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2001-2002 Wet Season Branchiopod Survey Report, Lawrence Livermore National Laboratory, Site 300, Alameda and San Joaquin Counties, California

W. Weber, J. Woollett

January 24, 2005

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Ninety-Day Findings Report
USFWS Permit # TE-016591-1
LLNL PO#: B522170

2001-2002 Wet Season Branchiopod Survey Report

University of California
Lawrence Livermore National Laboratory
Site 300
Alameda and San Joaquin Counties, California

December 3, 2002

Prepared for:
University of California
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INTRODUCTION

Project Description

Condor Country Consulting on behalf of Lawrence Livermore National Laboratory (LLNL) has performed wet season surveys for listed branchiopods at Site 300, located in eastern Alameda County and western San Joaquin County (**Figure 1, Appendix A**). LLNL is collecting information for the preparation of an EIS covering ongoing explosives testing and related activities on Site 300. Related activities include maintenance of fire roads and annual control burns of approximately 607 hectares (1,500 acres) (Jim Woollett, personal comment). Control burns typically take place on the northern portion of the site.

Purpose of the Survey

Condor Country Consulting conducted surveys for listed branchiopods in the 2001-2002 wet season to determine the distribution of federally-listed branchiopods within the study area. A second survey is required to complete the requirements of the U. S. Fish and Wildlife Service (USFWS) "Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods" (Guidelines). The second survey will likely be conducted during the 2002-2003 wet season.

The 2001-2002 wet season survey is intended to provide LLNL with information that will assist them in determining the effects of the proposed action on federally listed branchiopods and provide information useful in the preparation of the associated environmental documentation. It is also expected to partially satisfy the survey requirements of the USFWS.

For the purpose of this report, the term branchiopod refers specifically to phyllopodous branchiopods (Smith 2001) and not cladocerans. Fairy shrimp, tadpole shrimp, and clam shrimp are all categorized as phyllopodous branchiopods and are currently the only members of the Class Branchiopoda that contain species that are listed under the federal Endangered Species Act. Although cladocerans are branchiopods and were found on the site, they are only referred to by Order in this report because they are not federally listed and therefore are not the target species of this study.

Wendy Weber of Condor Country Consulting conducted surveys to determine the distribution of vernal pool branchiopods at Site 300. Verbal approval to conduct the surveys was received from Vincent Griego of the USFWS on January 18, 2002. The written authorization (1-1-02-PR-1012), received on March 19, 2002 (**Appendix B**), incorrectly identifies the date of the verbal authorization. Vincent Griego acknowledged the correct date in a telephone conversation on August 15, 2002.

The following wet season report is submitted in accordance with the conditions of USFWS Permit TE-016591-1 (**Appendix B**). The format of the report follows the format outlined in the Guidelines (USFWS 1996).

METHODOLOGY

Study Area

The Site 300 study area is located on the Midway and Tracy USGS 7.5 minute topographic quadrangle maps (**Figure 1**). The study area encompasses approximately 2,833 hectares (7,000 acres) of the rolling hills and plunging canyons typical of the Altamont Hills (LLNL 2002a). Contributing to the precipitous topography of the southern portion of the site are several rock outcrops. Elevations on the site range from 170 to 525 meters (560 to 1,722 feet) above mean sea level.

Sheep historically grazed Site 300, but no ranching or farming has taken place there since the site was purchased in 1953 (LLNL 2002a). The site is predominantly open space, with only about 142 hectares (350 acres) occupied by structures or pavement. Surrounding land uses include cattle grazing and an off-road vehicle recreation park.

Site 300 contains a diverse mosaic of plant communities including native and introduced grasslands, blue oak and riparian woodlands, coastal sage scrub, and herbaceous wetlands (LLNL 2002a). Non-native grasslands occupy the largest portion of the site, approximately 2,285 hectares (5,647 acres) (LLNL 2002a). Native perennial grasslands, found mainly in the northern half of the site, occupy approximately 293 hectares (723 acres). Blue oak woodlands are found on north-facing slopes in the southern half of Site 300 and occupy about 61 hectares (150 acres). In the southwest corner of the site coastal sage scrub occupies about 44 hectares (108 acres). Riparian woodland is confined to drainages on the southern half of the site. Herbaceous wetlands are scattered throughout the site and occupy a very small percentage of the site. Reports containing updated vegetation and wetland information will be available for inclusion in the next findings report for this site.

Pooled aquatic habitat on Site 300 is limited, largely due to the relatively low average rainfall [around 25 centimeters (10 inches) per year] and steep terrain. Seeps, drainages, puddles, and modified vernal pools are the only aquatic habitat found on the site. All of these habitat types provide some potentially suitable habitat for large branchiopods.

Survey Methodology

Upon commencement of surveys Condor Country Consulting assessed the site to determine areas of suitable habitat. All suitable habitat was sampled throughout the survey period. A total of 14 pools were identified and included in the survey.

Surveys were conducted according to the methods described in the Guidelines (USFWS 1996). Surveys began on January 18, 2002, approximately two weeks after pools had filled to a depth greater than 3 cm (1 in). Sampling occurred every two weeks thereafter until April 26, 2002 when all pools were either dry or had been inundated for at least 120 days. The surveys performed in the interim were conducted on the dates listed in **Table 1 (Appendix C)**. Wendy Weber conducted all surveys under the authorization of her permit (Permit TE-016591-1).

Each day's survey data were collected on data sheets (**Appendix D**). All pools were surveyed as they filled through the end of the survey period or until they were dry. A fine-meshed aquarium net attached to a piece of plastic pipe was used to sample the water column. Samples were taken at the surface, throughout the water column, and along the margins and bottom of each pool. Identification of specimens was performed in the field using a 10X hand lens. Living specimens were identified and returned to their respective pools. The branchiopod key developed by Clyde Eriksen and Denton Belk (1999) was employed to confirm identifications. All amphibian eggs and larvae found in samples were immediately released at the point of capture.

Initial reconnaissance of the study area was performed using a four-wheel-drive truck due to the large area to be covered and the steep terrain on much of the site. Ms. Weber was assisted in locating pools by LLNL biologist Jim Woollett. His familiarity with known pool locations and general navigation of the site were instrumental in ensuring all potential branchiopod habitat was identified and surveyed. Vehicular access to the site proved to be the most feasible way of surveying and was employed throughout the survey period. Each pool identified was mapped by hand on a USGS 7.5 minute topographic map of the area, sampled, and data were recorded on a data sheets. Temperature and weather data were taken at the beginning of each survey. Air temperature and wind speed were obtained from Site 300 weather station data for 8:30am the day of each survey. This data is published on the LLNL website (LLNL 2002b). The data recorded for each pool included habitat type, branchiopods observed, amphibians observed, and other aquatic invertebrates observed.

Pool locations and areas (**Table 1**) were recorded with a Trimble Global Positioning System unit during survey round seven. The area of each pool was recorded by walking the pool's perimeter at the approximate mean high water line. This information was used to create **Figure 2A and 2B** with ESRI ArcView™ software. Both figures show the locations of surveyed pools.

HABITAT DESCRIPTIONS

Several disturbed and undisturbed habitat types provide potentially suitable habitat for listed branchiopods on the site, and include vernal pools, puddles in roadbeds, and ephemeral drainages. Rock outcrops on the site were not found to be suitable branchiopod habitat because no pooling was observed there during the habitat reconnaissance.

Vernal Pools

Two natural vernal pools (FS-04 and FS-07 in **Figure 2A**) are present on the site. Both have been mechanically modified sometime in the past by the construction of a berm on the downslope side of each pool (**Photos 1 and 2**).

According to Jim Woollett, LLNL's principal biologist for Site 300, pool FS-07 only begins to fill after 13 cm (5 in) of rain have fallen and requires more rain to reach a depth suitable to support branchiopods. Rainfall at the site reached 13 cm (5 in) on February 7, 2002 only one week before most pools showed signs of drying (LLNL 2002b). The rainfall total on the site,

for the period of October 2001 through April 2002, was 17.65 cm (6.95 in) (LLNL 2002b). As a result pool FS-07 never filled during the 2001-2002 wet season.



Photo 1. Vernal Pool FS-07. March 29, 2002.



Photo 2. Vernal Pool FS-04 supports populations of *L. occidentalis* and *C. californicus*. March 29, 2002.

Vernal pool FS-04 depicted in **Photo 2** is the only vernal pool in the study area that filled this season. It had a surface area of approximately 1,948 square meters (20,968 ft²) and was greater than one meter (3 feet) deep. This pool is seasonal although it may remain ponded late into the dry season. Species encountered in this pool include: California fairy shrimp (*Lindieriella occidentalis*), California clam shrimp (*Cyzicus californicus*), California red-legged frog, California tiger salamander, ostracods, copepods, dytids, cladocerans, notonectids, corixids, and microturbularians.

Puddles

Nine of the pools sampled for this survey were puddles in roadbeds (**Table 1**). Periods of inundation in this habitat type ranged from 14 days to greater than 120 days. Pools FS-06 and FS-13 are fed by seeps, increasing their duration of ponding. Species encountered in this habitat type include: California red-legged frog (*Rana aurora draytonii*), California tiger salamander (*Ambystoma californiense*), Pacific treefrog (*Hyla regilla*), ostracods, dytids, notonectids, corixids, culicids, and chironomids.

Ephemeral Drainages

The habitat suitability of pools within ephemeral drainages is influenced by factors such as the frequency and duration of astatic conditions and the presence or absence of fish. Three ephemeral drainages containing seasonal pools occur on the site. None of these drainages directed flows that would preclude the presence of branchiopods and none contained fish. Pools within the drainages varied in depth and surface area. Species encountered in this habitat type include: Immature fairy shrimp (likely *L. occidentalis*), California tiger salamander, ostracods, copepods, cladocerans, dytids, notonectids, corixids, chironomids, and microturbularians.

SURVEY RESULTS

The 2001-2002 wet season survey effort for Site 300 identified no listed branchiopods on the site.

All pools surveyed are shown in **Figures 2A and 2B**. Data collected at each pool is summarized in **Table 1**. Data collected during each field visit, including weather and temperature, are included on the data sheets in **Appendix D**.

Two branchiopod species that are not listed were observed during surveys. California fairy shrimp (*L. occidentalis*) and California clam shrimp (*C. californicus*) were positively identified in only one pool (FS-04) in the study area. Immature fairy shrimp were identified in FS-09, but shrimp were not present during the next round of surveys and were therefore not identified to species. Observations of the immature shrimp and the fact that pool FS-09 is downslope of vernal pool FS-07, known from previous surveys to contain *L. occidentalis*, support the surveyor's conclusion that the shrimp were likely *L. occidentalis*.

The distribution of other invertebrates and amphibians detected during these surveys is also reported below.

Sampling Locations

The Site 300 study area is located in Alameda and San Joaquin Counties, on the Midway and Tracy, California, U. S. Geological Survey 7.5 minute topographic quadrangle maps. The locations of the sampled pools are shown in **Figures 2A and 2B**. Each pool's location (in decimal degree latitude and longitude), habitat type, and faunal composition identified during surveys is shown in **Table 1**.

Study Area Photographs

Photographs of the site as a whole and those of specific seasonally inundated habitats will be provided in the subsequent report addressing the results of the next survey. Original color photographs showing the two modified vernal pools (FS-04 and FS-07) are included in **Appendix E**. None of the pools on the site contained listed branchiopods. Where branchiopods were observed the species names are included in the photo's caption. Photographs were taken on March 29, 2002.

Species Identified and Population Size

Two branchiopod species were identified during the surveys, *L. occidentalis* and *C. californicus*. Other animals found in the study area pools include California red-legged frog, California tiger salamander, Pacific treefrog, ostracods, copepods, cladocerans, culicids, dytids, notonectids, corixids, chironomids, and microturbularians.

Amphibians were observed in several pools. Juvenile California red-legged frogs were seen in pools FS-04 and FS-06. Pacific treefrogs were found in pools FS-08 and FS-13. California tiger salamander eggs and/or larvae were found in five of the pools sampled (**Table 1**). Two of the five pools containing tiger salamanders were also inhabited by branchiopods. No other species of amphibians were detected within the study area.

The populations of each branchiopod species and that of the immature fairy shrimp were greater than 1,000 individuals per species per pool.

California Fairy Shrimp

California fairy shrimp (*Lindleriella occidentalis*) was found in a vernal pool (FS-04) and possibly a drainage pool (FS-09) downslope of the vernal pool. The limited distribution of this species observed on Site 300 is likely due in part to the below-average rain year in which the surveys took place. A more compelling factor is that this species requires a minimum of 31 days to reach maturity and given that only eight of the fourteen pools sampled persisted for at least that long, the eight pools were the only ones with the potential to harbor this species (Eriksen and Belk 1999). Many life history characteristics of *L. occidentalis* contribute to the logic of their sparseness on Site 300. This species typically requires 45 days to reach maturity, is the longest lived of all California fairy shrimp species, and is on average found in pools that

are deeper and larger than that of all other California fairy shrimp species except *Branchinecta conservation*. In short, long lasting pools are most likely to harbor this species and only two pools on the site were long lasting. Of these only one contained *L. occidentalis*.

California Clam Shrimp

Found only in the vernal pool that filled this season (FS-04), California clam shrimp (*Cyzicus californicus*) has a very narrow distribution within the study area. The limited distribution of this species is likely due to its habitat requirement for long-lived static pools. Reproductive individuals of this species were only observed during the last two rounds of surveys.

CONCLUSIONS

Because natural branchiopod habitat is sparse on Site 300, it is not surprising that listed branchiopods were not observed during this 2001-2002 wet season survey. Although the site is large, a majority of it has topography and geology that precludes the formation of static seasonal pools. Even the relatively gentle topography of the northern half of the site contains few areas where water pools for more than two weeks. The rock outcrops found on the site did not provide suitable habitat for listed branchiopods. Most of the habitat available to branchiopods on the site is puddles that form in roadbeds and dry quickly. The one persistent pool on the site, the larger of the two modified vernal pools and the only one to fill this season, is occupied by two branchiopod species that require long-lived pools to reach maturity. In short, there is little habitat available on the site for branchiopods and most of the habitat present is generally too short-lived to support the branchiopod species that do occur at Site 300.

REFERENCES

Eriksen, C. H. and D. Belk. 1999. Fairy shrimps of California's puddles, pools and playas. Mad River Press, Eureka, CA.

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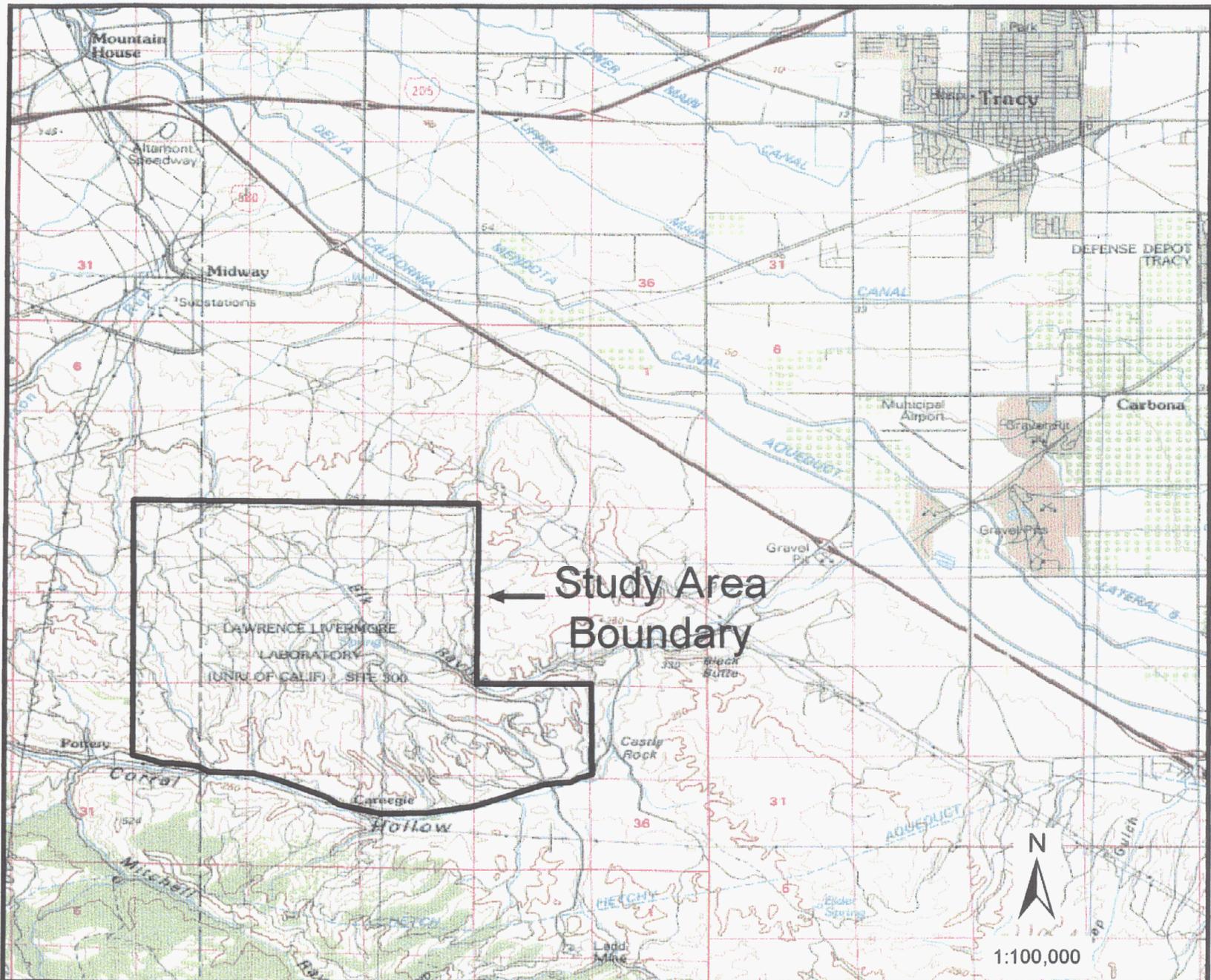
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Smith, D. G. 2001. Pennak's freshwater invertebrates of the United States: porifera to crustacea (4th ed.). John Wiley and Sons, Inc., New York, NY.

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APPENDIX A

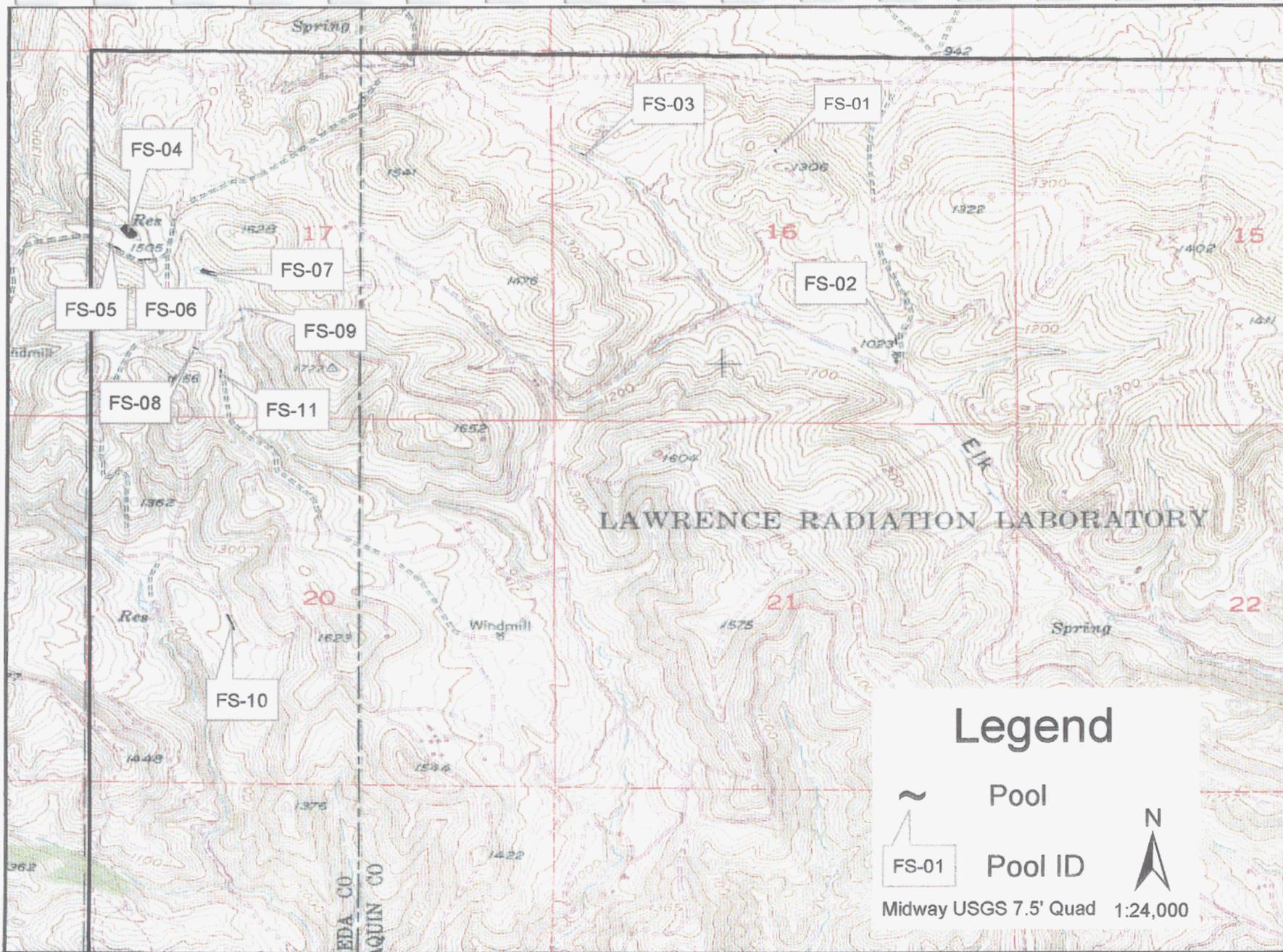
FIGURES



Condor
Country
Consulting

Figure 1. Site 300 Project Location

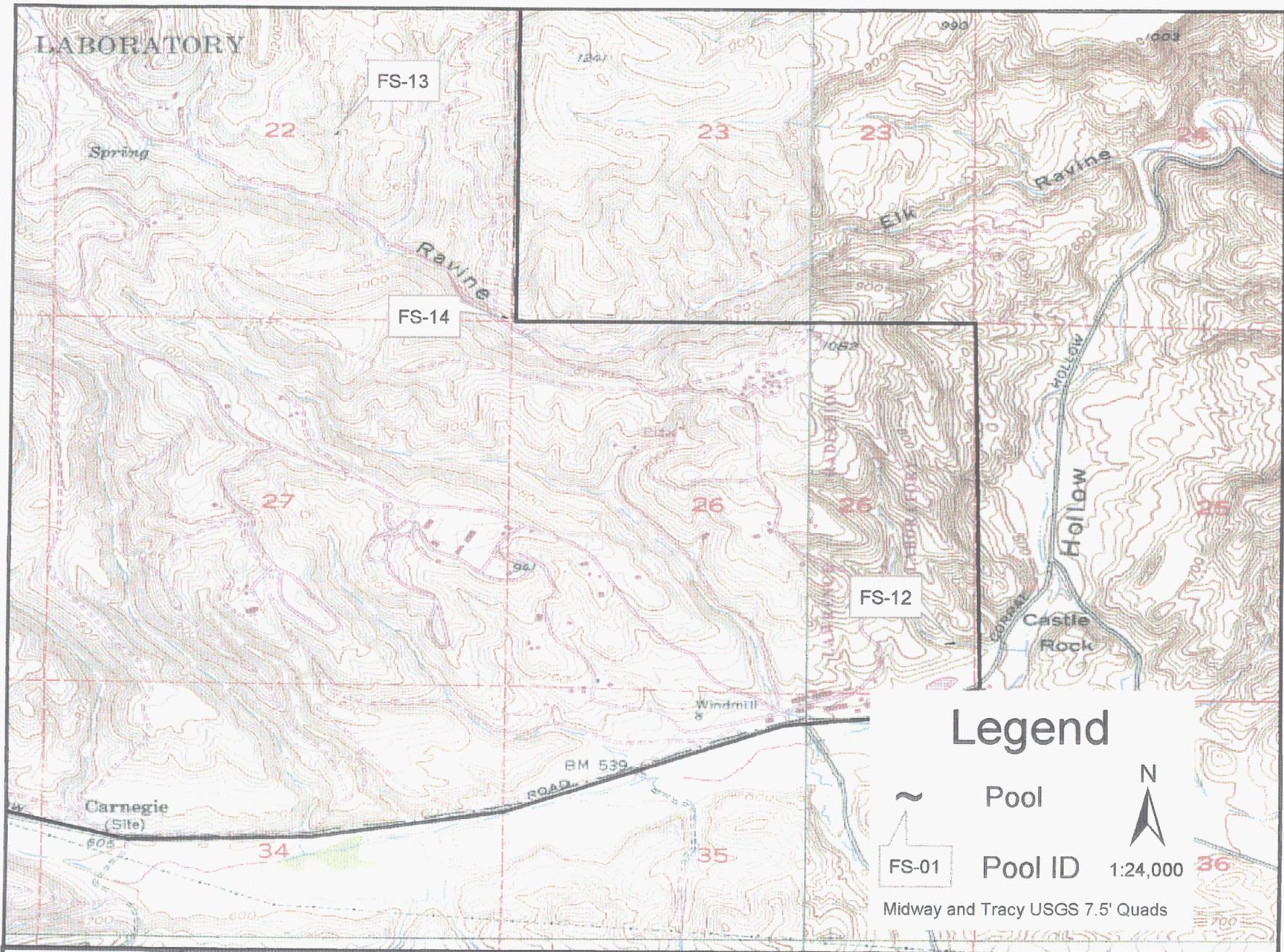
University of California,
Lawrence Livermore
National Laboratory



Condor
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Figure 2A. Site 300 Pool Locations

University of California,
Lawrence Livermore
National Laboratory



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Figure 2B. Site 300 Pool Locations

University of California,
Lawrence Livermore
National Laboratory

APPENDIX B

USFWS LETTER OF AUTHORIZATION AND SURVEYOR'S PERMIT



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

IN REPLY REFER TO:

1-1-02-PR-1012

March 18, 2002

Ms. Wendy Weber
Condor Country Consulting
1627 D Street # 4
Hayward, California 94541

Subject: Authorization to Conduct a Wet-season Survey for Federally-listed Vernal Pool Branchiopods at Alameda and San Joaquin Counties, California (Permit TE-016591-1)

Dear Ms. Weber:

This letter verifies the U. S. Fish and Wildlife Service's (Service) verbal approval on January 31, 2001, of your request, dated, January 18, 2001, to conduct a wet-season survey for federally-listed vernal pool branchiopods at the Lawrence Livermore National Laboratory, site 300 in eastern Alameda and western San Joaquin counties, California. You are authorized, under Service permit TE-016591-1 and this letter, to determine the presence of federally-listed vernal pool branchiopods within the above project area. The wet-season survey shall be conducted during the 2001-2002 wet season and in accordance with the protocols specified in the *Interim Survey Guidelines to Permittees under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods*, dated April 19, 1996. Surveys shall also be conducted following the conditions on permit TE-016591-1, and those stated below.

1. Because this request was received after the onset of the wet season, and the area's vernal pools may have been inundated for more than two weeks, negative survey results may not necessarily be accepted as proof of absence.
2. Only Service-approved biologists listed on permit TE-016591-1, or other personnel working under their direct supervision, may conduct wet-season surveys for the federally-listed vernal pool branchiopods at the Lawrence Livermore National Laboratory, site 300 property in eastern Alameda and western San Joaquin counties, California.
3. You must notify the Service within 10 working days by letter or telephone of any new locality, or any new information regarding the range, distribution, ecology, or other pertinent life history data for any of the federally-endangered or threatened species, State-listed species, and rare or sensitive species obtained during the course of the permittee's authorized activities under this permit.

This information also shall be submitted to the California Department of Fish and Game (CDFG), using completed California Native Species Field Survey Forms or their equivalent, no more than 90 calendar days after completing the last field visit of the season at each project site. Each form shall have an accompanying scale map of the site (such as a photocopy of a portion of the appropriate 7.5 minute U.S. Geological Survey map) and shall provide at least the following information for a single species: township, range, and quarter section; the name of the 7.5' or 15' quadrangle; dates (day, month, year) of field work; number of individuals and life stage (where appropriate) for each species encountered by the permittee; and a description of the habitat by community-vegetation type.

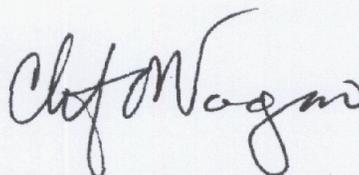
Note: All information obtained during activities conducted under the authority of this permit is required to be submitted to the Service and the CDFG to remain in compliance with section 10(a)(1)(A) permit Terms and Conditions. Failure to report, or disclose upon request by the Service and/or the CDFG, any information obtained during activities conducted under the authority of this permit could result in the revocation, suspension, or non-renewal of this permit. For reporting a new locality or new life history data, the Service contact is Jan C. Knight, Chief, Endangered Species Division, Sacramento Fish and Wildlife Office, phone number (916) 414-6620. The CDFG can be contacted at the following address:

Wildlife Habitat Data Analysis Branch
California Department of Fish and Game - HCD
1416 9th Street, 12th Floor
Sacramento, California 95814
Telephone (916) 324-3812

4. Any changes to the above-specified survey methods, survey times, personnel, or areas to be surveyed will require the permittee to request and receive approval from the Service before any such surveys commence.

Please contact Vincent Griego or Daniel Buford of my staff at (916) 414-6625 if you have any questions concerning this authorization.

Sincerely,



Jan C. Knight
Chief, Endangered Species Division



FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

WENDY WEBER
1627 D STREET, APT. #4
HAYWARD, CA 94541
U.S.A.

2. AUTHORITY-STATUTES
16 USC 1539(A)

REGULATIONS (Attached)
50 CFR 17.22
50 CFR 17.32

3. NUMBER

TE016591-1

AMENDMENT

4. RENEWABLE

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

08/08/2001

7. EXPIRES

11/16/2003

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)

9. TYPE OF PERMIT

THREATENED AND ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

11. CONDITIONS AND AUTHORIZATIONS:

- A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.
- B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.
- C. VALID FOR USE BY PERMITTEE NAMED ABOVE.
- D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ANNUAL REPORTS DUE: 1/31

See permit conditions for further reporting requirements.

SIGNED BY

Laura Hill

TITLE

Acting CHIEF - ENDANGERED SPECIES

DATE

08/08/2001

APPENDIX C

TABLE 1

Table 1: Branchiopod Survey Results for th Site 300 2001-2002 Wet Season

Pool #	Habitat Type	Location (decimal degrees)		Pool Area (m ²)	01/18/02	02/01/02	02/15/02	03/01/02	03/15/02	3/29/02	4/12/02	4/26/02	Non-Branchiopod Species
		Latitude	Longitude		Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	
FS-01	Puddle	37.67490467	-121.5405864	53.086	None	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Cor
FS-02	Puddle	37.66738551	-121.5358224	117.873	None	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Cor
FS-03	Drainage	37.67475997	-121.5481448	34.644	None	None	Dry	Dry	Dry	Dry	Dry	Dry	GTS, Ost, Cor, Chi
FS-04	Vernal Pool	37.67175686	-121.5661536	1,948.372	LIOC	None	LIOC	LIOC	LIOC, CYCA	CYCA	CYCA	None	CRLF, CTS, Ost, Cop, Dyt, Cla, Not, Cor, Mic
FS-05	Puddle	37.67110589	-121.5666276	99.944	None	None	Dry	Dry	Dry	Dry	Dry	Dry	GTS, Ost, Not, Chi
FS-06	Puddle	37.67063927	-121.5655557	146.218	None	None	None	None	None	None	None	None	CRLF, CTS, Ost, Dyt, Not, Cor, Chi
FS-07	Vernal Pool	37.6700827	-121.5629649	865.909	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	
FS-08	Puddle	37.6671512	-121.5634828	13.186	None	None	None	None	None	Dry	Dry	Dry	PATR, Ost, Cor, Chi
FS-09	Drainage	37.66867166	-121.5617178	18.570	ImmFS*	None	Dry	Dry	Dry	Dry	Dry	Dry	(*Looked like LIOC) CTS, Ost, Cop, Cla, Dyt, Not, Mic
FS-10	Puddle	37.65635612	-121.5620595	305.660	None	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Cor, Chi
FS-11	Puddle	37.6661674	-121.5624918	61.830	None	None	None	None	Dry	Dry	Dry	Dry	Dyt, Not, Cor, Cul, Chi
FS-12	Drainage	37.63669735	-121.4951891	140.081	Dry	None	Dry	Dry	Dry	Dry	Dry	Dry	Cor, Chi
FS-13	Seep Pool	37.65683549	-121.5198344	4.965	Dry	None	None	Dry	None	Dry	Dry	Dry	PATR
FS-14	Puddle	37.64957731	-121.5130621	40.312	Dry	None	Dry	Dry	Dry	Dry	Dry	Dry	Cor

KEY: Branchiopods

LIOC=*Linderiella occidentalis*

CYCA= *Cyzicus californicus*

ImmFS= Immature fairy shrimp

Non-Branchiopods

CRLF=California Red-legged Frog

CTS=California Tiger Salamander

PATR=Pacific Treefrog

Ost=Ostracods

Cop=Copepods

Cla=Cladocera

Cul=Culicidae

Dyt=Dyticids

Not=Notonectid

Cor=Corixid

Chi=Chironomid

Mic=Microturbularia

APPENDIX D

DATA SHEETS

LNL Site 300

Friday
Date: Jan 18, 2001
Investigator: W. WASSER

Weather Conditions:

5.8°C
~10% cloud cover
WIND 10-25 mph

Habitat Types:
VP = Vernal Pool
SP = Spring Pond
VS = Vernal Slope
SW = Seasonal Wetland
(V) = road cut

Habitat Modifiers:
(D) = disturbed
(A) = artificially created
(P) = plowed

Abundance:
R = Rare (<2 individuals)
NC = Not Common (3-10 individuals)
C = Common (11-50 individuals)
VC = Very Common (50-100 individuals)
A = Abundant (>100 individuals)
X = Present but not observed in 1 meter sample

Pool No.	Habitat Type	Max. Depth (cm)	Littoral Zone	Emergent	Substrate	Ostracods	Copepods	Chironomids	Diptera	Trichoptera	Caddisflies	Hydroptilidae		Ephemeroptera	Odonata	Diptera	Chironomidae	Lymnaeidae	Psephenidae	Psephenidae	Mites		
												Hydroptilidae	Hydroptilidae										
1	VP																						
2	VP																						
3	VP																						
4	VP																						
5	VP																						
6	VP																						
7	VP																						
8	VP																						
9	VP																						
10	VP																						
11	VP																						

Figure 3. Standardized Field Data Form

CRUF

LLNL - SITE 300

Date: 2/1/02

Investigator(s):

W. WERBER

Weather Conditions:

CLOUD COVER ~ 70%
WIND 0-5 mph
5.2°C

Habitat Types:
 VP = Vernal Pool
 SP = Stock Pond
 VS = Vernal Swale
 SW = Seasonal Wetland (r) = road run
 (a) = grazed
 (b) = plowed

Habitat Modifiers:
 (a) = artificially created
 (b) = bermed

Abundance: R = Rare (<2 individuals)
 NC = Not Common (3-10 individuals)
 C = Common (11-50 individuals)
 VC = Very Common (50-100 individuals)
 A = Abundant (>100 individuals)
 X = Present but not observed in 1 meter sample

Pool No.	Habitat Type	Depth (m)	Large Invertebrates	Small Invertebrates	Amphibians	Reptiles	Birds	Mammals	Plants	Other
1	DRY									
2	DRY									
3										
4										
5										
6										
7	DRY									
8										
9										
10	DRY									
11										
12										
13										
14										

CTS eggs most den
 leak via
 CTS
 CTS
 CTS
 CTS of pond/drain
 muddy
 HYPE
 X CTS eggs
 elbbs

Figure 3. Standardized Field Data Form

LLNL-SITE 300

Date: 3/29/02

Investigator(s):

W. WEBER

Weather Conditions:

0% CLOUDS
WIND 15-30 mph
16.1°C

Habitat Types:

VP = Vernal Pool
SP = Stock Pond
VS = Vernal Swale
SW = Seasonal Wetland

Habitat Modifiers:

(b) = bermed
(a) = artificially created
(p) = plowed
(r) = road rut

Abundance:

R = Rare (<2 individuals)
NC = Not Common (3-10 individuals)
C = Common (11-50 individuals)
VC = Very Common (50-100 individuals)
A = Abundant (>100 individuals)
X = Present but not observed in 1 meter sample

Pool No.	Habitat Type	Max. Depth (ft.)	Large Branchiopods				Copepods			Collembola				Hemiptera		Ephemeroptera	Odonata		Diptera		Lymnaeidae	Physidae	Planorbidae	Micro-terrestrial		
			Lepidochers packardii	Branchinecta hyali	Limnocalanus macrurus	Cyclops vernalis	Diacyclops thomasi	Diacyclops	Diacyclops	Diacyclops	Dytiscidae	Hydrophilidae	Isotomidae	Hydroptilidae	Notonemidae		Corixidae	Zygoptera	Anisoptera	Culicidae					Chironomidae	
1			DRY																							
2			DRY																							
3			DRY																							
4							X	X	X				X													
5			DRY																							
6				NONE			X						X													
7			DRY																							
8			DRY																							
9			DRY																							
10			DRY																							
11			DRY																							
12			DRY																							
13			DRY																							
14			DRY																							

photos 3-6

photos 1+2

CTS larvae & eggs / CRLF

CTS larvae / CRLF male

Figure 3. Standardized Field Data Form

Date: 4/26/02

Investigator(s): W. WEBER

Weather Conditions: ~70° CLOUD COVER
~~11.5°C~~ 11.5°C
 WIND 10-20 mph

Habitat Types: VP = Vernal Pool, SP = Stock Pond, VS = Vernal Swale, SW = Seasonal Wetland
 Habitat Modifiers: (b) = berm'd, (a) = artificially created, (p) = plowed, (r) = road rut
 Abundance: R = Rare (<2 individuals), NC = Not Common (3-10 individuals), C = Common (11-50 individuals), VC = Very Common (50-100 individuals), A = Abundant (>100 individuals), X = Present but not observed in 1 meter sample

Pool No.	Habitat Type	Max. Depth (in)	Large Branchiopods				Ostracods	Copepods		Cladocera	Coleoptera			Hemiptera		Odonata		Diptera		Lymnaeidae	Physidae	Planorbidae	Micro-arthropods
			Lepidochus packardii	Aeschrothusa hutchi	Linderiella cockerella	Cyclops californicus		Calanoida	Cyclopoida		Dytiscidae	Hydrophilidae	Beetles sp.	Hydrophilidae	Notonectidae	Gerridae	Zygoptera	Anisoptera	Culicidae				
FS-00			- NONE -					CTS & HYLA LARVAE			exposed, very shallow water												
FS-01			- NONE -					CTS LARVAE			1 CRIP			Subadult									

Figure 3. Standardized Field Data Form