

APPENDIX 8.2B

## Resumes of Biology Staff

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# Debra J. Crowe

## Environmental Scientist/Wildlife and Wetlands Biologist

### Education

B.S., Environmental Biology and Management (Honors), University of California, Davis

Veterinary Technician Certification Program, Western Career College, Sacramento, California

### Professional Registrations

Endangered Species Act (ESA) Section 10 Scientific Take Permit for California Threatened and Endangered Fairy Shrimp and Tadpole Shrimp (Permit #TE004824-1)

California Department of Fish and Game (CDFG) Scientific Collector's Permit

Certified Veterinary Technician

### Distinguishing Qualifications

- Experienced in California Energy Commission (CEC) power plant licensing procedures
- Expert witness for biological resource evaluations on power plant projects
- Experienced in Sections 7 and 10 of ESA consultations and mitigation plans
- Expertise in biological resource construction mitigation monitoring
- Routinely consults with natural resource agencies on project permitting, mitigation measures, and construction monitoring

### Relevant Experience

Ms. Crowe is a wildlife and wetlands biologist who analyzes potential project impacts on biological resources, including wetlands and threatened or endangered species and Species of Concern. She has been an expert witness in several power plant licensing projects under the CEC regulations and prepared biological resource analyses, mitigation, monitoring, and resources management plans, and monitored construction and operations for compliance with Conditions of Certification as the Designated Biologist. She conducts wetland delineations, biological resource surveys, timber stand exams, wetland creation/preservation monitoring, and avian collisions along new transmission lines.

She has 14 years of field experience in surveys and identification of wildlife and plants, wetland delineations, field sampling, vernal pool crustacean surveys, and threatened and endangered wildlife surveys in California, Alaska, Washington, Oregon, and Nevada. Ms. Crowe is experienced in Section 7 of the ESA consultations, Biological Assessments (BAs), and mitigation negotiations, as well as in fresh and salt marsh wetland delineations using U.S. Army Corps of Engineers (USACE) methods. She also has experience obtaining CWA Section 404 and 401 permits, Coastal Consistency Determinations, CDFG Consultations and Streambed Alteration Agreements. Her expertise includes National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) regulations, procedures, and documentation production.

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She is certified in identification of California fairy shrimp and tadpole shrimp to species and has a current ESA Section 10 permit. Ms. Crowe is familiar with California floristics, GIS, habitat modeling, environmental law, and report preparation and is certified in Hazardous Waste Operations and Emergency Response. Ms. Crowe also conducts soil and water sampling on hazardous waste sites and conducts groundwater and surface water sampling programs.

She has 25 years of experience handling injured and diseased animals as a licensed Veterinary Technician and is a member of the Sacramento Wildlife Care Association.

## Biological Assessments/Wildlife Surveys/Expert Testimony

**Application for Certification (AFC) of South Bay Energy Facility, LS Power, Chula Vista, California.** Task Manager for biological resource impact analysis and document section of AFC. Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, natural gas pipeline route, and electric transmission line route. Will prepare Biological Resources Mitigation Implementation and Monitoring Plan addressing protection measures for special-status species during construction and operation of SBEF and demolition of the existing South Bay Power Plant.

**Application for Certification (AFC) of Sutter Power Plant, Calpine Corporation and Western Area Power Administration, Yuba City, California.** Task Manager for biological resource impact analysis and document section of AFC. Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, natural gas pipeline route, and electric transmission line route. Conducted wet season and dry season surveys for listed vernal pool branchiopod species. Conducted wetland delineation, prepared wetland delineation report, biological assessment, and mitigation plans for Western Area Power Administration for submittal to USACE, U.S. Environmental Protection Agency (USEPA), USFWS, CDFG, and CEC. Consulted with above-mentioned agencies and the California RWQCB for Clean Water Act Section 404 permit and Section 401 water quality certification to fill seasonal wetlands and construct a gas pipeline through Sutter National Wildlife Refuge. Conducted stream geometry surveys and water quality analysis for irrigation canals, Sutter Bypass, and the Sacramento River. As the CEC qualified Designated Biologist, prepared and implemented a mitigation implementation and monitoring plan for sensitive biological resources during construction and operation of the project. Conducting ongoing avian collision study along the Western Area Power Administration 4-mile 230-kilovolt (kV) transmission line.

**Application for Certification (AFC) of Walnut Energy Center, Turlock Irrigation District, Turlock, California.** Task Manager for biological resource impact analysis and document section of AFC. Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, natural gas pipeline route, and electric transmission line route. Conducted wet season and dry season surveys for listed vernal pool branchiopod species. Consulted with USACE, USEPA, USFWS, CDFG, and CEC and the California RWQCB for potential project impacts. As the CEC qualified Designated Biologist, prepared and implemented a mitigation implementation and monitoring plan for sensitive

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biological resources during construction and operation of the project. Conducting ongoing avian collision study along the 69 and 138-kilovolt (kV) transmission lines.

**Environmental Assessment for North Area Right-of-Way Maintenance Project, Western Area Power Administration.** Task Manager for biological resource surveys and biological data report. Coordinating survey crews of botanists and wildlife biologists to conduct habitat typing along 900 miles of electric transmission line ROW from the Oregon border to Tracy, California. Surveys include data collection using GPS and GIS to record wetland features, elderberry plants, noxious weeds, and special-status species. Survey results would be used to determine appropriate Operations and Maintenance procedures to manage vegetation within the ROW.

**Expert Testimony of Cosumnes Power Plant, Sacramento Municipal Utility District (SMUD), Sacramento, California.** Prepared expert testimony for portions of biological resource impact analysis and agency consultations. Performed threatened and endangered species surveys, including Swainson's hawk and Western burrowing owl. Consulted with USFWS and CDFG on potential impacts to federal and state listed species. Prepared Biological Resources Mitigation Implementation and Monitoring Plan for sensitive biological resources during construction and operation of the project.

**Application for Certification of Metcalf Energy Center, Calpine Corporation, San Jose, California.** Task Manager for biological resource impact analysis and document section of Application for Certification (AFC). Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, recycled water supply line, natural gas pipeline route, and electric transmission line connection. Prepared the biological resources section of the AFC and initiated consultations for sensitive biological resources with USACE, U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), U.S. National Marine Fisheries Service (NOAA Fisheries), California Regional Water Quality Control Board (RWQCB), CDFG, City of San Jose, Santa Clara Valley Water District, and CEC. Consulted with local experts and USFWS on potential impacts to serpentine habitat on Tulare Hill and with Santa Clara Valley Water District on potential impacts within the Fisher Creek Riparian Corridor. Prepared Management Plan for the MEC Ecological Preserve and Fisher Creek Riparian Corridor Enhancement Plan. As the CEC qualified Designated Biologist prepared and implemented a mitigation implementation and monitoring plan for sensitive biological resources during construction and operation of the project. Currently monitoring construction of the MEC plant and linears.

**Application for Certification (AFC) of Delta Energy Center, Calpine Corporation, Pittsburg, California.** Task Manager for biological resource impact analysis and document section of AFC. Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, natural gas pipeline route, and electric transmission line route. Conducted wet season and dry season surveys for listed vernal pool branchiopod species. Currently preparing wetland delineation report, biological assessment, and mitigation plans for U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, California Department of Fish and Game, and California Energy Commission. Consulted with above-mentioned agencies and

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the California Regional Water Quality Control Board for Clean Water Act Section 404 permit, Section 10 Rivers and Harbors Act, and Section 401 water quality certification to construct in areas of coastal wetlands with special-status species such as California clapper rail, salt-marsh harvest mouse, species occurring within the Antioch Dunes National Wildlife Refuge. As the CEC qualified Designated Biologist prepared and implemented a mitigation implementation and monitoring plan for sensitive biological resources during construction and operation of the project.

**Environmental Impact Report/Environmental Impact Statement for Teayawa Energy Center, Calpine Corporation, Indio, California.** Task Manager for threatened or endangered species consultations with U.S. Fish and Wildlife Service and California Department of Fish and Game. Performed threatened and endangered species surveys, literature search, and wildlife impact evaluation for proposed electric power plant, recycled water supply line, natural gas pipeline route, and electric transmission line connection. Consulted with local experts and USFWS/CDFG on potential impacts to desert species and habitat in the Coachella Valley. Prepared the Biological Assessment and mitigation plan and initiated consultations for sensitive biological resources.

**Application for Small Power Plant Exemption for Carson Ice-Cogeneration Facility, Sacramento Regional Wastewater Treatment Plant, Carson Energy Group, Elk Grove, California.** Assisted in the preparation of a Biological Resources Management Plan for the burrowing owl and threatened or endangered species at the project site. Served as assistant project manager for biological resource construction mitigation monitoring in vicinity of project site. Conducted surveys for threatened and endangered species, Species of Special Concern, and wetlands and other wildlife habitats. Researched alternative structures for burrowing owl burrows. Assisted in the development of a Biological Resources Sensitivity Awareness Training Program and brochure for site managers. The training class covered species identification (giant garter snake, Swainson's hawk, burrowing owl), habitat management, and the nature of, and compliance with, existing state and federal environmental laws. Assisted in teaching the sensitivity program. Prepared the 1994 Burrowing Owl Monitoring Report for submission to the CEC. Attended agency meetings and consulted with client on agency matters.

**Application for Certification of Sacramento Ethanol and Power Cogeneration (SEPCO) Project, Ark Energy Group, Rio Linda, California.** Performed threatened and endangered species surveys (giant garter snake, fairy shrimp, Swainson's hawk, burrowing owls), literature search, and wildlife impact evaluation for proposed ethanol production plant and water pipeline route. Assisted in vernal pool crustacean surveys on project site. Conducted wetland and raptor surveys for evaluation of impacts along proposed water pipeline route.

**Threatened and Endangered Species Surveys for New Electric Transmission Line Corridors, Sacramento Municipal Utility District, Sacramento County, California.** Assisted in threatened and endangered species surveys of new utility corridors in Sacramento County. Located occurrences of state protected species, including Swainson's hawks, burrowing owls, and vernal pool crustaceans.

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**Biological Assessment and Vernal Pool Crustacean Surveys for B.T. Collins Army Reserve Training Center, U.S. Army Reserve Command, Sacramento, California.** Conducted threatened and endangered species surveys and prepared a BA for the project area. Responsible for organization and conducting vernal pool crustacean surveys and identifications under a Section 10 Scientific Take Permit (#796012) and USACE Vernal Pool Crustacean Survey Guidelines. Collected voucher specimens and identified them to species. Responsible for submission of annual report to USFWS and voucher specimens to California Academy of Sciences. Consulted with USFWS to develop and implement a mitigation plan for seasonal wetlands, vernal pool fairy shrimp, and burrowing owls. Conducted burrowing owl mitigation monitoring and reports.

**Environmental Impact Statement and Biological Assessment for Sacramento Army Depot Disposal and Reuse, Sacramento, California.** Conducted surveys for threatened and endangered species and Species of Special Concern (including burrowing owls, fairy shrimp, and tadpole shrimp). Prepared the BA for vernal pool fairy shrimp on the Sacramento Army Depot for the USFWS. Consulted with USFWS and developed vernal pool fairy shrimp mitigation measures for closure and reuse of the Depot. Prepared a wetland delineation report for vernal pools in Open Space areas. Conducted an extensive vernal pool fairy shrimp and tadpole shrimp literature search.

**Environmental Baseline Survey for McClellan Air Force Base, Sacramento, California.** Conducted Phase I, II, and III Visual Site Inspections of buildings and open land areas for evidence of hazardous material releases and potential pathways for contamination. These surveys were used to determine DOD categorization of land parcels and possible privatization reuse opportunities under the Base Realignment and Closure (BRAC) process. Conducted wildlife and sensitive habitat surveys on all property sites. Assisted in production of Basewide and Site-specific Environmental Baseline Survey documents.

**Habitat Evaluation Procedures Study and Sensitive Species Surveys for Ramsey-French Meadow Hydroelectric Project, Northern California Power Agency, Upper Stanislaus River, California.** Assisted in timber map and aerial photograph evaluation, habitat typing, planimetry, field surveys, and ground-truthing of delineated habitat polygons, along with data compilation. Assisted in spotted owl and northern goshawk surveys and data compilation. Mapped mule deer migration routes (summer and winter) and fawning habitats along proposed transmission line. Mapped sensitive wildlife species sightings along proposed transmission line.

**Water Quality Monitoring of Morrison Creek, Sacramento Municipal Utility District.** Performed water quality analysis for monitoring along Morrison Creek at various sites below the Proctor and Gamble cogeneration plant. Conducted monitoring from the area immediately below the site to 10 miles downstream.

**Wetland Delineation for Hazardous Waste Remediation, U.S. Navy, Naval Weapons Station-Seal Beach, Seal Beach, California.** Conducted wetland delineation and prepared wetland delineation report. Consulted with USACE and USFWS to determine impacts of remedial action on threatened and endangered species and southern California coastal salt

marsh habitat. Consulted with California Coastal Commission on Coastal Consistency Determination.

**Wetland Delineation and Section 404 Permit for B.T. Collins Army Reserve Training Center, U.S. Army Reserve Command, Sacramento, California.** Responsible for delineation of seasonal wetlands on the Reserve Center. Consulted with USACE, USFWS, CDFG, California RWQCB for mitigation measures and Nationwide Permit 26 to fill seasonal wetlands. Process included preparation of CEQA Initial Study, Section 404 Predischarge Notification package, Section 401 Water Quality Certification application, Streambed Alteration Agreement (FG 1601), BA, and mitigation plan assumed in the resulting Biological Opinion.

**FRED M. ROBERTS**

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(760) 439-6244  
antshrike@cox.net

**EDUCATION:**

University of California, Santa Barbara, CA.  
Bachelor of Arts Degree in Geography, June, 1982  
Plant Geography, Plant Taxonomy, Botanical field and research techniques; Remote Sensing;  
Cartography.

**AFFILIATIONS:**

Rare Plant Chair, San Diego Chapter, California Native Plant Society  
co-chair Conservation, Orange County Chapter, California Native Plant Society  
Rare Plants Chair, Riverside/San Bernardino County Chapter, California Native Plant Society  
Southern California Botanical Society  
California Botanical Society

**EXPERIENCE:**

**Botanical Survey Experience within Southwestern California:** 28 years.

**Botanical Survey/Consulting (self Employment)**

**April 1999 to present:** Since April of 1999, I have been conducting a series of general botanical inventories and rare plant field surveys in Orange, San Diego, San Bernardino, and Riverside Counties specializing in the South Coast, San Bernardino Mtns., and Peninsular Ranges subregions as defined by the Jepson Manual. These activities include literature and herbarium searches; general floristic and directed rare surveys, the latter including GPS site descriptions; report preparation which frequently involves text preparation and graphics (figures, maps). In the summer of 1999 and spring of 2000 I also conducted extensive literature searches and reviewed existing GIS data to prepare plant species accounts for the Western Riverside County Multiple Species Habitat Conservation Plan. Recent major comprehensive rare plant surveys include the SR79 corridor alignment study in Hemet (2005), Donna O'Neill Land Conservancy in Orange County (2003, 2004), western Miramar Marine Corps Airstation, San Diego County (2003, 2005), Willows burn within the San Bernardino Mtns., San Bernardino County (2001, 2004), and Limestone Canyon, Orange County (1999-2000). Several of these surveys required use of Tremble GPS units.

**County of San Diego Planning and Landuse Department, MSCP Division**

**March 2001 to May 2003:** Primary duties consisted of directed rare plant surveys on selected MSCP Parcels between Lake Hodges and Otay Mountain (Lusadri Creek, Santa Fe Valley, 4S Ranch, Hollenbeck Ranch, Otay Lakes North (Jamul Mtns.), Otay Lakes South (San Ysidro Mtns.) in San Diego County. My responsibilities included locating rare plants, site descriptions for stands and populations, mapping, use of submeter GPS equipment (Tremble Geoexplorer II or III handheld GPS unit), and a written summary of survey results.

**F.M. Roberts Publications, Encinitas, CA (self employment)**

**1995 to present:** Since 1995 I have published three books on plant identification or distribution and have been in the process of preparing (or co-writing) four manuscripts for self publication and one revision for UC Press. These activities include field research, examining specimens in herbaria, literature research, and data base preparation in addition to camera ready layout and graphics design for the final product. I also have drawn scientific illustrations for new species descriptions (*Amyris* - San Diego Natural History Museum, *Suaeda* - Museum of Systematics and Ecology at UC, Santa Barbara, and *Monardella* - UC, Riverside Herbarium) and taught a number of plant identification classes at the Rancho Santa Ana Botanical Garden and San

Diego Natural History involving oaks, lilies, liveforevers, salt marsh plants, and fire followers. Since 1999 I have also been painting realistic water color and acrylic paintings of southern California wildlife and plants.

**U.S. Fish and Wildlife Service, Laguna Niguel Field Office, Laguna Niguel, CA (1991-1992)**  
**U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA (1992-1999)**

**December 1991 to April 1999:** *Habitat Conservation Plan Branch (September 1997 to April 1999):* Primary duties included critical review of State, County, City, U.S. Army Corps of Engineers, and Department of Defense environmental reports in Orange and Riverside County; preparation of comment letters, section 7 biological opinions, and assistance with HCP's (4(D) permit analysis, reviewing elements of the embryonic Western Riverside County HCP and the Orange County southern subregion NCCP); meeting with and coordinating with local jurisdictions, California Department of Fish and Game staff, and project proponents in negotiating project impacts. My duties also included office wide coordination with, and assistance to office staff biologist on botanical issues. *Listing and Recovery Branch (December 1991 to September 1997):* Primary duties included monitoring the status of rare plants throughout the jurisdiction of the field office; analysis of potential threat and determination to whether species qualified for federal protection under the Endangered Species Act; preparation of proposed rules for plants and fairy shrimp; final rules preparation (six total publications total); coordination with the public and local agencies regarding such rules preparation; participating in public hearings. My duties also included office wide coordination with, and assistance to office staff biologist on botanical issues.

**Museum of Systematic Biology, University of California, Irvine, CA.**

**July 1985 to October 1991:** Assistant Museum Scientist: Organization and maintenance of Herbarium, identification of incoming specimens, specimen acquisition, preparation, filling; systematics and flora distribution research; research series graphics, illustration and layout; public services; student assistance. This job also included extensive botanical field collections throughout Orange County, scattered locations in Baja California, Mexico, and Costa Rica.

#### **MANUSCRIPTS AND PUBLICATIONS 1995-2005:**

- Boyd, S. & F.M. Roberts, 1995. Additions to the vascular flora of the Santa Ana Mountains, California. *Aliso* 14(2): 105-108.
- Roberts, F.M., Scott White, Andy Sanders, Dave Bramlet, and Steve Boyd, 2004. *Plants of Western Riverside County, California: an Annotated Checklist of the Vascular Plants*. F.M. Roberts Publications, San Luis Rey, California.
- Roberts, F.M., *A Checklist of the Vascular Plants of Orange County, California, 2nd edition*. F.M. Roberts Publications, Encinitas, California.
- \_\_\_\_\_, 1998. *Quercus cedrosensis*. Noteworthy Collections. *Madrono* 45(4): 326-330.
- \_\_\_\_\_, 1998. *Quercus engelmannii*. Noteworthy Collections. *Madrono* 45(1): 85-87.
- \_\_\_\_\_, 1995. *Illustrated Guide to the Oaks of the Southern Californian Floristic Province*. F.M. Roberts Publications, Encinitas, California.

*In preparation:* *Shrubs and Trees of Southern California*, as co-author of the revision of "Native Shrubs of Southern California" by P. Raven and F.M. Roberts, Jr. for UC Press  
*Plants of Orange County, California: an Annotated Checklist of the Vascular Plants*.  
*Illustrated Guide to the Lilies and their Allies of southern Californian Floristic Province*.  
*A Flora of Orange County*

#### **FEDERAL RULES AND REGULATIONS 1995-1998 only (primary author):**

**October 13, 1998.** Endangered and Threatened Wildlife and Plants; Determination of Endangered or Threatened Status for four southwestern California Plants from vernal wetlands and clay soils (*Allium munzii*, *Atriplex coronata* var. *notatior*, *Brodiaea filifolia*, and *Navarretia fossalis*). 63 FR 54975.

**October 7, 1996.** Endangered and Threatened Wildlife and Plants; Determination of Endangered or Threatened Status for four southern maritime chaparral Plant taxa from coastal southern California and northwestern Baja California, Mexico (*Arctostaphylos glandulosa* ssp. *crassifolia*, *Baccharis vanessae*, *Chorizanthe orcuttiana*, and *Verbesina dissita*). 61 FR 52370.

**October 7, 1996.** Endangered and Threatened Wildlife and Plants; Withdrawal of the Proposed Rule to List the plants *Dudleya blochmaniae* ssp. *brevifolia* (short-leaved dudleya) as endangered, and *Corethrogyne filaginifolia* var. *linifolia* (Del Mar sand aster) as threatened. 61 FR 52402.

#### **UNPUBLISHED REPORTS (1994 to present):**

Roberts, F.M., 2002. Big-leaved Crown-beard Survey for 591 Balboa, City of Laguna Beach, California. Prepared for Mark H. Singer Architects, Laguna Beach, California.

\_\_\_\_\_, 2002. 2001 MSCP Baseline Rare Plant Surveys, Santa Fe Valley, Lusardi Creek, 4S Ranch, & Otay Lakes. Prepared for the San Diego County Planning and Landuse Department, MSCP Division, San Diego, California.

\_\_\_\_\_, 2001. Spring 2001 San Juan/San Mateo Watershed Vernal Pool Survey, Rancho Mission Viejo. Prepared for PCR, Incorporated, Irvine, California.

\_\_\_\_\_, 2000. Limestone Wilderness Park Supplemental Rare Plant Survey, Spring 2000. Prepared for the Nature Conservancy, Irvine, California, and The Nature Reserve of Orange County, Santa Ana, California.

\_\_\_\_\_, 2000. Shapell Area 1 Yorba Linda, Orange County, California Botanical Technical Report. Prepared for BonTerra Consulting, Costa Mesa, California.

\_\_\_\_\_, 2000. Southern tarplant (*Hemizonia parryi* ssp. *australis*) on the Bolsa Chica Mesa, Orange County, California. F.M. Roberts Publications, Encinitas, California.

\_\_\_\_\_, 1999. Many-stemmed dudleya (*Dudleya multicaulis*) status trend summary. Unpublished report prepared for the California Native Plant Society, Sacramento, California.

\_\_\_\_\_, 1999. Limestone Canyon spring 1999 rare plant survey. Unpublished report prepared for the Nature Conservancy, Irvine, California, and the Nature Reserve of Orange County, Santa Ana, California.

\_\_\_\_\_, 1999. Southern tarplant (*Hemizonia parryi* ssp. *australis*) preliminary status and distribution summary of U.S. populations. Unpublished report prepared for the Carlsbad Field Office, U.S. Fish and Wildlife Service, Carlsbad, California.

\_\_\_\_\_, 1998. Sensitive plant taxa of the Carlsbad Field Office: U.S. Fish and Wildlife, geographical species lists, volume I: north counties area. Unpublished report prepared for the Carlsbad Field Office, U.S. Fish and Wildlife Service, Carlsbad, California.

\_\_\_\_\_, 1998. Sensitive plant taxa of the Carlsbad Field Office: U.S. Fish and Wildlife, geographical species lists, volume II: south counties area. Unpublished report prepared for the Carlsbad Field Office, U.S. Fish and Wildlife Service, Carlsbad, California.

\_\_\_\_\_, 1998. Rare Plant Survey: Valley Center Road Widening Project, Escondido and Valley Center, San Diego County, California. Prepared for Marquez and Associates, Chula Vista.

\_\_\_\_\_, 1998. 1998 spring survey: ashy spike-moss (*Selaginella cinerascens*) status and distribution in Shady Canyon, San Joaquin Hills, Orange County, California. Prepared for the Nature Conservancy, Irvine, California.

\_\_\_\_\_ & David E. Bramlet, 2004. A Botanical Assessment of the Donna O'Neill Land Conservancy, Rancho Mission Viejo: Sensitive, Rare, and Endangered Plants. Prepared for Glen Lukos Associates, Lake Forest, California, and Mission Viejo Land Conservancy, San Juan Capistrano, California.

#### **OTHER CAPABILITIES**

*Photography:* 28 years of photography experience using 35mm single lens reflex cameras, flash photography, and digital cameras.

*Computer programs:* Apple Works, Word, Wordperfect, Adobe Photoshop, Adobe Pagemaker, Micromedia Freehand, some experience with Claris Filemaker Pro (Macintosh) and Excel.

References available upon request.



**EDUCATION**

Ph.D. in Biology, Department of Biological Sciences, University of Arkansas at Fayetteville (UAF), 2000.

Master of Science in Engineering, Department of Biological and Agricultural Engineering, UAF, 1994.

Bachelor of Arts, College of Creative Studies, University of California at Santa Barbara, 1991.

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**PROFESSIONAL EXPERIENCE****California State University, Sacramento.**

Adjunct Professor (2004 – present, part-time)

Instructor for BIO-279 - Conservation Biology and Wildlife Management, and thesis committee member.

**Tetra Tech, Inc., Sacramento, California.**

Senior Environmental Scientist (2004 – present, part-time)

- Project management and staff supervision of research/engineering team producing preliminary assessments, site investigations, remediation work plans, and monitoring of environmental contamination for the US Army Corps of Engineers, Sacramento District, Formerly Used Defense Sites Program.
- Consulting biologist to other Tetra Tech programs and offices.

**The Nature Conservancy, Arkansas Field Office and Oklahoma Field Office.**

Ecologist (2001 – 2003, full-time; 2003 – 2005, part-time)

Consulting scientist for the Ozark Karst Program and other internal programs, specializing in conservation planning, bioinventories / taxonomy, monitoring and bioassessment:

- Developed recovery programs for listed species and lead author of the draft “*Safe Harbor Programmatic Permit for Endangered Species Obligate to Subterranean Habitats of Arkansas*” in partnership with US Fish and Wildlife Service, Arkansas Field Office;
- Development of conservation and monitoring plans for Sian Ka’an Biosphere Preserve, US Agency for International Development (USAID) Parks in Peril Program, Quintana Roo, Mexico;
- Program development and bioinventory / assessment of priority sites for Cockpit Country USAID Parks in Peril Program, Windsor Research Centre, Jamaica;
- Development of conservation / monitoring plans for Fort Hood, US Army, Bell / Coryell Counties, Texas;
- Awarded over \$300,000 in grants and produced numerous journal publications.

**Analytical Environmental Services, Inc. (AES), Sacramento, California.**

Senior Biologist (2003 – 2004)

Managed the biological department, including staff supervision / hiring, proposal writing and budgeting, agency consultation, and technical report production:

- Project manager or team member of numerous environmental documents (NEPA & CEQA) and constraints analyses; clients / lead agencies included State Water Resources Control Board, Bureau of Indian Affairs, Caltrans, City governments of Sacramento, Vacaville, West Sacramento, and American Canyon, county governments of Placerville and Yolo, and private development firms and Indian tribes (*see attached project list*);
  - Field biologist – wetland delineations / permitting, biological assessments, special status species surveys and permitting; GPS/GIS computer mapping.
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**University of Arkansas at Fayetteville.**Research Associate and Instructor (2000 – 2002)

- Dept. of Biological Sciences: created and directed the Ozark Subterranean Biodiversity Project, a multi-agency research program dedicated to the bioinventory and protection of rare species dependent upon groundwater and cave habitats; developed a database of rare species' occurrences in tri-state region.
- Dept. of Continuing Education: taught 2 semesters of Conservation of Natural Resources course; guest lecturer for General Tropical Ecology course, Organization for Tropical Studies, Palo Verde, Costa Rica.
- Awarded over \$300,000 in grants and produced numerous technical reports and conference presentations (*see attached grant list and publication list*).

Research Assistant and Instructor (1993 – 2000)

- Dept. of Biological Sciences; coordinated statewide study of cave and groundwater ecosystems, including environmental quality analyses, bioinventories and assessments, and wrote research grants, plans, permits, and reports; awarded CCF Research Fellowship;
- Lab Director – directed lab operations of general microbiology lab, revised class curriculum, trained and supervised instructors and assistants; taught 5 semesters of General Microbiology, Principles of Biology, and General Zoology lab classes;
- Dept. of Food Sciences - investigated energy-saving techniques in the food processing industry, including a feasibility study of solar thermal water heating for fermentation technologies;
- Dept. of Biological and Agricultural Engineering – provided technical support for several agricultural waste recovery projects and agricultural technology extension services to the public.

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**PROFESSIONAL AFFILIATIONS, LICENSES, AND HONORS**

Registered Environmental Assessor 1, License # 08060, California Department of Toxic Substances Control.

Certified Arborist, # WE-6725A, International Society of Arboriculture.

Hazardous Waste Operations and Emergency Response (HAZWOPER) certification (March 2005)

Member of: American Fisheries Society; American Society of Agricultural Engineers; American Water Resources Association; Arkansas Academy of Science; California Native Plant Society; Ecological Society of America; International Society of Arboriculture; International Society of Biospeleology; National Speleological Society; North American Benthological Society; Oklahoma Academy of Science; Sigma Xi: the Scientific Research Society; and Southwestern Association of Naturalists.

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**COMPUTER SKILLS**

Proficient in: Microsoft Office 2003, including Access database management, Excel spreadsheet modeling, and PowerPoint presentations; Adobe Suite, including Acrobat document preparation and computer drawing and layout on Illustrator CS, Photoshop CS, and InDesign CS; and biogeographical analyses using ESRI ArcView 3.3 and ArcGIS 8 geographic information system.

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**REFERENCES**

Available upon request.

**FEDERAL / STATE CLIENTS**

**County of Merced, Santa Nella, California – 2005** (independent contractor as Natural Investigations Co.)  
San Joaquin Kit Fox habitat assessment, team member, to support Biological Assessment for County of Merced Specific Plan EIR, subcontract by Bumgardner Biological Consulting.

**US Army Corps of Engineers, Sacramento District, 2004 – present** (with Tetra Tech)  
Formerly Used Defense Sites Program, California and Nevada, deputy program manager for numerous preliminary assessments, work plans/site investigations, groundwater monitoring reports, and agency coordination / document production and review.

**County of Placer, Lincoln, California, 2003 – 2004** (with AES)

- *Athens Connector Road Environmental Impact Report*, project manager and lead author.
- Thunder Valley Casino, United Auburn Indian Community – authored Burrowing Owl Site Assessment, performed construction monitoring and worker awareness training.

**California Department of Transportation, 2003 – 2004** (with AES)

- *Jackson Rancheria Highway 88 Access Project*, Amador County, California, authored Delineation of Waters of the US and Biological Resources Assessment; consultant to Caltrans on Initial Study. authored California Red-legged Frog Site Assessment; performed tree inventory; filed permits.
- *Shingle Springs Interchange Environmental Impact Report / Environmental Assessment*, El Dorado County, California, performed tree inventory and impact analysis.

**Bureau of Indian Affairs / National Indian Gaming Commission, 2003 – 2004** (with AES)

- *Martin Ranch Fee-to-Trust Environmental Assessment*, Del Norte County, California, co-author.
- Chico Casino Fee-to-Trust Biological Assessment and rare plant survey, Butte County, California, co-author.
- *Timbisha Shoshone Casino and Hotel Project*, Biological Assessment, San Bernardino County, California, co-author.
- Trust Lease and Smoke Shack Environmental Assessment, Siskiyou County, California, co-author.
- North Fork Rancheria Environmental Constraints Analysis, Madera County, California, co-author.
- Gun Lake Gaming and Entertainment Facility Environmental Assessment, Allegan County, Michigan, co-author.
- Lone Casino and Hotel Biological Assessment and Wetland Delineation, Amador County, California, co-author.

**State Water Resources Control Board, Various Counties, California, 2003 – 2004** (with AES)

- Guenoc Water Rights Modification Environmental Impact Report co-author, performed wetland assessment.
- Sleepy Hollow Vineyard Water Rights Renewal Initial Study co-author.
- Rosenthal Vineyard Water Rights Application Biological Assessment co-author.
- Dino Dina Water Rights Application Initial Study co-author.

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**MUNICIPAL CLIENTS**

**City of Roseville, California – 2005** (as Natural Investigations, Inc.)

Authored "*Phase 1 Environmental Site Assessment for the Riverside Gateway Specific Plan*" to support Riverside Gateway Specific Plan EIR.

**Amador Water Agency, Amador County, California, 2004** (with AES)

Gravity Supply Line Constraints Analysis author, performed special status species surveys and authored analysis of cultural, environmental, and biological constraints on project design.

**City of Sacramento, California, 2003 – 2004** (with AES)

- Buena Park Development Biological Assessment lead author.
- City of Freeport Annexation Initial Study co-author.
- U & S Street Inline Storage Project Initial Study co-author, performed tree inventory.
- Natomas East Corporate Center, Biological Assessment lead author.
- Brookfield Natomas Development - Northern Territories Biological Assessment co-author.

**City of West Sacramento, California, 2003 – 2004** (with AES)

Acquisition of the Clarksburg Branch of the Sierra Railroad Initial Study, project manager, designed multi-use trail, performed GIS mapping, and participated in Phase I Environmental Site Assessment.

**County of Yolo, Brooks, California, 2003 – 2004** (with AES)

- Capay Hills Golf Club Initial Study lead author, assisted in wetland delineation and permitting.
- State Route 16 Improvements Adjacent to Cache Creek Casino Initial Study co-author.
- Rumsey Rancheria Natural Gas Pipeline Initial Study lead author.
- State Route 16 and Road 85B Intersection Improvements Initial Study co-author.
- State Route 16 and Interstate 505 Intersection Improvements Initial Study co-author.
- Cache Creek Casino Storm Water Pollution Prevention Plan site inspector.

**City of Vacaville, Vacaville, California, 2003 – 2004** (with AES)

- Rice McMurry Annexation and Development Project Environmental Impact Report, co-author; and
- Shannon Drive Stormwater Bypass Initial Study co-author, performed wetland delineation and biological assessment, submitted permits.

**City of Fayetteville, Washington County, Arkansas, 2001** (independent contractor)

Subcontractor to Environmental Consulting Operations, Inc., assisted in biological impact analysis of a new municipal sewage treatment system.

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**PRIVATE / NONPROFIT CLIENTS****McClellan Park LLC, McClellan, California, 2005** (with Tetra Tech)

Phase 1 Environmental Site Assessment for Santa Ana property, author.

**Confederated Tribes of the Coos, Lower Umpqua, & Siuslaw, Lane County, Oregon, 2003** (with AES)

Hatch Tract Biological Resources & Hazardous Materials Study author, performed wetland assessment.

**Winrock Int'l Institute for Agricultural Development, Morrilton, Arkansas, 1993 – 1994** (ind. contractor)

Performed laboratory analyses and provided technical support to a biogas recovery study at a commercial swine facility.

**FEDERAL**

*Taxonomic Identification of Cave Animals of the Ozark National Forest, 2004 – 2005*  
Graening (as Natural Investigations, Inc.) awarded \$5,400 by US Forest Service.

*Karst Geographical Information Systems Coordinator, 2003 – 2004.*  
Snell, McGinnis, and Graening awarded \$60,000 by US Fish and Wildlife Service.

*Endangered Species Habitat Protection at Logan Cave National Wildlife Refuge, 2002 – 2003.*  
Graening and Snell awarded \$27,000 by US Fish and Wildlife Service.

*Long-term Conservation of Priority Ozark Karst Systems, 2002 – 2003.*  
Snell and Graening awarded \$50,000 by US Fish and Wildlife Service.

*Status Survey of the Endangered Cave Crayfish, Cambarus zophonastes, 2002 – 2003.*  
Graening awarded \$6,000 by US Fish and Wildlife Service.

*Big Spring Restoration, 2001 – 2002.*  
Snell and Graening awarded \$17,400 Private Stewardship Grant, US Fish and Wildlife Service.

*Restoration and Protection of Caves Containing Endangered Cave Fauna, 2001 – 2002.*  
Graening and Snell awarded \$39,940 by US Fish and Wildlife Service.

*Karst Conservation in the Ozark Ecosystem, 2001 – 2002.*  
Snell and Graening awarded \$90,620 by US Fish and Wildlife Service.

*Arkansas Safe Harbor Coordinator for Endangered Cave Fauna, 2001 – 2002.*  
Graening and Snell awarded \$195,400 by US Fish and Wildlife Service.

*Unified Site Conservation Plan for 3 Ozark Big-eared Bat Caves in Marion County, Arkansas, 2001 – 2002.*  
Snell and Graening awarded \$28,000 by US Fish and Wildlife Service.

*Taxonomic Identification of Arkansas' Cave Animals, 2001 – 2002.*  
Graening awarded \$16,000 by US Fish and Wildlife Service.

*Cave Fauna of the Buffalo National River, 2000 – 2001.*  
Graening awarded \$15,325 by US National Park Service Challenge Cost-Share Program.

*Investigating Environmental Quality and Trophic Dynamics in sensitive Subterranean Habitats of the Ozark Plateaus, 2000 – 2001.* Graening and Brown awarded \$21,422 by US Fish and Wildlife Service.

*Bioinventory & Bioassessment of the Caves of the Sylamore Ranger District, Ozark National Forest, Phase 1 & 2, 2000 – 2002.* Graening and Brown awarded \$42,937 by US Forest Service.

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**STATE**

*Bioinventory of rare and endangered cave and spring animals in Oklahoma, 2004 – 2006*  
Bergey, Graening, and Fenolio awarded \$148,180 by the Oklahoma Department of Wildlife Conservation.

*Status of Ozark Cavefish and other Biota and Environmental Quality in Cave Springs Cave, Arkansas.*

Graening and Brown awarded \$25,000 by Arkansas Natural Heritage Commission, 2000 – 2001.

*Subterranean Biodiversity Project, 2000 – 2001.*

Graening and Brown awarded \$87,914 by Ark. Natural Heritage Commission / Ark. Game & Fish Comm.

*Status Survey of Rare and Endangered Aquatic Cave Fauna in Arkansas, 1999 – 2000.*

Graening and Brown awarded \$25,216 by Arkansas Game & Fish Commission.

*Monitoring Cavefish Populations and Environmental Quality in Cave Springs Cave, 1998 – 1999.*

Graening and Brown awarded \$19,520 by Arkansas Natural Heritage Commission.

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### **ACADEMIC / NON-PROFIT**

*Determination of the Fate of Organic Carbon Inputs and Foodweb Structure in Ozark caves, 1998 – 1999.*

Graening awarded a \$15,000 Graduate Fellowship in Karst Studies by the Cave Conservancy Foundation.

*Improving Conservation of Subterranean Habitats by Engaging Key Partners in the Site Conservation Planning Process and Monitoring Results, 2001.*

Simon, Snell, and Graening awarded \$6,000 by The Nature Conservancy's R. Johnson and K. Ordway Stewardship Endowment.

*Aquatic Ecologist for the Ozark Ecoregion - Freshwater Initiative Capacity Building Grant, 2001 – 2003.*

Zollner and Graening awarded \$15,000 by The Nature Conservancy Freshwater Initiative Program.

*General Motors Corporation Truck Donation Program to The Nature Conservancy, 2001.*

Snell and Graening awarded \$28,000 by General Motors Corporation.

**ARTICLES IN PROFESSIONAL JOURNALS**

- Fenolio, D., G. Graening, and J. Stout. 2005. *Seasonal movement pattern of pickerel frogs (Rana palustris) through an Ozark Cave and ecological implications supported by stable isotope evidence*. Southwestern Naturalist 50(3):385-389.
- Graening, G. In press. *Trophic structure of Ozark cave streams containing endangered species*. Journal of Oceanological and Hydrobiological Studies.
- Graening, G., M. Slay, and J. Holsinger. In press. *Checklist of the Amphipoda of Arkansas with emphasis upon ground water habitats*. Journal of the Arkansas Academy of Science.
- Graening, G., et al. In press. *Range extension and status update of the Oklahoma Cave Crayfish, Cambarus tartarus (Decapoda: Cambaridae), endemic to three cave streams in Oklahoma*. Southwestern Naturalist.
- Graening, G., M. Slay, and K. Tinkle. 2004. *Bioinventory and bioassessment of caves of the Sylamore Ranger District, Ozark National Forest, Arkansas*. Journal of the Arkansas Academy of Science 57:44-58.
- Graening, G. 2004. *Status update of the Foushee Cavesnail (Amnicola cora)*. Journal of the Arkansas Academy of Science 57:195-196.
- Graening, G. 2004. *Use of the Costa Rican Cave, Cueva del Tigré, as a classroom for cave ecology and conservation by the Organization for Tropical Studies*. National Speleological Society News 62(6):168-171.
- Graening, G., and A. Brown. 2003. *Ecosystem dynamics of an Ozark cave stream*. Journal of the American Water Resources Association 39(6):1497-1507.
- Nilius, R., and G. Graening. 2000. *Ozark Underworld*. Endangered Species Bulletin 25(5):14-17.
- Graening, G., et al. *Status update of the endangered Hell Creek Cave Crayfish, Cambarus zophonastes (Decapoda: Cambaridae)*. Southwestern Naturalist, in review.
- Graening, G., H. Hobbs, M. Slay, W. Elliott, and A. Brown. *Status update of the Bristly Cave Crayfish, Cambarus setosus (Decapoda: Cambaridae) and range extension into Arkansas*. Southwestern Naturalist, in review.
- Graening, G., M. Slay, A. Brown, and T. Snell. *Range extension and status update of the endangered Benton Cave Crayfish, Cambarus aculabrum (Decapoda: Cambaridae)*. Southwestern Naturalist, in review.
- Fenolio, D., G. Graening, and J. Stout. *Coprophygy in a cave-adapted salamander*. Proceedings of the Royal Academy of Science, London, in review.
- Holsinger, J., T. Sawicki, and G. Graening. *Bactrurus speleopolis, a new species of subterranean amphipod crustacean (Crangonyctidae) from caves in northern Arkansas*. Proceedings of the Biological Society of Washington, in review.

**TECHNICAL REPORTS TO AGENCIES**

Graening, G., and B. Wagner. 2003. *Status update of the Hell Creek Cave Crayfish, Cambarus zophonastes (Decapoda: Cambaridae)*. Final Report Submitted to USFWS in fulfillment of Grant #1448-40181-02-G-135. *The Nature Conservancy*, Little Rock, AR. 22 pp.

Bergey, E., D. Fenolio, and G. Graening. 2003. *Aquatic cave invertebrate survey, Ozark Plateau National Wildlife Refuge and Associated Areas*. Report submitted to USFWS. Oklahoma Biological Survey, University of Oklahoma at Norman.

Graening, G., M. Slay, and A. Brown. 2001. *Subterranean biodiversity in the Ozark Plateaus of Arkansas*. Final report to AR Natural Heritage Commission / AR Game & Fish Commission. Dept. of Biological Sciences, UAF. 52 pp.

Graening, G., and A. Brown. 2001. *Protection of Cave Springs Cave biota and groundwater basin*. Final report to AR Natural Heritage Commission. Pub. # MSC-297, AR Water Resources Center, UAF 37 pp.

Graening, G., and A. Brown. 2000. *Status survey of aquatic cave fauna in Arkansas*. Final report to AR Game & Fish Commission. Pub. # MSC-286. AR Water Resources Center, UAF.

Graening, G., and A. Brown. 2000. *Trophic dynamics and pollution effects in Cave Springs Cave, Arkansas*. Final report to AR Natural Heritage Commission. Pub. # MSC-285. AR Water Resources Center, UAF

Graening, G., and A. Brown. 1999. *Cavefish Population Status and Environmental Quality in Cave Springs Cave, Arkansas*. Final report to AR Natural Heritage Commission. Pub. # 276, AR Water Resources Center, UAF

Brown, A., G. Graening, and P. Vendrell. 1998. *Monitoring cavefish population and environmental quality at Cave Springs Cave, Arkansas*. Final report to AR Natural Heritage Commission. Pub. # MSC-214. AR Water Resources Center, UAF

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**PAPERS PRESENTED AT CONFERENCES**

Graening, G., and A. Brown. 2001. *New advances in the study and management of Arkansas caves*. Abstract, Proceedings of the 1999 National Cave & Karst Management Symposium. Chattanooga, TN. Southeastern Cave Conservancy, Inc. 221 pp.

Graening, G. 2000. *Subterranean biodiversity in the Ozark Plateaus of Arkansas, Phase 1*. 1<sup>st</sup> Annual Fish and Wildlife Research Symposium. AR Game & Fish Commission. Little Rock, AR.

Brown, A., and G. Graening. 2000. *Trajectories of water quality parameters and endangered biota in Cave Springs Cave, Arkansas*. Geological Society of America Abstracts with Programs, Vol. 32. March 2000.

Graening, G. 1999. *Cavefish Stewardship*. American Fisheries Society Annual Meeting, Arkansas Chapter, Little Rock, AR.

Graening, G. 1998. *Biospeleology as the basis of groundwater ecosystem management*. 1998 National Speleological Society Abstracts. Journal of Cave and Karst Studies 60(3):181.

Graening, G. 1995. *The use of steam-peeled potato waste as a brewing adjunct*. Proceedings of the 7<sup>th</sup> Int'l Symposium of Food and Agricultural Waste, American Society of Agricultural Engineers, Chicago, Illinois.