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RESULTS OF FOCUSED SURVEYS FOR LISTED FAIRY SHRIMP SPECIES FOR THE PROPOSED VALLEY-IVYGLEN TRANSMISSION LINE PROJECT

Prepared for:

Southern California Edison
2244 Walnut Grove Avenue
Rosemead, California 91770

Submitted by:

AMEC Earth & Environmental, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123
(858) 300-4300

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ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Earth and Environmental, Inc.
CDFG	California Department of Fish and Game
°C	degrees Celsius
cm	centimeter
DRI	Desert Research Institute
°F	degrees Fahrenheit
ft	feet
HCP	Habitat Conservation Plan
in	inches
kV	kilovolt
m	meter
MSHCP	Multiple Species Habitat Conservation Plan
project	Proposed Valley-Ivyglen Transmission Line Project
SCE	Southern California Edison
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFS	Versatile fairy shrimp

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1.0 INTRODUCTION

At the request of Southern California Edison (SCE), AMEC Earth & Environmental, Inc. (AMEC) delineated and assessed potential habitat for listed fairy shrimp species in support of the proposed Valley-Ivyglen Transmission Line Project (project). Identified potential habitat was sampled following U.S. Fish and Wildlife Service (USFWS 1996) protocol for two federally listed fairy shrimp species known from the region: Riverside fairy shrimp (*Streptocephalus wootonii*) and vernal pool fairy shrimp (*Branchinecta lynchi*).

The proposed project is designed to improve reliability and meet projected electrical load requirements in western Riverside County, and involves the construction of a new 115 kilovolt (kV) transmission line between the Valley and Ivyglen substations.

Of 120 pools identified and sampled, none were found to support federally listed fairy shrimp species during the sampling period, although the non-sensitive versatile fairy shrimp (*Branchinecta lindahli*) was observed in 68 of the pools.

1.1 Project Location and Study Area

The proposed project is located in western Riverside County, in southern California (Figure 1). It traverses areas of unincorporated Riverside County within the cities of Lake Elsinore, Corona, Perris, and Sun City. Construction of the new 115 kV transmission line includes portions of the Alberhill, Lake Elsinore, and Romoland U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangles (Figure 2). The proposed transmission line connects the Valley Substation, located in the southwest corner of an unincorporated community of Romoland, with the Ivyglen Substation, located along Temescal Canyon Road and near Glen Ivy Hot Springs. The study area addressed in this focused survey includes the proposed project route and a 500-foot study buffer off of the project centerline (1000 feet total).

1.2 Species Status

Several species of fairy shrimp are considered sensitive by the USFWS and the California Department of Fish and Game (CDFG) (resource agencies) because of their rarity and/or association with sensitive aquatic habitats such as vernal pools (CDFG 1990). There are two listed fairy shrimp species that are known to occur in Riverside County: vernal pool fairy shrimp and Riverside fairy shrimp.

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FIGURE 1

Regional Location
Valley - Ivyglen Transmission Line Project, California

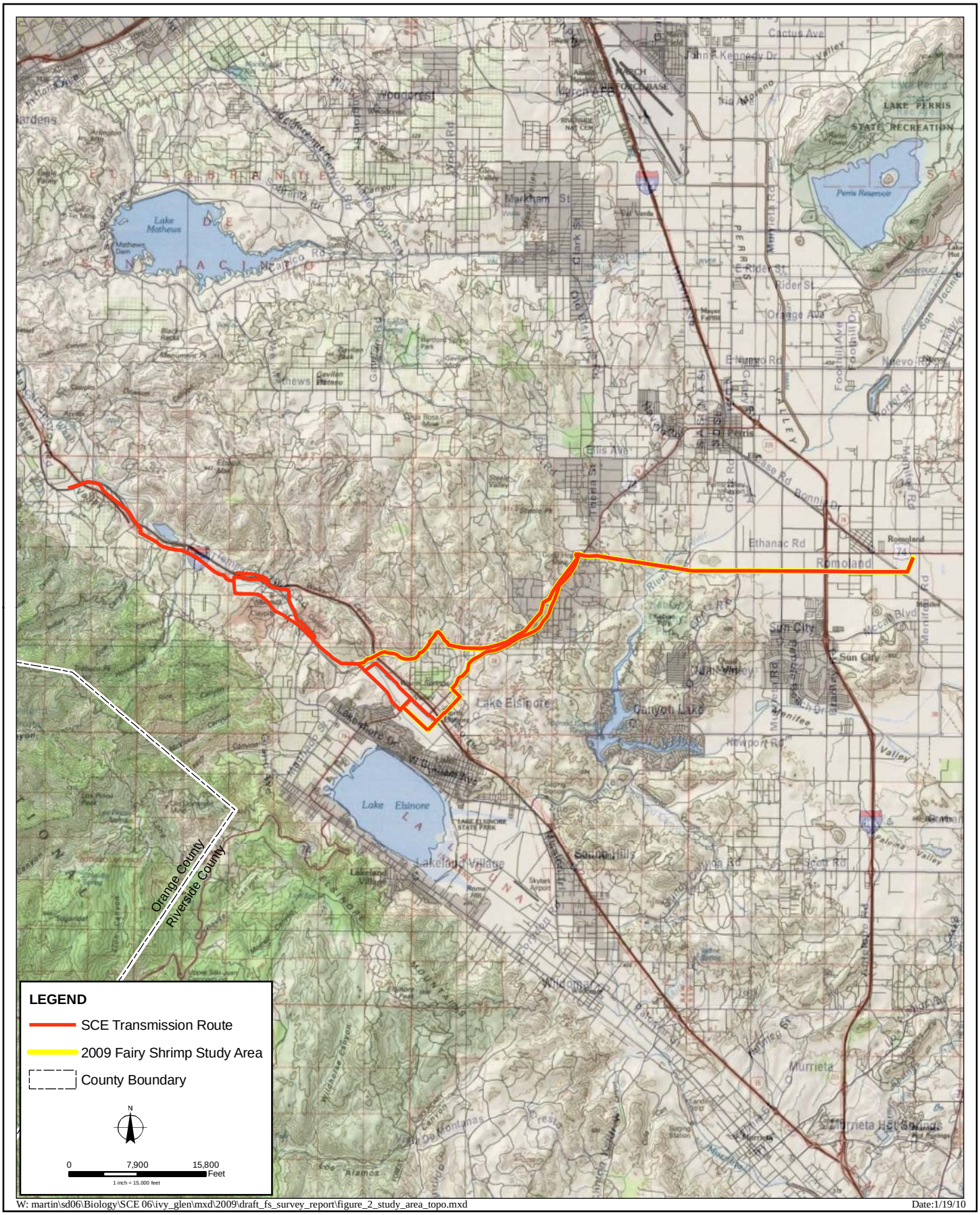

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FIGURE 2

Project Location
Valley - Ivyglen Transmission Line Project, California

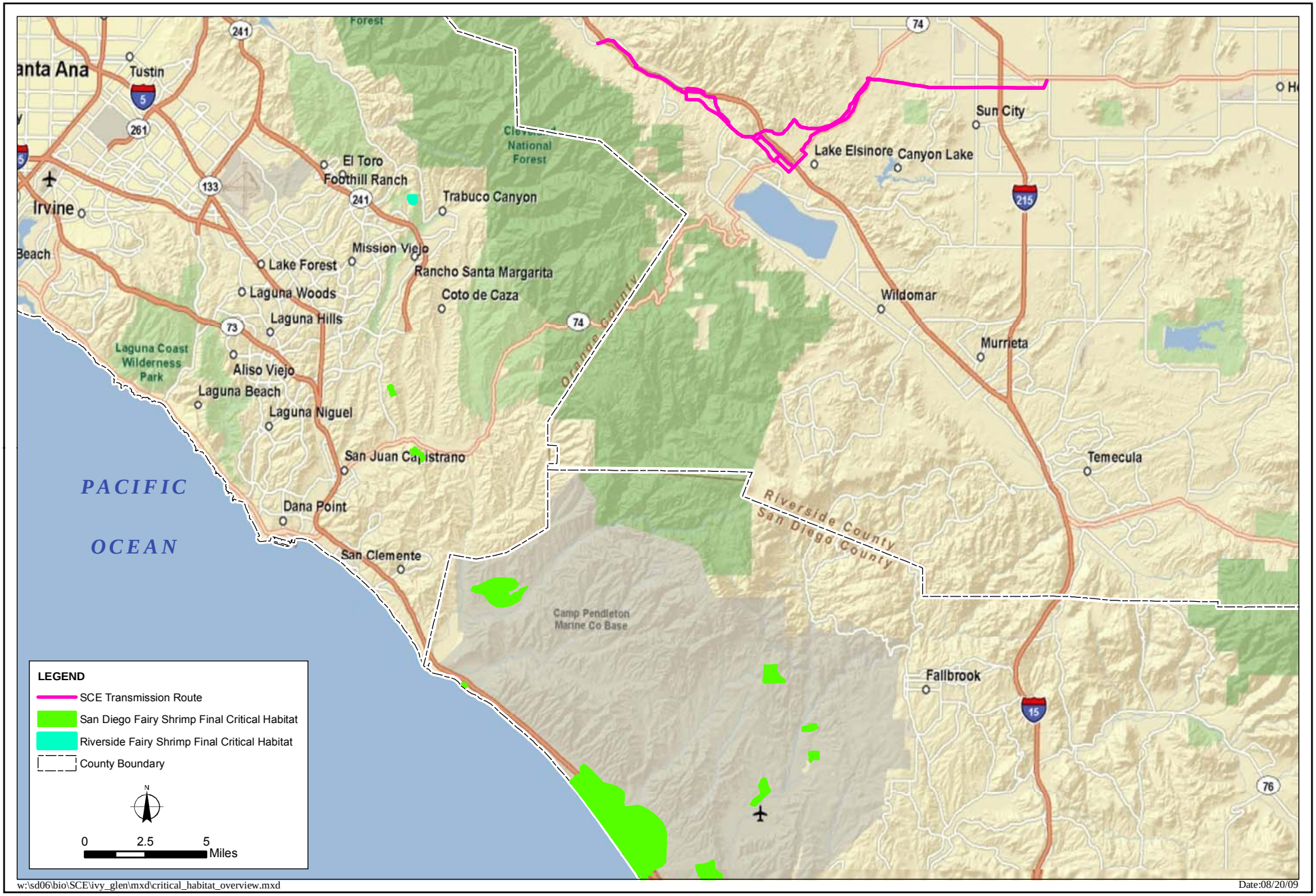
Vernal pool fairy shrimp was listed as federally threatened in 1994 (USFWS 1994), and Critical Habitat was designated in 2006 (USFWS 2006). No Critical Habitat for vernal pool fairy shrimp has been designated in western Riverside County, although occurrences of the species have been documented at the Santa Rosa Plateau and Skunk Hollow. These locations are approximately 12 and 6 miles from the study area, respectively (USFWS 2006, CNDDB 2009) (Figure 3).

Riverside fairy shrimp was listed as federally endangered in 1993 (USFWS 1993), Critical Habitat was designated in 2001 (USFWS 2001), and a revised Critical Habitat was proposed in 2004 (USFWS 2004); the final designation of Critical Habitat was announced on 12 April 2005 (USFWS 2005). The proposed project is approximately 14 miles (22 kilometers) northeast of the nearest Riverside fairy shrimp critical habitat unit, Critical Habitat Unit 2, near Trabuco (USFWS 2005) (Figure 3).

The study area is within western Riverside County, which historically harbored relatively large populations of fairy shrimp due to natural environmental conditions (e.g., soils, hydrology, and topography) that make much of it conducive to vernal pool formation. These vernal pools, and the fairy shrimp populations they support, have been reduced and fragmented over the years due to human development pressure, such as housing and agriculture. Regardless, the area is still designated as an important vernal pool management area by the USFWS within the larger Riverside Management Area (USFWS 1998).

1.2.1 Life History

Fairy shrimp (Class: Crustacea; Order: Anostraca) are conspicuous members of the fauna of ephemeral ponds and vernal pools. California has 25 known species of fairy shrimp belonging to six genera (Eriksen and Belk 1999). Fairy shrimp have the ability to produce resting eggs (eggs that can withstand desiccation and freezing), which allows them to survive from year to year in ephemeral aquatic habitats. This allows fairy shrimp to avoid many potential aquatic predators that require a year-round water source to survive, such as predatory fish and many frog species. The continued survival of a fairy shrimp population in a particular location requires water to be ponded for a length of time sufficient for the completion of their life cycle. The length of time for fairy shrimp from hatching to sexual maturity and egg-laying is variable depending on environmental conditions and the specific species. In general, a minimum of 1 to 2 weeks is required. As such, the presence of fairy shrimp (either free swimming or in resting eggs in the soil) can be considered an indication of an ephemeral pond or vernal pool that holds water for at least 1 to 2 weeks every few years.



Fairy Shrimp Critical Habitat
Valley - Ivyglen Transmission Line Project, California

FIGURE
3

Fairy shrimp eggs tend to hatch in pools with relatively cool temperatures, with species-specific differences in responses that are related to temperature regime (USFWS 1998). Lack of hatching at higher temperatures (greater than 77° Fahrenheit [F] or 25° Celsius [C]) protects fairy shrimp from the infrequent summer storms that might otherwise be sufficient to stimulate development, but inadequate for the organisms to complete their life cycles. Also, only a portion of the dormant egg bank, often less than 10 percent, hatches with any one hydration (Hathaway and Simovich 1996). This appears to be an ecological bet-hedging strategy, which helps protect the species from hatching the entire egg bank during years where rainfall and pooling is insufficient to allow the fairy shrimp to reach sexual maturity and breed. In addition, laboratory studies have shown that many fairy shrimp cysts can hatch after 15 years of dormancy when given the proper environmental conditions (Eriksen and Belk 1999).

Vernal pool fairy shrimp is widely distributed within California's Central Valley with disjunct populations in western Riverside County. Typically, this species is found in sandstone puddles surrounded by foothill grassland. Other habitats include small swale, earth slump, or basalt-flow depression basin with a grassy or sometimes muddy bottom within unplowed grassland. It is found in water ranging from 46.1º F to 73.4º F (4.5º C to 23º C). Vernal pool fairy shrimp have been observed between December and early May. It hatches soon after pools fill with water of temperatures less than or equal to 50º F (10º C), reaching maturity as quickly as 18 days. However, if water temperatures remain at approximately 59º F (15º C), then at least 41 days are required for maturity. This species is known from some of the shortest-lived pools (e.g., 6 to 7 weeks for winter pools or 3 weeks for spring pools). Although vernal pool fairy shrimp co-occur with several different species, only two of these have the potential to occur in western Riverside County, which are versatile fairy shrimp and Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*). Santa Rosa Plateau fairy shrimp is endemic to grassland pools located at Santa Rosa Plateau. Therefore, it is not expected to occur within the study area (Eriksen and Belk 1999). The primary threats to vernal pool fairy shrimp are urban and agricultural development of its habitat. Documented vernal pool fairy shrimp populations in the region are known from large, deepwater vernal pools of the Santa Rosa Plateau and Skunk hollow (CNDDB 2009).

Riverside fairy shrimp has a very restricted and scattered distribution. This species has been detected in vernal pools and temporary ponds in the vicinity of Temecula in Riverside County (Eng et al. 1990), and on Otay Mesa, Marine Corps Base Camp Pendleton, and Miramar Naval Air Station in San Diego County (Simovich and Fugate 1992). It has also been collected in a few places in Orange County and Baja California Norte, Mexico (Eriksen and Belk 1999). The nearest documented population occurrence is recorded near Lake Elsinore, approximately three miles south of the study area. This species typically is found in longer-lived pools that often support spikerush (*Eleocharis* sp.). These pools tend to occur in seasonal grasslands sometimes interspersed with chaparral or coastal sage scrub vegetation. The Riverside fairy shrimp appears to be a relatively warm-water species (i.e., hatching between 50 °F to 77 °F [10 °C and 25 °C]) (Eriksen and Belk 1999), typically not appearing until late in the season (Eng et al. 1990) although it has been observed as early as late January. It can co-occur with other species of fairy shrimp, including the San Diego fairy shrimp (*Branchinecta sandiegonensis*). It typically occupies long-lasting pools in which the water persists into April or May, and which

reach an average minimum depth of 11.8 inches (in) (30 centimeters [cm]) at filling (Eng et al. 1990). The Riverside fairy shrimp requires approximately 2 months to reach reproductive age after hatching (USFWS 1998). Like vernal pool fairy shrimp, the main threats are urban and agricultural development.

For comparison, vernal pool fairy shrimp generally hatch earlier in the rainy season, mature more quickly, and use shallower, cooler pools (typical of early season pools) than Riverside fairy shrimp. In contrast, Riverside fairy shrimp usually hatch later in the season in pools that are warmer and deeper than San Diego fairy shrimp, and they are slower to reach sexual maturity. Where they occupy the same pools, San Diego fairy shrimp usually reach adulthood when Riverside fairy shrimp are still in the larval stage (USFWS 1998). These different ecological niches likely minimize competition between the species for food and other resources, even when they occupy the same pools.

One other fairy shrimp species commonly occurs in Riverside County and may occupy the same pools as vernal pool fairy shrimp and the Riverside fairy shrimp: versatile fairy shrimp (VFS). This species is found in vernal pools throughout California and is not considered to be sensitive by the resource agencies. San Diego fairy shrimp occurs in Orange County, west of the study area, but is not documented from the region. The nearest locations of listed fairy shrimp species are depicted on Figure 4.

1.2.2 Regulatory Setting

The study area is within the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP is a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP), which focuses on conservation of species and their associated habitats in western Riverside County (County of Riverside 2003).

Surveys are needed for specific species in conjunction with the MSHCP. The *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pool* policies presented in Section 6.1.2 of the MSHCP outlines these habitats and species. Additional surveys shall be conducted within suitable habitat for these species in the MSHCP (Figure 2). Listed fairy shrimp species are protected under Section 6.1.2 (County of Riverside 2003). Therefore, focused surveys were conducted for listed fairy shrimp species according to USFWS Survey Guidelines for Wet Season Surveys (USFWS 1996).

2.0 SITE CHARACTERIZATION

The topography in the study area is generally flat or with gentle rolling hills. The approximately 58 miles (93 kilometers) of study area contains a combination of agricultural, municipal, private, and reserve land, most with previous disturbance.

2.1 Climate

The study area is located within a Mediterranean climate region consisting of warm, dry summers and mild, wet winters. In summer, temperatures often reach 100º F (38º C) and winter temperatures fall as low as 30º F (-1º C), with an occasional freeze. Average annual temperature ranges are fairly moderate for the area, ranging from 49.3º F to 79.5º F (9.6º C to 26.4º C). Average total precipitation for the area is approximately 10 to 15 in (25.4 to 38.1 cm) per year (Desert Research Institute [DRI] 2009).

2.1.1 2008/2009 Wet Season

The Elsinore station, near Lake Elsinore, is the closest weather station to the study area for the 2008/2009 wet season. The total rainfall for the 2008/2009 wet season to date was 8.72 in (22.15 cm), which falls short of the yearly average (11.25 in [28.57 cm]) at this weather station by approximately 2.53 in (6.43 cm) (DRI 2009).

2.2 Topography, Land Use, and Soils

The study area traverses the relatively flat Perris Valley in the east, before crossing the San Jacinto River west across a series of low, rolling hills. North of Lake Elsinore the alignment follows Temescal Canyon north to the proposed Ivyglen Substation. The study area is located on predominantly flat areas that have historically been used for grazing,,agriculture, and rural residential development. Much of the proposed alignment is adjacent to existing paved and dirt roads, transmission lines, and access roads. The central section of the study area is within a recently developed industrial/commercial area, segments of which are currently graded for development and pooling has occurred on these graded pads.

Soils in the study area are primarily in the Monserate-Arlington-Exeter and Traver-Domino-Willows associations. These soils are characterized as level to moderately steep soils that have a surface layer of sandy loam often with a hardpan. The soils can range from very shallow to relatively deep (U.S. Department of Agriculture [USDA] 1971). Soils in the study area do not generally have a high clay component; however, there are “lenses” of clay soils in the study area. Another soil type is the Traver-Domino-Willows association. It is considered a MSHCP sensitive soil type and includes saline-alkali soils largely located along floodplain areas of the San Jacinto River (County of Riverside 2003).

2.3 Vegetation Communities

The vegetation communities and land cover types in the study area are primarily agriculture, coastal sage scrub, developed disturbed land (ruderal habitat), and grasslands. Additional vegetation communities found within the study area include meadows and marshes, riparian forests/woodlands/scrub, Riversidean alluvial fan sage scrub, as well as woodlands and forests. Previous agriculture, grazing, fire suppression, and invasion of nonnative plant species have contributed to the disturbed condition of many vegetation communities.

The vegetation communities present are described below. These communities are classified using the plant community definitions in the Western Riverside County MSHCP, which is based on the vegetation communities presented in the *Preliminary Descriptions of Terrestrial Natural Communities of California* (Holland 1986; County of Riverside 2003).

2.3.1 Agriculture

Agricultural lands within the MSHCP boundary include areas occupied by dairies and livestock feed yards or areas that have been tilled for use as croplands or groves/orchards. Extensive agricultural areas occur in the eastern portion, with patches occurring throughout the study area.

2.3.2 Coastal Sage Scrub

In western Riverside County, coastal sage scrub is found both in large contiguous blocks scattered throughout the county, as well as integrated with chaparral and grasslands. Coastal sage scrub is dominated by a characteristic suite of low-statured, aromatic, drought-deciduous shrubs, and subshrub species. Composition varies substantially depending on physical circumstances and the successional status of the vegetation community; however, characteristic species include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), California encelia (*Encelia californica*), and several species of sage (e.g., *Salvia mellifera*, *S. apiana*). Other common species include brittlebush (*Encelia farinosa*), lemonadeberry (*Rhus integrifolia*), sugarbush (*R. ovata*), yellow bush penstemon (*Keckiella antirrhinoides*), Mexican elderberry (*Sambucus mexicana*), sweetbush (*Bebbia juncea*), boxthorn (*Lycium* spp.), coastal prickly pear (*Opuntia littoralis*), coastal cholla (*Cylindropuntia prolifera*), tall prickly-pear (*O. oricola*), and species of dudleya (*Dudleya* spp). Within the study area, coastal sage scrub also occurs in various disturbed phases, as a result of mechanical disturbances such as agriculture, grading, or grazing, characterized by a sparse, open shrub habitat separated by grasses or bare ground.

2.3.3 Developed or Disturbed Land

Developed or disturbed land consists of disced, cleared, or otherwise altered areas. Developed lands may include roadways, existing buildings, and structures. Disturbed lands may include ornamental plantings for landscaping, exotics, or ruderal vegetation dominated by nonnative, weedy species such as mustard (*Brassica* sp.), fennel (*Foeniculum vulgare*), tocalote (*Centaurea melitensis*), and Russian thistle (*Salsola tragus*). The majority of the identified pools

occur within developed habitat, along dirt roads, building pads, or other manmade features that result in soil compaction or exposure of hardpan soils suitable for pooling.

2.3.4 Grasslands

Two general types of grasslands occur in western Riverside County: native dominated perennial grassland (valley and foothill grassland); and nonnative dominated, primarily annual grassland (nonnative grassland).

Valley and foothill grasslands typically contain the perennial bunch grasses, such as purple needlegrass (*Nassella pulchra)* and foothill needlegrass (*N. lepida*). Lesser amounts of other native grasses, such as onion grass (*Melica* spp.), wild rye (*Leymus* spp.), muhly (*Muhlenbergia* spp.), and cane bluestem (*Bothriochloa barbinodis*), also may be present. In addition, nonnative grasses or forbs may be present to varying degrees. Native herbaceous plants commonly found within valley and foothill grasslands include yellow fiddleneck (*Amsinckia menziesii*), common calyptridium (*Calyptridium monardum*), suncup (*Camissonia* spp.), Chinese houses (*Collinsia heterophylla*), California poppy (*Eschscholzia californica*), tarweed (*Hemizonia* spp.), coast goldfields (*Lasthenia californica*), common tidy-tips (*Layia platyglossa*), lupine (*Lupinus* spp.), popcornflower (*Plagiobothrys* spp.), blue dicks (*Dichelostemma capitata*), muilla (*Muilla* spp.), blue-eyed grass (*Sisyrinchium bellum*), and dudleya (*Dudleya* spp.).

Nonnative grasslands are likely to be dominated by several species of grasses that have evolved to persist in concert with human agricultural practices: slender oat (*Avena barbata*), wild oat (*A. fatua*), fox tail chess (*Bromus madritensis*), soft chess (*B. hordeaceus*), ripgut grass (*B. diandrus*), barley (*Hordeum* spp.), rye grass (*Lolium multiflorum*), English ryegrass (*L. perenne*), rat-tail fescue (*Vulpia myuros*), and Mediterranean schismus (*Schismus barbatus*).

2.3.5 Meadows and Marshes

Meadow and marsh vegetation communities occur in both flowing and still water. This vegetation community includes cattails (*Typha* spp.), bulrushes (*Scirpus* spp.), sedges (*Carex* spp.), spikerushes (*Eleocharis* spp.), sedges (*Cyperus* spp.), smartweed (*Polygonum* spp.), watercress (*Rorippa* spp.), and yerba mansa (*Anemopsis californica*). It also contains perennial and biennial herbs (e.g., *Oenothera* spp., *Lupinus* spp., *Potentilla* spp., and *Sidalcea* spp.) and grasses (e.g., *Agrostis* spp., *Deschampsia* spp., and *Muhlenbergia* spp.). Rooted aquatic plant species with floating stems and leaves, such as pennywort (*Hydrocotyle* spp.), water smartweed (*Polygonum amphibium*), pondweeds (*Potamogeton* spp.), and water-parsley (*Oenanthe sarmentosa*) may also be present.

2.3.6 Riparian Forest, Woodland, and Scrub

Riparian vegetation, including forest, woodland, and scrub subtypes, is distributed in waterways and drainages throughout much of western Riverside County. Depending on community type, a riparian community may be dominated by any of several trees or shrubs, including box elder (*Acer negundo*), bigleaf maple (*A. macrophyllum*), coast live oak (*Quercus agrifolia*), white alder (*Alnus rhombifolia*), sycamore (*Platanus racemosa*), Fremont's cottonwood (*Populus fremontii*),

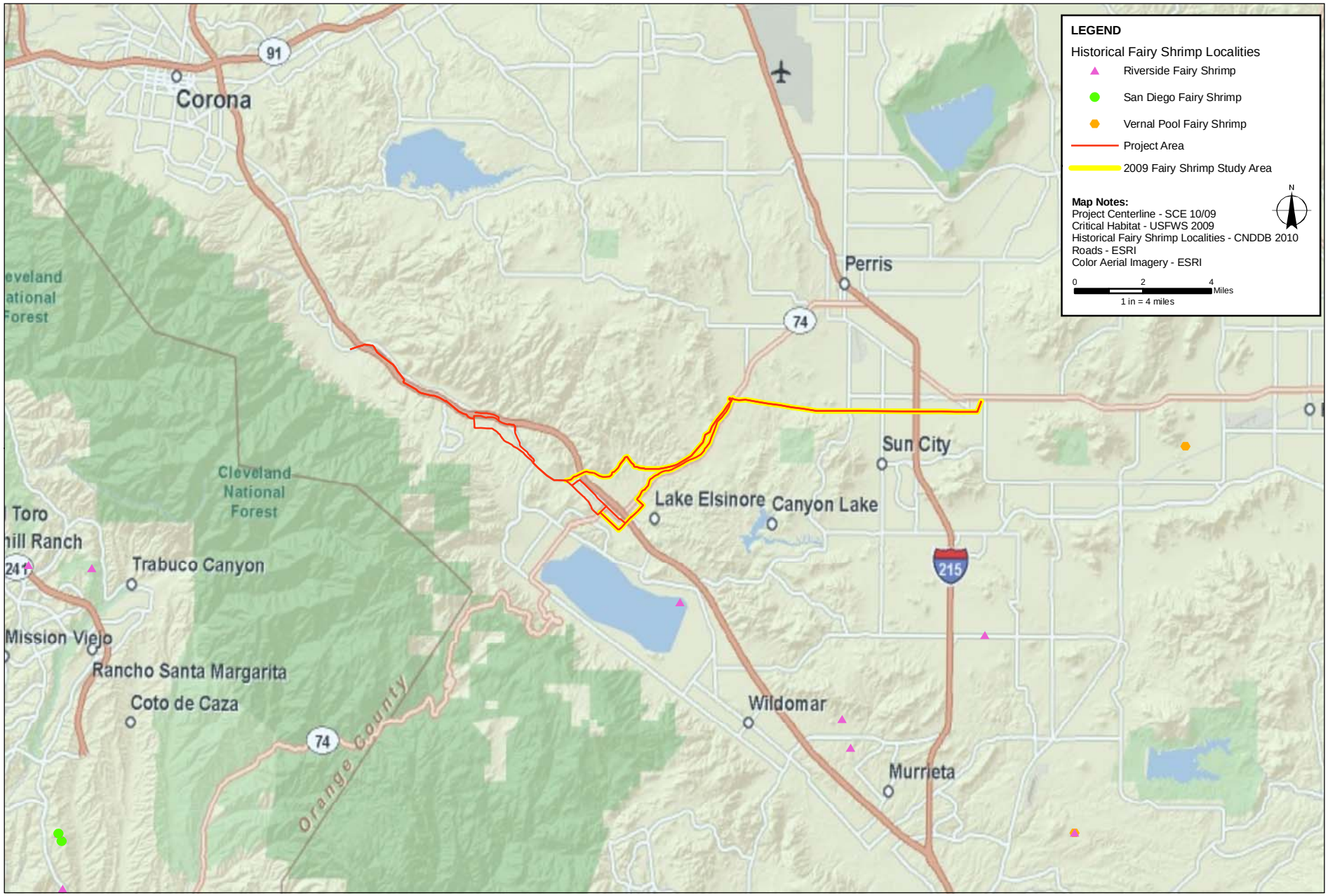
California walnut (*Juglans californica*), Mexican elderberry (*Sambucus mexicana*), wild grape (*Vitis girdiana*), giant reed (*Arundo donax*), mule fat (*Baccharis salicifolia*), tamarisk (*Tamarix* spp.), or any of several species of willow (*Salix* spp.). In addition, various understory herbs may be present, such as saltgrass (*Distichlis spicata*), wild cucumber (*Marah macrocarpus*), mugwort (*Artemisia douglasiana*), stinging nettle (*Urtica dioica*), and poison-oak (*Toxicodendron diversilobum*) (County of Riverside 2003). Subcategories of these habitat types within the study area include mule fat scrub, southern cottonwood-willow riparian forest, and southern sycamore-alder riparian woodland. Within the study area, riparian habitats occur primarily along stream courses, floodplains, and riverbanks.

2.3.7 Riversidean Alluvial Fan Sage Scrub

Riversidean alluvial fan sage scrub generally occurs on alluvial fans and benches along the floodplains of larger waterways in the Riverside County. Alluvial scrub is made up predominantly of drought-deciduous soft-leaved shrubs, but with significant cover of larger perennial species typically found in chaparral. Scalebroom (*Lepidospartum squamatum*) generally is regarded as an indicator of Riversidean alluvial fan sage scrub. In addition to scalebroom, alluvial scrub typically is composed of white sage (*Salvia apiana*), redberry (*Rhamnus crocea*), California buckwheat, Spanish bayonet (*Yucca whipplei*), California croton (*Croton californicus*), cholla (*Cylindropuntia* spp.), tarragon (*Artemisia dracunculus*), yerba santa (*Eriodictyon* spp.), broom baccharis (*Baccharis sarothroides*), and mountain-mahogany (*Cercocarpus betuloides*). Annual species composition has not been studied, but is probably similar to that found in understories of neighboring shrubland vegetation.

2.3.8 Woodlands and Forests

Woodland and forest vegetation communities in western Riverside County are dominated by Engelmann oak (*Quercus engelmannii*), coast live oak, canyon live oak (*Q. chrysolepis*), interior live oak (*Q. wislizenii*), and black oak (*Q. kelloggii*) in the canopy, which may be continuous to intermittent or savannah-like. Four-needle pinyon pine (*Pinus quadrifolia*), single-leaf pinyon pine (*P. monophylla*), and California juniper (*Juniperus californica*) are the canopy species of peninsular juniper woodland, which most commonly occur in southern California, forming a scattered canopy from 10 to 49 feet (ft) (3 to 15 meters [m]) tall.



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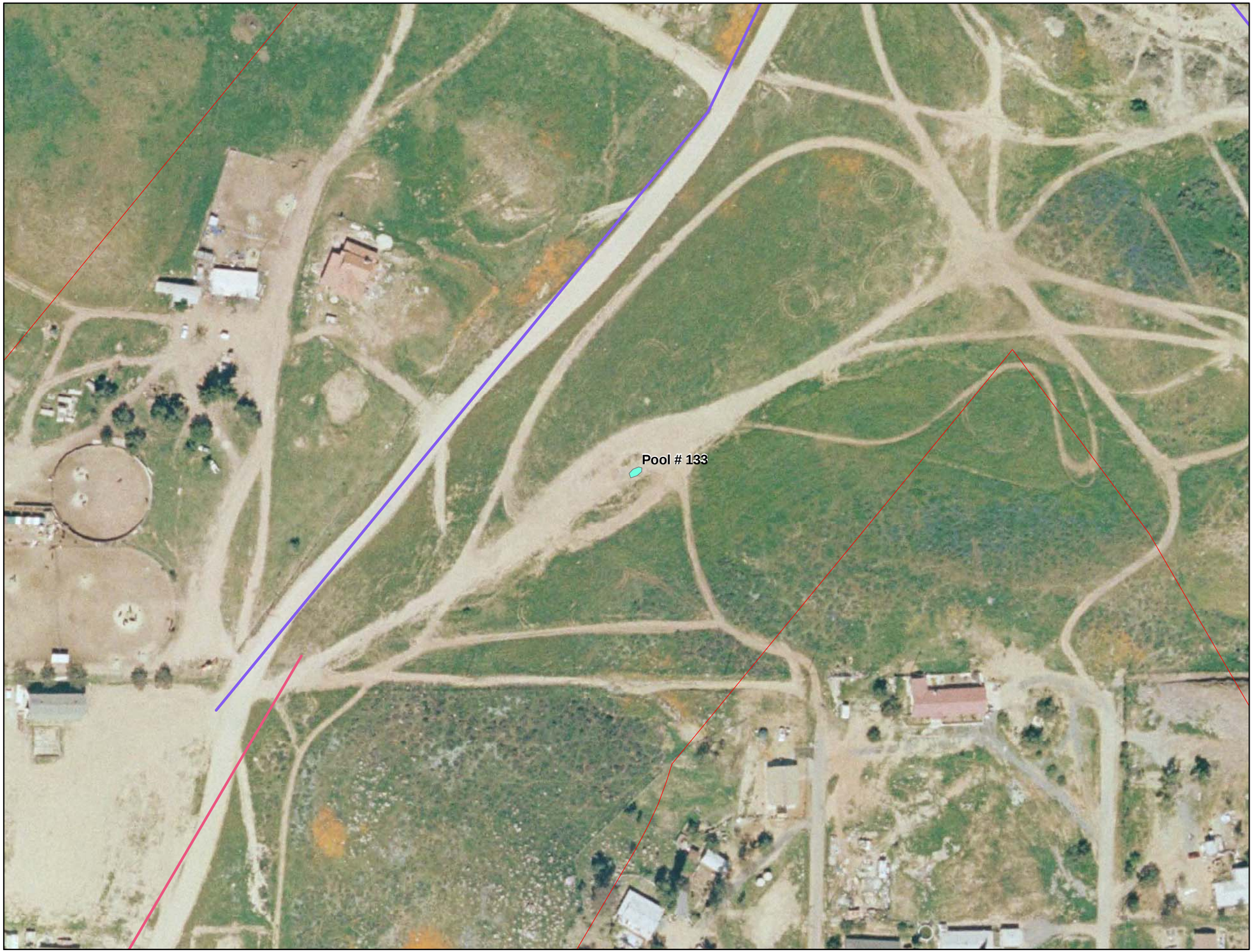
Regional Fairy Shrimp Distribution
Valley - Ivyglen Transmission Line Project
Riverside County , California

FIGURE

4



Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line

Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

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2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 1 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
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- E-1

Map Notes

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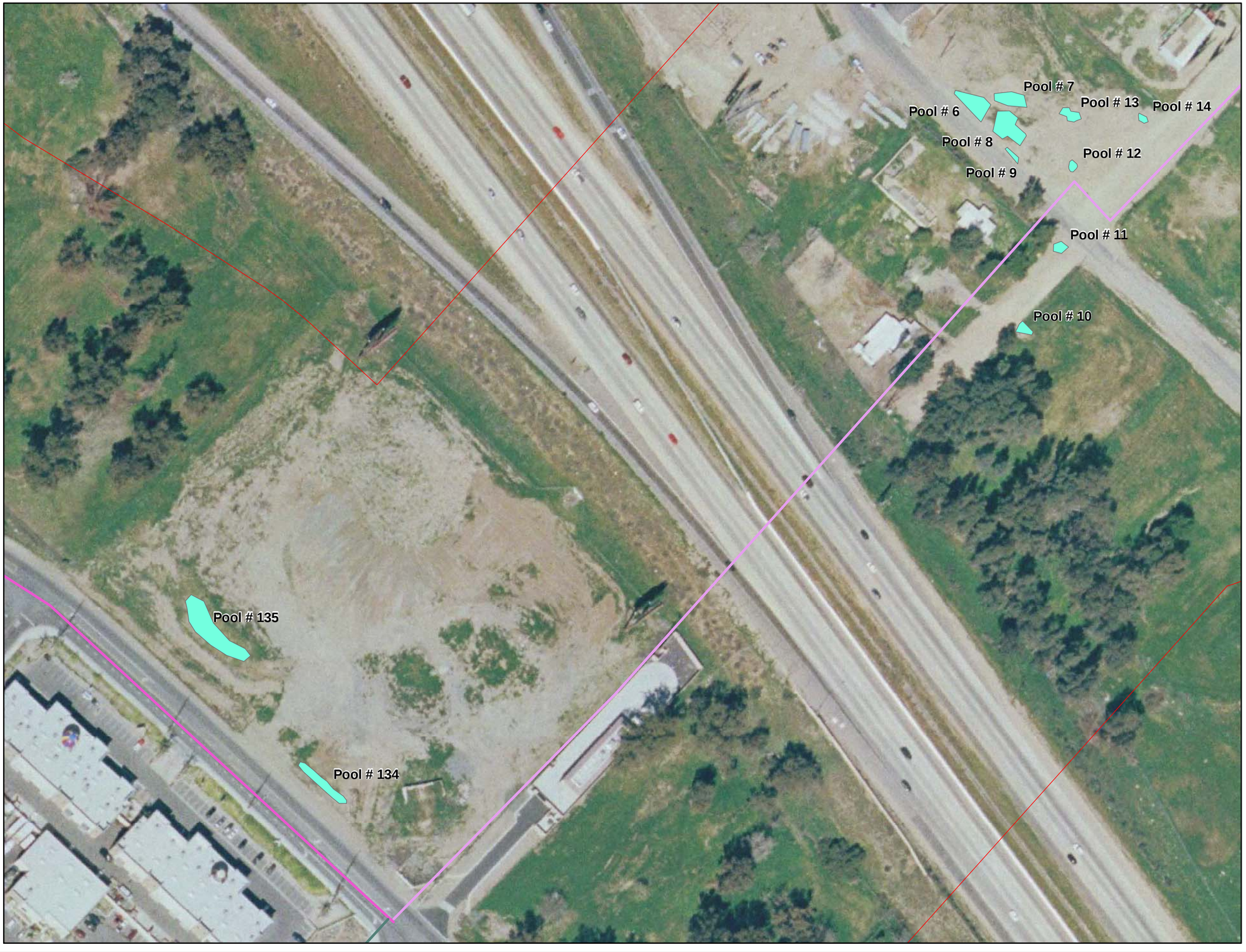
Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 2 of 23



Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

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Transmission Line (SCE 2009)

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amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 3 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
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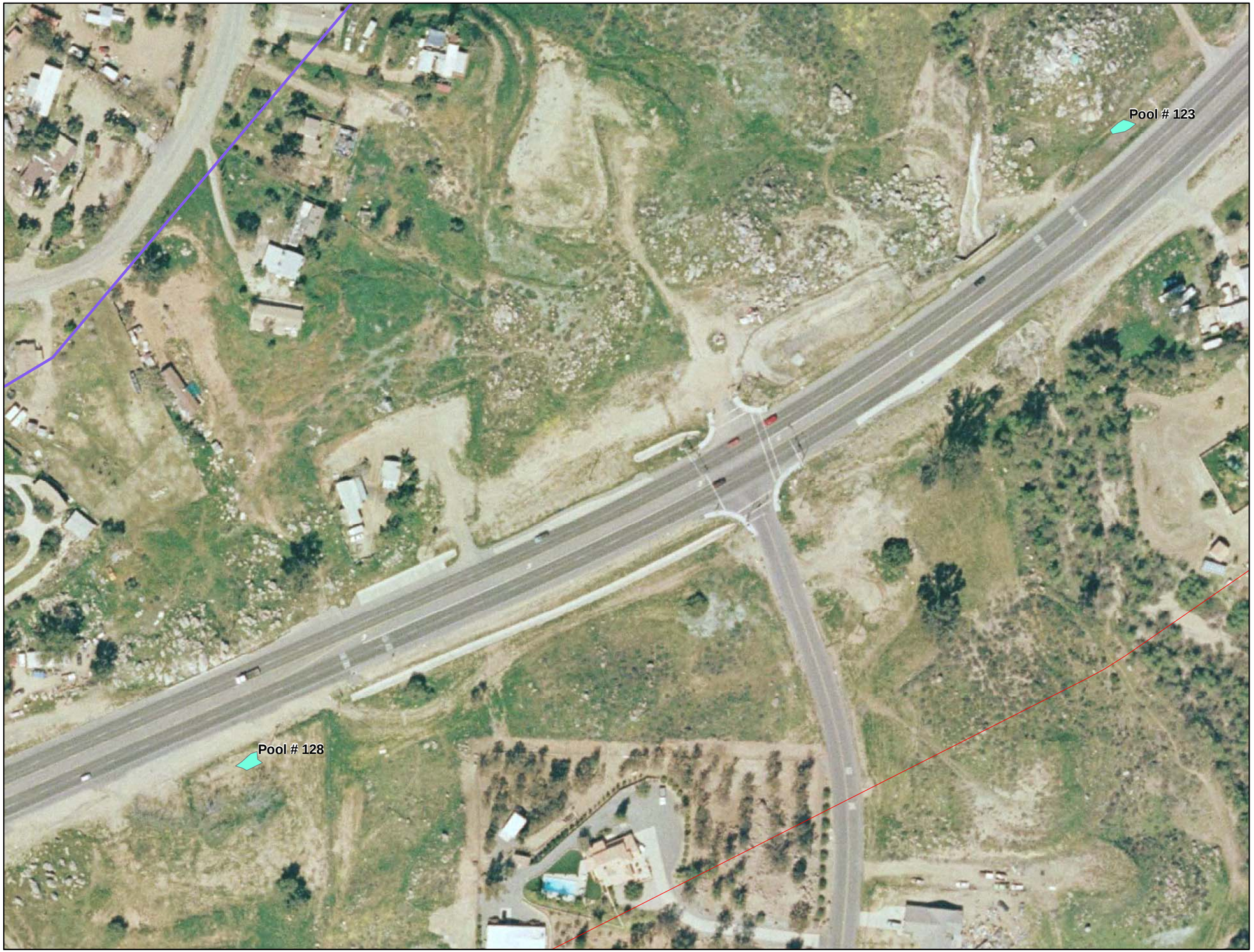

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

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- C-4
- C-9C
- C-9D
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- E-1

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Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

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Projection: Transverse_Mercator

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amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 5 of 23

Legend

500 ft Buffer

Vernal Pools

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- C-4
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Map 6 of 23

Legend

500 ft Buffer

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amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 7 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

:sd0 / iolo /sce/iv _ len/mxd/ 2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 8 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

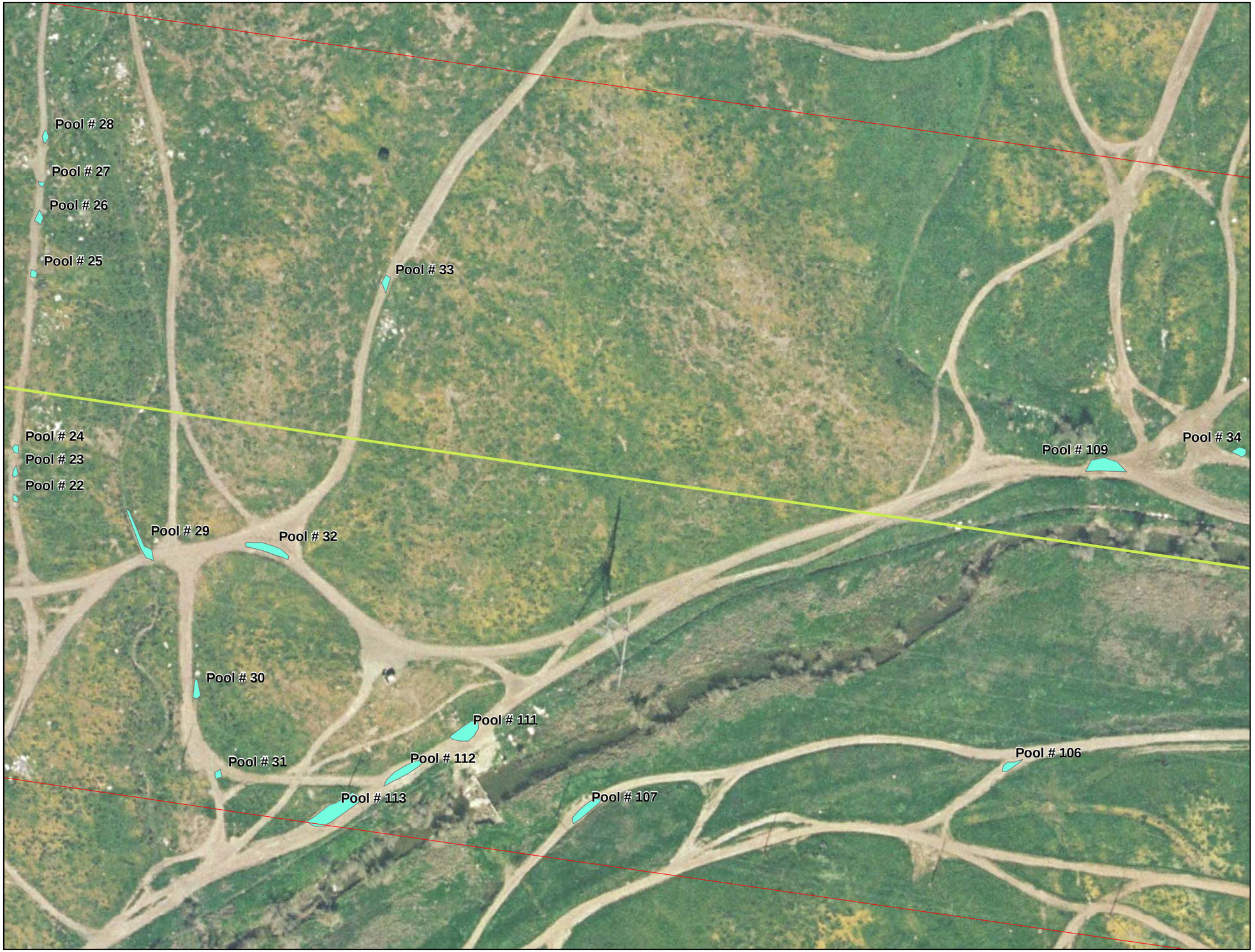
0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project



Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

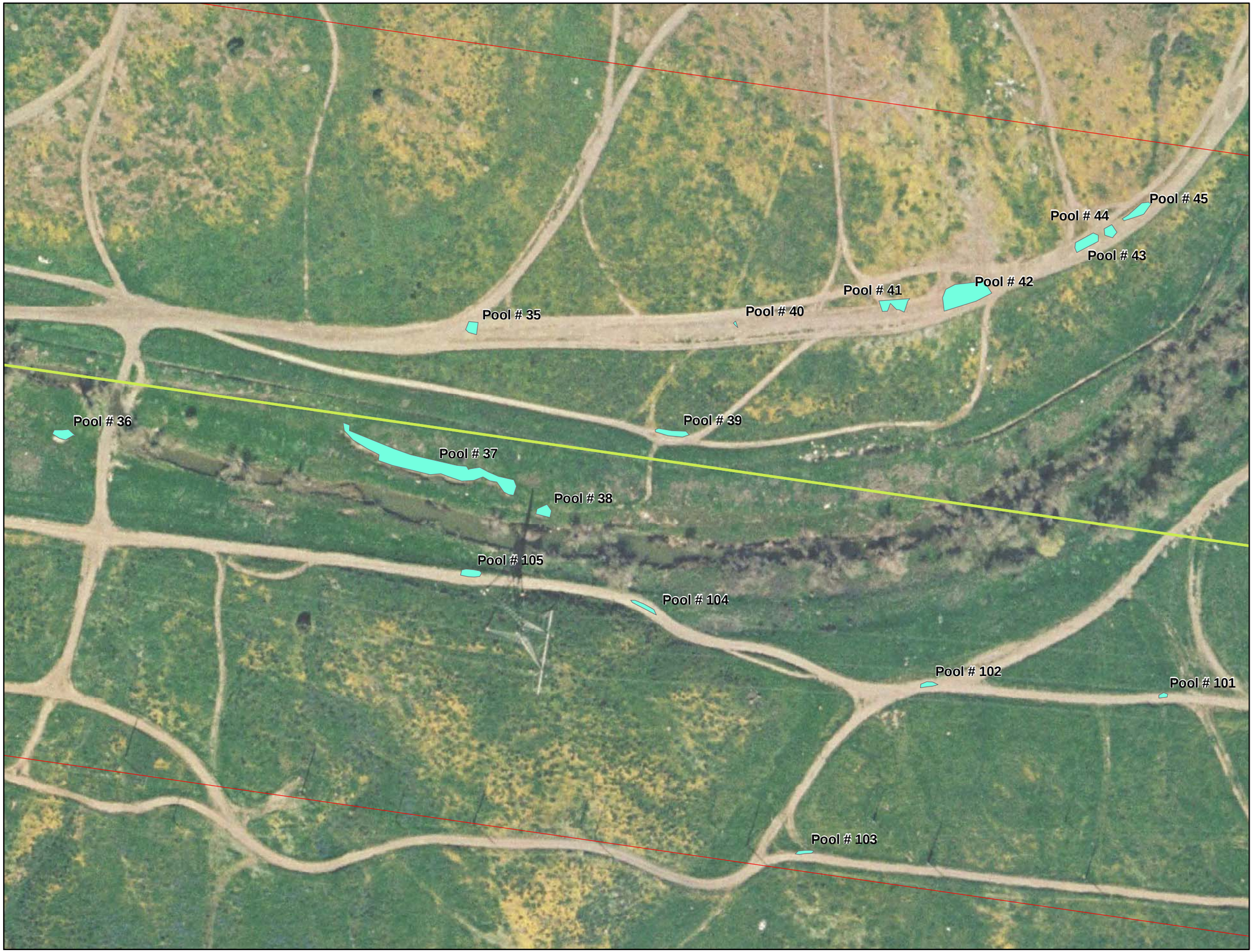
1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 10 of 23



Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 11 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 12 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 13 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 15 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 16 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 17 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 18 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 20 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 21 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 22 of 23

Legend

500 ft Buffer

Vernal Pools

Ivyglen Transmission Line Segment

- C-2
- C-4
- C-9C
- C-9D
- C-9E
- E-1

Map Notes

w:sd06/biology/sce/ivy_glen/mxd/2009/vernal_pools.mxd

Vernal Pools (AMEC 2009)
Transmission Line (SCE 2009)

NAD_1983_UTM_Zone_11N
Projection: Transverse_Mercator

0 125 250 Feet

1 inch = 125 feet

N

amec

Figure 5
Vernal Pools
Valley - Ivyglen Transmission Line Project

Map 23 of 23

2.4 Weather Conditions and Pool Formation

Precipitation levels during 2008/2009 were greater than the previous wet season, with approximately 8.72 in (22.15 cm) and 1.44 in (3.66 cm) recorded at the Elsinore station, respectively. Although there was an increase in precipitation levels between the two seasons, 2009 remains below the yearly average level of 11.25 in (28.57 cm) (DRI 2009).

In addition to relatively low precipitation levels, pool formation is typically affected by general rainfall patterns wherein much of the yearly precipitation is delivered by relatively few, large storm systems. Large but widely spaced precipitation events may result in saturated soil conditions and temporary pool formation, but greater precipitation levels and/or more closely spaced storms may be required for longer inundation periods.

Pools within the study area are extremely dynamic, as most are continually altered by human activity. Such activities include vehicle traffic, hikers, pets, dirt bikes, and other recreational activities along dirt access roads. Of the 120 pools identified during wet season surveys, 97 would fall into this category (Appendix A: Photograph 1). A smaller portion of pools were formed on topography created by construction practices, such as grading lots, roads, and pads (Appendix A: Photograph 2). These pools are not subject to ongoing disturbance, but are the result of past activities. A few pools are directly subjected to runoff and storm drain flows associated with rain events, which are adjacent to paved roads (Appendix A: Photograph 3). One pool appears to be naturally formed in the floodplain of the San Jacinto River, in that it fills when the river overflows its bank (Appendix A: Photograph 4). This pool can be inundated for long periods of time, whereas all remaining pools typically dry up within a couple of weeks or months. Table 1 summarizes these construction related, roadside, and San Jacinto River pool types.

Table 1. Pool Types for the Proposed Valley-Ivyglen Transmission Line Project

Pool Type	Pool Identification Number	Total
Construction Related	4,5,84,87,88,134,135,136,137,138,139,140,141,142,143,144	16
Roadside	15,19,51,120,123,127	6
San Jacinto River	37	1
		Grand Total: 23

The pool identification numbering system reflects the dynamic character of the study area. Although only 120 pools were studied, the identification numbers reflect the 145 depressions originally mapped. Some pools were assigned a number when first observed, but dried up prior to sampling and never refilled (thereby not qualifying as potential habitat during that season). In addition, some pools were created within the middle of the season and remained inundated for at least one sampling.

3.0 SURVEY METHODOLOGY

Focused surveys for listed fairy shrimp species were conducted by Nicole Shorey under USFWS Permit TE-053598-2. Surveys were conducted according to USFWS survey guidelines for wet season surveys (USFWS 1996). Once the pools were inundated with at least 1.2 in (3 cm) of water following a storm event, pools were sampled once every two weeks until the pools were no longer inundated (or until they experienced 120 days of continuous inundation). In cases where the pools dry and then refill in the same wet season, the pool sampling is reinitiated every time they reach the 1.2 in (3 cm) of standing water criterion, and sampling is started within 8 days of reaching the criterion, with continual sampling every two weeks. Pools were sampled using a dip net with mesh size smaller than 3.2 millimeters.

Pools identified by AMEC during 2008/2009 focused wet season surveys were sampled. A total of 120 pools were sampled. Table 2 summarizes sampling visits for the study area. Appendix B summarizes pool sampling information, and Figure 5 shows pool locations.

All inundated pools were sampled on each site visit. Pools were sampled with small dip-nets. All fairy shrimp netted were identified to species, when maturity level allowed. Immature fairy shrimp were occasionally encountered. If they did not yet exhibit the adult characteristics needed for identification, it was noted and identification was attempted upon the next visit.

Table 2. Sampling Visits for the Proposed Valley-Ivyglen Transmission Line Project Fairy Shrimp Surveys

Date	Week	Activity
09 January	1	Significant rain events occurred. Pooling was observed in the area; sampling began.
12 January	1	Continued to sample inundated pools.
27 January	2	Continued to sample inundated pools.
10 February	3	Continued to sample inundated pools.
23 February	4	Significant rain events occurred and refilled many pools. Continued to sample refilled and still inundated pools.
24 February	4	Continued to sample refilled and still inundated pools.
25 February	4	Continued to sample refilled and still inundated pools.
09 March	5	Continued to sample inundated pools.
10 March	5	Continued to sample inundated pools.
23 March	6	Continued to sample inundated pools.
06 April	7	Only one pool was holding water, so continued to sample the single pool.
22 April	8	Only one pool was holding water, so continued to sample the single pool.
04 May	9	Only one pool was holding water, so continued to sample the single pool.
18 May	10	Only one pool was holding water, so continued to sample the single pool. Surveys have ended, as this pool was inundated continuously for 120+ days.

4.0 SURVEY RESULTS

A total of 120 pools were identified during 2008/2009 focused wet season surveys. The locations of the identified pools are included in Figure 5 (maps 1 through 23) and detailed pool information is included as Appendix B.

The study area is highly dynamic, as the local residents utilize the dirt access roads daily and the majority of the pools are in or adjacent to the existing access roads. Residents drive vehicles, hike, walk their dogs, and other recreational activities, which alter the pools. As such, pool depths, boundaries, and length of inundation are continually changing. Construction sites with graded lots, roads, and pads are currently inactive, or are influenced by runoff and storm drain flows. These pools remained relatively untouched at the time of the surveys. These pool types (active access roads and inactive construction sites) typically are not considered vernal pools, but they do support VFS, an ubiquitous species.

Pools within the study area not only changed at the beginning and the end of the wet season, but between sampling visits. A pool could be inundated at the beginning of the season and would not refill even with sufficient rain because vehicular activity had reconfigured the pool. Conversely, a pool can be formed in the middle of the season that was not present upon initiation of surveys. Therefore, several pools were only sampled once. Although they fit the criteria of holding at least 1.2 in (3 cm) of water for over eight days, they were altered by recreational activity or dried up prior to the next sampling visit. Of the 120 pools sampled, 85 were only sampled once; 35 pools were sampled more than once.

No listed fairy shrimp species were identified in any of the pools. Only VFS, not considered sensitive by resource agencies, was observed. Other pools supported no fairy shrimp species during the early 2009 season, or supported VFS for only a portion of the season. Table 3 provides information relating to VFS occupancy and Appendix B provides pool sampling information.

Table 3. Pools with Versatile Fairy Shrimp Occupancy during Surveys

Survey Week	Number of Pools Occupied / Inundated	Survey Week (continued)	Number of Pools Occupied / Inundated
1	15 / 15	6	2 / 4
2	2 / 5	7	0 / 1
3	0 / 5	8	0 / 1
4	68 / 118	9	0 / 1
5	14 / 27	10	0 / 1

Between Survey Weeks 1 and 3, the number of pools with VFS decreased, as did Survey Weeks 5 through 10. Prior to Survey Week 4, a significant rain event occurred, causing 118 pools to be inundated, followed by an extreme dry period. Of the 118 pools sampled during Survey Week 4, 68 had versatile fairy shrimp or were identified as a Branchinecta species because the shrimp were too small to confidently identify. Although several pools with fairy shrimp were only identified to genus level, during subsequent surveys the shrimp were identified as VFS.

5.0 CONCLUSION AND RECOMMENDATIONS

Although one pool appears to be naturally formed in the floodplain of the San Jacinto River, the majority of the pooling within the study area was associated with depressions in disturbed and developed areas. Many of these pools are associated with existing access roads and shoulders.

Only VFS was identified during 2008/2009 focused wet season surveys; no listed fairy shrimp were detected (i.e., Riverside fairy shrimp and vernal pool fairy shrimp). VFS is a ubiquitous species, and is distributed throughout the study area.

This survey result confirms that listed fairy shrimp were not present within potentially suitable habitat during 2008/2009 wet season surveys. In order to take into account seasonal variability in weather patterns and conditions, a second sampling conducted during the wet season is required by the USFWS to make a final presence/absence determination for the pools. Currently, a second wet season survey is underway for 2009/2010.

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Nicole Shorey
Permit Number TE-053598-2

Date

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Appendix A
Study Area Photographs

Photograph 1: Looking East at a Tire Rut Pool (Taken 05 January 2009)

Photograph 2: Looking South at a Construction Site (Taken 05 January 2009)

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Study Area Photographs
Proposed Valley - Ivyglen Transmission Line Project

APPENDIX

A-1

Graphics/Biology/Ivyglen09/IvyglenA_1.fh8

Photograph 3: Looking West at a Roadside Pool (Taken 05 January 2009)

Photograph 4: Looking West at the San Jacinto River Pool (Taken 05 January 2009)

Appendix B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
11	1	12/31/2008	N/A	10.75	14	24.5	24.5	105	70	58.1*	59-62*	B. lindahli	1000's	adults/juveniles		
11	2	01/15/2009	10:55	9		82.5	22.5			53.1	77.2	B. lindahli, poss. male SD	10,000's	adult/juveniles	disturbed	seed shrimp (1000's), tadpoles & other amphibian eggs, adult water strider
11	3	01/30/2009	11:15	8		60	20.5			57.9	71.8	B. lindahli, poss. male SD	10,000's	almost all juveniles (adults in 10's)		seed shrimp, tadpoles, mosquito larvae, possible dragonfly larvae
11	4	02/13/2009	10:39	10		105	25			54	59.2	too small to ID	10000s			seed shrimp, tadpoles, frog eggs, insect larvae, water fleas, water boatmen
11	5	02/26/2009	12:45	9		105	35			61	70	Riv.	1000s			seed shrimp, tadpoles, insect larvae, waterboatmen
11	6	03/13/2009	10:30	6.5		30	15			58	64.2	Riv.	100s			water strider, ostracod, anostracans, belostromid, Pacific tree frog, water boatman, striped garden snakes
11	7	03/26/2009	10:48	8		67	17.5			65.7	69.8		none			Pacific tree frog tadpoles and froglets, water fleas, wter striders, mosquito larvae
11	8	04/10/2009	9:30	5		16.4	13.1			63.3	65.1		none			Pacific tree frog tadpoles, mosquito larvae, water striders, water fleas
13	1	12/31/2008	N/A	8.8	9	45	6	48	6.5	61.3*	59-62*	B. lindahli	100's	adults/mostly juveniles	disturbed	
13	2	01/15/2009	11:25	5		32	16.5			56.8	80.1	B. lindahli	100's	adult/juveniles	disturbed	seed shrimp, water fleas
13	3	01/30/2009	11:44	2.5		17.5	3.5			65.7	72		none			seed shrimp, tadpoles, possible dragonfly larvae, algae on surface
13	4	02/13/2009	11:02	9.5		25	16			54	70.9	too small to ID	100s			frog eggs
13	5	02/26/2009	1:00	8.5		50	20			65.8	70	B. lindahli; Riv. (at least 1)	100s			seed shrimp, many tadpoles of varying sizes
13	6	03/13/2009	N/A	5		15	5			57.9	71.8	B. lindahli	1	adult		tadpoles (spadefoot), Pacific tree frog, hemipteran, ostracod
16	1	12/31/2008	N/A	9.5	11	19	12	21	13	56.7*	59-62*	too small to ID	10's	juveniles	undisturbed	
16	2	01/15/2009	11:35	4		19	9.5			54	74.1	B. lindahli			disturbed	seed shrimp, tadpoles
16	4	02/13/2009	11:10	9		27	16			54.3	67.1		none			frog eggs, hydrophilidae
16	5	02/26/2009	1:15	8.25		35	18			64.9	70	B. lindahli	1			frog eggs, many tadpoles, insect larvae, seed shimp
16	6	03/13/2009	11:25	6		20	15			61.2	66.9	SD	1			ostracod, anastracod, Pacific tree frog tadpoles
25	1	12/31/2008	N/A	11	12.4	24	13	26	14	64*	59-62*	too small to ID	10's	juveniles	disturbed	frog/salamander eggs
25	2	01/15/2009	12:10	7		21	9			58.3	87.8	B. lindahli, poss. male SD	1000's	adult/juveniles	disturbed	seed shrimp, a lot of tadpoles and eggs
25	4	02/13/2009	11:57	6.5		25	17			53.5	71.2		none			
25	5	02/26/2009	1:40	4.5		32	16			67.8	70		none			tadpoles, insect larvae
26	4	02/13/2009	N/A	5	~5	5	4	~5	~4	67.5	67.6	too small to ID	10s			
28	1	01/07/2009	2:00	6	9	N/A	N/A	~16	~13	62.6		B. lindahli	100's		disturbed	seed shrimp
28	4	02/13/2009	N/A	7.5		8	5			61.2	66.6		none			seed shrimp
28	5	02/26/2009	2:05	6.5		16	13			72.7	70		none			seed shrimp
36	1	12/31/2008	N/A	2.5	4	6	1	10	2	N/A	50-65	B. lindahli	10's	adults		
36	4	02/13/2009	11:50	6		17	8			59.4	61.7	too small to ID	100s			
36	5	02/26/2009	2:00	3		20	10			77.4	70	B. lindahli	100s			seed shrimp
40	4	02/13/2009	11:47	7	~7	12	8	~12	~8	58.5	63.5	too small to ID	100s			
40	5	02/26/2009	1:50	2.5		8	8			74.8	70	B. lindahli, SD	100s			seed shrimp

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
43	4	02/13/2009	11:35	3.25	~3.25	7	5	~7	~5	57.2	69.3		none			weevil
55	1	12/31/2008	N/A	9	10.5	25	9	26	10	66.6*	59-62*	too small to ID	10s	juveniles	undisturbed	fish/frog eggs
55	4	02/13/2009	11:25	11.5		25	10			55	73.8	too small to ID	100s			frog eggs
55	5	02/26/2009	1:30	11.5		40	22			64	70	B. lindahli	100s			seed shrimp, tadpoles, insect larvae, water strider
55	6	03/13/2009	11:40	7.5		N/A	N/A			61.5	68		none			tadpoles, ostracodes, insect larvae, mosquito larvae, water boatman
56	1	12/31/2008	N/A	4.75	9	22	1	35	4	N/A	50-65	too small to ID	10's	juveniles	undisturbed	fish/frog eggs
56	2	01/15/2009	12:00	4		21	18.5			65.1	83.7	B. lindahli	1000's	adult/juveniles	disturbed	seed shrimp, tadpoles
56	4	02/13/2009	11:20	7		25	10			53.6	69.8	too small to ID	100s			frog eggs
56	5	02/26/2009	1:25	8.5		50	16			68.4	70	B. lindahli	1000s	juvenile and adult		seed shrimp, tadpoles
56	6	03/13/2009	11:30	2		N/A	N/A			66.2	66.9		none			pacific tree frog tadpoles, hemipterid
61	1	01/07/2009	12:51	3.5	6.5	N/A	N/A			64.6	67.5	B. lindahli, poss. SD	10's		disturbed	seed shrimp (1000's), Pacific tree frog eggs
65	1	12/31/2008	N/A	4.25	6.25	10	7	11	10	67.6*	59-62*	B. lindahli, poss. SD	10's	juveniles	undisturbed	
65	4	02/13/2009	10:18	3		30	12			57.4	59	SD; others too small to ID	10s			frog eggs
65	5	02/26/2009	12:20	4		14	12			74.5	67	B. lindahli	100s	mostly juvenile; some adults		seed shrimp
67	1	12/31/2008	N/A	6.25	8.25	22	9	50	15	65.7*	59-62*	B. lindahli, poss. SD	100's	juveniles	disturbed	frog eggs
67	4	02/13/2009	10:08	5		36	18			54.1	57.4	SD; others too small to ID	1000s			frog eggs
67	5	02/26/2009	12:05	7		35	20			58.3	70	B. lindahli, SD	100s			
67	6	03/13/2009	10:19	2		26	12			55.8	63.9		none			ostracods, anostracans
68	1	12/31/2008	N/A	7	10	35	15	50	20	65.5*	59-62*	too small to ID	1000's	juveniles	disturbed	
68	2	01/15/2009	10:39	4		28.5	6			52.2	83	B. lindahli, poss. male SD	1000's	juveniles		seed shrimp (1000's)
68	4	02/13/2009	10:29	7		37	18			54.9	59	SD; others too small to ID	10000s			frog eggs
68	5	02/26/2009	12:35	8.5		60	35			68.9	70	too small to ID (poss. SD)	100s			seed shrimp, insect larvae, tadpoles
68	6	03/13/2009	11:00	3.5		15	2			63.7	63		none			tadpoles; ostracod; mosquito; hemipterid larvae
70	1	12/31/2008	N/A	3.5	6	18	3	20	3.5	N/A	50-65	B. lindahli	10's	mid-size	disturbance	
70	4	02/13/2009	10:12	7.5		26	15			54.7	59	SD; others too small to ID	100s			frog eggs
70	5	02/26/2009	12:30	4		60	15			72.3	70	B. lindahli	10s			seed shrimp, insect larvae, tadpoles
72	4	02/13/2009	N/A	6.5		8	4			55.6	68.4	too small to ID	100s			
72	5	02/26/2009	2:45	2		4	1.5			75.4	68	B. lindahli	100s	juvenile and adult		seed shrimp
74	1	01/07/2009	11:19	<1.0	5.5	N/A	N/A	~70	~6	64	69.4	B. lindahli	1		disturbed	seed shrimp (1000's)
74	4	02/13/2009	12:45	5		50	6			64	66.6		none			
74	5	02/26/2009	2:50	4		70	6			74.5	68		none			seed shrimp, tadpoles
75	4	02/13/2009	12:42	4.5	~4.5	10	3	~10	~3	57.9	66.9		none			
78	4	02/13/2009	N/A	2	~2	6	4	~6	~4	70.3	66.2		none			
81	4	02/13/2009	N/A	4	~4	3	3	~3	~3	58.6	65.7		none			
88	1	12/31/2008	N/A	7.75	8.75	21	3	27	3	64.9*	59-62*	B. lindahli	10's	juveniles	disturbed	
88	4	02/13/2009	N/A	5		22	5			55.8	64.4		none			
88	5	02/26/2009	2:20	4.5		28	5			75.9	70	B. lindahli	10s	adults		seed shrimp, tadpoles

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
90	1	12/31/2008	N/A	N/A	~6	12	2	20	6	N/A	50-65	too small to ID	10's	juveniles	undisturbed	
90	4	02/13/2009	N/A	6		15	10			60.1	65.1	too small to ID	100s			
90	5	02/26/2009	2:25	4.75		28	24			77.4	68	SD (poss. B. lindahli)	100s			seed shrimp, tadpoles
91	4	02/13/2009	12:08	3.5	~3.5	15	6	~15	~6	55.8	72.5		none			spring tails
96	4	02/13/2009	1:52	3.5	~3.5	8	5	~8	~5	68.5	63.5		none			
101	4	02/13/2009	1:58	3	~3	7	4	~7	~4	68	63.5	too small to ID	10s			
102	1	12/31/2008	N/A	5	8	12	7	20	10	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
102	4	02/13/2009	2:07	11		5	5			57.7	61.9	too small to ID	1000s			
102	5	02/26/2009	11:50	7.25		8	6			61.3	68		none			seed shrimp, beetle larvae
102	6	03/13/2009	10:09	0.5		1.5	1.5			54.9	63		none			ostracods, mosquito larvae
109	4	02/13/2009	2:12	4	~4	15	7	~15	~7	65.3	62.2	too small to ID	10s			frog eggs
124	4	02/13/2009	2:27	4.75	~4.75	15	10	~25	~12	67.5	59.5	too small to ID	1s			weevil, copepods
124	5	02/26/2009	11:25	2		25	12			68.7	65		none			seed shrimp
126	4	02/13/2009	3:12	6	~6	N/A	N/A	~10	~8	56.1	56.5		none			
126	5	02/26/2009	3:00	2		10	8			64	68		none			seed shrimp
129	4	02/13/2009	3:21	9.5	~9.5	50	12	~85	~12	55.8	58.6		none			
129	5	02/26/2009	11:35	6		85	12			58.3	65		none			seed shrimp, beetle larvae
133	1	12/31/2008	N/A	2.5	6	10	1.5	30	1.5	N/A	50-65	too small to ID	10's	juveniles	undisturbed	
133	4	02/13/2009	2:44	8		30	5			59.4	61	too small to ID	10s			
133	5	02/26/2009	11:10	7.5		50	25			56.7	62		none			seed shrimp
134	1	12/31/2008	N/A	4.5	6	12	2	24	2	N/A	50-65		none		undisturbed	
134	4	02/13/2009	2:48	7		30	20			60.3	59.9		none			seed shrimp, copepods, weevil
134	5	02/26/2009	11:05	5.75		42	68			57.4	62		none			seed shrimp, beetle larvae
135	1	12/31/2008	N/A	6	~11	30	2	40	2.5	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
135	4	02/13/2009	2:58	11		30	15			56.7	58.5	too small to ID	10s			copepods
135	5	02/26/2009	10:45	10		55	35			55	61	B. lindahli, SD	100s			seed shrimp, copepods
135	6	03/13/2009	9:50	6		15	5			52.7	62.2		none			ostracods, anostracans, mosquito larvae
136	4	02/13/2009	3:10	1.5	~1.5	10	3	~10	~3	61.3	57.9		none			
139	1	12/31/2008	N/A	6	8	25	2	50	3	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
139	4	02/13/2009	3:05	7		40	8			57.6	58.1		none			seed shrimp, copepods
139	5	02/26/2009	10:30	5.5		50	18			62.8	60		none			seed shrimp, copepods
50-B	4	02/13/2009	1:17	1.5	~2.5	2	2	~2	~2	74.3	67.5		none			

* Temperature taken a week later due to a broken water thermometer on 07 January 2009.

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
11	1	12/31/2008	N/A	10.75	14	24.5	24.5	105	70	58.1*	59-62*	B. lindahli	1000's	adults/juveniles		
11	2	01/15/2009	10:55	9		82.5	22.5			53.1	77.2	B. lindahli, poss. male SD	10,000's	adult/juveniles	disturbed	seed shrimp (1000's), tadpoles & other amphibian eggs, adult water strider
11	3	01/30/2009	11:15	8		60	20.5			57.9	71.8	B. lindahli, poss. male SD	10,000's	almost all juveniles (adults in 10's)		seed shrimp, tadpoles, mosquito larvae, possible dragonfly larvae
11	4	02/13/2009	10:39	10		105	25			54	59.2	too small to ID	10000s			seed shrimp, tadpoles, frog eggs, insect larvae, water fleas, water boatmen
11	5	02/26/2009	12:45	9		105	35			61	70	Riv.	1000s			seed shrimp, tadpoles, insect larvae, waterboatmen
11	6	03/13/2009	10:30	6.5		30	15			58	64.2	Riv.	100s			water strider, ostracod, anostracans, belostromid, Pacific tree frog, water boatman, striped garden snakes
11	7	03/26/2009	10:48	8		67	17.5			65.7	69.8		none			Pacific tree frog tadpoles and froglets, water fleas, wter striders, mosquito larvae
11	8	04/10/2009	9:30	5		16.4	13.1			63.3	65.1		none			Pacific tree frog tadpoles, mosquito larvae, water striders, water fleas
13	1	12/31/2008	N/A	8.8	9	45	6	48	6.5	61.3*	59-62*	B. lindahli	100's	adults/mostly juveniles	disturbed	
13	2	01/15/2009	11:25	5		32	16.5			56.8	80.1	B. lindahli	100's	adult/juveniles	disturbed	seed shrimp, water fleas
13	3	01/30/2009	11:44	2.5		17.5	3.5			65.7	72		none			seed shrimp, tadpoles, possible dragonfly larvae, algae on surface
13	4	02/13/2009	11:02	9.5		25	16			54	70.9	too small to ID	100s			frog eggs
13	5	02/26/2009	1:00	8.5		50	20			65.8	70	B. lindahli; Riv. (at least 1)	100s			seed shrimp, many tadpoles of varying sizes
13	6	03/13/2009	N/A	5		15	5			57.9	71.8	B. lindahli	1	adult		tadpoles (spadefoot), Pacific tree frog, hemipteran, ostracod
16	1	12/31/2008	N/A	9.5	11	19	12	21	13	56.7*	59-62*	too small to ID	10's	juveniles	undisturbed	
16	2	01/15/2009	11:35	4		19	9.5			54	74.1	B. lindahli			disturbed	seed shrimp, tadpoles
16	4	02/13/2009	11:10	9		27	16			54.3	67.1		none			frog eggs, hydrophilidae
16	5	02/26/2009	1:15	8.25		35	18			64.9	70	B. lindahli	1			frog eggs, many tadpoles, insect larvae, seed shimp
16	6	03/13/2009	11:25	6		20	15			61.2	66.9	SD	1			ostracod, anastracod, Pacific tree frog tadpoles
25	1	12/31/2008	N/A	11	12.4	24	13	26	14	64*	59-62*	too small to ID	10's	juveniles	disturbed	frog/salamander eggs
25	2	01/15/2009	12:10	7		21	9			58.3	87.8	B. lindahli, poss. male SD	1000's	adult/juveniles	disturbed	seed shrimp, a lot of tadpoles and eggs
25	4	02/13/2009	11:57	6.5		25	17			53.5	71.2		none			
25	5	02/26/2009	1:40	4.5		32	16			67.8	70		none			tadpoles, insect larvae
26	4	02/13/2009	N/A	5	~5	5	4	~5	~4	67.5	67.6	too small to ID	10s			
28	1	01/07/2009	2:00	6	9	N/A	N/A	~16	~13	62.6		B. lindahli	100's		disturbed	seed shrimp
28	4	02/13/2009	N/A	7.5		8	5			61.2	66.6		none			seed shrimp
28	5	02/26/2009	2:05	6.5		16	13			72.7	70		none			seed shrimp
36	1	12/31/2008	N/A	2.5	4	6	1	10	2	N/A	50-65	B. lindahli	10's	adults		
36	4	02/13/2009	11:50	6		17	8			59.4	61.7	too small to ID	100s			
36	5	02/26/2009	2:00	3		20	10			77.4	70	B. lindahli	100s			seed shrimp
40	4	02/13/2009	11:47	7	~7	12	8	~12	~8	58.5	63.5	too small to ID	100s			
40	5	02/26/2009	1:50	2.5		8	8			74.8	70	B. lindahli, SD	100s			seed shrimp

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
43	4	02/13/2009	11:35	3.25	~3.25	7	5	~7	~5	57.2	69.3		none			weevil
55	1	12/31/2008	N/A	9	10.5	25	9	26	10	66.6*	59-62*	too small to ID	10s	juveniles	undisturbed	fish/frog eggs
55	4	02/13/2009	11:25	11.5		25	10			55	73.8	too small to ID	100s			frog eggs
55	5	02/26/2009	1:30	11.5		40	22			64	70	B. lindahli	100s			seed shrimp, tadpoles, insect larvae, water strider
55	6	03/13/2009	11:40	7.5		N/A	N/A			61.5	68		none			tadpoles, ostracodes, insect larvae, mosquito larvae, water boatman
56	1	12/31/2008	N/A	4.75	9	22	1	35	4	N/A	50-65	too small to ID	10's	juveniles	undisturbed	fish/frog eggs
56	2	01/15/2009	12:00	4		21	18.5			65.1	83.7	B. lindahli	1000's	adult/juveniles	disturbed	seed shrimp, tadpoles
56	4	02/13/2009	11:20	7		25	10			53.6	69.8	too small to ID	100s			frog eggs
56	5	02/26/2009	1:25	8.5		50	16			68.4	70	B. lindahli	1000s	juvenile and adult		seed shrimp, tadpoles
56	6	03/13/2009	11:30	2		N/A	N/A			66.2	66.9		none			pacific tree frog tadpoles, hemipterid
61	1	01/07/2009	12:51	3.5	6.5	N/A	N/A			64.6	67.5	B. lindahli, poss. SD	10's		disturbed	seed shrimp (1000's), Pacific tree frog eggs
65	1	12/31/2008	N/A	4.25	6.25	10	7	11	10	67.6*	59-62*	B. lindahli, poss. SD	10's	juveniles	undisturbed	
65	4	02/13/2009	10:18	3		30	12			57.4	59	SD; others too small to ID	10s			frog eggs
65	5	02/26/2009	12:20	4		14	12			74.5	67	B. lindahli	100s	mostly juvenile; some adults		seed shrimp
67	1	12/31/2008	N/A	6.25	8.25	22	9	50	15	65.7*	59-62*	B. lindahli, poss. SD	100's	juveniles	disturbed	frog eggs
67	4	02/13/2009	10:08	5		36	18			54.1	57.4	SD; others too small to ID	1000s			frog eggs
67	5	02/26/2009	12:05	7		35	20			58.3	70	B. lindahli, SD	100s			
67	6	03/13/2009	10:19	2		26	12			55.8	63.9		none			ostracods, anostracans
68	1	12/31/2008	N/A	7	10	35	15	50	20	65.5*	59-62*	too small to ID	1000's	juveniles	disturbed	
68	2	01/15/2009	10:39	4		28.5	6			52.2	83	B. lindahli, poss. male SD	1000's	juveniles		seed shrimp (1000's)
68	4	02/13/2009	10:29	7		37	18			54.9	59	SD; others too small to ID	10000s			frog eggs
68	5	02/26/2009	12:35	8.5		60	35			68.9	70	too small to ID (poss. SD)	100s			seed shrimp, insect larvae, tadpoles
68	6	03/13/2009	11:00	3.5		15	2			63.7	63		none			tadpoles; ostracod; mosquito; hemipterid larvae
70	1	12/31/2008	N/A	3.5	6	18	3	20	3.5	N/A	50-65	B. lindahli	10's	mid-size	disturbance	
70	4	02/13/2009	10:12	7.5		26	15			54.7	59	SD; others too small to ID	100s			frog eggs
70	5	02/26/2009	12:30	4		60	15			72.3	70	B. lindahli	10s			seed shrimp, insect larvae, tadpoles
72	4	02/13/2009	N/A	6.5		8	4			55.6	68.4	too small to ID	100s			
72	5	02/26/2009	2:45	2		4	1.5			75.4	68	B. lindahli	100s	juvenile and adult		seed shrimp
74	1	01/07/2009	11:19	<1.0	5.5	N/A	N/A	~70	~6	64	69.4	B. lindahli	1		disturbed	seed shrimp (1000's)
74	4	02/13/2009	12:45	5		50	6			64	66.6		none			
74	5	02/26/2009	2:50	4		70	6			74.5	68		none			seed shrimp, tadpoles
75	4	02/13/2009	12:42	4.5	~4.5	10	3	~10	~3	57.9	66.9		none			
78	4	02/13/2009	N/A	2	~2	6	4	~6	~4	70.3	66.2		none			
81	4	02/13/2009	N/A	4	~4	3	3	~3	~3	58.6	65.7		none			
88	1	12/31/2008	N/A	7.75	8.75	21	3	27	3	64.9*	59-62*	B. lindahli	10's	juveniles	disturbed	
88	4	02/13/2009	N/A	5		22	5			55.8	64.4		none			
88	5	02/26/2009	2:20	4.5		28	5			75.9	70	B. lindahli	10s	adults		seed shrimp, tadpoles

APPENDIX B
Pool Sampling Information for the Proposed Valley-Ivyglen Transmission Line Project

Pool	Week	Date	Time of Sample	Actual Depth (in)	Max Depth (in)	Actual Length (ft)	Actual Width (ft)	Max Length (ft)	Max Width (ft)	Water Temp (°F)	Air Temp (°F)	Shrimp sp.	No. of shrimp	Reproductive Status	Habitat Condition	Other Species
90	1	12/31/2008	N/A	N/A	~6	12	2	20	6	N/A	50-65	too small to ID	10's	juveniles	undisturbed	
90	4	02/13/2009	N/A	6		15	10			60.1	65.1	too small to ID	100s			
90	5	02/26/2009	2:25	4.75		28	24			77.4	68	SD (poss. B. lindahli)	100s			seed shrimp, tadpoles
91	4	02/13/2009	12:08	3.5	~3.5	15	6	~15	~6	55.8	72.5		none			spring tails
96	4	02/13/2009	1:52	3.5	~3.5	8	5	~8	~5	68.5	63.5		none			
101	4	02/13/2009	1:58	3	~3	7	4	~7	~4	68	63.5	too small to ID	10s			
102	1	12/31/2008	N/A	5	8	12	7	20	10	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
102	4	02/13/2009	2:07	11		5	5			57.7	61.9	too small to ID	1000s			
102	5	02/26/2009	11:50	7.25		8	6			61.3	68		none			seed shrimp, beetle larvae
102	6	03/13/2009	10:09	0.5		1.5	1.5			54.9	63		none			ostracods, mosquito larvae
109	4	02/13/2009	2:12	4	~4	15	7	~15	~7	65.3	62.2	too small to ID	10s			frog eggs
124	4	02/13/2009	2:27	4.75	~4.75	15	10	~25	~12	67.5	59.5	too small to ID	1s			weevil, copepods
124	5	02/26/2009	11:25	2		25	12			68.7	65		none			seed shrimp
126	4	02/13/2009	3:12	6	~6	N/A	N/A	~10	~8	56.1	56.5		none			
126	5	02/26/2009	3:00	2		10	8			64	68		none			seed shrimp
129	4	02/13/2009	3:21	9.5	~9.5	50	12	~85	~12	55.8	58.6		none			
129	5	02/26/2009	11:35	6		85	12			58.3	65		none			seed shrimp, beetle larvae
133	1	12/31/2008	N/A	2.5	6	10	1.5	30	1.5	N/A	50-65	too small to ID	10's	juveniles	undisturbed	
133	4	02/13/2009	2:44	8		30	5			59.4	61	too small to ID	10s			
133	5	02/26/2009	11:10	7.5		50	25			56.7	62		none			seed shrimp
134	1	12/31/2008	N/A	4.5	6	12	2	24	2	N/A	50-65		none		undisturbed	
134	4	02/13/2009	2:48	7		30	20			60.3	59.9		none			seed shrimp, copepods, weevil
134	5	02/26/2009	11:05	5.75		42	68			57.4	62		none			seed shrimp, beetle larvae
135	1	12/31/2008	N/A	6	~11	30	2	40	2.5	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
135	4	02/13/2009	2:58	11		30	15			56.7	58.5	too small to ID	10s			copepods
135	5	02/26/2009	10:45	10		55	35			55	61	B. lindahli, SD	100s			seed shrimp, copepods
135	6	03/13/2009	9:50	6		15	5			52.7	62.2		none			ostracods, anostracans, mosquito larvae
136	4	02/13/2009	3:10	1.5	~1.5	10	3	~10	~3	61.3	57.9		none			
139	1	12/31/2008	N/A	6	8	25	2	50	3	N/A	50-65	too small to ID	100's	juveniles	undisturbed	
139	4	02/13/2009	3:05	7		40	8			57.6	58.1		none			seed shrimp, copepods
139	5	02/26/2009	10:30	5.5		50	18			62.8	60		none			seed shrimp, copepods
50-B	4	02/13/2009	1:17	1.5	~2.5	2	2	~2	~2	74.3	67.5		none			

* Temperature taken a week later due to a broken water thermometer on 07 January 2009.