

**FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING
AT THE
AMAZING FACTS PROJECT**



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FEDERALLY-LISTED LARGE BRANCHIOPODS SAMPLING AT THE AMAZING FACTS PROJECT

INTRODUCTION

Helm Biological Consulting, LLC was contracted by Shearer & Associates, Inc. to conduct dry and wet-season sampling for large branchiopods (fairy shrimp, tadpole shrimp, and clam shrimp) that are listed as threatened or endangered under the federal Endangered Species Act (e.g., vernal pool fairy shrimp [*Branchinecta lynchi*] and vernal pool tadpole shrimp [*Lepidurus packardii*]) at the Amazing Facts Project.

The Amazing Facts Project is located immediately south of Sierra College Boulevard, approximately $\frac{3}{4}$ of a mile west of Barton Road, and north of Oak Hill Lane in Placer County, California. Additionally, the Amazing Facts Project is located in the west $\frac{1}{2}$ of the southwest $\frac{1}{4}$ of Section 28, Township 11 North, and Range 7 East of the Rocklin 7.5 minute U.S. Geological Survey topographic quadrangle map (Latitude 038° 46' 16.90" North; Longitude 121° 12' 26.60" West; UTM 100655732 Easting; and UTM 4292723 Northing) (Figure 1).

Background

Helm Biological Consulting conducted dry-season sampling for federally-listed large branchiopods in October 2007 followed by wet-season sampling during the 2007-2008 wet-season. During the 2007-2008 wet-season sampling efforts, Helm Biological Consulting, LLC identified four additional areas as potential federally-listed large branchiopod habitat. Therefore, Helm Biological Consulting, LLC conducted dry-season sampling on these additional four areas during the dry-season of 2008.

This report discusses the methods and results of the dry-season sampling efforts for 2007 and 2008 and the wet-season sampling efforts during 2007-2008 for the presence of federally-listed large branchiopods at the Amazing Facts Project.

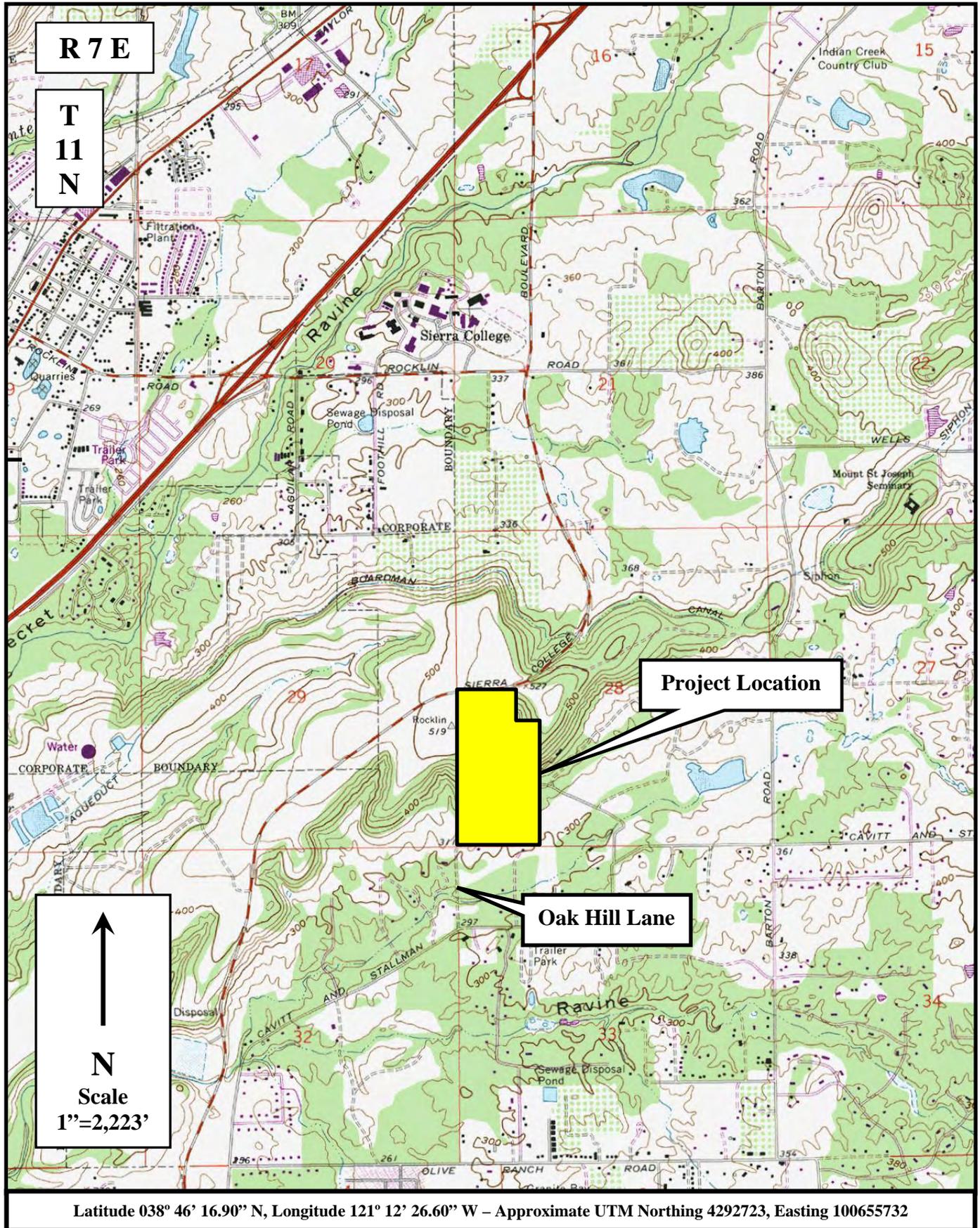


Figure 1. Amazing Facts Project Location
 (Source: U.S. Geological Survey Rocklin 7.5 minute Topographic Quadrangle Map)



METHODS

Large branchiopod surveys consisted of both dry-season and wet-season sampling. Survey methods generally followed U.S. Fish and Wildlife Service's (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* (1996) and are described below.

Dry-Season Sampling

Dr. Brent Helm and Mr. Todd Wood conducted dry-season sampling on October 9, 2007 and April 18, 2008 as authorized by USFWS (Appendix A). Sampling was conducted under permits TE-795930-4 and TE-795930-5 of Section 10(a)(1)(A) of the federal Endangered Species Act, 16 U.S.C. 1531 *et. seq.*, and its implementing regulations.

All areas that potentially could support federally-listed large branchiopods were sampled. Potential habitat for federally-listed large branchiopods is defined as any seasonal inundated depression that on average ponds water 2.0 inches or greater in depth for 14 or more consecutive days for fairy shrimp and 30 or more consecutive days for tadpole shrimp. Potential habitat characteristics of large branchiopods are based on the life history of Central Valley endemics (Eriksen and Belk 1999; Helm 1998, 1999; Helm and Vollmar 2002). The presence of water marks, algae mats, driftlines, hydrophytic vegetation ("water-loving plants"), slope, contributing watershed, maximum potential ponding depth, and aquatic arthropods (i.e., crustaceans and insects) exoskeletons were helpful indicators for evidence of ponding depth and duration. Habitats that swiftly flow water (e.g., creeks, streams, and ephemeral drainages) or semi-to-permanently inundated areas that support population of predators (e.g. bullfrogs, fish, and crayfish) were generally not considered suitable habitat for federally-listed large branchiopods.

Dry-season sampling involved the collection of a minimum of ten-soil sub-samples mainly from the lowest topographic areas within each basin considered potential habitat on site. Soil samples were placed in liter size plastic freezer bags and marked with the project name, basin number, and date. The soil was then transported to Helm Biological Consulting's, LLC laboratory for processing and analysis.

In the laboratory, a brine solution was prepared by mixing table salt (NaCl) with lukewarm tap water in a large container. The collected soil material was placed in the



brine solution. The soil material was then gently worked by hand to breakdown any persistent soil structure. The organic material rising to the top of the brine solution was skimmed off and placed in a 600-micron diameter pore-size sieve stacked atop a 75-micron diameter pore-size sieve. The soil material was processed through the top sieve by flushing it with lukewarm tap water while gently rubbing it with a soft-bristle brush. The soil retained from the 75-micron diameter pore size sieve was then removed and thinly (≈ 1.0 mm) spread into plastic petri dishes.

The contents of each petri dish were examined under a 10 to 252-power zoom binocular microscope. A minimum of 0.5-hour was spent searching the contents of each petri dish for large branchiopod cysts (embryonic eggs). Dr. Helm's large branchiopod cyst reference collection and scanning electron micrographs of cysts (Hill and Shepard 1998, Mura 1991, and Gilchrist 1978) were used to identify and compare any cysts observed within the soil samples.

Wet-Season Sampling

Dr. Brent Helm and Mr. Todd Wood conducted wet-season sampling as authorized by USFWS (Appendix A). Sampling was conducted under permits TE-795930-4 and TE-795930-5 of Section 10(a)(1)(A) of the federal Endangered Species Act, 16 U.S.C. 1531 *et. seq.*, and its implementing regulations.

Site visits were conducted on December 7 and 21, 2007; January 5 and 18, 2008; February 2, 16 and 29, 2008; and March 15, 2008. Wet-season sampling was initiated when any of the basins on site ponded a minimum of 1.0 inch of water and continued at two-week intervals until the basins were dry or 120 continuous ponding days had occurred.

All basins determined as potential large branchiopod habitat were viewed prior to entering the water for active large branchiopods. Any large branchiopods observed were quickly netted, viewed with the aid of an 18x hand lens to determine species, and released unharmed back into the environment from which they were obtained. If no large branchiopods were observed, then a semi-quantitative sample was taken to determine the relative abundance of macroscopic invertebrates as follows.

A dip net was lowered vertically into the deepest portion of the inundated basin (usually the center) and rested on the bottom. The 153- μm (plankton net) to 500- μm mesh size dip net was then moved in the direction of the longest axis of the basin for approximately



one-meter. Smaller mesh size nets were used during the first few sampling events to maximize the detection of young (instars) large branchiopods. In instances where half of the basin length is less than one meter in length, the dip net was repositioned in the deepest portion of the basin and moved in the opposite direction for the remainder of the one-meter sample. Given the aperture of the dip net of 0.025 m² and distance the dip net was moved, roughly 0.025 m³ or 25 liters of the water column was sampled horizontally each time. In those cases when the water column was shallower than the dip net aperture height, the volume of water per sweep was calculated by the horizontal distance the net is moved multiplied by the width of the dip net (25-cm) multiplied by the depth of water. After the completion of each sample sweep, the contents of the net were examined for aquatic macroscopic invertebrates. All animals captured in the dip net were identified to the lowest justifiable taxon in the field (consisting of 28 taxonomic groups), and recorded on standardized data sheets.

The relative numbers of individuals observed within each taxonomic group was recorded in one of five categories: rare (≤ 2 individuals), not common (3-10 individuals), common (11-50 individual), very common (51 -100 individuals), and abundant (>100 individuals). This method allows for the relative abundances and richness of aquatic invertebrates to be compared between and among wetlands through time. Additionally, this method allows for concentration estimates of invertebrates to be calculated as number of individuals per liter of water (= number of individuals/net aperture area x length of sweep).

If no federally-listed large branchiopods are captured during the semi-quantitative sampling effort then the entire basin was sampled as follows. Starting at one end of the basin, the dip net was moved from one side of the basin to the other in a zigzag fashion, until the opposite end of the basin was reached. During this procedure, the net was often bounced along the basin bottom (to encourage large branchiopods to move up into the water column from hiding places for easier capture) and viewed often for evidence of large branchiopods. If still no federally-listed large branchiopods were captured, then additional dip netting took place in specific locations within the basin that may have not been sampled during prior efforts. Additional taxonomic groups of aquatic invertebrates detected using this alternative method is noted as present by an "X" on the standardized field data sheet. After the taxonomic identification and enumeration were completed, the contents of the dip net were placed back into the basin from which they were collected.



In addition, the temperature, the maximum and average ponding depth, the potential maximum and average ponding depth, the present and potential ponding surface area, and the habitat condition of each basin sampled was collected during each field visit.

RESULTS

Dry-Season Sampling

A total of 45 basins identified by Helm Biological Consulting, LLC as potential federally-listed large branchiopod habitat were sampled using dry-season techniques (Figure 2). One cyst belonging to the California fairy shrimp (*Linderiella occidentalis*) was observed in soils collected from one basin (16) on site (Table 1).

Wet-Season Sampling

All 45 of the basins identified by Helm Biological Consulting, LLC as potential federally-listed large branchiopod habitat were sampled using wet-season techniques (Appendix B). No evidence of federally-listed large branchiopods (i.e., active adult fairy shrimp or tadpole shrimp, or carapaces of tadpole shrimp) was observed in the basins sampled.

Representative photographs of the basins on site are in Appendix C.



0 70 140 280 420 Feet

Potential Habitat
 Property Boundary

Figure 2. Potential Federally-Listed Large Branchiopod Habitat at the Amazing Facts Project

Table 1. Results of Soil Examinations

Basin No.	Insect Exo-Skeletons	Micro-Turbularian Cysts	Ostracods Live/Cysts/Carapaces	Copepods Live/Cysts	Large Branchiopod Cysts	Hydracarina Live	Nematoda	Collembola	Year Sampled	
					<i>Lindieriella occidentalis</i>				2007	2008
1	X	X						X	X	
2	X	X	X			X		X	X	
3	X	X				X			X	
4	X	X				X		X	X	
5								X	X	
6	X	X				X		X	X	
7	X	X				X		X	X	
8	X	X				X			X	
9	X	X				X		X	X	
10	X	X				X	X	X	X	
11	X					X		X	X	
12	X	X	X			X		X	X	
13	X	X		X		X			X	
14	X	X						X	X	
15	X					X		X	X	
16	X	X	X	X	1	X	X		X	
17	X	X		X		X		X	X	
18	X	X				X	X	X	X	
19	X	X							X	
20	X								X	
21	X		X			X		X	X	
22	X	X				X		X	X	
23	X					X		X	X	
24	X	X				X		X	X	
25	X	X				X		X	X	
26	X	X				X		X	X	
27	X							X	X	
28	X	X				X		X	X	
29	X					X			X	
30	X	X				X			X	
31	X					X		X	X	
32	X							X	X	
33	X	X				X		X	X	
34	X	X	X			X		X	X	
35									X	
36	X	X				X		X	X	
37	X	X	X			X			X	
38	X	X				X	X	X	X	
39	X	X	X			X		X	X	
40	X	X				X		X	X	
19a	X								X	
22a	X	X		X		X		X		X
8a	X	X		X		X		X		X
tireruts 1	X	X	X	X				X		X
tireruts 2	X	X						X		X



LITERATURE CITED

- Eriksen, C. H., and D. Belk. 1999. Fairy shrimps of California's puddles, pools, and playas. Mad River Press, Inc. Eureka, CA. 196 pp.
- Gilchrist, B. M. 1978. Scanning electron microscope studies of the egg shell in some Anostraca (Crustacea: Branchiopoda). *Cell Tiss. Res.* 193: 337-351.
- Helm, B. P. 1998. Biogeography of eight large branchiopods endemic to California. Pages 124-139 in Witham, C. W., E. T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff. (eds.). *Ecology, conservation, and management of vernal pool ecosystems – proceeding from a 1996 conference.* California Native Plant Society, Sacramento, CA. 285 pp.
- Helm, B. P. 1999. Feeding ecology of *Lindleriella occidentalis* (Dodds) (Crustacea: Anostraca). Doctoral thesis. University of California, Davis. 158 pp.
- Helm, B. P., and J. E. Vollmar. 2002. Vernal pool large brachiopods. Pages 151-190 in John E. Vollmar (ed.). *Wildlife and rare plant ecology of eastern Merced County's vernal pool grasslands.* Sentinel Printers, Inc. CA. 446 pp.
- Hill, R. E., and W. D. Shepard. 1998. Observation on the identification of California anostracan cysts. *Hydrobiologia* 359: 113-123.
- Mura, G. 1991. SEM morphology of resting eggs in the species of the genus *Branchinecta* from North America. *J. Crust. Biol.* 11: 432-436.
- U. S. Fish and Wildlife Service. 1996. 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. 11 pp.



APPENDIX A. USFWS AUTHORIZATION LETTER

----- Forwarded by Jana Milliken/SAC/R1/FWS/DOI on 10/02/2007 01:50 PM -----

Jana Milliken/SAC/R1/FWS/DOI

To bhelm@69485@aol.com

cc

Subject Authorization to Conduct Vernal Pool Crustacean Surveys at the Amazing Facts Project site in Placer County, California

09/24/2007 11:24 AM

Brent,

By this email message, you are authorized to conduct dry and wet season surveys of listed vernal pool crustaceans at the Amazing Facts Project site in Placer County, per the conditions of your permit, TE-795930-4, and as specified in your September 10, 2007 letter.

Please remember to carry a copy of their permit while doing the work, and to follow the terms and conditions of the permit and the survey protocol, including the reporting requirements. Please include the recovery permit numbers and all persons involved in the reports of the results of surveys, and the date of this authorization, to help ensure that we correctly record the fulfillment of the reporting requirement under this authorization.

We appreciate that you send separate copies of the report(s) at the time of any formal or informal consultation under section 7 of the Endangered Species Act with the Fish and Wildlife Service. Please let us know if the surveys are not performed as authorized, or if they are done by a different permittee under a separate authorization. Also include a summary of what surveys were authorized, who was authorized, when the surveys were done, and who did the surveys in your annual report for each recovery permit involved with this survey authorization. Please reference Service File # 1-1-07-PR-1706 in any future correspondence with this office on this project.

Thanks, Jana

Jana Milliken
Fish and Wildlife Biologist
Sacramento Fish and Wildlife Office
US Fish & Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
916-414-6800 (voice)
916-414-6713 (fax)

Jana_Milliken@fws.gov

Sent: Tue, 8 Apr 2008 9:40 am

Subject: Authorization to conduct dry-season sampling for large branchiopods on the proposed Pastor Property and Amazing Facts Project, Placer County, California - TE-795930-5

Hello Brent,

By this email message, you are authorized to conduct dry-season surveys for listed vernal pool branchiopods, per the conditions of your permit, TE-795930-5, and as specified in your March 31, 2008, letter that was received in our office on April 02, 2008. The surveys may be conducted in the two additional pools which were identified as potential vernal pool crustacean habitat during the 2007-2008 wet season surveys on the described property located on the 13 acres located east of Barton Road and south of Eureka Road in Placer County, California. The dry-season surveys will be conducted by individuals authorized under the permit number above. Please refer to Service file number 81420-2008-TA-0118-2 on any future correspondence about this authorization.

Please remember to have all biologists carry a copy of their permit while doing the work, and to follow the terms and conditions of the permit and the *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*, including the data-collection and reporting requirements. In your report, please include which surveys were authorized, the names of all persons involved the surveys, their recovery permit numbers, and the date of this authorization, to help ensure that we correctly record the fulfillment of the reporting requirement under this authorization. Include all the data requested in the survey guidelines. Please let us know if the surveys are not performed as authorized, or if they are done by a different permittee under a separate authorization.

Please send one copy of the report(s) to David Kelly, of our Recovery Branch, and send a separate copy to the Acting Sacramento Valley Branch Chief at the time of any formal or informal consultation with the Fish and Wildlife Service under section 7 of the Endangered Species Act. The second copy may be sent in electronic format.

Jason Hanni
Fish and Wildlife Biologist
Endangered Species Division
2800 Cottage Way, Room W-2605
Sacramento, California
(916) 414-6645 (phone)
(916) 414-6712 (fax)

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Subj: **Re: Authorization to conduct dry-season sampling for large branchiopods on the proposed Pastor Property and Amazing Facts Project, Placer County, California - TE-795930-5**
Date: 4/15/2008 1:03:50 P.M. Pacific Daylight Time
From: Jason_Hanni@fws.gov
To: bhelm69485@aol.com

Todd, Yes, you are authorized for dry-season sampling on both the Pastor Property as well as the Amazing Facts Project.

Jason Hanni
Fish and Wildlife Biologist
Endangered Species Division
2800 Cottage Way, Room W-2605
Sacramento, California 95825
(916) 414-6645 (phone)
(916) 414-6712 (fax)

bhelm69485@aol.com

04/15/2008 12:55 PM

To Jason_Hanni@fws.gov

cc

Subject Re: Authorization to conduct dry-season sampling for large branchiopods on the proposed Pastor Property and Amazing Facts Project, Placer County, California - TE-795930-5

Jason,

Thank you for the quick response to our request letter for dry-season sampling. I just wanted to clarify one thing. The subject line in your E-mail states that we have authorization to conduct dry-season sampling at both the Pastor Property and the Amazing Facts Project, but the E-mail itself only describes the Pastor Property. So there isn't any confusion do we have permission at the Amazing Facts Project as well?

Thanks,
Todd Wood

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-----Original Message-----

From: Jason_Hanni@fws.gov
To: bhelm69485@aol.com
Cc: David_Kelly@fws.gov; Chris_Nagano@fws.gov; Kirsten_Tarp@fws.gov;

Tuesday, April 15, 2008 America Online: BHelm69485



APPENDIX B. FIELD DATA SHEETS



APPENDIX C. REPRESENTATIVE PHOTOGRAPHS



Amazing Facts Project – 1



Amazing Facts Project – 5



Amazing Facts Project – 12



Amazing Facts Project – 15



Amazing Facts Project – 5



Amazing Facts Project – 39



Amazing Facts Project – 1



Amazing Facts Project – 2



Amazing Facts Project – 16



Amazing Facts Project – 4



Amazing Facts Project – 6



Amazing Facts Project – 11



Amazing Facts Project – 22a



Amazing Facts Project – 40



Amazing Facts Project – 18



Amazing Facts Project – tileruts1