfish	-	common	none
	Smallmouth Bass	-	common	none

APPENDIX G (continued)

Habitat Type	Expected Species	Observed Species	Relative Occurrence	Status ¹
Creek	Largemouth Bass	-	common	none
	White Crappie	-	common	none
	Sacramento Sucker	-	?	none
	Three-spined Stickleback	-	?	none
	Tule Perch	-	?	none
	Sacramento Squawfish	-	?	none
	Threadfin Shad	-	?	none
	Mosquitofish	-	?	none
	Brown Bullhead	-	?	none
	Bluegill	-	?	none
	Redear Sunfish	-	?	none
	Mississippi Silverside	-	?	none
	Inland Silverside	-	?	none
	Striped Bass	-	?	none
	Golden Shiner	-	?	none
	Bigscale Logperch	-	?	none
Fathead Minnow	-	?	none	
Black Crappie	-	?	none	

¹See Appendix D for an explanation of status codes.

APPENDIX H
Summary of Potential Exposure Pathways

Habitat Type	Potential Exposure Group	Contaminated Medium	Direct Exposure Pathway	Food Web Exposure
Ruderal/Non-native Grassland	terrestrial invertebrates	soil	absorption/ingestion	
Ruderal/Non-native Grassland	insectivorous birds	soil	ingestion	burrowing invertebrates to birds
Ruderal/Non-native Grassland	aestivating amphibians	soil	dermal absorption	
Ruderal/Non-native Grassland	reptiles	soil	dermal absorption	
Ruderal/Non-native Grassland	reptiles	soil	ingestion of prey	rodents and burrowing mammals to snakes
Ruderal/Non-native Grassland	bats	soil	ingestion	insects to bats
Ruderal/Non-native Grassland	burrowing mammals	soil	soil ingestion	
Ruderal/Non-native Grassland	burrowing mammals	soil	ingestion of prey and plant roots	plant roots and soil invertebrates to burrowing mammals
Ruderal/Non-native Grassland	burrowing mammals	soil	particulate and gas inhalation	
Ruderal/Non-native Grassland	burrowing mammals	soil	dermal absorption	
Ruderal/Non-native Grassland	burrowing mammals	groundwater	ingestion of water	
Ruderal/Non-native Grassland	granivorous birds	soil	ingestion of seeds	soil to seeds to birds
Ruderal/Non-native Grassland	burrowing raptors	soil	dermal absorption	
Ruderal/Non-native Grassland	raptors	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to raptors
Ruderal/Non-native Grassland	predatory mammals	soil	ingestion of prey	burrowing mammals to mammals

APPENDIX H (continued)

Habitat Type	Potential Exposure Group	Contaminated Medium	Direct Exposure Pathway	Food Web Exposure
Ornamental Trees	raptors	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to raptors
Ornamental Trees	predatory mammals	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to mammals
Ruderal/Non-native Grassland	reptiles	soil	ingestion of prey	rodents and burrowing mammals to snakes
Great Valley Mixed Riparian Forest	raptors	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to raptors
Great Valley Mixed Riparian Forest	bats	sediment	ingestion of prey	invertebrates to fish and amphibians to bats
Great Valley Mixed Riparian Forest	predatory mammals	soil	ingestion of prey	burrowing mammals to mammals
Great Valley Mixed Riparian Forest	raptors	sediment	ingestion of prey	invertebrates to fish and amphibians to raptors
Great Valley Mixed Riparian Forest	piscivorous birds	sediment	ingestion of prey	invertebrates to fish to birds
Great Valley Mixed Riparian Forest	predatory mammals	sediment	ingestion of prey	invertebrates to fish and amphibians to mammals
Great Valley Willow Scrub	raptors	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to raptors
Great Valley Willow Scrub	predatory mammals	soil	ingestion of prey	burrowing mammals and granivorous/insectivorous birds to mammals
Great Valley Willow Scrub	piscivorous birds	sediment	ingestion of prey	invertebrates to fish and amphibians to birds
Great Valley Willow Scrub	raptors	sediment	ingestion of prey	invertebrates to fish and amphibians to raptors
Great Valley Willow Scrub	predatory mammals	sediment	ingestion of prey	invertebrates to fish and amphibians to mammals
Creek	benthic invertebrates	sediment	ingestion of sediments	

APPENDIX H (continued)

Habitat Type	Potential Exposure Group	Contaminated Medium	Direct Exposure Pathway	Food Web Exposure
Creek	fish	sediment	ingestion of prey	invertebrates to fish
Creek	amphibians	sediment	ingestion of prey	invertebrates to amphibians
Creek	amphibians	sediment	dermal absorption	
Creek	reptiles	sediment	ingestion of prey	invertebrates, fish and amphibians to reptiles
Creek	wading shore birds	sediment	ingestion of prey	invertebrates to birds
Creek	bats	sediment	ingestion of prey	invertbrates to fish to bats
Creek	predatory aquatic mammals	sediment	ingestion of prey	invertebrates to fish and amphibians to mammals
Buildings and Structures	bats	sediment	ingestion of prey	invertebrates to fish and amphibians to bats