Final Report

Unocal San Luis Obispo Tank Farm Phase I Biological Resources Studies

Prepared for:
Union Oil Company of California

Prepared by:
Rincon Consultants, Inc.

rincon

September 10, 2003

Environmental Scientists Planners Engineers

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Prepared for:

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1.0 INTRODUCTION AND PURPOSE

The Union Oil Company of California (Unocal) requested a work plan for biological resources studies to support the development of an ecological risk assessment for the approximately 365-acre San Luis Obispo Former Tank Farm (SLO Tank Farm). Rincon Consultants, Inc., prepared a Phase I work plan approach to capitalize on appropriate spring/summer 2003 seasonal field survey conditions, to accommodate protocol survey timing, and to use Phase I survey data/results to further refine subsequent work plan phases for the collection of biological resources data. The purpose of the work plan was to meet the data quality objectives (DQOs) developed by the study team and the Ecological Risk Working Group (ERWG) for aquatic invertebrates, benthic invertebrates, and special-status species. The Phase I Work Plan was developed by Rincon and ratified by the ERWG at a meeting on April 23, 2003. Rincon Consultants conducted the Phase I Work Plan studies from May through September, 2003. A copy of the ratified work plan and DQOs are included in Appendix A. This report presents the methods and results of the Phase I Work Plan biological resources studies for the aquatic invertebrates and vertebrates, California red-legged frog (*Rana aurora draytonii*) protocol survey, black rail breeding survey, and rare plant distribution mapping. Subsequent phases that remain for the biological resources data collection include wet and dry season fairy shrimp and Morro shoulderband snail surveys, and a winter bird inventory survey.

2.0 METHODS

Phase I studies included a sampling program for aquatic invertebrates (water column and benthic) and aquatic vertebrates use of selected ponded areas of the SLO Tank Farm. Six areas representing affected and unaffected aquatic environments were selected by the study team and ERWG for sampling. The selected pond locations were identified as the north marsh, SW-1, cow pond, western marsh, southwest corner, and reservoir 3 as shown on Figure 1. The Phase I Work Plan also included the protocol survey for the California red-legged frog that requires surveying all areas of suitable habitat on the SLO Tank Farm that included other ponded areas and the area identified as the riparian corridor of the east fork of San Luis Obispo Creek (see Figure 1) and other ponded areas shown as CRLF Survey on Figure 1. Photographs representing the six selected habitats for survey are included as Photos 1 through 14 in Appendix B. The following describes the specific survey methodology for each task completed under the Phase I Work Plan.

2.1 Aquatic Water Column and Benthic Invertebrates

Rincon Consultants biologists David Wolff, Marcie Shove, and Kim Sanders assisted invertebrate expert Wayne Fields of Hydrozoology in collecting the water column and benthic invertebrate samples. While the purpose of this study was primarily a general inventory of the invertebrate fauna of the selected areas, the potential to encounter vernal pool crustaceans listed under the Endangered Species Act (ESA) could not be ruled out. As such, this work was conducted under Wayne Fields' scientific take permit Number TE-796280-2 for compliance with the ESA. The U.S. Fish and Wildlife Service (USFWS) was provided a courtesy notification of the study by letter dated May 13, 2003 (included in Appendix A). Surveys were conducted and sample collections were taken on May 14-15, 2003

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EXPLANATION

SMALL AREAS WITH LESS THAN 100 INDIVIDUALS

- CONGDON'S TARPLANT
- HOOVER'S BUTTON CELERY
- PURPLE NEEDLEGRASS
- SAN LUIS OBISPO MORNING GLORY

LARGE AREAS WITH GREATER THAN OR LESS THAN 100 INDIVIDUALS

- CONGDON'S TARPLANT
- HOOVER'S BUTTON CELERY
- PURPLE NEEDLEGRASS
- SAN LUIS OBISPO MORNING GLORY

NOTE:
CRLF = CALIFORNIA RED LEGGED FROG

SOURCE:
BIOLOGICAL RESOURCES MAPPING CONDUCTED BY RINCON CONSULTANTS INC., 2003. FIELD STUDIES PERFORMED MAY THROUGH SEPTEMBER 2003.

0 450 900 FEET
APPROXIMATE SCALE

FIGURE 1

2003 BIOLOGICAL STUDIES SURVEY LOCATIONS AND RARE PLANT DISTRIBUTIONS

FORMER UNOCAL TANK FARM
SAN LUIS OBISPO, CALIFORNIA

PREPARED FOR

UNOCAL CORPORATION
SAN LUIS OBISPO, CALIFORNIA

ENGLAND GEOSYSTEM

The water column of the selected aquatic habitat areas were sampled by walking meandering transects of opportunity using a standard D-ring dip net, a triangular dip net, and a large (12"x18") sweep net to collect invertebrates. Samples were brought to shore and deposited in white plastic basins for identification in the field. As stipulated in the Phase I Work Plan, field identification to the taxonomic Order and/or Family level was conducted by Mr. Fields. Samples analyzed in the field generated an inventory of invertebrates observed that included a qualitative analysis estimating relative abundance as observed in the samples. Most samples collected were returned to the aquatic areas of collection. A representative sample was collected from each of the selected aquatic habitats sampled for review in Mr. Fields' laboratory to confirm and/or refine the identification of collected invertebrates. No samples collected are being archived for this general inventory study. Depth of water did not prove prohibitive for walking/wading to collect samples so that no boat was necessary for the survey.

Benthic invertebrate sampling was conducted by both scraping the bottom surface with the dip and sweep nets and by collecting multiple two-inch cores of bottom muds to a depth ranging from two to four inches. The combination of scraping and coring obtained an appropriate sample as it was anticipated that the benthic fauna of these temporary ponded areas would be mostly on or close to the surface of these mud/clay bottom aquatic habitats. Mud core samples were washed through coarse mesh and fine mesh screens in the field for identification of benthic organisms and for collection of benthic samples from each selected aquatic habitat location for further identification by Mr. Fields in his laboratory.

2.2 Aquatic Vertebrates

Rincon Consultants biologists David Wolff and Jason Kirschenstein, assisted herpetologist expert Larry Hunt, Ph.D., of Hunt and Associates Biological Consulting Services, in conducting the aquatic vertebrate survey. The purpose of this study was primarily a search and analysis of habitat for the California tiger salamander (*Ambystoma californiense*) and general inventory of the aquatic vertebrate fauna of the selected areas. However, the potential to encounter the California red-legged frog listed under the ESA could not be ruled out. As such, this work was conducted under Larry Hunt's scientific take permits numbers TE-023892-1 and TE-023892-2 for compliance with the ESA. The USFWS was provided a courtesy notification of the study by letter dated May 13, 2003. Daytime dip net and seine surveys of the target habitats and other areas of suitable habitat for amphibians were conducted on May 21-22, 2003.

The six selected aquatic habitat areas were sampled by walking meandering transects of opportunity using a standard D-ring dip net, a triangular dip net, and a large (12"x18") sweep net to capture vertebrates. A 10x4 foot seine was used at some locations to provide a more thorough survey of ponded areas. At the Cow Pond site a three-foot diameter hoop throw net was used because of the depth of this one area. Otherwise, depth was not prohibitive for adequate access by wading and netting/seining the ponded areas. Adult and/or larval forms collected were identified to species level in the field and specimens returned to the ponds where they were collected. No specimens were collected for laboratory processing.

2.3 California Red-Legged Frog Protocol Survey

Rincon Consultants biologists David Wolff, Jason Kirschenstein, and Marcie Shove assisted herpetologist expert Larry Hunt, Ph.D., of Hunt and Associates Biological Consulting Services, in conducting the protocol survey for the California red-legged frog in the six selected sites and all other areas representing suitable aquatic habitat including the riparian corridor (East Fork San Luis Obispo Creek) in the study area. The survey was conducted in accordance with the U.S. Fish and Wildlife Service protocol that required two daytime and two nighttime surveys of all areas with suitable habitat. Day and night surveys were conducted during the same 24-hour period. While the USFWS survey protocol is a "non-take" protocol, all areas representing suitable aquatic habitat were dip netted and seined as described in 2.2 above under Larry Hunt's scientific take permits numbers TE-023892-1 and TE-023892-2 for compliance with the ESA. Daytime observation, dip net, and seine surveys of the target habitats and other areas of suitable habitat for amphibians were surveyed on May 21-22, 2003 and nighttime spotlight surveys were conducted on May 21, 22, & 28, 2003.

2.4 Black Rail Breeding Season Survey

Daytime and nighttime black rail breeding season surveys were conducted concurrently with the aquatic invertebrate and vertebrate surveys described above and on May 30, 2003. Surveys were conducted using binoculars and recorded call. Rincon Consultants biologist Jason Kirschenstein was the lead investigator in using the recorded call survey technique. The black rail breeding season survey focused only on areas of suitable habitat supporting stands of bulrush and cattails.

2.5 Rare Plants

Rincon Consultants biologists Kevin Merk, Kim Sanders, and Marcie Shove conducted the rare plant survey within the study area to determine the presence, absence, and distribution of any rare, threatened, or endangered plant species (rare plants). Target species included but were not be limited to Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), Pismo clarkia (*Clarkia speciosa* ssp. *immaculata*), and Cambria morning glory (*Calystegia subacaulis* ssp. *episcopalism*). The distribution of observed rare plants was recorded and mapped. The rare plant survey was conducted in accordance with the guidelines recommended by the California Native Plant Society and the California Department Fish and Game that included:

- Conducting the survey at the proper time of year when rare plants were both evident and identifiable. This is typically during the flowering and fruiting period.
- Surveys that are floristic in nature where all plant species noted in the field are identified to the level necessary to determine if it is rare, threatened, or endangered.
- Conducting the survey using systematic field techniques in all habitats of the site to ensure a reasonable and thorough coverage.
- Up to three visits to the site may be necessary to ensure that seasonal variations in the flowering period of the target species are adequately covered.

Prior to field surveys, information regarding special-status plant species with potential to occur at the study site was gathered from biological documents and individuals with knowledge of special-status plant species in the area. Plants were either identified in the field or were collected and brought to the laboratory for identification. In addition, comparisons with herbarium specimens and discussions with local plant experts confirmed plant identification. Surveys were conducted on the following dates: May 27, June 18, July 10, 14 – 18, 23 - 25, 28, 30, 31, August 1,14, 15, and September 2 and 3, 2003.

Rare plant surveys were conducted by walking roughly linear transects spaced approximately 20 feet (6 meters) apart over the subject property. Special attention was paid to areas with irregularities in topography and changes in vegetative cover. When a rare plant occurrence was located, the extent of the population was delineated by placing pin flags at the perimeter of the distribution of the localized occurrence. See Photo 19 in Appendix B. In large areas that contained greater than 100 individuals, and in large areas containing less than 100 individuals, a polygon was mapped by walking the perimeter of the occurrence with the Trimble GeoXT GPS unit. For small areas that contained less than 100 individuals, a data point was recorded utilizing a Trimble GeoXT GPS unit.

Percent cover and relative density was recorded for each polygon and point recorded. Percent cover is the area of ground covered by a species within a specified area. It is commonly used as a way to quantify plants in the field and was used in our survey in conjunction with density, or the estimated number of plants per area. These two measurements used together provide a comprehensive representation of how these plant species occurred in the field. Percent cover within polygons was approximated utilizing the following categories: < 25%, 25 – 50%, 51 - 75%, and > 75%, and by estimating the cover of the rare plant within the overall area of the occurrence. For low density occurrences, the approximate number of plants was determined by directly counting the number of individual plants. For dense occurrences, the approximate number of plants in a defined area was counted, and the amount of those defined areas within the occurrence was estimated. The number of individuals was then extrapolated by multiplying the number of areas by the number of individuals in one area. For example, if 50 plants were counted in an approximate one square meter area, and the entire occurrence covered approximately 20 square meters, the number of individual plants was estimated to be 1,000. For occurrences collected as data points, individual plants were either counted or estimated in the same manner.

3.0 RESULTS

All tasks under the Phase I Work Plan have been completed and the results are detailed in this report. In summary, a suite of aquatic invertebrates typical of seasonal ponded freshwater habitats were observed during the study. Aquatic vertebrates observed were those common to the area. No threatened or endangered invertebrates or vertebrates were observed during the field studies described above. The southwestern pond turtle, a species of concern, was observed in the creek of the riparian corridor. As expected, Congdon's tarplant was observed with an extensive distribution throughout the SLO Tank Farm site. Previously undocumented occurrences of Cambria morning glory and Hoover's button celery were also observed and mapped throughout the site. The following provides the detailed results of each survey task.

While not the focus of this study, several upland vertebrates were observed during the course of conducting the field studies. Upland vertebrates observed included the mule deer, red fox, raccoon, pocket gopher, California ground squirrel, black-tailed hare, domestic cat, cow, common king snake, Pacific gopher snake, terrestrial garter snake and western fence lizard.

3.1 Aquatic Water Column and Benthic Invertebrates

The aquatic water column and benthic invertebrate fauna observed and identified to the taxonomic Order and Family level were represented by a suite of invertebrates typical of the non-flowing seasonally ponded habitats. Table 1 in Appendix C provides a list of invertebrates observed during the study. No threatened or endangered invertebrates were observed. The surveys were conducted too late in the season to detect fairy shrimp should they be present. Implementation of a dry and wet season fairy shrimp survey work plan is planned for the fall/winter of 2003-2004.

Given that this study was conducted in support of the ERWG technical analysis, it was important to distinguish habitat use of invertebrates observed between the water column and benthos. Water column invertebrates were easily captured for identification as described above. Benthic organisms sampled from the cores or scraping were collected for identification in the laboratory. Observations of the mud/clay cores indicate that invertebrate use is primarily on the bottom surface or within the first several inches of substrate. It is presumed that the heavy clay substrate becomes anaerobic and inhospitable for invertebrate life below the first several inches in depth. The following text describes the general habitat use for the invertebrates observed as shown in Table 1.

Benthic. The term "benthic" refers to any organism that lives in contact with the bottom most of the time, as opposed to planktonic, meaning animals that spend most of their time up in the water column. The purely benthic fauna was made up of perhaps six or seven species of oligochaete worms in the families Naididae and Tubificidae, at relatively low population densities. The substrate available for colonization by benthic forms was limited, being shallow and underlain by dense anoxic clayey sediment. The worms (throughout their lives, although some species can swim) and some of the more sedentary Diptera (as larvae only) are there essentially constantly, but reside only in the superficial layers.

Facultative. The term "facultative" is used to describe the use by animals of both the water column and bottom surface interactively. There are perhaps other terms that could be used, such as epibenthic for example, that refers to animals that move around on the mud/water interface, which would describe most of the animals observed during this study. The facultative/epibenthic fauna was relatively diverse, consisting of groups expected to be found in seasonal wetlands in California. Many of the families listed were represented by more than one species. It is important to note that different life stages of a species will use the water column and/or bottom surface in different ways and at different lifecycle stages such as the Dytiscidae and Hydrophilidae.

Swimming. The term "swimming" is used to designate animals that move around mostly in the water column. Included in this grouping are some more truly planktonic animals that have only a limited ability to control where they go such as the Cladocera (Daphnidae) and Copepoda (Diaptomidae). While these animals are mostly observed swimming in the water column, all these animals spend at least a little time on the bottom.

Water Surface. The term "water surface" refers to animals that occur only on the water surface. This is represented by only one taxon, the water strider.

3.2 Aquatic Vertebrates

Daytime dip net and seine surveys of the selected habitat areas and other areas of suitable habitat revealed mostly Pacific tree frog larvae and adults, and bullfrog adults and one bullfrog egg mass. The western marsh selected habitat area supported an abundant number of young common carp which seemed unusual given these areas typically dry out each year. Table 2 in Appendix C provides the inventory of aquatic vertebrates observed. No listed threatened or endangered species were observed during this study.

While the SLO Tank Farm supports both aquatic and upland habitat that could be considered as suitable for the California tiger salamander, Larry Hunt suggests that this species is not likely to occur given the combination of historical absence and more recent habitat disturbance and introduction and establishment of non-native predator species. Larry Hunt's letter of findings detailing his conclusions is included in Appendix D. The native threespine stickleback and southwestern pond turtle were observed in the east fork San Luis Obispo Creek on site. The southwestern pond turtle is also documented upstream and downstream of the SLO Tank Farm riparian corridor in studies from the City of San Luis Obispo's Damon-Garcia Sports Complex project and the Land Conservancy of San Luis Obispo's Filiponi wetlands restoration area. Based on these results no further survey for aquatic vertebrates are required at this stage in the process.

3.3 California Red-Legged Frog

Daytime dip net and seine surveys, and nighttime spotlight surveys of the selected habitat areas and other areas of suitable habitat revealed mostly Pacific tree frog larvae and adults, and bullfrog adults and one bullfrog egg mass. Other areas of suitable habitat beyond the six selected sites included other seasonally ponded areas of the SLO Tank Farm and the creek and riparian corridor along the east fork of San Luis Obispo Creek (see Photo 15 in Appendix B). These additional areas are shown on Figure 1. Data from other California red-legged frog surveys in the east fork San Luis Obispo Creek upstream (City of SLO Damon-Garcia Sports Complex) and downstream (SLO Land Conservancy Filiponi Wetlands) have noted abundant bullfrogs and no California red-legged frogs. The predominance of bullfrogs being both a predators and competitor of the California red-legged frog further substantiates the negative findings of this study. Based on these results no further survey for aquatic vertebrates are required at this stage in the process.

San Luis Obispo County morning-glory is a perennial herb in the morning-glory family (Convolvulaceae) that typically blooms from April to May. See Photos 17 and 18 in Appendix B. This species is primarily found in dry open scrub including chaparral and cismontane woodland, and is known to occur only in San Luis Obispo County. San Luis Obispo County morning-glory was wide spread and abundant throughout upland areas of the SLO Tank Farm. Some occurrences of San Luis Obispo County morning-glory contained predominantly dried plants. Because many of the dried plants were releasing seeds, and a positive identification could be made by the presence of green plants in the vicinity, they were determined to be from this year's growth and were included when estimating the number of individuals. There were approximately 100 occurrences of less than 25% cover. Twenty-eight of these occurrences contained individuals numbering in the thousands, about half numbered in the hundreds, and approximately 17 occurrences contained less than 100 plants. An additional five occurrences of 25 - 50% cover were also located in which individuals numbered in the hundreds and thousands. There were also 42 data points collected each containing less than 100 individuals. The occurrences were usually located in non-native annual grassland habitat that contained dense to sparse vegetation covering berms or flat areas. San Luis Obispo County morning-glory was also found along the upland fringes of riparian habitat. In addition, the friable soil of gopher mounds provided habitat that supported this species. Habitat that appeared suitable but that did not contain Cambria morning glory, may have had soil that was too compacted or that retained too much moisture to support this species. Rarely was San Luis Obispo County morning-glory found cohabitating with Congdon's tarplant, but in some locations it was immediately adjacent.

Hoover's button celery is an annual/perennial herb in the carrot family (Apiaceae) that typically blooms in July. See Photo 16 in Appendix B. This species is known to occur in Alameda and San Luis Obispo Counties. It may also occur in San Benito and Santa Clara Counties although information is lacking in these Counties. There were many areas at the site in which Hoover's button celery was found co-occurring with Congdon's tarplant. A total of seven occurrences of less than 25% cover were located. Four of these occurrences contained individuals numbering in the hundreds and three contained less than 100 plants. There were also 13 data points collected each containing 50 or fewer individuals. This species was found in a very similar ecological niche as Congdon's tarplant consisting of low lying areas within wetland habitat. A dense cover of short grasses was often found in the areas in which Hoover's button celery and Congdon's tarplant were found cohabitating. Areas in which Congdon's tarplant grew but that were void of Hoover's button celery were sometimes more sparsely vegetated.

The native perennial bunchgrass occurrences, consisting mainly of purple needle grass (*Nassella* sp.) were concentrated in the northeastern portion of the property. While not a special status species, native perennial bunchgrass as a plant community is considered rare by the California Department of Fish and Game (CDFG). Native perennial bunch grass habitat formerly exceeded approximately 5.35 million hectares in California, and an additional 3.87 million hectares of native perennial grassland existed with an oak overstory (EDAW, 1999). Due to introduction of non-native annual grasses resulting from European settlement and grazing practices that occur throughout the state, the grassland habitat type is currently dominated by introduced annual grasses.

There were approximately six native perennial bunchgrass occurrences with 15% to 20% cover. One occurrence contained approximately 80% cover, but was only approximately 90 square feet in size. In addition, there were approximately 11 occurrences of native perennial bunchgrass with less than 10% cover. Six data points were also collected. Five of these contained approximately 25 or fewer individuals, and one contained approximately 50 individuals. Native perennial bunchgrass was found in patches within non-native annual grassland generally dominated by slender wild oats (*Avena barbata*) and containing other annual grass species. In only one occurrence (the occurrence containing 80% cover described above) did it warrant being classified as a separate habitat type. All other occurrences contained a mixture of native perennial bunchgrass and non-native annual grassland.

Appendix A

Phase I Ratified Work Plan, Data Quality Objectives, & USFWS Notification Letter

Appendix B

Study Area Photographs

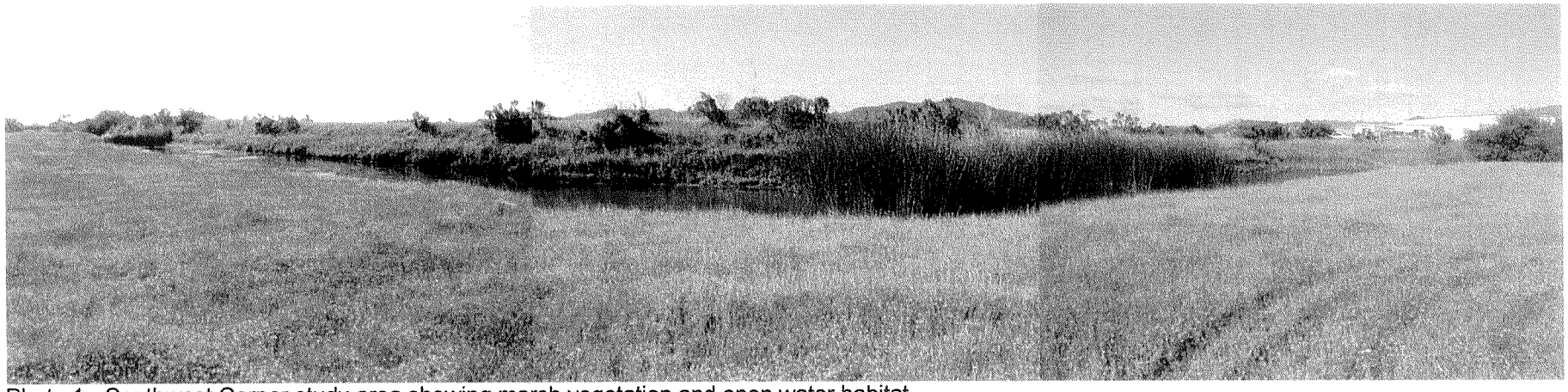

Photo 1 - Southwest Corner study area showing marsh vegetation and open water habitat.

Photo 2 - SW-1 study area showing small pool.

Photo 3 - SW-1 study area showing invertebrate sample collection of small pool.

Photo 4 - Western Marsh study area showing pond and emergent vegetation.

Photo 5 - Western Marsh study area showing open water pond.

Photo 6 - Western Marsh study area showing drying pond and emergent vegetation.

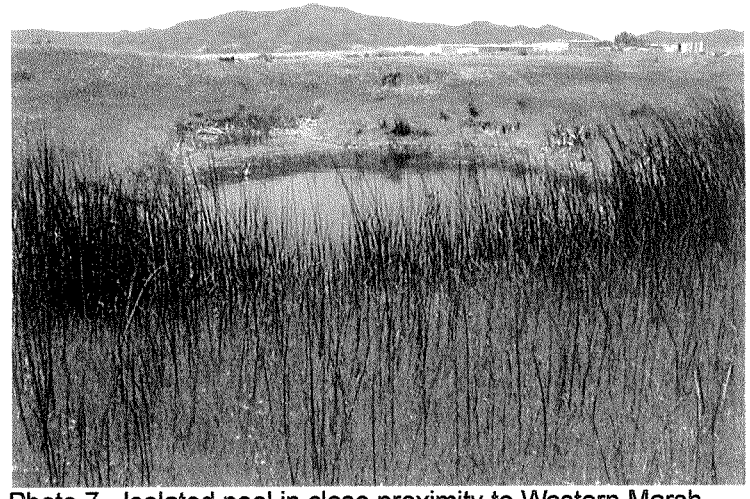

Photo 7 - Isolated pool in close proximity to Western Marsh study area.

Photo 8 - Reservoir 3 study area showing emergent vegetation south of fenced area.

Photo 9 - Reservior 3 study area shwoing emergent vegetation south of fenced area.

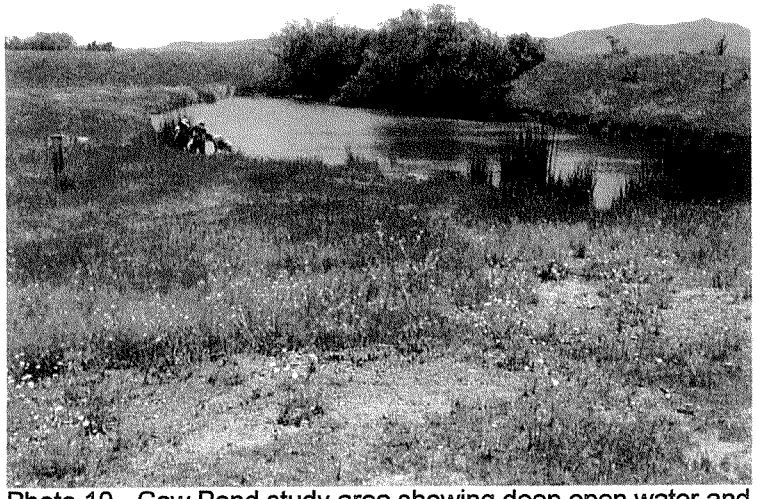

Photo 10 - Cow Pond study area showing deep open water and fringe vegetation.

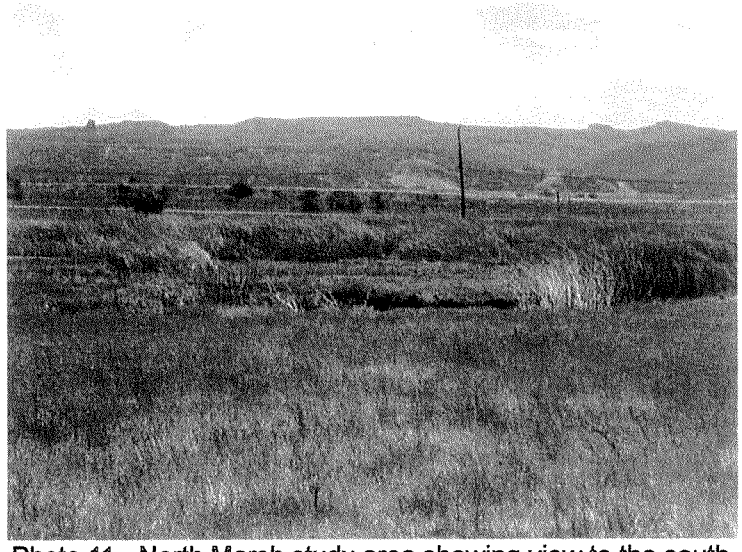

Photo 11 - North Marsh study area showing view to the south.

Photo 12 - North Marsh study area showing view to the northwest.

Photo 13 - North Marsh Ditch study area showing view to the east.

Photo 14 - North Marsh Ditch study area showing view to the west.

Photo 15 - Riparian corridor showing shallow ponding and steep eroded banks.

Photo 16 - Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) Hoover's button celery (*Eryngium aristulatum* var. *hooveri*)

Photo 17 - San Luis Obispo County morning glory (*Calystegia subacaulis* ssp. *episcopalis*) in flower.

Photo 18 - San Luis Obispo County morning glory (*Calystegia subacaulis* ssp. *episcopalis*) showing dried leaves and fruit with seeds.

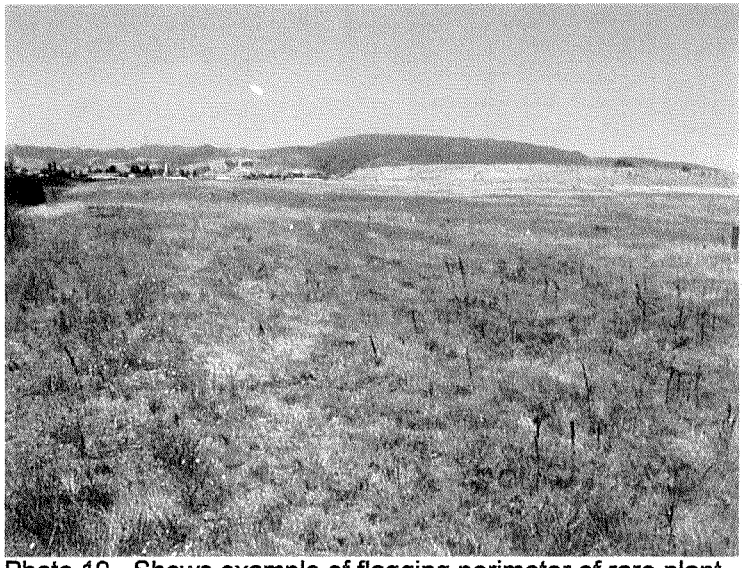

Photo 19 - Shows example of flagging perimeter of rare plant occurrence for GPS data collection to create occurrence map polygons.

Appendix C

Species Observed Tables

Table 1
Aquatic Invertebrates, Unocal Tank Farm, San Luis Obispo, May 14 and 15, 2003

				Sample Location & Relative Abundance[2]					
PHYLUM/CLASS	FAMILY	COMMON NAME	HABITAT[1]	N. MARSH	SW. CORNER	W. MARSH	COW POND	RESERVOIR 3	SW. 1
				NON-INSECTS					
Cnidaria	Hydridae	hydras	B		p			p	
Platyhelminthes	unknown	flatworms	B	p		p			
Annelida	Naididae	oligochaete worm	B			c	c		
Annelida	Tubificidae	oligochaete worm	B	c	c	c	c	p	p
Annelida	Erpobdellidae	leeches	F		c		p		
Mollusca	Planorbidae	rams horn snails	B	p	p	a	p	p	
Arthropoda Crustacea	Caenestheridae	clam shrimp	S		p	p	p	p	
Arthropoda Crustacea	Daphnidae	water fleas	S	A	A	A	c	p	A
Arthropoda Crustacea	Diaptomidae	copepods	S	p	p	p	c	A	
Arthropoda Crustacea	Candonidae	ostracods (seed shrimp)	F	p					
Arthropoda Crustacea	Cyprididae	ostracods (seed shrimp)	F	a	A	a	c	A	A
Arthropoda Crustacea	Hyalellidae	amphipods (scuds)	S		p			p	
Arthropoda Crustacea	Astacidae	crayfishes	F	c					
Arthropoda Arachnida	Arrenuridae	mites	F					p	
Arthropoda Arachnida	Hydrachnidae	mites	F		p	p	p	p	
Arthropoda Arachnida	Hygrobatidae	mites	F				p	p	
Arthropoda Arachnida	Pionidae	mites	F			p		p	
ORDER	FAMILY	COMMON NAME	HABITAT[1]	N. MARSH	SW. CORNER	W. MARSH	COW POND	RESERVOIR 3	SW. 1
				INSECTS					
Ephemeroptera	Baetidae	mayflies	F	c	c	a	c	c	c
Odonata	Aeshnidae	dragonflies	F				p	p	
Odonata	Libellulidae	dragonflies	F	p	p	p		p	
Odonata	Coenagrionidae	damselflies	F	p	c	p	p	c	
Odonata	Lestidae	damselflies	F	p			p		
Hemiptera	Corixidae	water boatmen	S	a	A	a	a	A	c
Hemiptera	Notonectidae	backswimmers	S	p	A	a	A	a	
Hemiptera	Gerridae	water striders	WS	p	p			c	
Coleoptera	Haliplidae	crawling water beetles	B			p		p	
Coleoptera	Dytiscidae	predaceous diving beetles	F	p	c	c	p	p	c
Coleoptera	Helophoridae	helophorid beetles	F				p		
Coleoptera	Hydrophilidae	water scavenger beetles	F	p	p	p		c	
Diptera	Ceratopogonidae	biting midges	B	p					
Diptera	Chaoboridae	phantom midges	S	p	p	p	c		
Diptera	Chironomidae	nonbiting midges	B	c	c	a	c	a	c
Diptera	Culicidae	mosquitoes	S		a	p		c	c
Diptera	Dixidae	dixid midges	B		p			p	
Diptera	Ephydridae	shore flies	B		p	p			

[1] B = benthic; F = facultative; S = swimming; WS = water surface
[2] p = present; c = common; a = abundant; A = super abundant

Table 2
Aquatic Vertebrate Survey Results, Unocal Tank Farm, San Luis Obispo
May 20, 21, 28, 2003

COMMON NAME/ SCIENTIFIC NAME	N. MARSH[1]	SW. CORNER	W. MARSH	COW POND	RESERVOIR 3	CREEK / RIPARIAN	OTHER[2]
Common carp *(Cyprinus carpio)*			X				
Threespine stickleback *(Gasterosteus aculeatus)*						X	
Mosquito fish *(Gambusia affinis*			X				
Bullfrog *(Rana catesbiana)*		X				X	
Pacific treefrog *(Hyla regilla)*	X	X	X	X	X	X	X
Western Toad *(Bufo boreas)*	X	X					
Southwestern pond turtle *(Clemmys marmorata pallida)*						X	

[1] Includes ditch north of North Marsh.
[2] Includes other seasonal ponds representing suitable aquatic habitat for amphibians
NOTE: SW1 not sampled during vertebrate surveys. This small feature was thoroughly dip netted during the invertebrate surveys resulting in no vertebrates observed.

Table 3
Avian Species Observed During Black Rail Survey
Unocal Tank Farm, San Luis Obispo, May 2003

COMMON NAME	N. MARSH	SW. CORNER	W. MARSH	COW POND	RESERVOIR 3	CREEK / RIPARIAN
Great Blue Heron	X					
Great Egret	X		X	X		X
Turkey Vulture (overhead)	X	X			X	
Mallard	X	X				
Cinnamon Teal	X					
Cooper's Hawk (overhead)						X
Red-tailed Hawk (overhead)				X		
American Kestrel (overhead)			X			
California Black Rail	**None detected; recorded call played 3 nights and 1 morning at N. Marsh and W. Marsh areas.**					
American Coot	X	X		X		
Killdeer	X	X				
Mourning Dove		X		X		
Anna's Hummingbird						X
Black Phoebe	X	X	X	X		X
Ash Throated Flycatcher						X
Scrub Jay						X
American Crow	X					
Horned Lark		X		X	X	
Tree Swallow						
Northern Rough-winged Swallow						X
Cliff Swallow	X	X	X	X	X	X
Barn Swallow	X	X	X			
Bushtit		X				X
Bewick's Wren						X
Northern Mocking Bird		X			X	X
European Starling	X		X			X
Common Yellowthroat	X					
Spotted Towhee						X
California Towhee						X
Lark Sparrow		X				
Song Sparrow	X	X				X
Red-winged Blackbird	X	X	X			
Western Meadow Lark	X				X	
Brewer's Blackbird	X		X		X	X
House Finch		X	X			X
American Goldfinch						X

Note: Adjacent grassland areas were included in surveys. SW-1 location was not surveyed due to lack of water at time of survey.

Table 4
Plant Species Observed
Unocal Tank Farm Road, San Luis Obispo, May-September, 2003

Scientific Name	Common Name
Acacia decurrens	green wattle
Alisma plantago-aquatica	water plantain
Ambrosia psilostachya	common ragweed
Anagallis arvensis	scarlet pimpernel
Anthemis cotula	mayweed
Artemisia californica	California sagebrush
Artemisia douglasiana	mugwort
Ascelpias fascicularis	narrow-leaf milkweed
Atriplex semibaccata	Australian saltbush
Avena barbata	slender wild oats
Baccharis pilularis var. *consanguinea*	coyote brush
Brachypodium distachyon	false brome grass
Brassica nigra	black mustard
Bromus diandrus	rip-gut brome
Bromus hordeaceus	soft chess
Bromus madritensis ssp. *rubens*	foxtail chess
Calystegia subacaulis ssp. *episcopalis*	San Luis Obispo County morning glory
Carduus pycnocephalus	Italian thistle
Centaurea calcitrapa	purple star-thistle
Centaurea melitensis	tocalote
Centaurea solstitialis	yellow star-thistle
Centromadia parryi ssp. *congdonii*	Congdon's tarplant
Chenopodium californicum	California goosefoot
Chicorium intybus	chicory
Cirsium vulgare	bull thistle
Conium maculatum	poison hemlock
Convolvulus arvensis	field bindweed
Conyza canadensis	horseweed
Cotula coronopifolia	brass buttons
Cynara cardunculus	artichoke thistle
Cyperus eragrostis	umbrella sedge
Dipsacus sativus	Fuller's teasel
Distichlis spicata	saltgrass
Eleocharis macrostachya	spikerush
Epilobium brachycarpum	panicled willow-herb
Eriogonum elongatum	slender buckwheat
Erodium botrys	storksbill
Erodium cicutarium	red-stemmed filaree
Eryngium aristulatum var. *hooveri*	Hoover's button celery
Eschscholzia californica	California poppy
Eucalyptus spp.	eucalyptus
Filago gallica	narrow-leaved filago

Table 4
Plant Species Observed
Unocal Tank Farm Road, San Luis Obispo, May-September, 2003

Scientific Name	Common Name
Foeniculum vulgare	fennel
Gnaphalium luteo-album	cudweed
Hazardia squarrosa	saw-toothed goldenbush
Heliotropium curassavicum	Chinese pusley
Hemizonia congesta ssp. *luzulifolia*	hayfield tarweed
Hemizonia fasciculata	fascicled tarweed
Heterotheca grandiflora	telegraph weed
Hirschfeldia incana	perennial mustard
Hordeum brachyantherum	meadow barley
Hordeum marinum ssp. gussoneanum	Mediterranean barley
Hordeum murinum ssp. *leporinum*	barnyard foxtail
Hypochaeris radicata	rough cat's ear
Juglans californica var. *californica*	southern California black walnut
Juncus bufonius	toad rush
Juncus phaeocephalus	brown-headed rush
Juncus tenuis	slender rush
Lactuca serriola	prickly lettuce
Lathyrus sp.	wild pea
Lolium multiflorum	Italian ryegrass
Lotus corniculatus	bird's-foot trefoil
Lotus purshianus	Spanish clover
Lupinus succulentus	succulent lupine
Lythrum hyssopifolium	purple loosestrife
Malvella leprosa	alkali-mallow
Marrubium vulgare	horehound
Medicago polymorpha	bur-clover
Melilotus alba	white sweetclover
Melilotus indica	Indian melilot
Nassella pulchra	purple needle grass
Paspalum sp.	paspalum
Pennisetum setaceum	fountain grass
Phalaris sp.	phalaris
Picris echioides	bristly ox tongue
Plantago coronopus	cut-leaved plantain
Plantago lanceolata	narrow-leaved plantain
Plantago major	common plantain
Platanus racemosa	sycamore
Plantago major	common plantain
Platanus racemosa	sycamore
Polygonum arenastrum	common knotweed
Polygonum sp.	smartweed
Polypogon monspeliensis	rabbitfoot grass
Populus fremontii	Fremont cottonwood

Table 4
Plant Species Observed
Unocal Tank Farm Road, San Luis Obispo, May-September, 2003

Scientific Name	Common Name
Potentilla anserina	silverleaf
Psilocarphus brevissimus var. *brevissimus*	woolly marbles
Quercus agrifolia	coast live oak
Ranunculus californicus	California buttercup
Raphanus sativus	wild mustard
Ricinus communis	castor bean
Rumex acetosella	sheep sorrel
Rumex crispus	curly dock
Rumex pulcher	fiddle dock
Salix lasiolepis	arroyo willow
Schinus molle	pepper tree
Scirpus acutus	common tule
Scirpus robustus	prairie bulrush
Sonchus asper	common sow thistle
Sonchus oleraceus	prickly sow thistle
Toxicodendron diversilobum	poison oak
Trifolium fragiferum	strawberry clover
Trifolium pratense	red clover
Trifolium repens	white clover
Typha latifolia	cattail
Vicia villosa	woolly vetch
Vulpia myuros	rat-tail fescue
Xanthium strumarium	cocklebur

Appendix D

Lawrence E. Hunt, Ph.D., Aquatic Vertebrate Letter of Findings

Lawrence E. Hunt
Consulting Biologist

David Wolff
Rincon Consultants, Inc.
1530 Monterey Street, Suite D
San Luis Obispo, CA 93401

15 July 2003

Re: Habitat Assessment of Unocal-Tank Farm Road Site for California Tiger Salamander (*Ambystoma californiense*) and California Red-legged Frog (*Rana aurora draytonii*), City of San Luis Obispo, San Luis Obispo County

Dear Mr. Wolff,

This letter report summarizes my findings on the potential for the project site, located on Unocal property along Tank Farm Road in San Luis Obispo to support California tiger salamanders (CTS) and/or California red-legged frogs (CRLF), both federally-listed taxa.

Project Area. The project area encompasses approximately 365 acres of land owned by Unocal Corporation extending eastward along both sides of Tank Farm Road from approximately 0.3 miles east of its intersection with Higuera Street to just west of its intersection with Santa Rosa Road. An unnamed creek, called "eastern creek" in this report, borders the east edge of the property.

Methods. Daytime surveys for CTS and daytime and nighttime surveys for CRLF, were conducted by Lawrence E. Hunt, consulting biologist, and David Wolff and Jason Kirschenstein of Rincon Consultants, Inc. on 20-21 May 2003. All work was done under USFWS Permit Nos. TE023892-1 and TE023892-2 issued to Lawrence E. Hunt. The weather during the surveys was clear to partly cloudy with daytime air temperatures ranging from 60 F to 80 F and nighttime air temperatures ranging from 55 F to 65 F. Winds were gusting to 25 mph during the day on both days.

The site was surveyed during the day using random walks to visit and sample all available water sources, including the eastern creek. Long-handled dip nets and 6-foot wide scoop seines were used to sample aquatic habitats.

Nighttime spotlight surveys were used to sample water sources on the site for CRLF. All of the larger pools and the eastern creek were surveyed at night. Standard USFWS survey protocol was following in surveying for CRLF. These surveys were conducted between 2000 hrs and 2350 hrs on the evenings of May 20th and 21st.

Site Conditions. Surface water is present in three hydrologically different forms on the project site: tule marsh, seasonal ponds, and creeks. Moreover, surface water sources on the project site are markedly different north and south of Tank Farm Road. The project

site north of Tank Farm Road contains two water sources: one associated with a man-made ditch dominated by tules (*Scirpus californicus*) that runs east to west across the property, and the other with extensive tule marsh vegetation scattered across this portion of the site. The former source had intermittent surface water at the time of the surveys, but in some reaches the water was up to 30 inches deep. The tule marshes appear to dry completely each year, but some portions still supported water up to 24 inches deep at the time of the surveys. Seasonal ponds appeared to be absent north of Tank Farm Road.

The project site south of Tank Farm Road lacked extensive tule marsh, but contained a number of man-made seasonal ponds formed along the base of earth berms and other ground disturbance that occurred during construction and maintenance of the former tank farm site. The pools varied in size from less than 50 feet in diameter and 8 inches deep to more than 300 feet long and 36 inches deep at the time of the surveys. The pools also varied in degree of turbidity, ranging from opaque to clear (tea-colored). Most of the pools supported a relatively diverse assemblage of aquatic invertebrates, including notonectids, odonates, coleopterans, dipterans, belostomatids, crustaceans (amphipods and ostracods). The vernal pool obligate crustacean, clam shrimp (*Cyzicus* sp.), was abundant in many pools. Water found in ditches along the western and southern boundary of the tank farm site may persist throughout the year in some years, as evidenced by: a) dense willow vegetation surrounding portions of the pools, b) the large number of adult bullfrogs (*Rana catesbeiana*) present in these water sources, and; c) the presence of large numbers of young-of-the-year common carp (*Cyprinus carpio*) in these particular water sources. The eastern creek also apparently sustains perennial flow, judging by the presence of native stickleback (*Gasterosteus aculeatus* subsp.), bullfrog larvae and adults, and southwestern pond turtles (*Clemmys marmorata pallida*).

The eastern creek has been severely disturbed by adjacent land use, originally farming, then residential and commercial development. Cattle are allowed to freely roam the creek corridor and have drastically altered the physiognomy of the riparian vegetation, the riparian understory, and continue to contribute significantly to bank degradation and soil erosion. The existing riparian canopy is highly disturbed and consists of arroyo willow, western sycamore, coast live oak, California walnut, elderberry, and blue gum, with an understory of poison oak, California blackberry, castor bean, Italian thistle, milk thistle, various mustards, prickly ox-tongue, and other native and non-native herbaceous plants. The active channel of the creek at the time of the surveys varied in width from 20 inches to eight feet and had a maximum depth of four feet in pools. The surveyed reach of the creek was generally slow-moving, with mostly deep runs and pools separated by short riffles. The substrate consisted mostly of silty fine sand with little or no bedrock exposure. Many of the runs and pools had overhanging banks composed of earth or willow root masses and in many places willow vegetation contacted the water surface.

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Survey Results.

1. CTS. No larval of adult CTS were found during the surveys for this project. Several factors appear to preclude the occurrence of CTS on the project site:

a) CTS have apparently been collected from the San Luis Obispo area, e.g., Jennings and Hayes (1994) show two "extinct" records, one from the south slope of the Irish Hills, less than six air miles southwest of the project site, and another approximately one mile north of the City of San Luis Obispo. However, salamanders have never been collected from these sites since these specimens were found, despite active collecting throughout the area. Additionally, it is not known if these specimens are native California tiger salamanders or tiger salamanders introduced from outside California.

b) The nearest verified records of native tiger salamanders are from the Santa Maria Valley, approximately 28 air miles south-southwest of the project site in northern Santa Barbara County, and from the Temblor Range, approximately 70 air miles north-northeast of the project site, in northeastern SLO County.

c) Non-native predators such as bullfrogs and carp are abundant in the perennial water sources south of Tank Farm Road.

d) The seasonal pond features on-site appear to be entirely man-made, and in the absence of aerial photographs that pre-date the tank farm (ca. 1910), one can only speculate about the original condition of this area.

e) The surveys were done in sufficient detail and timing to detect CTS larvae, if present, e.g., CTS larvae were still present in many known breeding ponds in Santa Barbara County at the same time the surveys were being conducted for this project.

It is likely that the former tank farm site was historically mesic, supporting seasonal, and possibly perennial wetlands in the form of tule and/or cattail marsh. Additionally, the topography of the eastern Los Osos Valley and Edna Valley is generally flat and may also have been conducive to the formation of vernal pools. Laguna Lake, a large vernal lake located approximately three air miles northwest of the project site, may be a remnant of formerly more extensive vernal pool features in this area. Certainly, these features, the topography of the area, and the persistence of wetland vegetation in extensive portions of the project sites, indicate a high water table. Although CTS were not found on-site and may never have occurred there, the portion of the site south of Tank Farm Road contains a number of man-made seasonal ponds whose hydroperiod appears capable of supporting CTS reproduction and metamorphosis (i.e., > 70 days), as well as open upland habitat surrounding these seasonal ponds support California ground squirrels (*Spermophilus beecheyi*), pocket gophers (*Thomomys bottae*), and other burrowing rodents that provide refugia for juvenile and adult CTS.

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Regardless of past conditions or the current presence of a number of critical habitat features on-site, the former tank farm site north and south of Tank Farm Road does not appear to support CTS now.

2. *CRLF.* No CRLF larvae or adults were observed on-site during surveys for this project. CRLF occur within the San Luis Obispo Creek watershed, but are apparently now restricted to the smaller tributaries in the upper watershed because of habitat disturbance and the presence of bullfrogs and a variety of introduced fishes throughout the main stem of the creek and the lower watershed. The California Natural Diversity Data Base shows records from Miossi Creek, Fox Hollow Road, and Reservoir Canyon north of the City of San Luis Obispo, extensively throughout the Chorro Creek watershed northwest of the City, and the Arroyo Grande Creek watershed, approximately 12 air miles southeast of the project site. Several apparently "extinct" localities occur in the Irish Hills and near the City of San Luis Obispo (Jennings and Hayes, 1994), and it is likely that CRLF formerly inhabited most of the perennial drainages throughout the region. San Luis Obispo Creek, Islay Creek, and other perennial drainages in the vicinity of the project site now contain reproducing populations of bullfrogs. The project site may have historically supported CRLF in the eastern creek. However, they likely do not now occur on the project site because: a) only the eastern creek and the perennial man-made wetlands in the southwestern corner of the site appear to contain water long enough to allow successful metamorphosis of CRLF (typically 4-5 months), and; b) these perennial water sources are thoroughly infested with either bullfrogs, common carp, or both. Ironically, the eastern creek and the perennial water sources in the southwestern portion of the project site provide excellent CRLF aquatic habitat in the form of deep pools with overhanging banks, and extensive, adjacent upland habitat.

3. ***Other species observed during the field surveys.*** Native and non-native fishes, amphibians, and reptiles found on-site during the surveys included: threespine stickleback (common to abundant in the eastern creek), common carp (common to abundant in perennial ponds in southwest corner of project site), Pacific treefrog (common to abundant in most water sources); western toad (rare; found only in one or two seasonal ponds south of Tank Farm Road); bullfrog (larvae and adults commonly found in the eastern creek and in perennial ponds in southwestern corner of project site); southwestern pond turtle (five large adults found in the eastern creek; two large adults found in perennial ponds in southwest corner of site); common kingsnake (one large adult observed crossing dirt road on-site north of Tank Farm Road), and; gopher snake (one large adult observed near "Cow Pond").

Conclusions. The project site contains excellent quality aquatic and upland habitat for both CTS and CRLF. However, due to a combination of either historical absence, or more recent habitat disturbance (creek flood control activities and tank farm land use) coupled with the introduction and establishment of non-native predator populations, neither species appears to be present on-site.

Please call me if you need additonal information.

Sincerely,

Lawrence E. Hunt

Lawrence E. Hunt

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